
Literature Report

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Abstract

On the factors affecting the choice of regional transit for commuting in Greater Toronto and Hamilton Area: Application of an advanced RP-SP choice model

- Transportation Research Part A: Policy and Practice---2017---Zohreh Rashedi,Mohamed Mahmoud,Sami Hasnine,Khandker Nurul Habib

This paper presents a jointly estimated Revealed Preference – Stated Preference (RP-SP) choice model to explore mode choice behavior of commuters in a multi-modal regional transportation system in the Greater Toronto and Hamilton Area (GTHA). The paper focuses on the commuting trips that are long enough to be served by more than one transit services (local and regional transit services) in the GTHA (hence denoted by cross-regional commuting). This type of trips represents a unique travel market for which multimodal transportation services compete with each other. The study uses a dataset collected by a purposely designed SP pivoted on RP choices of cross-regional commuters in the GTHA. An advanced RP-SP model structure is specified to enhance parameter estimation from the SP choices by explicitly capturing the correlations between the SP choices and corresponding elicited confidence ratings. The econometric model also accounts for serial

correlations between SP choices of the same respondents as well as inertia effects between RP and SP choices. The estimated choice model is used to predict the effectiveness of different strategies on commuting mode choice behaviour of cross-regional commuters. The results of the empirical investigation revealed many behavioural details such as the effect of eliminating co-fare between local and regional transit services and providing Wi-Fi on regional transit vehicles on increasing the share of regional transit modes. It is found that monetizing park and ride at transit stations will deter some individuals from using transit, however, this strategy can be considered as a way to manage the increasing parking demand at regional transit stations and to improve the access time of park and ride users.

The impact of policy measures on consumer intention to adopt electric vehicles: Evidence from China

- Transportation Research Part A: Policy and Practice---2017---Shanyong Wang,Jun Li,Dingtao Zhao

Electric Vehicles (EVs) have been recognized as a promising means to reduce carbon emissions from the transport sector. To promote the adoption of EVs, great efforts have been made and a series of policy measures have been introduced. However, the widespread

adoption of EVs is likely to be insufficient. This study divides policy measures into three catalogs (i.e., financial incentive policy measures, information provision policy measures and convenience policy measures) and investigates how these policy measures motivate consumers to adopt EVs and how such effects are moderated by consumers' environmental concern. The results of a survey of 324 respondents suggest that three catalogs of policy measures are positively and significantly related to EVs adoption intention, and convenience policy measures are the most important policy measures to promote EVs. In addition, the results indicate that consumers' environmental concern plays a moderating role in the relationships between two catalogs of policy measures (financial incentive policy measures and convenience policy measures) and EVs adoption intention. Implications and suggestions for future research are provided.

Assessing strategies for protecting transportation infrastructure from an uncertain climate future

- Transportation Research Part A: Policy and Practice---2017---Ali Asadabadi, Elise Miller-Hooks

This paper investigates the importance of explicitly considering the stochastic nature of future climate impact predictions and predictive accuracy for optimal investment planning in the protection of coastal and inland transportation infrastructure against climate impacts. Such impacts include sea level rise, coastal and riverine flooding resulting from more frequent and intense precipitation events, storms, storm surges and other extreme events. For this purpose, numerical experiments utilizing stochastic optimization based methodologies were conducted on a case study of the Washington, D.C. Greater Metropolitan area proximate to the Potomac River under varying climatic predictions. Results from the numerical experiments suggest a 54% reduction in added costs due to the implementation of chosen protective infrastructure investments. They also indicate a reduction in added costs (capital investment and added delays) on the order of 19% when the investments are

chosen to hedge against probable future flooding events as compared with planning for the 50th percentile SLR prediction with associated weather events. A potential gain of nearly 27% in reduced costs through improved predictive accuracy in climatic forecasts is also noted, suggesting significant value in more accurate forecasts.

The influence of social-psychological factors on the intention to choose low-carbon travel modes in Tianjin, China

- Transportation Research Part A: Policy and Practice---2017---Di Yi Liu, Huibin Du, Frank Southworth, Shoufeng Ma

This paper explores the relationships between travelers' intentions to use low carbon travel modes, a set of socio-psychological variables, and the influence of government supported low carbon travel policies. Specifically, a Comprehensive Intention Determination Model (CIDM) is used to study residents' low-carbon travel intentions, based on the theory of planned behavior (TPB) and value-belief-norm theory (VBN), and using structural equations modeling (SEM) applied to survey responses by 811 residents of the city of Tianjin, China. Low-carbon transport policies are shown to influence traveler intentions primarily through attitude, subjective and personal norms, awareness of consequence, and ascription of responsibility; and that combining positive social-psychological factors towards low-carbon awareness with effective low carbon transport policies can influence the residents' willingness to choose low-carbon travel modes to a moderate degree.

Estimating railway rail service life: A rail-grid-based approach

- Transportation Research Part A: Policy and Practice---2017---Lei Bai, Rengkui Liu, Feng Wang, Quanxin Sun, Futian Wang

Precise estimation of railway rail service life is of great significance for the efficient use of maintenance and replacement resources and the effective prevention of broken rails. Here, an innovative model for railway rail service life estimation is proposed. A railway line

is divided into adjacent segments of the same specific length. Each segment is termed a “rail grid.” Employing the theory of Markov stochastic processes and hazard models, the service life of each rail grid is estimated and the degradation law of each rail grid is customized. The proposed model is verified using five-year rail inspection data for the Longhai Railway. Our evaluation demonstrates that the estimated rail service life is very close to the real rail service life and meets railway management requirements.

Quantifying the value of a clean ride: How far would you bicycle to avoid exposure to traffic-related air pollution?

- Transportation Research Part A: Policy and Practice---2017---Sabreena Anowar,Naveen Eluru,Marianne Hatzopoulou

While there is widespread acceptance of the health benefits of bicycling, recent research has highlighted that the benefits may be partially offset by the potential adverse health impacts as a result of bicyclists' exposure to traffic-related air pollution. Using a stated preference experiment, data from 695 commuter cyclists was compiled through a web-based survey and analyzed using a random utility approach to evaluate whether and to what extent cyclists are willing to trade-off air pollution exposure with other attributes such as roadway characteristics, bike facilities, and travel time. Mean and maximum concentrations of nitrogen dioxide (in parts per billion or ppb), a common marker of traffic-related air pollution, were used as the attributes to represent the externality (ranging from 5 to 60ppb). Empirical results indicate that travel time and traffic volume remain the most important attributes for commuter cyclists in their route decision. We also computed a unique marginal rate of substitution called “Value of Clean Ride” (VCR). For mean exposure, the VCR is: 0.72min/ppb and for maximum exposure, the VCR is: 0.25min/ppb (95% distribution: 0.16, 0.67). This essentially suggests that if an alternative route was available with an average nitrogen dioxide concentration that is lower by 5ppb (a realistic goal in light of the high spatial variability in air pollution

within urban areas), then cyclists would be willing to take it if it added no more than about 4min to their travel time. We also observed that cyclists who received information on short-term impacts of traffic-related air pollution tended to be more concerned with avoiding maximum exposure.

Road to price: User perspectives on road pricing in transition country

- Transportation Research Part A: Policy and Practice---2017---Drazenko Glavic,Mladenovic Milos,Tapio Luttinen,Svetlana Cicevic,Aleksandar Trifunovic

Bosnia and Herzegovina (BiH), a country in transition, is currently implementing motorway pricing schemes due to the financial constraints. Considering the importance of user perspectives for a successful implementation of a road pricing scheme, and a lack of research in the South East Europe (SEE), drivers in BiH were surveyed. Total sample includes 15,321 respondents. Results indicate that 19% of respondents are unwilling to pay for road pricing, including a low average estimate for road tolls. In addition, the results provide comprehensive analysis of willingness-to-pay and willingness-to-accept, accounting for day of the week, vehicle origin, trip purpose, roadway use frequency, and income. The results are further interpreted in the context of a transition country, with high percentage of low income citizens, and lack of trust in public institutions. Planners can use the findings to determine the road toll price by relying on both willingness-to-pay and willingness-to-accept values, while also aiming for financial sustainability. In order to provide recommendations for planning and policy learning in SEE, discussion provides recommendations for further analysis that should account for both economic and socio-political aspects. Recommendations include questions such as how should the burden of charges be allocated, how should the toll revenue be used, and what actions planners and politicians should take.

Drivers' self-perceptions about being an eco-driver according to their concern for the environment, beliefs on eco-driving, and driving behavior

- Transportation Research Part A: Policy and Practice---2017---Julien Nègre, Patricia Delhomme

Technological progress has allowed motorized transportation to make a step toward more sustainable mobility but remains one of the main causes of air pollution in France. One way to help reduce the detrimental impact of motorized road transportation is to lead drivers, particularly car-dependent ones, to adopt eco-driving. However numerous drivers do not abide by highway laws or display driving-anger behaviors, which are in opposition to eco-driving. Unfortunately, few people practice eco-driving and many new adopters often have trouble maintaining this driving style. What is more, most studies on this issue have focused on eco-driving gains, the ability of people to put it into effect, and/or the continuous decline in the number of people who practice eco-driving. They usually do not take into account people's self-perceptions about their driving style, nor the associated beliefs. The aim of the present self-report study was twofold: identify drivers' self-perceptions about being an eco-driver, and determine how these self-perceptions about being an eco-driver or not are linked to eco-driving-friendly behaviors, levers favoring eco-driving (concern for the environment), and brakes on eco-driving (driving anger and road violations), according to gender. An online survey was carried out with 300 French drivers (127 men) ages 19–83. In our sample, 11.3% of the drivers said they felt they were eco-drivers (G1); 50% said they feel trying to eco-drive (G2); 9.7% said they had never heard of eco-driving and 25% said they knew about eco-driving but didn't do it (G3, felt they were not eco-driver), and 4% said they felt they had abandoned eco-driving (G4). The differences between the first three groups (G1 vs. G2/G3) were in line with their eco-driving self-perceptions: G1 had higher scores on three eco-driving-friendly behavior scale components and on environmental conservation, and lower scores on one factor of the driving-anger scale. Also

in line with the groups' eco-driving self-perceptions, G2's scores were higher than G3's scores on one eco-driving friendly behavior component. A gender-by-group interaction was found for G1 vs. G3 on one eco-driving friendly behavior component, with a larger increase in the men's than the women's scores on eco-driving self-perceptions. Finally, violation scores, once again, were higher for men than for women on the speed and anger subscales. The findings of this study are discussed with respect to improving eco-driving learning.

Urban rail transit PPPs: Lessons from East Asian cities

- Transportation Research Part A: Policy and Practice---2017---Zheng Chang, Sock-Yong Phang

Private sector participation in urban rail transit has proliferated in the past two decades. The large metropolises of East Asia have had decades of experience with private sector participation in the provision of heavy metro services. The design of these public-private partnerships (PPP) are varied. The diverse experiences of Tokyo, Hong Kong, Singapore and Beijing contain valuable lessons for other cities. Using a case study approach, this paper discusses three features of urban rail transit developments in the context of East Asian cities, viz., farebox recovery, land value capture mechanisms, and vertical structure of the industry. Super vertical integration between rail transit and real estate development as land value capture strategy to finance urban rail transit has proven to be successful in Japanese cities and Hong Kong. Singapore's experience illustrates that vertically unbundled PPPs could cut off avenues for cross-subsidisation, reduce information flows as well as economies of scale and scope, introduce principal agent problems, and result in underinvestment in capital stock and maintenance. We conclude that (i) a combination of high farebox recovery ratios and successful land value capture contributed significantly to the development of urban rail transit in East Asia cities; (ii) given the complexities and high costs of heavy metros, the optimal structure is a vertically integrated public-owned and driven

system, with the public sector entering into selective partnerships with the private sector where risk sharing is clearly defined and allocated.

Optimal toll of new highway in the equilibrium framework of heterogeneous households' residential location choice

- Transportation Research Part A: Policy and Practice---2017---Tongfei Li,Huijun Sun,Jianjun Wu,Ying-en Ge

Because of limited budget and the consideration of transportation demand management, most of the new highways will be tolled after putting them into use. Meanwhile, lots of people belonging to different sectors of society flocked to city to search for jobs and better living each year. Therefore, for the government departments, one of most important issues is to determine the optimal toll of new highway under the background of ever-increasing households. This paper proposes an optimal toll model in the equilibrium framework of heterogeneous households' residential location choice. It is formulated as a bi-level program. In the upper-level subprogram, government departments determine an optimal toll of new highway in order to minimize urban system's total travel time. However, the construction and toll charge of the new highway will totally change urban traffic condition, and thus under the assumption of a complete market economy it will further affect the new households' location and commute behavior. Here, new households' location choice behavior has been modeled based on reference-dependent theory and household balance model. And their route choice behavior has been formulated as the multi-class multi-criteria stochastic user equilibrium model. This combined residential location choice and traffic assignment problem has been formulated by fixed point theory as the lower-level program. Finally, a genetic algorithm based solution approach is used to solve this optimization problem. In addition, a set of numerical experiments has been conducted to demonstrate the properties of this problem and the performance of our proposed model. And some interesting conclusions have been given.

Developing a disaggregate travel demand system of models using data mining techniques

- Transportation Research Part A: Policy and Practice---2017---Milad Ghasri,Taha Hossein Rashidi,S. Travis Waller

The travel demand modelling has experienced a paradigm shift from aggregate to disaggregate models, leading to an increase in computational time and simulation cost. Meanwhile, transferability models have emerged to reduce the associated cost and computational burden, but haven't discounted the disaggregation level. This research proposes the proof of the concept of an innovative transferability modelling framework to estimate total number of trips and trip attributes in a tour of trips at a disaggregate level. In contrast to tour-based or activity-based models, the focus of transferability models is on replicating trip patterns rather than reflecting travellers' behaviour. Similar to previous transferability models, classifying decision tree is utilized as one of the modelling techniques in this study. Moreover, the merits of a modified version of decision tree and the random forest methods are examined. Victorian Integrated Survey of Travel and Activity (VISTA) in 2007 and 2009 are utilized to calibrate and validate the proposed framework, respectively. According to the results, the random forest method shows highest individual-level accuracy while matching the system-level observed distributions.

An optimization approach for the placement of bicycle-sharing stations to reduce short car trips: An application to the city of Seoul

- Transportation Research Part A: Policy and Practice---2017---Chung Park,So Young Sohn

Substantial motor vehicle exhaust, a primary cause of air pollution, is emitted on short car trips of three miles or less. Bicycles have been considered an optimum means of completing these short trips because the bicycle is an environmentally friendly, economical, and convenient vehicle. Accordingly, many countries have adopted public bicycle-sharing systems to reduce the use of private vehicles for short trips in central

downtown areas. In this paper, we propose a new framework, based on taxi trajectory data, for locating bicycle-sharing stations most efficiently to replace short automobile trips. The proposed framework is applied to Gangnam-gu, a district within the city of Seoul, Korea. Results using two different location-allocation models are demonstrated. As expected, when the p-median model was implemented, the selected stations were more scattered over the whole district, whereas when the MCLP model was implemented, the stations were more concentrated on central areas. Our approach is applicable to any city considering a bicycle-sharing system and can contribute to the system's efficiency in improving environmental conditions in a central downtown area.

Easing the traffic: The effects of Indonesia's fuel subsidy reforms on toll-road travel

- Transportation Research Part A: Policy and Practice---2017---Paul Burke,Tsendsuren Batsuuri,Muhammad Halley Yudhistira

Indonesia has serious traffic jams. This study uses data from 19 Indonesian toll roads over 2008–2015 to calculate the effects of Indonesia's historic recent fuel subsidy reforms on motor vehicle travel. The timing of the reforms was determined by budgetary and political factors, providing a suitable setting for estimating a causal effect. We control for a broad set of other factors potentially influencing traffic flows. Estimates using monthly data suggest an immediate fuel price elasticity of motor vehicle flows on the roads in our study of -0.1 , increasing to -0.2 when responses over a year are considered. We estimate that Indonesia's fuel subsidy reforms of 2013 and 2014 had reduced traffic pressure on these roads in the second half of 2015 by around 10% relative to the counterfactual without reform. A move to an adequate fuel excise system could contribute to more free-flowing traffic, while generating revenue for infrastructure and other investment.

Increasing the capacity of signalized intersections with left-turn waiting areas

- Transportation Research Part A: Policy and Practice---2017---Wanjing Ma,Ye Liu,Jing Zhao,Ning Wu

One of the most complex issues for the design of at-grade signalized intersections is accommodating left-turn (LT) movements, especially when approaches have insufficient available spatial resources. In this study, we mitigated this problem by reorganizing left-turning traffic flows within intersections through the use of a left-turn waiting area (LTWA). We proposed a series of design pattern left-turn waiting areas for different combinations of spatial and temporal treatments of left-turn movements: exclusive left-turn lanes with protected left-turn phasing, exclusive left-turn lanes with permitted left-turn phasing, and shared left-turn lanes with permitted left-turn phasing. Based on probability theory, an analytical procedure is developed for estimating the capacity of shared and short lanes. Explicit VISSIM simulations are conducted to validate the accuracy of the proposed capacity models, and the impact of design parameters for the proposed system on the left-turn capacity are studied. On the basis of the analyses, benefits of the proposed system are identified, and the domain of application where these benefits are most significant is identified. In addition, optimal LTWA design scheme and critical LT volumes of exclusive LT lane and protected LT phase with different LTWA schemes are presented from the operation efficiency perspective.

Using bargaining-game model to negotiate compensation for the early termination of BOT highway projects

- Transportation Research Part A: Policy and Practice---2017---Jinbo Song,Lulu Jin,Yunpeng Zhao,Wenjin Hu

Build-operate-transfer (BOT) highway projects are widespread around the world. However, many BOT highway projects are terminated before the expiry of the concession period for a variety of reasons, such

as unreasonable decisions and a lack of a risk allocation mechanism. As the most concerning issue for the government and private sector, compensation for early termination has been a major controversy due to the lack of a fair and reasonable decision approach. This paper proposes an effective method to evaluate the compensation amount for projects with incomplete contracts using game theory. First, a bargaining-game model with complete information is constructed to analyse the process of negotiation, for which the influences of the government investing in a new road and the traffic demand changes of the early terminated project on bargaining are taken into consideration. Then, the Nash equilibrium solution of the model is derived by backward induction, and a discussion of the properties of the solution is presented. Finally, the model results are verified using the Wutong Mountain Tunnel BOT project in China. This paper provides a solution to compensation for early termination of BOT highway projects with incomplete contracts.

Effectiveness of policy incentives on electric vehicle acceptance in China: A discrete choice analysis

- Transportation Research Part A: Policy and Practice---2017---Ning Wang,Linhao Tang,Huizhong Pan

The Chinese Government has introduced numerous policy incentives to promote the development and adoption of electric vehicles (EVs), especially aggressive subsidization policies. Stimulated by such policies, sales of EVs exceeded 500,000 in 2016. However, the subsidies for EVs will be abrogated after 2020. In order to maintain market stability, the EV-related policy system needs innovation. Nonetheless, it is still unclear how effective different policy incentives are.

An empirical analysis of maritime cluster evolution from the port development perspective – Cases of London and Hong Kong

- Transportation Research Part A: Policy and Practice---2017---Wei Zhang,Jasmine Siu Lee Lam

The maritime industry has adopted the concept of clustering to promote the growth of related maritime sectors. Based on the theoretical development of maritime cluster evolution in the current research literature, components and functions of maritime clusters are observed to have changed over time. However, very few empirical studies have been conducted on maritime cluster evolution that reflect the diverse components and their interactions within a cluster. Particularly, there is insufficient literature that systematically studies the relationship between ports and other maritime sectors, though the port is deemed to play an important role among sectors in maritime cluster development. This paper aims to fill these research gaps by analysing two cases – London and Hong Kong. London is considered as an international maritime service centre, while Hong Kong is en route to be an international maritime service centre, with the latter cluster possesses a supportive port while the former does not. Grounded on the symbiosis theory, this paper examines the evolution of maritime clusters empirically through investigating the interactions between a port and other sectors within a maritime cluster with the Lotka-Volterra model. Empirical results show that advanced maritime services, namely marine insurance and shipbroking, benefit from port development in London. However, these maritime services sectors are in pure competition with the port sector in Hong Kong. The research provides reference for policy makers on the dynamic development path of maritime clusters in practice.

Analysis of the modal choice of transport at the case of university: Case of University of the Basque Country of San Sebastian

- Transportation Research Part A: Policy and Practice---2017---I. Gurrutxaga,M. Iturrate,U. Oses,H. Garcia

Transportation has significant and long lasting economical, social and environmental impacts, and so is an important dimension of urban sustainability.

Does the social context help with understanding and predicting the choice of activity type and duration? An application of the Multiple Discrete-Continuous Nested Extreme Value model to activity diary data

- Transportation Research Part A: Policy and Practice---2017---Chiara Calastri,Stephane Hess,Andrew Daly,Juan Antonio Carrasco

An understanding of activity choices and duration is a key requirement for better policy making, in transport and beyond. Previous studies have failed to make the important link with individuals' social context. In this paper, the Multiple Discrete-Continuous Nested Extreme Value (MDCNEV) model is applied to the choice of activity type and duration over the course of two days, using data from the Chilean city of Concepción. In common with other studies, heterogeneity across decision makers is accommodated in the model by analysing the impact of different socio-demographic, mobility and residential location variables on both the activity choice and the time allocation decision. In addition, different social network and social capital measures are found to be significantly correlated with the choice and duration of different activities, and we show how these relationships seem to differ from the effects of socio-demographic variables. Finally, we perform a forecasting exercise using the MDCNEV model, highlighting the differences in substitution patterns from a standard MDCEV model.

Cycling on the extensive and intensive margin: The role of paths and prices

- Transportation Research Part A: Policy and Practice---2017---Manuel Frondel,Colin Vance

Drawing on a panel of German survey data spanning 1999–2013, this paper identifies the correlates of non-recreational bicycling, focusing specifically on the roles of bicycle paths and fuel prices. Our approach conceptualizes ridership as a two-stage decision process comprising the discrete choice of whether to use the bike (i.e. the intensive margin) and the continuous choice of how far to ride (i.e. the extensive margin).

To the extent that these two choices are related and, moreover, potentially influenced by factors unobservable to the researcher, we explore alternative estimators using two-stage censored regression techniques to assess whether the results are subject to biases from sample selectivity. A key finding is that while higher fuel costs are associated with an increased probability of undertaking non-recreational bike trips, this effect is of a significantly higher magnitude among those residing in an urbanized region. We also find evidence for a positive association with the extent of bike paths, both in increasing the probability of non-recreational bike travel, as well as the distance traveled.

Robust stochastic vehicle routing and scheduling for bushfire emergency evacuation: An Australian case study

- Transportation Research Part A: Policy and Practice---2017---Shahrooz Shahparvari,Babak Abbasi

This study proposes a stochastic modeling approach as an evacuation decision support system to determine the required vehicles, scheduling and routes under uncertainties in evacuee population, time windows and bushfire propagation. The proposed model also considers road availability and disruptions. A greedy solution method is developed to cope with the complex nature of vehicle routing problem. Furthermore, the effectiveness of the proposed solution is evaluated by comparison with a designed genetic algorithm on sets of various numerical examples. The model is then applied on the real case study of the 2009 Black Saturday bushfires in Victoria, Australia. Several plausible evacuation scenarios are generated, utilizing the historical data of Black Saturday. The results are analyzed using the frequency approach to determine the optimal evacuation plan. The results show that it would have been possible to evacuate the late evacuees on Black Saturday, even within hard time windows and a maximum population.

Automated vehicles and behavioural adaptation in Canada

- Transportation Research Part A: Policy and Practice---2017---Robyn D. Robertson, Shawna R. Meister, Ward G.M. Vanlaar, Marisela Mainegra Hing

The current tests of automated vehicles (AVs) with human back-up drivers and opt-into a self-driving car raise important questions regarding public awareness of the limitations of these vehicles. Road safety can be greatly improved by focusing on the often-overlooked intersection between driver behaviour and the use of new technologies. This paper presents the extent to which Canadian drivers self-reported how they would adapt their behaviour if using limited self-driving vehicles (LSDVs). An online survey and focus groups were conducted to explore the knowledge, attitudes, perceptions and behaviours of Canadians in relation to AVs. It was found that many drivers believed they would not need to pay attention to the road environment when using LSDVs, and that some of them would modify or adapt their behaviour in negative ways that would undermine safety objectives. These results provide insight useful to shape educational strategies, government policies, and tactics to help ensure the safety benefits that are highly expected of AVs actually materialize.

Lessons from building paratransit operators' capacity to be partners in Cape Town' s public transport reform process

- Transportation Research Part A: Policy and Practice---2017---Herrie Schalekamp

In 2013 the Cape Town municipality initiated planning for the second phase of its MyCiTi bus system. The first phase, on which preparations commenced in 2007, relied on incorporating existing road-based operators in a bus rapid transit (BRT) system. The municipality underestimated the cost and level of effort involved in the wholesale corporatisation of paratransit operators while concurrently equipping them to become BRT operators. Learning from this experience, it developed a more incremental transition approach

in the second phase, the first fruit of which was a pilot express bus service launched in mid-2014. The pilot service contract also provided for a training programme for paratransit operators in the affected parts of the city to build their managerial and technical capacity. It was envisaged that programme participants would ultimately manage and run the long-term operating companies and contracts that would be established by the end of the three-year interim period. This article provides a critical review of the programme' s context, content and participant experiences after the conclusion of its first year. In broad terms the programme has made a positive contribution to paratransit participants' understanding of the shortcomings of their current operations and why reform might be necessary, but much still remains to be done to enable them to fill their envisaged roles in future public transport operations. In view of growing interest in BRT installation in Sub-Saharan Africa lessons from Cape Town' s reform process offer both cautionary evidence and a potential mechanism for drawing existing operators in as partners in reform.

PSS: Beyond the implementation gap

- Transportation Research Part A: Policy and Practice---2017---Stan Geertman

In the last couple of decades, a large number of papers on planning support systems (PSS) have been published in national and international, scientific and professional journals. What is remarkable about PSS is that for quite some time their history has been dominated by an implementation gap, that is, a discrepancy between supply and demand: despite the availability of a growing number and diversity of potentially valuable PSS instruments, planning practitioners are rather hesitant to buy, implement or apply them. This implementation gap leads to the question whether PSS are a valuable tool for planning practice. In this commentary, I answer this question by taking a closer look at the PSS debate from four perspectives, namely those of PSS history, PSS research, PSS education and PSS in practice. Although these perspectives are closely related, I show that they also reveal different aspects of this issue. For

each of these perspectives, I start with a hypothetical conclusion and present some of my underlying considerations. At the end of this contribution, I summarize the situation, finalize the hypothetical conclusions and provide some recommendations concerning the implementation gap. These include focusing on the positive rather than the negative: we should look at the success stories (successful or best practices) and try to learn from them; after all, the proof of the pudding is in the eating. Furthermore, PSS are by no means a panacea for all our problems or challenges in planning practice. In my opinion, selectivity in their application in actual planning practice evidences a growing maturity of the PSS field.

Towards a pragmatic research agenda for the PSS domain

- Transportation Research Part A: Policy and Practice---2017---Marco te Brömmelstroet

The tenuous link between knowledge and processes of urban strategy-making leads to suboptimal plans, time delays and financial costs. The planning professional is ill-equipped to deal with fundamental urban challenges that threaten the quality and competitiveness of cities and regions. For decades, Planning Support Systems (PSS) are being developed to address this challenge. The PSS research domain grew accordingly. Only recently did researchers start to focus more directly on how PSS are used (or not used) by planning practitioners. Understanding the real-life application of PSS is fundamental for addressing the challenges of knowledge use. This commentary argues that we need to go beyond the current simplistic understanding of several key concepts. It identifies academic pathways that further mature the conceptualization of PSS, of planning processes, of the participants and the relationship between them. The argument builds on ten years of full-time research in this domain and combines this with recent insights from other academic fields, such as group performance and behavior psychology. This provides us pathways towards a more realistic evaluation of how knowledge can regain its important role in urban planning.

Usefulness of planning support systems: A conceptual framework and an empirical illustration

- Transportation Research Part A: Policy and Practice---2017---Peter Pelzer

Planning support systems (PSS) are digital instruments to support planning. Comparatively little attention has been paid to understanding the usefulness of PSS for planning practice and studying its application in real-world planning situations. This paper aims to address this omission. Conceptually, usefulness is subdivided in seven dimensions, and explained by the usability and utility of the PSS. This framework is applied to a case study with Urban Strategy – a PSS based on combined environmental and traffic models. A workshop with this PSS was studied using a questionnaire, interviews and observations. The findings indicate that in addition to the more commonly used concept of usability, utility (understood as task–technology fit) is helpful to understand the usefulness of a PSS application. This concept, for instance, helps to indicate when a PSS has a negative effect on planning tasks. Moreover, in addition to usability and utility, context turned out to be critical to understand the usefulness of a PSS application.

PSS are more user-friendly, but are they also increasingly useful?

- Transportation Research Part A: Policy and Practice---2017---Marco te Brömmelstroet

Planning Support Systems (PSS) can provide important and much needed knowledge and support in strategy-making processes, by bringing explicit information to daily planning practices. However, as decades of academic studies show, their use is riddled with barriers and bottlenecks.

The learning process of accessibility instrument developers: Testing the tools in planning practice

- Transportation Research Part A: Policy and Practice---2017---Enrica Papa,Pierluigi Cop-

Many planning support tools have recently been developed aimed at measuring and modelling accessibility (Accessibility Instrument or AI). The main difficulty for tool developers is designing an AI that is at the same time technically rigorous and usable in practice. Measuring accessibility is indeed a complex task, and AI outputs are difficult to communicate to target end-users, in particular, because these users are professionals from several disciplines with different languages and areas of expertise, such as urban geographers, spatial planners, transport planners, and budgeting professionals. In addition to this, AI developers seem to have little awareness of the needs of AI end-users, which in turn tend to have limited ability for using these tools. Against this complex background, our research focuses on the viewpoint of AI developers, with two aims: (1) to provide insights into how AI developers perceive their tools and (2) to understand how their perceptions might change after testing their AI with end-users. With this in mind, an analysis of 15 case studies was performed: groups of end-users tested different AI in structured workshops. Before and after the workshops, two questionnaires explored the AI developers' perceptions on the tools and their usability. The paper demonstrates that the workshops with end-users were critical for developers to appreciate the importance of specific characteristics the tool should have, namely practical relevance, flexibility, and ease of use. The study provides evidence that AI developers were prone to change their perceptions about AI after interacting directly with end-users.

The TUM Accessibility Atlas as a tool for supporting policies of sustainable mobility in metropolitan regions

- Transportation Research Part A: Policy and Practice---2017---Gebhard Wulfhorst, Benjamin Büttner, Chenyi Ji

Integrated planning policies require shared perspectives from stakeholders of various disciplines. Accessibility instruments can play a major role in developing a common understanding, and help to identify key challenges

of spatial development. In consequence, these instruments can foster joint strategies between transportation and land-use.

Evaluating the usefulness of the structural accessibility layer for planning practice – Planning practitioners' perception

- Transportation Research Part A: Policy and Practice---2017---Cecília Silva, Tiago Patatas, Ana Amante

There has been a growing attention on accessibility concepts from both planning practice and research recognising their relevance in understanding the evolution of urban areas. However, despite the large number of accessibility measures available in the literature, they are not widely used to support urban planning practices. Much has been said about the implementation gap of Planning Support Systems with a significant attention paid to usability and more recently to the usefulness of Accessibility Instruments.

Mapping transit accessibility: Possibilities for public participation

- Transportation Research Part A: Policy and Practice---2017---Anson F. Stewart

The value of accessibility concepts is well-established in transportation literature, but so is the low adoption of accessibility-based instruments by practitioners. Based on the premise that leveraging accessibility concepts to address public involvement challenges could promote their adoption in planning practice, this research investigates mechanisms to promote social learning among participants in public workshops. Potential mechanisms of learning include specific tool-based interactions and how such interactions reinforce structures of learning such as alignment and imagination. This paper details iterative testing of these mechanisms with a tool called CoAXs (short for Collaborative ACCESSibility-based stakeholder engagement system), through focus groups and exploratory workshops. A mixed-methods analysis of the workshops supports the expectation that alignment and imagination correlate positively

with social learning, as measured by reported learning and dialog quality. Specific interactions with the accessibility-based features of CoAXs in turn correlate positively with alignment and imagination, at individual and group levels of analysis. These findings, while not robustly generalizable, suggest that effective targeted stakeholder engagement for public transport can be structured around collaborative accessibility mapping. Adoption for broader public participation requires further development, especially the incorporation of actual day-to-day experiences such as unreliable operations.

The dynamics of commuting over the life course: Swiss experiences

- Transportation Research Part A: Policy and Practice---2017---Sigrun Beige,Kay W. Axhausen

Daily travel behavior, and especially commuting behavior, is strongly determined by the location of the places of residence, education and employment. After changes in these spatial choices, people inevitably show a travel behavior that is different from the travel behavior before these relocations occurred. Therefore, spatial alterations provide interesting starting points for policies and other interventions aiming at travel behavior change, as habits and routines are broken or at least weakened, and individuals reconsider their behavior and consciously reflect their decisions.

Mood during commute in the Netherlands

- Transportation Research Part A: Policy and Practice---2017---Sascha Lancée,Ruut Veenhoven,Martijn Burger

How happy we are depends partly on how we live our life and part of our way of life is the commute between home and work. In this context we are faced with the question of how much time spent on commuting is optimal happiness wise, and what means of transportation. Since our personal experience is limited, it is helpful to draw on the experience of other people, of people like us in particular.

Experiences of past school travel modes by university students and their intention of future car purchase

- Transportation Research Part A: Policy and Practice---2017---Yasunori Muromachi

We studied the relationship between experiences of past school travel-mode choice by university students and their intention to purchase a car in future by using the life-oriented approach. We conducted a retrospective questionnaire survey whose respondents were university students of two universities located in the center of the Tokyo Metropolitan Area (TMA), two in the suburbs of the TMA, and three in major local cities outside of it. We asked them to consider their experience of past travel mode for going to upper-level elementary, middle, and high school as well as general-purpose travels from their mobility biography. We also asked about possible factors affecting their future intentions, such as their degree of concern about the environmental damage that car use might entail and their daily use of information and communication technology (ICT) tools. Responses from 351 university students were successfully collected. We found that experience of past bicycle use for going to high school affected the intention of future car purchase positively, while rail use for attending high school showed a statistically significant negative correlation. We also modeled the degree of young university students' intention to purchase a car in future by estimating ordered probit model. As a result, we found that experiences of past school travel by bicycle as high school students showed a positive relation, and of general-purpose travel by rail showed negative relation to intentions of purchasing a car in future. The latter implies that the policy measures for promoting a less car-dependent lifestyle by locating schools in the areas that are easily accessible by rail and conducting mobility management programs for molding school students' experiences of rail travel.

Moving from monomodality to multimodality? Changes in mode choice of new residents

- Transportation Research Part A: Policy and Practice---2017---Thomas Klinger

This paper analyses the interdependences between modal variability as part of everyday mobility and residential relocations. Accordingly, the main research question to what extent the combination of travel modes changes after moving to another city. In discussing this, the paper is based on two conceptual assumptions. First, residential relocations are understood as biographical transitions within a mobility biography. Second, in recent years there has been a trend towards multimodal transport systems, especially in big cities, comprising both the supply and demand of urban transport. We believe that this tendency towards multimodality varies by the overall mobility culture of a particular city, which is expressed, for example, by its car dependence or cycling-friendliness. Combining these findings we believe that people who move between cities representing different mobility cultures are likely to change their use and combination of travel modes. Empirically, this assumption is scrutinized by surveying people who recently moved between the German cities of Bremen, Hamburg and the Ruhr area and showed a monomodal mode choice before the relocation (N=449). One central finding of this study is that people who moved to a public transport or cycling-friendly city are more likely to become multimodal than the ones who moved to auto-oriented cities.

Cross-border residential mobility, quality of life and modal shift: A Luxembourg case study

- Transportation Research Part A: Policy and Practice---2017---Philippe Gerber, Tai-Yu Ma, Olivier Klein, Julien Schiebel, Samuel Carpentier-Postel

It is argued in the life-oriented approach that travel behavior affects life choice and vice versa with resulting impacts on quality of life (QOL). By deepening

the analysis of interdependences between daily mobility and life event (relocation) and their relationships with QOL, this article focuses on two challenges. It aims at analyzing how these life events first, encourage travel behavior changes, especially mode choice, and second, improve or decrease people's QOL. By radically changing living context and built environment, relocation also affects routine and satisfaction. These relationships are investigated in the Luxembourg cross-border area, where great differences related to real estate price encourage residential moves from Luxembourg to neighboring countries, while the general decline in public transport efficiency at the border may support car use. We use both mixed and ordered logit models. The first one investigates whether individuals' life-stage changes and residential relocation are significant regarding their mode choice decision. The second estimates individuals' global QOL and the roles of complementary factors (changing housing conditions, built environment, subjective satisfaction, travel time and socio-economic characteristics). The analysis reveals several results. The effect of the different factors is consistent with travel mode choice literature despite the specific cross-border context. Nevertheless, relocation, mainly oriented towards a cross-border suburbanization, significantly increases the probability of using the car for daily activities. These trips and especially the journeys to work are the least satisfactory aspects of daily life after relocation but does not affect the general level of QOL. At the opposite, the better housing conditions after relocation have positive effect on the QOL. From a policy perspective, this life-oriented approach in cross-border context confirms the influence of life events on QOL while it demonstrates a higher importance of housing conditions than spatial constraints on relocation and satisfaction.

Dynamic analysis of holiday travel behaviour with integrated multimodal travel information usage: A life-oriented approach

- Transportation Research Part A: Policy and Practice---2017---Bobin Wang, Chunfu Shao, Xun Ji

The Integrated Multimodal Travel Information (IMTI) plays an important role in the evolution process of holiday travel behaviour, which is seldom investigated. To fill this gap, this study analyses holiday travel behaviour dynamics with IMTI usage, based on the life-oriented approach. IMTI usage is taken as a separate life domain in this study, and a two-way relationship between holiday travel biography and IMTI usage biography over the life course, is examined after controlling for the effects of residential, household structure, employment/education, and car ownership biographies. Based on the web-based life history survey data, statistical characteristics of mobilities in each life biography are first analysed. Then, different random-effects ordered logistic models are established to investigate the biographical interdependencies from three aspects: intra-domain interdependency, inter-domain interdependency and outer-domain interdependency. The results show that the life biography is not only affected by a personal life course, but also affected by external background of the times. Under the interaction of inner individual factors and outer environment factors, there is an obvious dynamic two-way relationship between holiday travel biography and IMTI usage biography. Meanwhile, residential, household structure, employment/education and car ownership biographies have significant effects on these two life biographies. Especially, the influence of long-term state dependence for different life domains, over the life course, is much more obvious when explaining holiday travel behaviour dynamics and IMTI usage mobilities. Therefore, the life-oriented approach provides a valid method for analysing the dynamics of holiday travel behaviour with IMTI usage.

Dynamic life course analysis on residential location choice

- Transportation Research Part A: Policy and Practice---2017---Biying Yu,Junyi Zhang,Xia Li

From a behavioral viewpoint, people choose where to live based on various factors, including their current situations, past experience, and plans for the future. Some aspects of residential preference might be con-

stant over time, inherited from the initial stage of life, and other parts might be responses to residential biography or other biographical domains like household structure, employment/education, and travel. Capturing these intertemporal dependences needs a life course analysis of residential location choices. However, a serious methodological gap exists between the perceived importance of dynamic life course analyses and quantitative modeling approaches. This study developed a dynamic choice model with cross-sectional and longitudinal heterogeneities as well as discounted utility (called the DU-DCLH model) to describe the decision-making process for residential relocation by incorporating various intertemporal dependences over the life course. Model parameters were estimated using data collected from a life history survey conducted in Japan in 2010. The estimation results firstly confirm the effectiveness of the DU-DCLH model for portraying the dynamics of residential mobility over a life course. Next, it was found that previous experiences dominate decisions on residential location choice and can explain more than 75% of the total variations in choice. It was also revealed that as the mobility age increases, the influence of the past on their choices increases continuously. In contrast, the influence of the present situation is small and almost negligible. Furthermore, the study empirically confirmed not only the influence of time-constant and time-varying preference for residential neighborhoods but also the specific influence of household biography, employment/education biography, and travel biography. This study enriches the existing research by providing a systematic modeling framework incorporating broader behavioral mechanisms for residential location choice over the life course.

Life history-oriented residential location choice model: A stress-based two-tier panel modeling approach

- Transportation Research Part A: Policy and Practice---2017---Mahmudur Rahman Fatmi,Subeh Chowdhury,Muhammad Ahsanul Habib

This paper presents a life history-oriented modeling

framework to investigate residential location decisions as a two-tier process of location search and location choice. In the first tier, a stress-based location search model is developed by assuming that households search for a new location due to continual stress at different life-domains. The search model adopts a fuzzy logic-based modeling method that mimics the interdependencies between push and pull factors. In the second tier, a location choice model is developed that accommodates how location decisions interact with life-cycle events at different life-domains. The model utilizes a latent segmentation-based logit modeling technique to address the panel effect of the households' housing career. The model results suggest that households in general show preference for larger lots, and locations closer to work place, transit stop, and health service. Location choice is found to be significantly influenced by the life-cycle events as well as the lead and lagged effects. For example, the birth of a child magnifies the need of larger lots. The life-history effects, however vary across two segments. Suburbanite households in segment two prefer larger lots following a job change; whereas, urbanite households in segment one show a negative relationship. The adjustment period for a job change is longer than that of addition of a new job. A longer adjustment time is also found in the case of the first time vehicle purchase than acquisition of a vehicle. Presence of children influences suburbanite households to reside closer to work place. Urbanite households with children prefer to live closer to school.

Life-course data reconstruction using complementary information taken from linked lives

- Transportation Research Part A: Policy and Practice---2017---Janna Albrecht,Christian Holz-Rau,Joachim Scheiner

Recently, research on travel behaviour has focused on life-course and socialisation effects. As residential decisions are considered to be long-term decisions which affect daily travel behaviour significantly, knowledge of residential experiences made over the life-course

may lead to a deeper understanding of later residential decisions and thus travel behaviour. Quantitative retrospective surveys are carried out to gather this information. These studies deal with missing information on particular life stages, e.g. childhood. This paper shows a new methodological approach for quantitative studies, illustrating how such missing life-course data can be reconstructed using complementary information taken from linked lives. The data used have been retrospectively collected from a sample of spatial planning students at TU Dortmund University, their parents and grandparents. The parents' residential biography from birth until the setting up of a household of their own is reconstructed using information from the grandparents. The reconstructed data are compared with the statements the parents made for the relevant life stages, thus testing how well the reconstruction worked. The results show that the reconstruction works better for the mothers (than fathers) using the grandmothers' information (rather than the grandfathers'). The findings also indicate that the reconstruction is more or less successful for various types of reconstructed data. The paper concludes with guidelines for future data reconstruction.

A life course perspective on the travel of Australian millennials

- Transportation Research Part A: Policy and Practice---2017---Alexa Delbosc,Hitomi Nakanishi

Recent research suggests that the millennial generation may be inclined to more sustainable travel habits than previous generations, reflected in lower rates of driver licensing in many countries and greater use of sustainable modes in others. However, it is still unknown whether millennials will continue to use sustainable transport modes as they age, or whether their travel patterns will revert to the car dependence displayed by previous generations. This research addresses this overlooked area in the travel behaviour research through an in-depth, qualitative prospective exploration of the interactions between life course and mobility of millennials in three Australian cities (Sydney, Melbourne and Canberra). Drawing from life-course transition research, fifty-five

in-depth interviews found that Australian millennial life courses could be categorised into three typologies: (a) traditional, (b) delayed-traditional and (c) non-traditional/uncertain. In addition, millennial mobility was categorised into four typologies: (a) choice multi-modals, (b) captive multi-modals, (c) choice drivers and (d) captive drivers. Many millennials preferred living in inner urban areas, were multi-modal and somewhat ‘mode-agnostic,’ open to using whatever travel mode best suited their needs; very few showed a strong preference for cars. However, the research does suggest that as millennials approach adult milestones such as having children, the difficulty in finding suitable housing near transit may push some of them into neighbourhoods where sustainable transport is no longer a practical option. Policy interventions that support a sustainable lifestyle are suggested and research directions are discussed.

Home telework and household commuting patterns in Great Britain

- Transportation Research Part A: Policy and Practice---2017---Patricia Melo, João de Abreu e Silva

This study provides new evidence on the relationship between household and intra-household commuting travel and home telework for Great Britain using data from the National Travel Survey for the period between 2005 and 2012. The results from the empirical models of individual and household commuting travel suggest there is some evidence of longer weekly commuting distances travelled, but shorter total travel times, for more frequent home teleworkers. The findings also suggest that there is no intra-household compensation effect between partners, that is, the home teleworking status of one of the household’s members does not appear to influence his/her partner’s commuting travel. We also find that some of the observed differences relate to the definition of home teleworker status, particularly with respect to the level of home telework frequency. Despite the increase in the share of workers using home telework at least once a week, from 4% in 2005 to 6% in 2012, the magnitude of

the relationship between home teleworking and weekly commuting length and duration does not seem to have changed over the period studied. Although the findings suggest that home telework tends to increase weekly commuting distances travelled (but not travel times), data-related limitations did not allow us to address issues of selection and/or simultaneity bias; consequently we cannot make causal inference conclusions about the nature and size of the relationship between home telework and commuting patterns, and in turn its policy implications.

Impacts of the built environment on activity-travel behavior: Are there differences between public and private housing residents in Hong Kong?

- Transportation Research Part A: Policy and Practice---2017---Donggen Wang, Xinyu Cao

The built environment impacts individuals’ participation in daily activities and associated travel (or activity-travel behavior). However, it is not well understood how these impacts differ between different socioeconomic groups (e.g. economically advantaged and disadvantaged people) and how neighborhood planning affects the difference. Using data of public housing and private housing residents in Hong Kong in 2010, this study applies the propensity score matching approach to identify differences in activity-travel behavior under different built environment settings for private and public housing residents respectively. We find that density, accessibility and self-containment collectively affect private housing residents’ auto ownership, travel time, trip frequency, and entertainment time spent at home, but have few influences on public housing dwellers. The different built environment effects are partly because the planning standards and guidelines in Hong Kong stipulate the provision of daily facilities and services such as grocery shops/supermarket, primary school and transit in proximity to public housing development. Thus, although economically disadvantaged people have limited transportation resources, neighborhood planning can adequately meet their daily needs even if they are placed in suburban areas.

Inclusion of latent constructs in utilitarian resource allocation model for analyzing revenue spending options in congestion charging policy

- Transportation Research Part A: Policy and Practice---2017---Sugiarto Sugiarto,Tomio Miwa,Takayuki Morikawa

With the government planning a congestion charging (CC) scheme for Jakarta, public support is regarded as a prerequisite for its implementation. Politicians typically see CC reform as a controversial policy if there is no public support. Yet a CC plan is currently under active development and remains under consideration as a way to mitigate the acute traffic congestion in Jakarta. The CC theme has been recognized as a powerful instrument in both delivering efficient road use and raising revenues. Studies indicate that revenue redistribution is one of the most important determinants of public support for such scheme. Given the absence of studies from the Asian megacity context, this paper presents a systematic study of how public perceptions relate to revenue spending choice behavior. A stated preference (SP) questionnaire is developed to investigate citizen's perceptions of CC reform, their preferences for revenue redistribution and their current travel behavior. Using data collected using this SP questionnaire in 2013, a hybrid revenue allocation (HRA) model is formulated that captures the impact of tangible factors (i.e. charges, socio-demographic characteristics, travel behavior) and intangible factors (perceptions) during process of deciding among revenue spending alternatives. The proposed model is drawn from traditional utilitarian resource (time) allocation theory, with an extension consisting of latent constructs representing subjective individual psychological perceptions. We find that there is a strong correlation between revenue allocation preferences and an individual's subjective psychological perceptions. The most preferred revenue allocations are for public transport improvements and traffic safety improvements, with 54% and 29% agreement, respectively. We find there is little support for spending revenues on other issues such as for stimulating local business (13%) and for parks/green spaces, driving education/enforcement

and improving the parking system (4% in total). The findings of sensitivity analysis further disclose that the choice of spending on public transport improvements among respondents who frequently visit the central business district (CBD) is sensitive to the level of the CC charge, while for respondents who frequently enter the CBD by car and have a medium-high income the traffic safety allocation is sensitive to charge.

Estimating pedestrian demand for active transport evaluation and planning

- Transportation Research Part A: Policy and Practice---2017---Ashley Dhanani,Lusine Tarkhanyan,Laura Vaughan

This article presents a recently developed walkability-based approach to evaluating the built environment's relationship to pedestrian activity, as well as the application of this evaluation in generating a model of pedestrian demand across London derived from built environment indicators. The approach is novel in its integration of space syntax measures to evaluate network accessibility and the use of volume area ratios to measure land use intensity. It utilises high-resolution geographic data surfaces for the generation of the built environment variables. The advantage of using this method is that it allows greater analytical flexibility in transport policy and practice, where the ability to compare the analytical results to other social and spatial indicators is vital for decision-making. Pedestrian density data covering the whole of Greater London are used to test the performance of the variables. The best performing variables are then analysed to determine their weighting in a model of pedestrian demand for London based on the selected built environment indicators. Randomised testing shows that the model is capable of reliably predicting pedestrian demand. It can be used to estimate pedestrian demand both currently and for future scenarios by quantify future changes to the built environment, and thus enabling walking to be quantitatively assessed in the same way as motorised modes. The model can be applied to active travel infrastructure planning and policy evaluation, from the scale of the street or intersection, to

larger administrative units. The model also has wider theoretical and policy implications that relate to the spatial structuring of London.

Exploring the psychosocial factors associated with public transportation usage and examining the “gendered” difference

- Transportation Research Part A: Policy and Practice---2017---Xuemei Fu,Zhikai Juan

Understanding the psychosocial factors that influence public transportation usage behavior can provide important implications for transport policies aimed at managing travelers’ mobility behavior. In the current study, a four-step analysis approach is developed to investigate the psychosocial determinants of public transportation usage behavior within the background of a small-sized Chinese city. The results suggest that public transportation specific factors including attitude, subjective norm, satisfaction, habit, and behavioral intention, as well as perceived car control, all contribute to explaining the target choice behavior. Behavioral intention is confirmed to be the most critical factor that influences public transportation usage behavior, while habit and satisfaction are important mediators in the process defined by the theory of planned behavior. Moreover, an examination upon “gendered” difference reflects that effects of both perceived car control and satisfaction vary distinctively across men and women groups, which demonstrates the necessity of demand management differentiation.

How network structure can boost and shape the demand for bus transit

- Transportation Research Part A: Policy and Practice---2017---Hugo Badia,Juan Argote-Cabanero,Carlos F. Daganzo

Conventional wisdom states that transit riders are averse to transfers and that consequently bus networks should be designed to limit their number. Probably as a result of this belief, many real bus systems try to connect as many origins and destinations as possible without transfers, so they are usually composed of long,

circuitous routes with redundant overlapping sections – and the resulting bus map is hard to understand. If coverage is extensive, many routes are needed. Economics then prevents an agency from populating all routes with sufficient buses to provide attractively frequent service. This low frequency and the complicated circuitous map discourage transfers, perpetuating the belief that people are averse to transferring. Not surprisingly, the percentage of bus trips that includes a transfer has been reported to be: 1.5% for Boston, 3% for New York, 13% for London, and 16% for Melbourne.

Are users better-off with new transit lines?

- Transportation Research Part A: Policy and Practice---2017---Moez Kilani,André de Palma,Stef Proost

This paper studies the entry of a new competitor in a public transport network. Competitors for existing rail can be long distance buses but also the vanpool services. These new lines decrease the ridership of the existing lines and increase waiting time for its passengers. A stylized network model is used to study this potential vicious cycle. We derive sufficient conditions for this negative effect to increase overall public transport costs. The new line is only beneficial when there are relatively many users that want to use the new direct line or when the unit cost reduction is sufficiently large. Our result raises concerns with respect to the decentralized management of transit systems.

A new model for determining the traffic accident black spots using GIS-aided spatial statistical methods

- Transportation Research Part A: Policy and Practice---2017---Mehmet Ali Dereli,Saffet Erdogan

Traffic accidents are one of the important problems in our country as it in the world. The World Health Organization case reports published in 2015 stated that approximately 1.25 million people died each year and more than 50 million people injured as a result of traffic accidents in the world. Considering this situation, it is

seen that traffic accidents are mostly human originated and one of the major problems that is negatively affecting life. In this context, many investments and many studies have been performed on the determination of traffic accident black spots to reduce traffic accidents.

Metafrontier analysis on productivity for West Coast of South Pacific terminals

- Transportation Research Part A: Policy and Practice---2017---V ctor Chang,Beatriz Tovar

This paper measures productivity of port terminals in Peru and Chile, and evaluates the influence of the certain specific explanatory variables that may explain their differences in productivity. In the first stage, a DEA-Malmquist model in a metafrontier framework is used to obtain the productivity scores. This approach lets us take the possible technological differences among the port terminals into account. In the second stage, an Arellano-Bond model was estimated, to explain the differences in productivity change. The empirical evidence shows that the Class 1 terminals produce output under certain less favourable technological conditions than the Class 2 terminals. Moreover, on average, both classes present positive evolutions of the catching up effect, which shows that the terminals as a whole are moving nearer to the efficiency metafrontier. We also observe a technological regress during 2004–2014 and that the terminals have been affected by the financial crisis which started in the United States in 2008. Finally, we identified that the container/bulk rate and that private management contribute positively to the change in productivity, whereas the bulk rate and the total factor productivity change lagged contribute negatively.

Determinants of the long-term performance of initial public offerings (IPOs) in the port industry

- Transportation Research Part A: Policy and Practice---2017---Giovanni Satta,Theo Notteboom,Francesco Parola,Luca Persico

Market players active in the port industry deploy a range of financial sources to meet the growing invest-

ment requirements in port infrastructure and to fund their (overseas) expansion strategies. Recent empirical evidence shows that equity capital markets are expected to extend their role in this regard.

Estimating the price elasticity of fuel demand with stated preferences derived from a situational approach

- Transportation Research Part A: Policy and Practice---2017---Reinhard H ssinger,Christoph Link,Axel Sonntag,Juliane Stark

An evidence-based policy debate about future fuel demand requires reliable estimates for fuel price elasticities. Such predictions are often based on revealed preference (RP) data. However, this procedure will only yield reliable results in the absence of severe structural discontinuities. In order to overcome this potential limitation we used a situational stated preference (SP) survey to estimate the response to hypothetical fuel price changes beyond the scope of previous observations. We elicit fuel price elasticities for price increases up to four Euros per liter and find that the situational approach predicts the actual responses to previously observed fuel price changes very well. We conclude that applying a situational approach is particularly useful, if behavioral predictions for unprecedented (non-monetary) policy interventions or supply side shocks are of interest that go beyond the reach of standard RP approaches.

Choice of transport mode in emerging adulthood: Differences between secondary school students, studying young adults and working young adults and relations with gender, SES and living environment

- Transportation Research Part A: Policy and Practice---2017---Dorien Simons,Ilse De Bourdeaudhuij,Peter Clarys,Bas de Geus,Corneel Vandelanotte,Jelle Van Cauwenberg,Benedicte Deforche

Encouraging sustainable travel behavior in emerging adults is important because this transport choice might

persist into adulthood. However, research on transport habits in emerging adulthood is scarce. This study aimed to examine potential differences in walking, cycling, car use and public transport use between three groups of emerging adults (secondary school students (17–18yrs), studying young adults (18–25yrs) and working young adults (18–25yrs)), and to investigate differences in choice of transport modes within each of the three groups according to gender, SES and living environment.

The intention to adopt electric vehicles: Driven by functional and non-functional values

- Transportation Research Part A: Policy and Practice---2017---Liu Han,Shanyong Wang,Dingtao Zhao,Jun Li

This study aims to investigate consumers' intention to adopt electric vehicles (EVs) from the consumption value perspective. Drawing from consumption value theory, consumers' value perceptions of EVs are classified into functional values (monetary, performance and convenience values) and non-functional values (emotional, social and epistemic values). We try to explore how consumers' intention to adopt EVs is affected by these two groups of values and how such effects are mediated by their attitude towards EVs. Via a survey of car drivers in Hefei, China, 607 responses were obtained to empirically test the relationships. The results indicate that the perceived functional value have both direct and indirect effects on consumers' intention to adopt EVs. While the perceived non-functional value have only indirect effects on the adoption intention, which is mediated by attitude. This research deepens the existing understanding of consumers' multi-dimensional value perceptions towards EVs. In practice, the findings could provide sensible guidelines for making the marketing strategies and offer references for policy makers to enhance the operability and pertinence of current policies.

Airport, airline and departure time choice and substitution patterns: An empirical analysis

- Transportation Research Part A: Policy and Practice---2017---Diego Escobari

This paper uses the random-coefficients logit methodology that controls for potential endogeneity of prices and allows for general substitution patterns to estimate various demand systems. The estimation takes advantage of an original ticket-level revealed preference data set on travels from the New York City area to Toronto that contains prices and characteristics of not only flight choices but also of all non-booked alternative flights. Consistent with having higher valuations, our results show that travelers buying closer to departure have a higher utility of flying. Moreover, consumers' heterogeneity decreases as the flight date nears. At the carrier level, we identify which carriers have more price-sensitive consumers and which carriers face greater competition. In addition, the results suggest that our multi-airport metropolitan area can be considered as a single market and that JFK and Newark are relatively closer substitutes. Overall, consumers are more willing to switch to alternative carriers than between airports or departure times.

A comparison of car driving, public transport and cycling experiences in three European cities

- Transportation Research Part A: Policy and Practice---2017---Ruth Woods,Judith Masthoff

Private car use in large cities causes congestion and pollution, and should be reduced. Previous research has shown that private cars are preferred over public transport, but it is not known whether that preference holds in large cities that attenuate the usual benefits of car travel. The small body of research comparing cycling with car driving has found a preference for cycling, but it is not clear what that preference is based on, nor its generalizability, particularly beyond those who already cycle frequently. The current study, which was undertaken as part of the EU-funded project, SUPERHUB (Sustainable and PERSuasive Human Users

moBility in future cities), compares liking and experiences of car driving, public transport and cycling in three European cities: Barcelona, Helsinki and Milan. Cycling was liked significantly more than car driving and public transport, and was rated significantly more positively than or equivalent to cars on many attributes, including flexibility and reliability, indicating an important role for cycling in the reduction of urban car use. Public transport was rated significantly less positively than car driving for some attributes (e.g. flexibility, reliability) but more positively for others (e.g. value for money, safety), demonstrating that in large cities, the usual advantages of car driving over public transport are considerably attenuated. Almost all these findings were replicated across all three cities, suggesting that they can be generalised. Most city dwellers already use more than one mode regularly, which may support mode change campaigns. In particular, a substantial proportion of car driver commuters already enjoyed cycling on a regular basis, suggesting the potential for mode switching, via multimodality to overcome the obstacle of journey distance.

Benign mobility? Electric bicycles, sustainable transport consumption behaviour and socio-technical transitions in Nanjing, China

- Transportation Research Part A: Policy and Practice---2017---Xiao Lin,Peter Wells,Benjamin K. Sovacool

In this paper, we ask whether electric bicycle (e-bike) use in urban China is a temporary phase or an embedded form of sustainable mobility. A survey was conducted in Nanjing in order to assess the characteristics and attitudes of electric bicycle users and other mode users (e.g. pedestrians; car drivers). Based on over 1000 responses a Logit Model was used to analyse current and future mode choice. The results show that electric bicycles are not necessarily displacing cars on a substantial scale, but are rather displacing the ‘benign’ modes of walking, traditional bicycling, and using the bus. We conclude that electric bicycles are helping to enable mobility-dependent lifestyles that may in the future be supported by cars, rather than of-

fering a true departure from carbon-centred, motorized forms of transport.

Impact of the built environment on the vehicle emission effects of road pricing policies: A simulation case study

- Transportation Research Part A: Policy and Practice---2017---Shaopeng Zhong,Max Bushell

In order to develop a road pricing policy that is effective in reducing vehicle emissions, this paper explores the relationship between road pricing, the urban built environment, and vehicle emissions. Existing studies generally tend to choose a city or an entire region as the research object. For this reason, these kinds of studies can neither analyze the differences in the vehicle emission effects of road charging on regions with different built environment attributes, nor distinguish how different built environment attributes affect the vehicle emission effects of road user charging. To fill in the research gap, this paper focuses on the influences of road charging on the vehicle emissions of regions with different built environment characteristics. In order to achieve the above mentioned goal, this paper first applies a method which combines the land use and transport interaction model with a vehicle emission model to simulate the automobile emissions under different road pricing schemes. Then, using multiple regression analysis, this paper establishes the association between the built environment attributes and the vehicle emissions under different road charging levels. Additionally, using factor analysis and cluster analysis, this research further distinguishes the vehicle emission effects of road pricing based on attributes of the built environment. The results confirmed that road pricing affects vehicle emissions in different regions differently. More importantly, not every region will experience decreases in vehicle emissions after the implementation of a road charging policy. The presence of retail amenities, good street design, and public transportation, the more significant the effect of road pricing in reducing vehicle emissions. Furthermore, a healthy jobs-housing balance is also conducive to the decline of regional automobile emissions as well.

Variations in mode-specific valuations of travel time reliability and in-vehicle crowding: Implications for demand estimation

- Transportation Research Part A: Policy and Practice---2017---Hao Li,Kun Gao,Huizhao Tu

This paper presents a two-stage Stated Preference survey to investigate the impacts of travel time reliability and in-vehicle crowding on the mode choice decisions across four different transport modes, i.e. car, metro, park and ride (P&R) and bus. The decisive attributes considered are average travel time, travel time reliability, cost and in-vehicle crowding. Five model specifications are defined for the parameter estimations. Significant interaction effects between in-vehicle crowding and travel time are found. Time multipliers are defined to represent the effects of in-vehicle crowding. In contrast, no evidence could be established for the interaction between in-vehicle crowding and travel time reliability. Results of the mode-specific valuations of travel time reliability and in-vehicle crowding, vary remarkably across the four different transport modes. In the mode-specific models, the range of time multipliers is estimated to be [1.44, 2.00]. Besides, demand estimates would be biased when the mode-specific willingness to pay (WTP) is ignored. For instance, the mode share of metro will be underestimated when its reliability level is high, and vice versa. This suggests that mode-specific WTP of travel time reliability and in-vehicle crowding should be considered in the demand estimations and in the earlier stage of public transport project appraisal.

Comparative analysis of port performance indicators: Independency and interdependency

- Transportation Research Part A: Policy and Practice---2017---Min-Ho Ha,Zaili Yang

Port performance measurement (PPM) and comparison research, presenting a multiple criteria decision making (MCDM) issue in nature, has been intensively conducted by researchers from both decision science on modelling and port studies from empirical perspectives. Assigning an appropriate weight to each defined port

performance indicator (PPI) is essential for rational decision and precise performance measurement. However, PPIs are often presented in a hierarchy, having the interdependency among them ignored. It causes concerns on the accuracy of PPIs' weight allocation and arguments on the performance measurement results, revealing a significant research gap to be addressed. As far as MCDM modelling is concerned, the importance of criteria has been studied utilising either absolute or relative comparisons, while the calculation of their importance also takes into account both independency and interdependency factors. However, there is lack of empirical studies in the literature to provide supporting evidence to distinguish the different impacts of the two factors. This study aims to compare the analysis of PPIs importance when taking into account their independent relationship using an analytic hierarchy process (AHP) and their interdependent relationship using a decision making trial and evaluation laboratory (DEMATEL) incorporating an analytic network process (ANP), respectively. The same domain experts are invited to evaluate the importance of the defined PPIs based on both approaches. The results demonstrate that a similar variance of relative importance across the PPIs but a clear difference on their importance scores and ranking. As a result, the results make contributions to fulfil the research gap on consideration of interdependency among PPIs in PPM and on the provision of convincing empirical evidence to highlight the impact of interdependency of criteria on MCDM modelling. Another practical significance draw from this study is that use of DEMATEL can aid port stakeholders to make more rational decision as to whether the interdependency among PPIs should be taken into account in PPM and/or port choice.

A new era of sustainable transport: An experimental examination on forecasting adoption behavior of EVs among Malaysian consumer

- Transportation Research Part A: Policy and Practice---2017---Nadia Adnan,Shahrina Md Nordin,Imran Rahman,Amran Md Rasli

The new global era of economy faced obstacle due to carbon emission. The main reason behind this intensification of crises is caused by the transportation sector, as million petroleum based vehicle are waging on the street day and day which initiated carbon emission. The Malaysian government also faced major problem due to this CO₂ emission. Because Malaysia is considered as major energy efficient nation. With the aim of obstructing these susceptibilities and endorse a more sustainable economy, the main solution is to change from Petroleum-based vehicles by using green vehicle innovation. Using, Electric Vehicles (EVs) have the probable to lessen the carbon emission, gasoline consumption in order to alleviate the environmental problem. Subsequently, the idea of this paper is to scrutinize whether attitudes (ATT) towards EV adoption by integrating three dimensions of attitude along with the theory of planned behavior the study suggests an assimilated model. A sample of 391 respondent has been collected from Malaysia in order to forecast the customer's purchase intention to adopt EV by using the extended theory of planned behavior. The empirical outcome by using PLS investigation exposed the three dimension of attitude have a significant effect to build attitude. Finally, the finding of this survey questionnaire is analyzed by using Smart PLS to perform CFA and SEM. The outcome of this research specifies that ecological significance and individual preference.

First/last mile transit access as an equity planning issue

- Transportation Research Part A: Policy and Practice---2017---Marlon G. Boarnet, Genevieve Giuliano, Yuting Hou, Eun Jin Shin

Previous studies have established that residents of low-income neighborhoods in major metropolitan areas have access to many more jobs by car than by transit. In this paper, we revisit this question and present evidence on how the mode of transit station access/egress (by walking, bicycling, or driving) can importantly influence the gap between car and transit accessibility in the San Diego region. We construct two accessibility measures to analyze low-wage job access by transit: (1)

the number of low-wage jobs accessible within a 30-min commute and (2) the number of low-wage jobs within a 30-min commute adjusted by the number of potentially competing workers who live within 30 min. We then simulate several policy changes that could reduce the difference in transit vs car accessibility. Examples include using faster station access/egress modes such as bicycling and driving to or from transit stations and reducing transit service wait time. Our results demonstrate that in the San Diego region, if transit riders walk to/from transit stops, low-wage job accessibility by car is almost 30 times larger than low-wage job accessibility by public transit. We find that changing the mode of access and egress to and from stations is more effective at improving transit access to low-wage jobs than policies that reduce transit wait time or improve service headway. Given the transition of transportation to a "service" or "sharing" economy, these results have important implications for how to improve access to employment in low income neighborhoods.

Estimation of crowding discomfort in public transport: Results from Santiago de Chile

- Transportation Research Part A: Policy and Practice---2017---Alejandro Tirachini, Ricardo Hurtubia, Thijs Dekker, Ricardo Daziano

The relationship between train occupancy, comfort and perceived security is analysed, using data from a survey and stated choice (SC) study of users of Santiago's Metro (subway) system. Mode choice models where crowding is one of the main explanatory variables are estimated and crowding multipliers to measure its relevance on travel time disutility for sitting and standing are computed. An international comparison with previous studies from London, Paris, Singapore and Sweden is presented. The type of estimated models include Multinomial Logit, Mixed Logit, and Latent Class models. Results show that there is significant heterogeneity in crowding perception across the population. Users classes with low and high crowding multipliers are identified, in which gender, age and income play a role. In the SC survey, occupancy levels were shown with three alternative forms of representation (text, 2D diagram

or photo), however we did not find relevant influences of the different forms of representation on crowding perception.

Electrically-assisted bikes: Potential impacts on travel behaviour

- Transportation Research Part A: Policy and Practice---2017---S. Cairns,F. Behrendt,D. Raffo,C. Beaumont,C. Kiefer

This paper reports on a review of the European literature about the impacts of having an electrically-assisted bike available to use, together with results from a trial in the UK city of Brighton, where 80 employees were loaned an electrically-assisted bike for a 6–8week period. In the Brighton trial, three-quarters of those who were loaned an e-bike used them at least once a week. Across the sample as a whole, average usage was in the order of 15–20miles per week, and was accompanied by an overall reduction in car mileage of 20%. At the end of the trial, 38% participants expected to cycle more in the future, and at least 70% said that they would like to have an e-bike available for use in the future, and would cycle more if this was the case. This is consistent with the results of the European literature which shows that when e-bikes are made available, they get used; that a proportion of e-bike trips typically substitutes for car use; and that many people who take part in trials become interested in future e-bike use, or cycling more generally.

Willingness to pay for local food?: Consumer preferences and shopping behavior at Otago Farmers Market

- Transportation Research Part A: Policy and Practice---2017---Nathan Berg,Kate Preston

New Zealand (NZ) survey data from Otago Farmers Market (OFM) provide new expenditures-based measures of local food preference. Discounts applied by consumers to non-local food items (e.g., from USA, China, or elsewhere in NZ) are reported. Some consumers have lexicographic preferences; they are unwilling to

purchase non-local food at any price. Others are willing to substitute non-local for local food when priced appropriately. Tobit and Fractional Probit models describe how consumer characteristics affect willingness to pay (WTP) for local food. The mean consumer's premium in WTP when a produce item is "local" ranges from 2.1 to 8.0% and is positively associated with age and income.

An analysis of carsharing vehicle choice and utilization patterns using multiple discrete-continuous extreme value (MDCEV) models

- Transportation Research Part A: Policy and Practice---2017---Sisi Jian,Taha Hossein Rashidi,Vinayak Dixit

Facing the growing demand for carsharing services, it is critical for operators to accurately predict users' preferences on different vehicle types and their vehicle usage. This vehicle choice behavior involves choosing multiple vehicle types simultaneously and allocating continuous amounts of budget to the chosen vehicles. The recent developed multiple discrete-continuous extreme value (MDCEV) modeling framework provides a suitable platform for allocation of continuous amounts of a consumer good (expenditure) to different discrete outcomes (different vehicle types). In this study, we develop three MDCEV models considering travel time, mileage, and monetary expenditure as the continuous consumption constraints. The three models estimate the impacts of a set of socio-demographic attributes on user's vehicle choice and capture the satiation effect with increasing the consumption for each vehicle type. The study also employs an efficient simulation procedure to obtain the simulated results of the three models, and compare the results to the observed data using normalized RMSE and correct ratio to determine the best-fitted model. The estimation results suggest that user age, income level, driving license country, insurance plan, membership plan, and origin location have impacts on users' vehicle utilization patterns. The comparison results indicate that travel time, mileage and expenditure affect users' vehicle

utilization patterns in the same way, and all three models can provide accurate predictions for the vehicle choice behavior. These findings can be referred to by operators when determining the most efficient allocation of resources within carsharing systems.

A probability-based indicator for measuring the degree of multimodality in transportation investments

- Transportation Research Part A: Policy and Practice---2017---Changju Lee, John S. Miller

Although decision makers may favor a “multimodal” transportation system, it can be difficult to indicate the extent to which a given transportation investment is, or is not, multimodal. This lack of an indicator can be acute when the project selection process requires consideration of how a given investment supports increased multimodality. In response to this need, this research reports on a taxonomy for classifying the degree of multimodality for transportation projects. Probability theory was employed with principal component analysis to create a new indicator based on both demand (modal shares) and supply (monetary investment for each mode). The indicator offers three main benefits in the area of performance measurement: (1) it is applicable in cases when some data are missing; (2) it provides a way of comparing multimodality from diverse projects such as high-occupancy toll lanes or multimodal centers; and (3) it can help decision-makers quantify how multimodality has changed over time. For example, application of the indicator to six U.S. public-private partnership projects in Colorado, Florida, Rhode Island, and Virginia showed that the degree of multimodality increased by an average value of 57%. (While the manner in which the impact boundary is defined affects this calculation for specific projects, the average value remained relatively stable whether the impact boundary was equal to the average commute trip length or less than half that amount.) Given that some planners view multimodality as societally beneficial, the indicator proposed herein can help one evaluate the multimodal potential of proposed transportation investments.

Discontinuation of the automobility regime? An integrated approach to multi-level governance

- Transportation Research Part A: Policy and Practice---2017---Sebastian Hoffmann, Johannes Weyer, Jessica Longen

The case study at hand investigates a largely neglected phenomenon: the discontinuation of incumbent socio-technical regimes by means of deliberate governance. Comparing actor constellations and policy measures in four different countries (the UK, Germany, France and the Netherlands) and on the EU level, we identify strategies and measures that have been applied to challenge the automobility regime. Instead of creating a new analytical framework for studying the governance of discontinuation, we propose to use three existing concepts, namely the multi-level perspective (MLP), multi-level governance (MLG) as well as actor-centred approaches, combining them into one integrated concept labelled “multi-level governance of socio-technical regimes”. From this perspective, the European Union is the most active actor in attempts to restrict automobility, especially exerting pressure at the landscape level. However, in spite of various challenges, the automobility regime still remains considerably stable.

Arterial signal coordination with uneven double cycling

- Transportation Research Part A: Policy and Practice---2017---Hongmin Zhou, H. Gene Hawkins, Yunlong Zhang

In arterial coordination, high traffic volume at large intersections often requires a long cycle length to achieve good two-way progression. This long cycle length, however, often causes excessive delay at some minor intersections where the traffic volume is low on cross streets. This paper describes optimization models developed to enable uneven double cycling (UDC) in arterial signal coordination to address this issue. The control scheme adopts UDC at some of the minor intersections where a background cycle has two sub-cycles of different lengths. Two multi-objective UDC models are developed. The basic UDC model maximizes

constant two-way bandwidths and minimizes average delay of through traffic on cross streets at UDC intersections. This model is then improved by maximizing variable bandwidth and considering pedestrian needs. The resultant models are a mixed integer quadratic programming (MIQP) problem. Results of numerical experiments and case study simulations indicate that the UDC control scheme can greatly reduce delay at UDC intersections without affecting progression quality of arterial through traffic. Preliminary guidelines are also provided for UDC implementation.

Global airline alliances and profitability: A difference-in-difference analysis

- Transportation Research Part A: Policy and Practice---2017---Ian Douglas,David Tan

Alliances and partnerships between airlines are entered into to create competitive advantage, reduce costs, and expand network reach. Three global alliance clusters emerged, with founding partners located in the major geographic regions, and often already involved in bilateral partnerships with other founders. This study examines whether the formation of global airline alliances, with its related expansion of network reach, resulted in an increase in profitability for the founding members. Employing difference-in-difference regressions, this study has found no evidence that the formation of global alliances improved the profitability of founding member airlines, or conferred an economic advantage over airlines that were not founding members. This result is robust across geographic regions, individual global alliances, and alternative event dates. The results of this research suggest that regulators should be less anxious that by sanctioning these closer relationships they are providing major carriers with opportunities for excessive profits.

Cost functions and determinants of unit cost effects in horizontal airline M&As

- Transportation Research Part A: Policy and Practice---2017---Sveinn Vidar Gudmundsson,Rico Merkert,Renato Redondi

This paper analyses the unit cost effects of mergers and acquisitions (M&As) using linear, quadratic, and translog cost functions. In addition to a basic unit cost model we specify separate models for distress, profit, relative size, and cost difference, among the merging firms. We use a sample of 19 horizontal M&As in the international airline industry and data spanning from 1980 to 2012. Our models show that M&As do not affect unit costs in a significant way, unless the relative size difference of the merging firms is large, in which case we detect an increase in unit costs.

The impact of operational exposure and value-of-time on customer choice: Evidence from the airline industry

- Transportation Research Part A: Policy and Practice---2017---Woohyun Cho,Robert J. Windle,Martin E. Dresner

This study examines how a passenger's operational exposure and value-of-time moderate the relationship between airline quality and passenger choice. Using a choice model, we show that the positive impact of providing nonstop flights and higher on-time performance is enforced by a passenger's exposure to airline operations, and high time value. In particular, the results show that segmenting passengers by their operational exposure may generate demand, even in a fairly standardized service operations industry, such as the airline industry. Finally, we discuss potential ways that airlines can discriminate the quality or the price of services provided based on our findings.

Air transport services in regional Australia: Demand pattern, frequency choice and airport entry

- Transportation Research Part A: Policy and Practice---2017---Yahua Zhang,Kun Wang,Xiaowen Fu

In this study, we investigate the development of the aviation market at Australia's top 50 regional airports during the 2005–2013 period. Our demand estimation results suggest that a higher commodity price

increases the traffic volume in markets where the local economy is heavily reliant on mineral resources and that appreciation of the Australian dollar decreases the passenger flow in tourism-dependent areas. The presence of leading airlines and low-cost carriers and the availability of international services all contribute positively to market growth. Airport entry analysis reveals that the major carriers engage in clear strategic interactions. The Qantas airline group uses Jetstar as a fighting brand, such that Jetstar flies to a destination if and only if the regional airport is also served by Virgin Australia, the group's major competitor. Unlike the routes connected to major airports, the demand at regional airports is not sensitive to flight frequency. Our empirical results support the introduction of a consistent aviation policy across Australia, especially for issues related to airline competition and demand stimulation. However, special consideration needs to be paid to regional airports to help them deal with economic shocks and cover fixed costs.

Connectivity at Chinese airports: The evolution and drivers

- Transportation Research Part A: Policy and Practice---2017---Yahua Zhang, Anming Zhang, Zhenran Zhu, Kun Wang

This study calculates the connectivity of 69 Chinese airports and identifies the underlying drivers of the variation in airport connectivity over a period 2005–2016. Our connectivity model incorporates multiple discount factors including capacity and velocity penalties to correct for the quality of a connection. We find that Chinese airports experienced a great increase in air connectivity over the study period. Beijing Capital, Shanghai Pudong and Guangzhou Baiyun are far ahead of other airports in terms of overall connectivity and especially so in terms of international connectivity. However, the growth of some tourism cities and small cities has been stagnant and they suffered losses of connectivity at times. Airport competition measured by HHI, average fare, investment in local city's fixed asset investment and airport facilities, macroeconomic conditions, and population are found to be closely as-

sociated with an airport's connectivity. We also find that the presence of low-cost carriers is conducive for air connectivity, while HSR has the effect of decreasing airport connectivity.

Airport dominance and airline pricing power: An investigation of hub premiums in the Chinese domestic market

- Transportation Research Part A: Policy and Practice---2017---Ruowei Chen, Zheng Lei

This research analyses the effects of airport dominance on airline pricing power with the empirical study based on the Chinese domestic market using fixed-effect panel data models. Results from the regression analysis indicate that airport dominance is the most important source of pricing power in the gradually deregulated Chinese domestic market. Hub carriers are able to charge higher prices to premium class passengers and non-hub carriers benefit from the “umbrella effects” of hub premiums. However, hub carriers are not able to translate their airport dominance to pricing power in the economy class market, whereas non-hub carriers even have to reduce the prices as their market shares at major airports increase. This study contributes to the literature by explicitly segmenting the market into economy and premium classes. The results have important policy implications in terms of further deregulation of Chinese domestic market.

The impact of technology progress on aviation noise and emissions

- Transportation Research Part A: Policy and Practice---2017---Mattia Grampella, Pak Lam Lo, Gianmaria Martini, Davide Scotti

This paper investigates the effects of incremental and substantial innovations on aviation emissions and noise levels among aircraft/engine combinations belonging to the Boeing B737 and the Airbus A320 families. We find a statistically significant impact of incremental technical progress on all environmental externalities both at the flight level and the passenger level. Although substantial innovation is found to have a limited impact

at the flight level, a noteworthy positive effect exists on per-passenger externalities. These results point to the need for incentives in aviation technical progress in order to neutralize future negative environmental effects due to the expected traffic growth.

Modeling urban freight generation: A study of commercial establishments' freight needs

- Transportation Research Part A: Policy and Practice---2017---Iván Sánchez-Díaz

Increasing urbanization, and the environmental and liveability impacts associated with urban activity, have directed attention to the need for sustainable cities. Achieving sustainable urban development requires including freight systems in strategic urban development plans. In this context, joint efforts involving academia and public- and private sector to collect the right data and develop suitable models, can contribute toward a better understanding of establishments' freight needs, the quantification of freight's traffic impacts and the development of appropriate methods to support decision making and strategic plans. This paper studies urban commercial establishments' freight needs and impacts on traffic using data collected from establishments in the City of Gothenburg (Sweden). The data cover different zones of the city and include commercial sectors found typically in urban cores (e.g., retailers, food services, health care, public sector offices and education). The paper introduces a set of statistical models—developed based on regression analyses and discrete choice models—to estimate the number of freight trips produced and attracted per week, and the attraction of weight and volumes of freight. In addition to shed light on the factors determining establishments' freight- and freight trips generation, the models are designed with the purpose of assisting planning and policy design efforts, thus the explanatory variables are selected based on suitability and availability. The results show that retailers of perishable goods have the highest freight trip generation per establishment, followed by public sector offices and education establishments, retailers of non-perishable goods and restaurants. The results also reveal a heterogeneity

between sectors, and a differential business size effect across commercial sectors.

Using Structural Equations Modeling to explore perceived urban freight deliveries parking issues

- Transportation Research Part A: Policy and Practice---2017---João de Abreu e Silva, André Romano Alho

This paper explores the relations between perceived urban freight delivery parking issues and commercial establishment characteristics, their associated distribution channels, delivery operation patterns and local land use patterns using a structural equations modeling framework. The main motivation is to test hypothesized relations between urban freight delivery parking issues and the aforementioned factors as a way to perform an indirect, but informative, freight infrastructure adequacy assessment. The hypothesized model structure makes it possible to examine, for example, if the distribution channel characteristics (e.g., the most frequently used delivery vehicle type) can be linked to a certain type of parking behavior/preference, due to operation requirements, which could result in perceived urban freight delivery parking issues.

Parking enforcement policies for commercial vehicles

- Transportation Research Part A: Policy and Practice---2017---Mehdi Nourinejad, Matthew J. Roorda

Commercial vehicles are of particular interest in parking enforcement because of their heavy presence in central business districts and their recurrent behavior of illegal parking. To deter illegal commercial vehicle parking, enforcement policies are defined by the citation fine and level of enforcement. This paper investigates how rational carriers react to a policy under steady state equilibrium conditions. To model the equilibrium, the paper uses the theory of bilateral searching and meeting where enforcement units meet illegally parked commercial vehicles at a rate which depends

on the size of the two agents (illegally parked commercial vehicles and enforcement units). In assessing policy effectiveness, two objectives are defined which are profit maximization and social cost minimization. With the two objectives, the paper presents three market regimes and studies the equilibrium of each market. The proposed model covers several gaps in the parking literature by introducing illegal parking behavior elasticity with respect to parking dwell time, level of enforcement, citation fine, and citation probability. The model is applied on a case study of the City of Toronto and the results show that the citation probability increases with dwell time and the level of enforcement. Increasing either the citation fine or level of enforcement will hinder illegal parking but the obtained profit remains approximately constant. Sensitivity analysis on the meeting rate elasticity shows that profits are low when both elasticities are either high or low.

A downtown on-street parking model with urban truck delivery behavior

- Transportation Research Part A: Policy and Practice---2017---Ahmed Amer, Joseph Y.J. Chow

In this study we present an on-street parking model for downtowns in urban centers that incorporates the often-neglected delivery demand of delivery trucks. The behavior of truck deliveries is distinctly different from commuter parking: trucks do not cruise for parking spaces, and demand for goods delivery is driven by customers and is practically inelastic to the delivery costs. We generalize the downtown on-street parking model from Arnott and Inci (2006) to study the relationship between passenger vehicles' parking and truck delivery behaviors, and provide tools for policy makers to optimize the trade-offs in parking space allocation, pricing, and aggregate network congestion. The social optimum can be obtained by solving a nonlinear optimization problem. The parking model is able to replicate the commuter-only scenario as a special case. It is shown that ignoring truck delivery behavior can significantly overestimate travel speeds and cruising stock. We applied the model to a case study of downtown Toronto and found that compared to a

baseline scenario representative of Toronto in 2015, increasing parking fees from CAD \$4/h to nearly CAD \$7.85/h and assigning 4.1% of parking spaces to truck deliveries would eliminate cruising and truck double-parking, resulting in a social surplus gain of over CAD \$14,304/h/mile². In a first-best allocation scenario where total parking spaces can also change, we found that increasing total parking spaces by 18%, having 3.5% truck delivery allocation, and reducing parking fees to CAD \$2.47/h would eliminate cruising and double-parking while increasing social surplus by CAD \$24,883/h/mile². These model findings are along the same level of effect as demonstrated in the literature.

Commercial vehicles time of day choice behavior in urban areas

- Transportation Research Part A: Policy and Practice---2017---Mubassira Khan, Randy Machemehl

This study presents a mixed Multiple Discrete-Continuous Probit (MDCP) modeling framework to describe time of day choice behavior of commercial vehicles and the vehicle-miles-traveled (VMT) at the chosen time(s) of day. The mixed MDCP model recognizes the unobserved heterogeneity across commercial vehicles in response to customer-to-customer travel speeds, and service time/dwell time at customer stops due to customer preferences for predefined business hours. Possible common unobserved factors affecting different times of day are also captured estimating a general covariance error structure. The estimated models show that a host of factors affect commercial vehicle time of day choice behavior. These include commercial vehicle class, type, commodity type, total unloading weight, as well as location features of base and intermediate stops, frequency of stops to office locations and construction sites; and time of day attributes including travel speed and service time. The results indicate that travel needs, are for the most part, influenced by activity needs. The estimated model can be used to predict the likelihood of commercial vehicle time of day choice for performing daily activities and the VMT generated at the chosen time(s) of day.

Analyzing tour chaining patterns of urban commercial vehicles

- Transportation Research Part A: Policy and Practice---2017---Mubassira Khan,Randy Machemehl

This paper presents an innovative methodology to comprehensively model two dimensions of commercial vehicle travel activity using disaggregate level commercial vehicle daily travel data. Two dimensions of freight activity considered in this model include the daily tour-chaining pattern(s), and the number of trips made in the tour-chains. The results of this study indicate that a host of factors including cargo characteristics, trip characteristics, activity features, base location of commercial vehicle trips, and the attributes of intermediate stop locations affect the choice of tour chain strategy and the associated number of daily trips.

Investigating the theoretical cost-relationships of urban consolidation centres for their users

- Transportation Research Part A: Policy and Practice---2017---Milena Janjevic,Alassane Ndiaye

Urban consolidation centres (UCCs) are a popular measure in city logistics. Although there are numerous pilot projects and test cases, many UCCs are granted only a short life because they fail to attract a sufficient number of customers. Evidence from literature shows that the cost-attractiveness of UCC solutions for their users plays a major importance in their decision to use these facilities. Indeed, since UCCs involve additional service costs for their customers, in order to be financially attractive, they must demonstrate their ability to decrease delivery costs further in the transport chain, through distance or time gains. Despite the significant interest of the practitioners and the research community in these facilities, there is a lack of knowledge and quantitative tools for assessing the costs of delivery operations and the potential savings by use of UCCs. In this paper, authors propose an analytical approach to estimating costs of deliveries with and without the UCC based on the description of the logistics behaviour of the urban stakeholders

from the literature. The analytical framework is then applied to a case of a UCC servicing Brussels. The study shows that the main costs of deliveries are time-related costs and that the use of the UCC can indeed decrease them. The main elements that influence the cost attractiveness of the UCCs are the characteristics of a delivery operations (e.g. number of stops, average number of cargo units per stop or the type of actor who performs the delivery), the characteristics of the UCC (e.g. its location, the service price or the possibility of overnight deliveries) and the characteristics of the services area (e.g. size of the town or delivery density).

Impacts of time restriction on heavy truck corridors: The case study of Mexico City

- Transportation Research Part A: Policy and Practice---2017---Liliana Lyons,Angélica Lozano,Francisco Granados,Alejandro Guzmán

This paper presents a macroscopic analysis of the impact that a time restriction policy for heavy trucks on the main access corridors in Mexico City has on traffic congestion and local pollutant emissions (NO_x and CO). The time restriction is a heavy truck ban at the morning rush hour.

Receivers' willingness-to-adopt novel urban goods distribution practices

- Transportation Research Part A: Policy and Practice---2017---dell' Olio, Luigi,Jose Luis Moura,Angel Ibeas,Ruben Cordera,Jose Holguin-Veras

There is no doubt that goods transport continues to play a vital role in today's society, in spite of the advances made with new information and communications technologies. The main objective of this research is to analyse the behaviour of goods receivers in two Spanish cities (Santander and Barcelona) when they are confronted with the possibility of adopting new goods distribution practices. The new goods distribution policies proposed to the receivers were: an Off-Hour Deliveries policy (OHD) and a policy which uses Urban Distribution Centres (UDC). The methodology

used was based on a stated preference survey and a Mixed Logit model. The results show that in both cases, receivers generally do not wish to change the manner in which they receive their goods, especially if such change involves increased costs. However, both policies were generally more accepted in a medium size city like Santander than in Barcelona, and some results can be achieved even without tax reductions which will result in fewer distribution vehicles circulating at peak times and therefore less congestion and pollution on urban streets. In addition, it is important to consider that not all the commercial sectors react the same way, so this heterogeneity has to be taken into account in the specification of the models and in the proposed policies.

Investigating the potential for off-hour deliveries in the city of Rome: Retailers' perceptions and stated reactions

- Transportation Research Part A: Policy and Practice---2017---Edoardo Marcucci,Valerio Gatta

This paper investigates the potential for off-hour deliveries in the city of Rome. It focuses on retailers that play a fundamental role in the decision making process often determining delivery times. It explores their preferences for three off-hour delivery prototypes and inquires retailers' willingness to adopt them, both with and without the provision of dedicated incentives. Finally, it analyses retailers' reactions to a hypothetical scenario where a mandatory off-hour delivery policy is imposed. The overall results show a good inclination towards off-hour deliveries. This induces optimism with respect to their potential introduction as well as skepticism about the lack of attention local decision makers have, so far, paid to this policy option.

Role and potential of a trusted vendor certification program to foster adoption of unassisted off-hour deliveries

- Transportation Research Part A: Policy and Practice---2017---José Holguín-Veras,Shama Campbell,Lokesh Kalahasthi,Cara Wang

The paper describes the research conducted by the authors regarding the willingness of receivers of supplies to accept unassisted off-hour deliveries (UOHD)—deliveries made during the off-hours without staff from the receiving establishment present at the time of delivery—from vendors certified by a Trusted Vendor Certification Program (TVCP). The main intent of the TVCP is to certify vendors as worthy of trust to conduct UOHD in a way that is both community friendly and that does not put the receiving establishment at risk. To this effect, the authors collected attitudinal data from a sample of 450 receivers from two different metropolitan areas, who were asked whether or not they would be inclined to accept UOHD if the vendors are certified as “trusted vendor” by a TVCP. The paper conducts descriptive analyses of the data and estimates behavioral models to gain insight into the industry sectors and establishment types that are the most inclined to accept UOHD if a TVCP program is created.

Fostering unassisted off-hour deliveries: The role of incentives

- Transportation Research Part A: Policy and Practice---2017---José Holguín-Veras,Wang, Xiaokun (Cara),Iván Sánchez-Díaz,Shama Campbell,Stacey D. Hodge,Miguel Jaller,Jeffrey Wojtowicz

This paper describes the chief findings of research conducted to assess the willingness of receivers of supplies to accept unassisted off-hour deliveries (U-OHD), which are those conducted outside regular business hours and without the assistance of the receiving establishment staff. U-OHD have potential to increase economic competitiveness, reduce congestion, improve environmental conditions, enhance livability, and increase quality of life in urban areas. This study considers the role that public policy initiatives could play in fostering receivers' acceptance of U-OHD by analyzing survey data collected from potential U-OHD adopters. The paper describes the survey conducted, performs descriptive analyses of the data, analyzes the respondents' stated willingness to participate in

unassisted off-hour deliveries, estimates discrete choice models to gain insight into receivers' decision-making processes, and analyzes the effectiveness of alternative policy scenarios. It is found that a number of policy levers can foster U-OHD: (1) public sector provision of a one-time incentive, a public recognition program, and business support services; (2) carriers providing shipping discounts to receivers of U-OHD; and (3) the creation of a Trusted Vendor Certification Program.

A logit model for shipment size choice with latent classes – Empirical findings for Germany

- Transportation Research Part A: Policy and Practice---2017---Raphael Piendl, Gernot Liedtke, Tilman Matteis

Decisions on shipment size in freight transport are often seen to represent a whole set of logistics decisions made by shippers and recipients. Also, shipment sizes have a large impact on transport mode choice. Therefore, they are an important aspect in the modeling of freight transport demand, as they allow to display the reactions of various stakeholders on policy measures. In this article, a model for the discrete choice of shipment sizes is applied to interregional road freight transport. Preferences of actors are reflected by a total logistics cost expression. Furthermore, a Latent Class Analysis approach is applied to identify groups of transport cases with similar logistics requirements. The classification reduces significantly heterogeneity in behavior. Reactions of actors on external influences such as policy measures could be predicted more accurately.

Encouraging intermodality: A stated preference analysis of freight mode choice in Rio Grande do Sul

- Transportation Research Part A: Policy and Practice---2017---Ana Margarita Larranaga, Julian Arellana, Luiz Afonso Senna

Brazil's freight modal split is mainly focused on road transport. The imbalance between different transport modes suggests a need to promote alternative modalities to strengthen the competitiveness and provide a

more sustainable economic development. The goal of this paper is to identify logistics managers' preferences for freight transport service attributes for the case of Rio Grande do Sul in Brazil, and discuss which transport policies could encourage multimodality and more sustainable uses of available transport infrastructure. In this paper we used the stated preference (SP) technique for collecting data on respondents' choices among hypothetical options. The experimental design was structured using an Efficient design. Discrete choice models were used to identify the preferences of respondents and discuss some possible sustainable policies that could increase the competitiveness of the region. The model structures studied were: multinomial logit; mixed logit as a special case of random coefficients; mixed logit error components- considering panel effect and mixed logit error components – including possible correlations between attributes of intermodal alternatives. Parameters estimated from the models were used to compute subjective value of time savings, which was Euro/t.h 0.34 (R\$/t. h 1.088) for the selected model. The direct and cross elasticity values of the probability of choosing a transport mode for the different attributes studied show that the shippers significantly value the fulfilment of delivery time and cost, suggesting that those attributes are the most important ones in the choice of transport mode in this State of Brazil. Simulation results suggest investments for increasing the reliability of intermodal alternatives are more effective to encourage intermodality than cost reductions. Policies and investments to encourage multimodality should prioritize the increase of intermodal alternatives reliability and combined policies of cost reduction and reliability.

A latent class model with attribute cut-offs to analyze modal choice for freight transport

- Transportation Research Part A: Policy and Practice---2017---Concepción Román, Ana Isabel Arencibia, María Feo-Valero

We use stated preference data to analyze modal choice for freight transport when information about attribute cut-offs is introduced into the utility specification. Dif-

ferent choice models are estimated to account for the negative effect produced when these threshold values are violated. In order to better understand the heterogeneity in shippers' preferences, a latent class model incorporating cut-offs penalties is estimated. Our results provide evidence of the existence of differentiated classes of individuals regarding both the perception of the main attributes affecting modal choice in the corridor under analysis and penalties imposed when these attributes do not meet acceptable levels of service.

Valuation of travel time reliability in freight transportation: A review and meta-analysis of stated preference studies

- Transportation Research Part A: Policy and Practice---2017---Kollol Shams,Hamidreza Asgari,Xia Jin

In an effort to advance the understanding of value of reliability (VOR) in freight transportation, this paper provides a comprehensive review of existing studies. This study focused on reliability measures adopted by various studies, the theoretical and mathematical foundation of modeling the valuation of reliability, and the contributing factors that influence the values. Since nearly all the studies in VOR analysis employed stated preference (SP) surveys and the survey design directly affects the study elements and modeling approaches, this synthesis pays close attention to the various survey design components. Through a comparative analysis among existing studies, this paper aims to shed some lights on the potential factors that contribute to the variations in VOR estimation. The results indicated that the estimated VOR values varied largely from one study to another; probably due to the use of different units, reliability measures and survey design approaches. This review showed the complexity and challenges faced when studying freight users' VOR. Insufficient data has also been cited as a major obstacle to advances in the understanding of how the freight industry values travel time reliability. Furthermore, the large variations in the VOR values indicate the need for further research efforts in this area.

Equity and social acceptability in multiple hazardous materials routing through urban areas

- Transportation Research Part A: Policy and Practice---2017---Rodrigo A. Garrido,Andrés C. Bronfman

In this article we study the problem of routing hazardous materials (hazmat) from an origin to a destination on an urban transportation network in which the arcs lay on irregular zones with different population densities. Hazmat are transported on a regular basis instead of a single shipment. In addition, different types of hazmat, posing different levels of risk, must be transported at the same time. We developed a methodology to incorporate the concept of equity in the spatial distribution of risk when multiple types of hazmat must be distributed along various simultaneous routes including not only the risk added by the transportation process but also other baseline risks from exogenous sources. The article describes the development of a multi-product multi-shipment hazmat routing model with equity constraints, departing from a theoretically rich single product single shipment hazmat routing model found in the literature, aimed to minimize the conditional expectation of the consequence of a catastrophic accident. The resultant modeling approach is a linear fractional programming model that incorporates a flexible set of linear constraints that allow a fair distribution of risk among populated zones, restricting the total level of risk below a socially acceptable threshold. We applied this modeling framework to two hypothetical examples and to an actual case in Santiago, Chile (a large capital city with over 6 million inhabitants) showing to be both mathematically tractable and useful for decision makers in practice.

Sourcing truckload capacity in the transportation spot market: A framework for third party providers

- Transportation Research Part A: Policy and Practice---2017---Christopher Lindsey,Hani S. Mahmassani

Due to uncertainty in supply chains and carrier net-

works stretched thin by demand, it is sometimes necessary for shippers to procure capacity for shipments on the transportation spot market. The transportation spot market is a mechanism by which unfulfilled and urgent demand is satisfied. Shipments are tendered one at a time on a load-by-load basis. Because of the often severe shortage of spot market capacity and its relatively high and volatile prices, shippers must actively as opposed to passively seek carrier capacity. Often, they turn to third parties. This research considers third party brokers (3PL, or non-asset carriers) operating in the spot market. On behalf of shippers, these brokers take responsibility for shipments and secure capacity for them. The paper proposes a behaviourally-based conceptual framework that uses 3PL broker data to improve the search for capacity on the spot market. It seeks to improve the effectiveness of the search process by combining (1) broker data on the availability of carrier capacity, (2) a priori information on a particular carrier's likely response to various prices to service a load (the reservation price), and (3) the ability to source multiple loads simultaneously (bundling). These components are incorporated into a framework that enables brokers to better prioritize the carriers they contact, thereby improving outcomes in terms of lower carrier costs and reduced search effort.

A two-stage approach for estimating a statewide truck trip table

- Transportation Research Part A: Policy and Practice---2017---Sarawut Jansuwan,Seungkyu Ryu,Anthony Chen

This research develops a two-stage approach to estimate a statewide truck origin-destination (O-D) trip table. The proposed approach is supported by two sequential stages: the first estimates the commodity-based truck O-D trip tables primarily derived from the commodity flow database, and the second refines the O-D estimates using the observed truck counts. The first stage uses national commodity flow data from the Freight Analysis Framework Version 3 (FAF3) database to develop a commodity-based truck trip table, while the second stage uses the path flow estimator (PFE)

concept to refine the truck trip table obtained from the first stage using the truck counts from the statewide truck count program. The model allows great flexibility for data incorporation at different spatial levels in terms of estimating the statewide truck O-D trip table. To show proof of concept, a case study is conducted using the Utah statewide freight transportation network to demonstrate how the two-stage approach can be implemented in practice. The results show that the proposed approach is applicable for estimating a statewide truck O-D trip table with limited resources, and can be used to conduct truck corridor analysis to determine congested links and potential bottlenecks in Utah.

A structural vector autoregressive model of technical efficiency and delays with an application to Chinese airlines

- Transportation Research Part A: Policy and Practice---2017---Mike Tsionas,Zhongfei Chen,Peter Wanke

This study reports on the performance assessment of Chinese airlines from 2006 to 2014 using a stochastic distance function where technical efficiency and a measure of flight delays follow a joint structural autoregressive process. This model is used to investigate whether technical efficiency causes flight punctuality or the other way around. The model, however, yields a non-trivial likelihood function and is not amenable to estimation using least squares or standard maximum likelihood techniques. To estimate the model therefore, we propose and implement maximum simulated likelihood with importance sampling. The results suggest a mutual dependence (feedback) between technical efficiency and delays. Policy implications are derived.

Hail a cab or ride a bike? A travel time comparison of taxi and bicycle-sharing systems in New York City

- Transportation Research Part A: Policy and Practice---2017---Ahmadreza Faghieh-Imani,Sabreena Anowar,Eric J. Miller,Naveen Eluru

In this paper, we examine the hypothesis that bicycles can compete with cars in terms of travel time in dense urban areas. We conduct a detailed investigation of the differences in observed travel times by taxi and a bicycle-sharing system (BSS) in New York City in 2014. The taxi trips with origins and destinations in proximity to BSS stations are identified and compared to BSS trips from the same origin and destinations. The travel time comparison is conducted along following dimensions: (a) all trips, (b) temporal dimension including different time periods of the day, weekday versus weekend, and seasonal variation, and (c) distance categories. It is found that during weekdays' AM, Midday and PM time periods for more than half of OD pairs with distance less than 3km, BSS is either faster or competitive with taxi mode. To further shed light on the travel time comparison, we develop a multivariate analysis using a random utility framework in the form of a panel mixed multinomial logit model. Identifying and understanding the factors that influence the travel time differences can help planners to enhance the BSS service offerings. The provision of information to bicycling-inclined individuals on the "faster" alternative could be used as a marketing tool to attract higher usage for BSS within dense urban cores. The comparison of BSS and taxi can also shed light on the competition between bicycle and car modes in general in dense urban areas.

International air passenger traffic, trade openness and exchange rate in Brazil: A Granger causality test

- Transportation Research Part A: Policy and Practice---2017---Ricardo Rodrigues Pacheco,Elton Fernandes

Brazil has invested substantially in encouraging international air passenger traffic. The results, however, have fallen far short of expectations, raising the question of what factors should be considered in policy-making to encourage the development of international passenger air traffic in Brazil. Based on indications in the literature, this study explores relations between international trade-related factors and international

air passenger movement in Brazil, using the Granger causality methodology. The study results show evidence that changes in international trade indicators hold a long-term relationship with, and precede, variations in international air passenger movement. These indicators also show significant impact on the evolution of international air passenger movement in Brazil. The study indicates a need to rethink policy and may serve as a point of reference for other developing countries.

Bicycling frequency: A study of preferences and travel behavior in Salt Lake City, Utah

- Transportation Research Part A: Policy and Practice---2017---Liwei Fu,Steven Farber

Improving our understanding of cycling behaviors in urban areas is an important step in producing a more sustainable transportation system. Based on a hybrid stated and revealed preference survey (n=132) in Salt Lake City, Utah, this paper studies the influence of attitudes and demographics on cycling frequency. A factor analysis of stated preferences shows the existence of four attitudinal factors concerning bicycling: safety, direct benefits, comfort, and timesaving. In turn, these are used in a multivariate model of cycling frequency and the decision to cycle is found to be positively correlated with the timesaving and convenience factors, and negatively correlated with preferences for travel comfort. Our results provide a broader empirical base for the complex relationships between attitudes, demographics and travel behaviors and point to some policy recommendations for increasing cycling uptake in the region.

Truck freight demand elasticity with respect to tolls in New York State

- Transportation Research Part A: Policy and Practice---2017---Wang, Xiaokun (Cara),Dapeng Zhang

Road pricing is an important travel demand management strategy and its effects on transportation system has been widely investigated. Toll elasticity has been derived in the existing literature to characterize its

effect on travel demand all around the world. However, very few studies have comprehensively analyzed the effect of tolls on freight transportation, which plays an increasingly important role in social and economic activities. To enrich the understanding of freight travel demand, this study conducted a stated preference survey on freight carriers who routinely use toll facilities. A regression model about freight carriers' stated reduction in vehicle miles traveled (VMT) on toll roads is then developed. The elasticity value is derived and compared with values in existing literature. Based on the calibrated model, the VMT change in response to hypothetical toll price increases is simulated for New York State. The simulation results reveal important insights that will help policy makers design ideal freight demand management strategies.

Exploring the determinants for airport profitability: Traffic characteristics, low-cost carriers, seasonality and cost efficiency

- Transportation Research Part A: Policy and Practice---2017---Joost Zuidberg

Given the growing pressure on aeronautical revenues, the increasing focus on airports' financial performance and the sharpened state aid guidelines in Europe, it is valuable to have detailed insight in the determinants for airport profitability. This paper fills in a gap in scientific research by presenting the most important traffic and financial determinants for airport profitability, since the majority of scientific literature on airport (financial) performance focuses on efficiency rather than on profitability. Comprehensive airport traffic and financial data for 125 airports in Europe, the United States (US), Canada, Australia and New Zealand for the period 2010–2016 have been used to estimate several fixed-effects panel data regression on profit margin. Among others, the results show evidence for the fact that an increasing share of transfer passengers affects an airport's profit margin. In addition, there is no sign of a general LCC effect and just limited evidence for the fact that the market share of specific LCCs affect airport profitability: only an increase in the market share of Southwest Airlines at

major airports leads to lower profit margins. Moreover, a quadratic relationship between seasonality and profitability has been identified. It points at the existence of a certain optimal seasonality score. Below that tipping point, a decrease in seasonality leads to higher profit margins. On the contrary, a further reduction of seasonality after the tipping point leads to lower profit margins. This might indicate that no or limited seasonality is a result of capacity constraints and, in turn, leads to increasing operating costs related to congestion. Regarding financial variables, the results especially show significant positive effects of capital cost efficiencies on profitability. Those effects are especially large for airports in the US and for small regional airports. Labour productivity only plays a important role in the profitability of US airports. Finally, the results show that regional O/D airports largely depend on regional economic development and population growth, while the major airports rather depend on global economic development than on an increase in local demand.

The accuracy of toll road traffic forecasts: An econometric evaluation

- Transportation Research Part A: Policy and Practice---2017---James Odeck,Morten Welde

This study assesses the accuracy of toll road traffic forecasts in Norway. This study contributes to extant literature regarding transportation economics and policy because few studies have analyzed the accuracy of toll road traffic forecasts and current studies on this topic do not use a succinct econometric framework to infer the forecast's bias and efficiency, which are determinants of the accuracy of forecasts. The data for this study include 68 toll road projects where forecasts and actual out-turns were available. All projects that are included in this study were opened for traffic during 1975–2014. Transport models were made mandatory for forecasting toll traffic in 2006. The results of this study reveal the following: (i) Norwegian toll road traffic forecasts are underestimated but are close to accurate because the mean percentage error is a mere 4%. This result sharply contrasts interna-

tional studies that resulted in large overestimations at more than 20%. (ii) The accuracy of forecasts has not improved since transport models became mandatory. (iii) The Norwegian toll road traffic forecasts are unbiased, which implies that they do not tend to be one-sided. (iv) Norwegian forecasts are efficient, which implies that available information is used adequately when making forecasts. Our conclusion is that the toll traffic forecasts in Norway perform fairly well compared to the forecasts of other countries. In addition, we recommend that the assessment of forecasts in the transportation sector should be based on succinct econometric frameworks; otherwise, the conclusions may lack important information regarding the bias and efficiency of the forecasts.

The determinants of garage prices and their interaction with curbside regulation

- Transportation Research Part A: Policy and Practice---2017---Daniel Albalade,Albert Gragera

The market for parking is characterized by intrinsic distortions such as cruising in search of a parking space and garage market power. Theoretical studies stress that the price differential between curbside and garage parking fees is critical in addressing this inefficiency; yet, the interactions between the two have received little attention to date in the literature. By drawing on a new self-constructed database for all the garages in the city of Barcelona, we empirically explore the determinants of garage prices. Our results indicate that prices are mainly influenced by fixed and variable cost drivers, the dominance position of the garage in its surrounding market and the garage's interaction with curbside parking. We also find that prices react to the scarcity of parking spaces in the street and to the curbside price fixed by the public authority.

Energy efficiency and rebound effect in European road freight transport

- Transportation Research Part A: Policy and Practice---2017---Manuel Llorca,Tooraj Jamasb

Energy efficiency has become a primary energy policy

goal in Europe and many countries and has conditioned the policies towards energy-intensive sectors such as road freight transport. However, energy efficiency improvements can lead to changes in the demand for energy services that offset some of the achieved energy savings in the form of rebound effects. Consequently, forecasts of energy savings can be overstated. This paper analyses the energy efficiency and rebound effects for road freight transport in 15 European countries during the 1992–2012 period. We use a recent methodology to estimate an energy demand function using a stochastic frontier analysis approach and examine the influence of key features of rebound effect in the road freight transport sector. We obtain, on average, a fuel efficiency of 89% and a rebound effect of 4%. Our results indicate that the achieved energy efficiencies are retained to a large extent. We also find, among other results, that the rebound effect is higher in countries with higher fuel efficiency and better quality of logistics. Finally, a simulation analysis shows significant environmental externalities costs even in countries with lower rebound effect.

Information for travelling: Awareness and usage of the various sources of information available to public transport users in NSW

- Transportation Research Part A: Policy and Practice---2017---Corinne Mulley,Geoffrey Tilden Clifton,Camila Balbontin,Liang Ma

Public transport authorities and service providers place great emphasis on information provision to travellers both before and during travel. Information provided prior to travel has included printed timetables, newspaper advertisements, telephone services and marketing campaigns. During the trip, providers have tended to offer maps at public transport stops (i.e. bus stops, train stations, ferry wharves, etc.) as well as timetables static, dynamic or real-time.

Needed reduction in mobility energy consumption to meet the goal of a 2000-watt society

- Transportation Research Part A: Policy and Practice---2017---Riccardo Scarinci,Frédéric Rast,Michel Bierlaire

Greenhouse gas emissions related to energy production is the main cause of climate change. Transportation accounts for 30% of the total energy consumption, and a reduction in the energy used for mobility is necessary. The 2000-watt society is an environmental concept that fixes a sustainable limit to the energy consumption in different sectors, including mobility. This paper evaluates the energy consumption in several mobility scenarios, and it assesses whether the goal suggested by the 2000-watt society is achievable. We investigate the social characteristics and travel habits of the population living in a case study area. Then, we calculate the modal shift induced by transportation policies such as car-sharing, car-pooling and car-free district. We evaluate the resulting energy consumption, and we compare it with the 2000-watt society limit. We conclude that only a set of measures combining car usage reduction, increase in walking and cycling, and reduction in the total travel distance can achieve the needed energy reduction.

An evaluation of the economic and business investment impact of an integrated package of public transport improvements funded by a Workplace Parking Levy

- Transportation Research Part A: Policy and Practice---2017---Simon Dale,Matthew Frost,Stephen Ison,Ken Nettleship,Peter Warren

Hypothecated revenue from the Nottingham Workplace Parking Levy (WPL) is being used to fund additional tram lines, refurbish the Nottingham Railway Station and to sustain the supported Linkbus network. This strategy aims to constrain congestion, cater for future economic growth and make Nottingham a more attractive location for business investment and to live, visit and work.

Fully automated vehicles: A cost of ownership analysis to inform early adoption

- Transportation Research Part A: Policy and Practice---2017---Zia Wadud

Vehicle automation and its adoption by the vehicle purchasers is an active area of research among transportation academics. So far, most of the interest in the adoption of fully automated, driverless vehicles has focussed on private vehicles alone, yet full automation could be beneficial for commercial vehicles too. This paper identifies the vehicle sectors that will likely be the earliest adopters of full automation. Total cost of ownership analysis is used to compare the costs (and benefits) of vehicle automation for private vehicles among different income groups and commercial vehicles in the taxi and freight sectors in the UK. Commercial operations clearly benefit more from automation because the driver costs can be reduced substantially through automation. Among private users, households with the highest income will benefit more from automation because of their higher driving distances and higher perceived value of time, which can be used more productively through full automation.

Assessment of the incentives on electric vehicle promotion in China

- Transportation Research Part A: Policy and Practice---2017---Ning Wang,Huizhong Pan,Wenhui Zheng

New Electric vehicles (NEVs) will not only solve the energy and environmental problems, but also promote reform and transformation of Chinese automotive industry. To promote the market acceptance of NEVs, Chinese government has launched NEV demonstration projects and issued numerous policies since 2009, which absolutely promoted NEV sales, but also resulted in a subsidies-oriented NEV market. Therefore, Chinese government decided to decrease NEV subsidies gradually in next 5years. In order to explore the key factors that promote NEV sales, and based on which to offer suggestions on designing and formulating matching policies when subsidies decrease, we utilized

multiple linear regression method to analyze electric vehicle (EV) sales with incentive measures and socio-demographic data of 41 pilot cities for year 2013–2014. The result shows that chargers' density, license fee exemption, no driving restriction, and give priority to charging infrastructure construction lands are the four most important factors, which could be continued and strengthened in next few years to keep EV market still present a perfect performance.

Do attitudes cause behavior or vice versa? An alternative conceptualization of the attitude-behavior relationship in travel behavior modeling

- Transportation Research Part A: Policy and Practice---2017---Maarten Kroesen,Susan Handy,Caspar Chorus

Attitudes are thought to play an important role in determining people' s travel behavior, although researchers have acknowledged the possibility of a reverse relationship. Given the importance of knowledge about the direction of causation as a basis for policies and programs designed to effect behavioral change, the scarcity of in-depth research on this subject is surprising and problematic. The aim of the present paper is twofold: first to assess the bidirectional relationships between attitudes and behavior (in a transport context) and second to present a new framework to study attitude-behavior (in)consistency over time. To achieve these aims, we use data from a two-wave mobility panel to estimate cross-lagged panel models and latent transition models. Results indicate that use of a mode and the attitude towards using that mode mutually influence each other over time. As expected, we find that people who have dissonant (i.e., non-aligned) attitude-behavior patterns are less stable than those who have consonant patterns. Contrary to conventional wisdom and commonly used model structures, however, the effects of behaviors on attitudes are much larger than vice versa. That is, dissonant travelers are more inclined to adjust their attitudes to align those with their behavior than vice versa. Based on these results, we outline several implications for research and

policy.

Estimating level of service of mid-block bicycle lanes considering mixed traffic flow

- Transportation Research Part A: Policy and Practice---2017---Lu Bai,Pan Liu,Ching-Yao Chan,Zhibin Li

The primary objective of the study was to identify the factors that influenced the comfort perception of e-bike, e-scooter and bicycle riders in mid-block bicycle lanes on urban streets and to estimate the bicycle level of service (BLOS) of a mid-block bicycle lane with mixed two-wheeled traffic. Data were collected at thirty locations on thirty different streets in Nanjing area in China. Pearson' s Chi-square tests were conducted to make comparisons of the comfort perception among different cyclist groups. The factors that significantly affected the comfort perception of the cyclists included the age of the cyclists, the type of two-wheeled vehicles, the volume of two-wheeled vehicles, the width of mid-block bicycle lanes, the proportions of e-bikes and e-scooters in two-wheeled vehicles, the physical separation between motorized, bicycle and pedestrian lanes, the slope of bicycle lanes, the roadside access points and the roadside land use. Ordered probit models were developed to quantitatively evaluate the impacts of different contributing factors on the comfort perception of the riders of e-bikes, e-scooters and bicycles. The results showed that compared to the riders of bicycles, the riders of e-bikes and e-scooters were more likely to perceive a poor comfort level. The comfort perception of the cyclists increased with an increase in the width of the mid-block bicycle lane, whereas it decreased with an increase in the volume of two-wheeled vehicles. The proportions of e-bikes and e-scooters in two-wheeled vehicles negatively affected the comfort perception of the cyclists. In addition, the presence of physical separation between the motorized, bicycle and pedestrian lanes significantly increased the comfort perception of the cyclists. With the comfort perception models, a procedure was developed and insights were gained to help transportation professionals estimate the BLOS of a mid-block bicycle lane with mixed two-wheeled

traffic.

Car sharing adoption intention in urban areas: What are the key sociodemographic drivers?

- Transportation Research Part A: Policy and Practice---2017---Marc Prieto,George Baltas,Valentina Stan

In recent years, car sharing has become an international transportation trend and has shown the potential to change the way people use cars. Sociodemographic variables are the key drivers of mobility patterns and travel modes and may determine the diffusion of car sharing services in the urban population. The present paper considers the impact of sociodemographic variables on car sharing behavior and explores individual choice between car clubs and peer-to-peer car sharing services. We carry out an international survey and analyze a representative sample of 2733 car owners in four major metropolitan areas: London, Madrid, Paris, and Tokyo. The empirical analysis identifies key drivers of car sharing behavior and choice. The findings yield practical insights for business practitioners and transportation planners.

Competition and vested interests in taxis in Ireland: A tale of two statutory instruments

- Transportation Research Part A: Policy and Practice---2017---Paul Gorecki

This paper addresses, for the taxi market in Ireland, whether judicial, legislative and regulatory processes promote taxi users' welfare or taxi license holders' welfare. It is argued that the 2000 decision to remove quantitative restrictions on taxi numbers favoured taxi users; the 2010 decision to re impose such restrictions, with the exception of wheelchair accessible taxis, had the effect of favouring taxi license holders, while doing little to meet its declared object to increase the number of wheelchair accessible taxis and the ready availability of such vehicles for wheelchair customers. Whether the late 2010s/early 2020s will be a rerun of the late 1990s, with increasing waiting times for taxi users, is a moot point. An applicant refused a taxi

license might, as in 2000, successfully bring a High Court case contesting the legal basis for the present quantitative restrictions. The Competition and Consumer Protection Commission might spark debate on taxi regulatory policy, while the Minister for Transport, Tourism and Sport might issue a policy direction to the National Transport Authority, the taxi regulator, requiring it to clarify the objectives and benchmarks for success of its existing prohibition on taxi licenses and to consider how best to create incentives for those with wheelchair accessible taxis to use them to service wheelchair users.

Questions of governance: Rethinking the study of transportation policy

- Transportation Research Part A: Policy and Practice---2017---Greg Marsden,Louise Reardon

This paper critiques the state of the art approaches to studying transportation policy. It does so through analysing 100 papers sampled from the two leading policy journals in the transportation literature. On applying two different frameworks for understanding policy, the review finds that only 13% of papers consider specific aspects of the policy cycle, that 60% focus on 'tools' for policy, and that two-thirds of papers did not engage with real-world policy examples or policy makers and focussed on quantitative analysis alone. We argue that these findings highlight the persistence of the technical-rational model within the transportation literature. This model, and the numerous traditions and disciplines that have fed into it have an important role to play in developing the transportation evidence base. However, we argue there are important questions of governance; such as context, power, resources and legitimacy, that are largely being ignored in the literature as it stands. The substantial lack of engagement with governance issues and debates means that as a field we are artificially, but more importantly, disproportionately generating a science of applied policy making which is unlikely to be utilised because of the distance between it and the realities on the ground. The paper identifies analytical approaches deployed readily in other fields that could be used to

address some of the key deficiencies.

Policy entrepreneurs and opportunities: Establishing a model of policy change through bicycle infrastructure at the municipal level

- Transportation Research Part A: Policy and Practice---2017---Johann Weber

Although bicycling has been the subject of increasing academic attention, particularly in the areas of mode choice, benefit analyses, and discussions of policies/treatments, much less attention has been devoted to actually studying how communities have made decisions about whether and what they will implement in regards to bicycle infrastructure. “Policy entrepreneurs” are theorized as actors centrally responsible for either creating an opportunity or capitalizing on an opportunity to pair a public problem with a policy solution. A survey instrument solicited directly the participation of the 200 most populous municipalities within the United States. Using a variety of analytical tools (and merged data sources) a model of municipal transportation policy change is developed that contributes an important perspective to the existing paradigm of policy process theory. Neither individual policy entrepreneurs nor their role or qualities were not significant effectors of change, despite being regularly present. However, where networks of supportive actors (including strong champions/policy entrepreneurs) were present they played a critical role in making projects happen and at larger scales. This finding puts additional emphasis moving forward on the collaborative nature of municipal policy change. Advocates and planners may be more successful by being attuned to these networks and political contexts and taking advantage of open “windows” of engagement, or by ‘manually’ opening these windows. Lastly, city population was also associated with implementation, suggesting underlying factors to be explored in the future.

The Fehmarn Belt duopoly – Can the ferry compete with a tunnel?

- Transportation Research Part A: Policy and Practice---2017---Rafael Aigner,Katharina Weber

The Fehmarn Belt is a strait between Denmark and Germany, currently served by a ferry operator. We analyse competition between the ferry service and a planned tunnel, the Fehmarn Belt Fixed Link. We develop a differentiated duopoly model to address two questions: 1. Will the tunnel induce the ferry to exit the market once it operates? 2. Will the tunnel’s toll revenue suffice to cover its cost? Using real-world data and traffic forecasts, we show that it should not be taken for granted that the ferry will exit the market, and that if the ferry competes, the tunnel project will make a loss.

The impact of voluntary travel behavior change measures – A meta-analytical comparison of quasi-experimental and experimental evidence

- Transportation Research Part A: Policy and Practice---2017---Sebastian Bamberg,Jonas Rees

Personal travel planning (PTP) is generally regarded as an effective approach to voluntary travel behavior change in the domain of transportation research. However, this view has recently been challenged by findings from another research domain, public health research, reporting little or no effect of PTP-based interventions. We argue that these conflicting results regarding the effectiveness of PTP-based measures are due to different understandings of which research designs should be used: Transportation research tends to be based on large-scale quasi-experimental designs whereas public health research tends to favor experimental designs such as randomized control trials (RCTs). Consequently, we argue, the discrepancy may at least partly be resolved by a more nuanced position on what empirical evidence really matters when evaluating if an intervention is effective or not. In the empirical part of the paper, we meta-analytically re-analyze ten quasi-experimental PTP evaluation studies and report an experimental RCT-based study testing the effectiveness

of a PTP strategy implemented in a major German city. Including all information in one meta-analytical synthesis yields a standardized effect size estimate of Cohen's $h=0.12$, documenting a small but reliable effect of PTP interventions. When implementing a PTP like one of those analyzed in this paper, in other words, we can expect an average reduction of the car modal split share of about 5 percentage points. We close by discussing the implications of our results for future PTP evaluation studies and the dispute about what kind of empirical evidence really matters when evaluating the effectiveness of PTP measures.

Light rail transit cost performance: Opportunities for future-proofing

- Transportation Research Part A: Policy and Practice---2017---Peter E.D. Love, Dominic Ahiaga-Dagbui, Morten Welde, James Odeck

The cost performance of Light Rail Transit (LRT) systems have been scrutinized by the popular press and public sector infrastructure agencies as they have been prone to incurring cost increases in their capital expenditures (CAPEX). In tackling such increases, emphasis is placed on mitigating strategic misrepresentation and optimism bias, which has hindered the public sectors ability to embrace innovation, particularly with regard to the justification and adoption of LRT. More often than not, operational expenditure (OPEX) is neglected, and is not considered a part of the transportation cost performance literature. The aim of this paper is to examine the equivocality that surrounds the determination of cost performance of LRT projects. It is suggested that the public sector should move beyond focusing on strategic misrepresentation and optimism bias, as many governments worldwide now have in place mechanisms to address such issues, and instead focus on future-proofing their assets. It is suggested that the key enablers of future-proofing LRT are (1) private finance; (2) delivery strategy (e.g. design-build-finance-operate); (3) digitization (e.g. building information modelling); and (4) asset management (e.g. smart technologies). If the public sector is to provide an LRT system that is cost effective and able to respond to the

demands imposed by climate change, then it needs to be considered from a life-cycle perspective and funding sought from the private sector to ensure its viability.

Relationships between the online and in-store shopping frequency of Davis, California residents

- Transportation Research Part A: Policy and Practice---2017---Richard J. Lee, Ipek N. Sener, Patricia Mokhtarian, Susan L. Handy

The growth of online shopping will likely impact rates of in-store shopping, signaling potentially significant ramifications for shopping-related vehicle travel. To better understand this relationship, we studied shoppers in Davis, California using a comprehensive survey dataset to explore the effect of personal characteristics, attitudes, perceptions, and the built environment on the frequencies of shopping online and within three distinct shopping settings. Overall, results showed that attitudes and perceptions played an important role in the shopping decision. The ordered response models of shopping frequency also revealed that the shopping motivations for each setting differed. Most notably, many of the factors influencing the frequency of shopping outside Davis had the opposite effect on shopping within Davis. Joint copula models subsequently suggested that online shopping had a complementary relationship with in-store shopping frequency, even after controlling for demographic variables and attitudes. Rather than reducing shopping travel, it appears that online shopping is associated with higher in-store shopping rates.

Bicyclists' preferences for route characteristics and crowding in Copenhagen – A choice experiment study of commuters

- Transportation Research Part A: Policy and Practice---2017---Suzanne Elizabeth Vedel, Jette Bredahl Jacobsen, Hans Skov-Petersen

Cycling as a mode of transportation is increasingly being advocated due to the many positive effects it has on people's health, the environment and to counteract

increasing congestion on the transportation infrastructure. There is a long tradition of using cycling as a mode of transportation among the Danish public and this is widespread across people with different socio-demographic characteristics. Copenhagen has an extensive network of cycling facilities and is often used as a role model for other large cities when developing cycling facilities. This setting provides a unique basis for investigating bicycle commuters' preferences for route characteristics and crowding in particular, which is not studied before, but likely to become an issue around the world's cities with increases in number of bicyclists. The study is based on a choice experiment of 3891 active cyclists in Copenhagen. The investigated attributes are cycle track, crowding, stops, environment/road type, green surroundings, and travel distance which is used as a payment vehicle to gain more desirable route characteristics.

Exploring the influence of built environment on travel mode choice considering the mediating effects of car ownership and travel distance

- Transportation Research Part A: Policy and Practice---2017---Chuan Ding,Donggen Wang,Chao Liu,Yi Zhang, Jiawen Yang

Though there is a growing literature on the connection between the built environment and travel behavior, limited efforts have been made to consider the intermediary nature of car ownership and travel distance simultaneously while modeling the relationship between the built environment and travel mode choice behavior. The mediating effects from car ownership and travel distance, as an important piece, are not sufficiently investigated. To fill this gap, in this study the relationships among travel mode choice, car ownership and travel distance were described using a framework of integrated structural equation model (SEM) and discrete choice model (DCM). Drawing on a rich dataset of National Household Travel Survey (NHTS) and numerous built environment measurements in Baltimore metropolitan area, this research applied the integrated SEM and DCM approach to investigate how the built environment affects travel mode choice through influ-

encing car ownership and travel distance. Therefore, the direct and indirect effects of built environment on travel mode choice were revealed. This study hopes to give transportation planners a better understanding on how the built environment influences travel mode choice, and consequently develop effective and targeted countermeasures to reduce car use.

Assessment of the Chinese driver licensing system implemented from 1 Jan 2013 to 30 Sep 2016

- Transportation Research Part A: Policy and Practice---2017---Qinghui Suo,Daming Zhang,Yang Liu

Under the conditions of the driver licensing system implemented from 1 Jan 2013 to 30 Sep 2016, learners gradually obtained their full driving privileges in China, and the Chinese driver licensing system is largely a type of Graduated Driver Licensing system.

A stated choice experiment to measure the effect of informational and normative conformity in the preference for electric vehicles

- Transportation Research Part A: Policy and Practice---2017---Elisabetta Cherchi

This work aims to measure the effect of both informational and normative conformity in the preference for electric vehicles (EV) versus internal combustion vehicles (ICV). Differently from most of the literature in the field, measures of conformity are included as attributes inside a stated choice (SC) experiment, allowing a direct comparison of their effects with typical effects such as purchase price, range and fuel/electricity price. To measure informational conformity we set up an experiment where the same individual answers the choice tasks before and after he/she has received social information on three specific EV features: range, parking spaces reserved for EV and the need to change activity schedule if using an EV. Normative conformity was measured in terms of social adoption, social-signalling and injunctive norms. Social adoption and a pair of eyes to detect social-signalling were included

as attributes in the stated choice experiment, while injunctive norms were measured using psychometric indicators. The SC experiment was also aimed at testing the effect of parking policy on the choice of EV. Hybrid choice models were estimated and a resampling technique was used to test the model sensitivity to the sample gathered. All social conformity effects tested are highly significant and their impact in the overall utility can be high enough to compensate also quite low driving range for EV (e.g. around 130km) or significant differences in purchase price (for example 1/3 higher for EV than ICV). We also found that parking price and the number of slots reserved for EV can be effective in boosting the demand for EV, but a combination of parking policies is needed because each measure alone does not have a sufficient impact to compensate major differences in the characteristics between EV and ICV.

Should China further expand its high-speed rail network? Consider the low-cost carrier factor

- Transportation Research Part A: Policy and Practice---2017---Kun Wang,Wenyi Xia,Anming Zhang

This paper examines China' s large-scale high-speed rail (HSR) expansion, announced in July 2016, and the associated benefits assessment of the expansion program from the perspective of HSR-LCC (low-cost carriers) interactions. Our analysis suggests that in the highly populated and developed corridors the HSR expansion is likely to leave LCCs with little survival room, which is also shown by our case study on Spring Airlines. On the other hand, in the low-density corridors especially in the central and western China, LCCs might leave HSR with little survival room in the long run. By conducting a "propensity score matching" to pair HSR-linked city pairs in China to the counterfactual US airline routes, we find that most of these Chinese routes would be viable markets for LCCs to operate. The benefits of HSR expansion may thus be overestimated if not recognizing the LCCs' role as an alternative mode to serve these markets. In particular, for the routes to the central and western China with very small travel demand and high HSR construction

cost, LCC service could be more cost efficient and operationally flexible than HSR. Our analysis calls for a more careful evaluation of the program and, more generally, a balanced and coordinated HSR and LCC development in China.

Airline efficiency measures using a Dynamic Epsilon-Based Measure model

- Transportation Research Part A: Policy and Practice---2017---Qiang Cui,Ye Li

In this paper, we focus on measuring airline dynamic efficiency. Number of Employees and Aviation Kerosene are chosen as the inputs. Revenue Tonne Kilometers, Revenue Passenger Kilometers and Total Revenue are the outputs. Capital Stock is selected as the dynamic factor. A new model, Dynamic Epsilon-Based Measure (DEBM) model, is proposed to evaluate the dynamic efficiencies of 19 airlines from 2009 to 2014. The main findings are: 1. Scandinavian, Emirates and Cathay Pacific are the benchmarking airlines among the 19 airlines. 2. The highest efficiency change index happens in 2010, which has close relationships with the financial crisis of 2008. 3. The output-oriented DEBM and non-oriented DEBM do well in reflecting the efficiency differences, while the input-oriented DEBM and output-oriented DEBM have good performance in mirroring yearly efficiency change.

Coauthorship network in transportation research

- Transportation Research Part A: Policy and Practice---2017---Lijun Sun,Iyad Rahwan

The field of transportation research has been accelerating in the last decade. In this paper, we examine the structure of scientific collaboration in transportation research by building a coauthorship network using publication metadata from 22 transportation journals. In this network, a vertex represents a researcher and an edge represents the collaboration (coauthorship) between a pair of researchers. To build an accurate network, we propose and apply an efficient author name correction algorithm. The obtained network provides us with a tool to understand patterns of collaborations

in transportation research. The results show an increasing trend of collaboration over the studied period (1990–2015), but different journals exhibit different patterns. We characterize the structural properties of this network and compute several centrality measures to quantify the performance/impact of researchers and their collaborations in the research community. This study could serve as a tool to qualitatively and quantitatively understand scientific collaborations in transportation research.

Examining usage patterns of a bike-sharing scheme in a medium sized city

- Transportation Research Part A: Policy and Practice---2017---Brian Caulfield,O'Mahony, Margaret,William Brazil,Peter Weldon

Bike-sharing is one of the fastest growing new modes of transport in the world, with more and more schemes opening every year. This paper examines the trends in a bike-sharing scheme that has been in operation in Cork since 2014. While many studies exist on how bike-sharing schemes are changing mobility in cities across the globe, few studies have looked at the dynamics of these schemes in smaller cities. One of the motivations in looking at a small city like Cork is to determine if smaller cities derive benefits from bike-sharing schemes and can bike-sharing schemes provide a prominent role in these cities. This research found that in a small, compact city like Cork, average trip times recorded are short with regular users displaying habitual trip patterns. This includes using the same bike stations and following similar routes on a daily or weekly basis. The findings also suggest weather has an impact upon usage, with longer trips more likely during better weather conditions. The findings of the paper provide insights to the dynamics of usage of a smaller bike-sharing scheme and results on how bike-sharing is offering citizens a new transport alternative.

What explains rapid transit use? Evidence from 97 urbanized areas

- Transportation Research Part A: Policy and Practice---2017---Oliver F. Shyr,David Emanuel

Andersson,Yu-Hsuan Cheng,Yu-Hsuan Hsiao

- Survey of 97 MRT/LRT systems.
- Statistical tests of 4 key variables.
- Scale economies are present.
- Affordability matters.
- MRT/LRT networks work best in large and dense cities.
- MRT/LRT systems with moderate coverage are less successful.

Duration of commute travel changes in the aftermath of Hurricane Sandy using accelerated failure time modeling

- Transportation Research Part A: Policy and Practice---2017---Eleftheria Kontou,Pamela Murray-Tuite,Kris Wernstedt

This paper used survey data from 397 commuters in the New York City area to determine the transportation-related disruptions and socio-demographic characteristics associated with the duration of home to work commute travel changes after Hurricane Sandy in 2012. The durations examined included those associated with working schedule/location alterations, home-to-work trip delays, telecommuting time, and the alteration of commuting patterns. Accelerated failure time fully parametric duration models, based on the Weibull distribution were used. The models' significant variables differed. Commuters with higher income or who were highly educated were more likely to prolong the time to return to normal working schedules and increase telecommuting duration. Longer commutes under normal circumstances (based on trip time) prolonged trip delays and the number of days that the commute was changed. Prolonged service recovery periods increased the duration of commute changes and delays, emphasizing the importance of timely transit service restoration. Policies like gas purchase restrictions were found to have trade-offs, since they can prolong the duration of commute changes and create queues at gas stations. Telecommuting can allow commuters to keep their productivity levels high during post-disaster periods.

Size matters: How vehicle body type affects consumer preferences for electric vehicles

- Transportation Research Part A: Policy and Practice---2017---Christopher D. Higgins,Moataz Mohamed,Mark R. Ferguson

Electric vehicles (EVs) hold great promise for reducing greenhouse gas emissions, yet achieving their environmental benefits depends on greater market uptake. While a growing body of literature has sought to offer information on consumer stated preferences for EVs, to date no research has examined how preferences for hybrid, plug-in hybrid, and battery electric vehicles are shaped by vehicle body size or type. The automobile market is differentiated with vehicle attributes that respond to heterogeneous consumer demands. We hypothesize that each bundle of attributes as it relates to vehicle body size also shapes demand for EVs. Using a large primary dataset, we segment respondents according to their preferred next vehicle body type (economy, intermediate, full-size sedan, luxury, minivan, sport utility, and pickup). Multivariate analysis of variance (MANOVA) results show significant differences in the socioeconomic, demographic, and psychological profile of consumers across the seven vehicle segments. From this, discrete choice models detail how vehicle type plays a significant role in the choicemaking behaviour of potential EV consumers. While factors like age, education, and the importance of fuel economy and reduced or eliminated emissions generally play a consistent role in improving the utility of EVs, our results also reveal significant heterogeneity in choice of powertrain across vehicle segments, with luxury and pickup buyers among the most distinct. The results offer useful information for marketing, policy, and research.

Bicycle sharing system ‘success’ determinants

- Transportation Research Part A: Policy and Practice---2017---Cyrille Médard de Chardon,Geoffrey Caruso,Isabelle Thomas

Many municipalities assert bicycle sharing systems (BSS) as having many benefits, justifying their adop-

tion, yet few explicitly state the purpose of their system making comparison or determination of success impossible. In addition, the apprehension of many BSS operators to share data further hinders comparison. This paper estimates the number of daily trips from publicly available data for 75 BSS case studies across the world and provides trips per bike per day scores as a comparison of performance and success. Results reveal that a third of case studies have fewer than the psychologically important one trip per bicycle per day. To ascertain what factors are associated with this metric we estimate models with independent variables related to system attributes, station density, weather, geography and transportation infrastructure. Our analysis provides strong evidence undermining the ‘network effect’ promoted by influential BSS policy makers that expanding system size increases performance. Finally our results describe and discuss causal variables associated with higher BSS performance.

Crowding in public transport: Who cares and why?

- Transportation Research Part A: Policy and Practice---2017---Luke Haywood,Martin Konig,Guillaume Monchambert

Crowding on public transport (PT) is a major issue for commuters around the world. Nevertheless, economists have rarely investigated the causes of crowding discomfort. Furthermore, most evidence on the costs of PT crowding is based on trade-offs between crowding, travel time and money. First, this paper assesses discomfort with PT crowding at various density levels across heterogeneous individuals using a different methodology. Based on a survey of 1000 Paris PT users, the negative relationship of in-vehicle density on reported satisfaction is similar to previous studies investigating PT crowding costs and stable across most individual characteristics. We also find a sensitive increase in crowding costs over users’ income. Second, we investigate the causes of this discomfort effect. We identify three key drivers: (a) dissatisfaction with standing and not being seated; (b) less opportunities to make use of the time during the journey; (c) the

physical closeness of other travelers per se.

Accounting for price endogeneity in airline itinerary choice models: An application to Continental U.S. markets

- Transportation Research Part A: Policy and Practice---2017---Virginie Lurkin,Laurie A. Garrow,Matthew J. Higgins,Jeffrey P. Newman,Michael Schyns

Network planning models, which forecast the profitability of airline schedules, support many critical decisions, including equipment purchase decisions. Network planning models include an itinerary choice model that is used to allocate air total demand in a city pair to different itineraries. Multinomial logit (MNL) models are commonly used in practice and capture how individuals make trade-offs among different itinerary attributes; however, none that we are aware of account for price endogeneity. This study formulates an itinerary choice model that is consistent with those used by industry and corrects for price endogeneity using a control function that uses several types of instrumental variables. We estimate our model using a database of more than 10million passenger trips provided by the Airlines Reporting Corporation. Results based on Continental U.S. markets for May 2013 departures show that models that fail to account for price endogeneity overestimate customers' value of time and result in biased price estimates and incorrect pricing recommendations. The size and comprehensiveness of our database allows us to estimate highly refined departure time of day preference curves that account for distance, direction of travel, number of time zones traversed, departure day of week and itinerary type (outbound, inbound or one-way). These time of day preference curves can be used by airlines, researchers, and government organizations in the evaluation of different policies such as congestion pricing.

Enhancing eco-safe driving behaviour through the use of in-vehicle human-machine interface: A qualitative study

- Transportation Research Part A: Policy and Practice---2017---Atiyeh Vaezipour,Andry Rakotonirainy,Narelle Haworth,Patricia Delhomme

The widespread reliance on motor vehicles has negative effects on both the environment and human health. The development of an innovative in-vehicle human-machine interface (HMI) has the potential to contribute to reducing traffic pollution and road trauma.

Sharing riders: How bikesharing impacts bus ridership in New York City

- Transportation Research Part A: Policy and Practice---2017---Kayleigh B. Campbell,Candace Brakewood

The objective of this research is to quantify the impact that bikesharing systems have on bus ridership. We exploit a natural experiment of the phased implementation of a bikesharing system to different areas of New York City. This allows us to use a difference-in-differences identification strategy. We divide bus routes into control and treatment groups based on if they are located in areas that received bikesharing infrastructure or not. We find a significant decrease in bus ridership on treated routes compared to control routes that coincides with the implementation of the bikesharing system in New York City. The results from our preferred model indicate that every thousand bikesharing docks along a bus route is associated with a 2.42% fall in daily unlinked bus trips on routes in Manhattan and Brooklyn. A second model that also controls for the expansion of bike lanes during this time suggests that the decrease in bus ridership attributable to bikesharing infrastructure alone may be smaller (a 1.69% fall in daily unlinked bus trips). Although the magnitude of the reduction is a small proportion of total bus trips, these findings indicate that either a large proportion of overall bikeshare members are substituting bikesharing for bus trips or that bikesharing may have impacted the travel behavior of non-members,

such as private bicyclists. Understanding how bike-sharing and public transit systems are interrelated is vital for planning a mutually reinforcing sustainable transport network.

I' m multimodal, aren' t you? How ego-centric anchoring biases experts' perceptions of travel patterns

- Transportation Research Part A: Policy and Practice---2017---Kelcie Ralph,Alexa Delbosc

Transport professional process an enormous range of information to help them accurately predict how, when and where people will use the transport system. Yet we know from a long-standing history of psychology research that people draw upon a range of mental shortcuts when making estimates about the world. Ego-centric anchoring and adjustment is a common example of a mental heuristic whereby people draw upon their own beliefs and experiences when estimating the behaviors and attitudes of others. Do transport professionals use ego-centric anchoring when estimating travel patterns? To find out we conducted a survey of transportation professionals (n=247) who were asked to reveal their own travel patterns and residential location and to estimate the travel patterns of millennials, generation X, and baby boomers.

A time-dependent stated preference approach to measuring vehicle type preferences and market elasticity of conventional and green vehicles

- Transportation Research Part A: Policy and Practice---2017---Cinzia Cirillo,Yan Liu,Michael Maness

The diversity of new vehicle technology and fuel markets, the governments' sustainable call to reduce energy consumption and air pollution lead to a change in the personal vehicle market. Considering the impact of these factors, a stated preference survey approach is adopted to analyze household future preferences for gasoline, hybrid electric, and battery electric vehicles in a dynamic marketplace. The stated choice experiment places respondents in a nine-year hypothetical time

window with dynamically changing attributes including vehicle purchasing price, fuel economy, recharging range, and fuel price. A web-based survey was performed during 2014 in the state of Maryland. The collected data include household social-demographics, primary vehicle characteristics, and vehicle purchasing preferences of 456 respondents during the year of 2014–2022. Mixed Multinomial logit (MMNL) models are employed to predict vehicle preferences based on households' socio-demographics and vehicle characteristics. The estimation results show that young people are more likely to buy vehicles with new technology, especially battery electric vehicles (BEV). Women with a high education level (bachelor degree or higher) prefer to choose hybrid electric vehicle (HEV) while men with a high education level are more likely to buy BEV. The estimated vehicle market elasticities with respect to vehicle price are from 1.1 to 1.8 for HEV and BEV, higher than those for gasoline vehicles from 0.6 to 1.0. The vehicle market cross-elasticities estimated by MMNL models range from 0.2 to 0.6. In addition, willingness to pay (WTP) of vehicle characteristics estimated by MMNL models provide a good understanding of household future vehicle preferences.

Fare evasion in public transport: A time series approach

- Transportation Research Part A: Policy and Practice---2017---Rodrigo Troncoso,Louis de Grange

An econometric model is presented that identifies the main variables explaining evasion of fare payment on a public transport system. The model uses a cointegration approach. The model parameters are estimated using data from the Santiago (Chile) bus system, where evasion has been measured at approximately 28%. The main results of the model are that (i) a 10% increase in the fare raises evasion by 2 percentage points and (ii) a 10% increase in inspections lowers evasion by 0.8 percentage points. An increase in unemployment, the third explanatory variable in the model, tends to induce a decrease in evasion, and vice versa. This counterintuitive finding may be explained by the fact that

those most vulnerable to job loss, and more likely to evade than the average user due to economic necessity, tend to reduce their use of the bus system when unemployment rises and increase it when unemployment falls.

Transport infrastructure, economic development and urbanization in India (1990–2011): Is there any causal relationship?

- Transportation Research Part A: Policy and Practice---2017---Tuhin Subhra Maparu,Tarak Nath Mazumder

Development of transport infrastructure has long been taken as a major tool in promoting economic development and urbanization of a region. However, it is quite debatable whether transport infrastructure promotes economic development and urbanization, or economic development and urbanization create demand first which leads to investment in transport infrastructure. Each of the views has theoretical support. Therefore, apart from theory, empirical evidence is required to establish direction of causality, which bears serious policy implications. This study looks into different sub-sectors of transport infrastructure to find its long-run relationship and direction of causality with economic development and urbanization. It first finds the order of integration of the variables and then tries to find their causal relationship using cointegration and Granger causality test approach for India between 1990 and 2011. It uses Vector Auto-Regression and Vector Error Correction model to find short-run and long-run causality. Results showed existence of long-run relationship between transport infrastructure and economic development, and the direction of causality is from economic development to transport infrastructure in most of the cases, thus drawing support in favor of Wagner's law.

The effect of BRT implementation and streetscape redesign on physical activity: A case study of Mexico City

- Transportation Research Part A: Policy and Practice---2017---Annie Chang,Luis Miranda-

Moreno,Jason Cao,Ben Welle

The reconfiguration of urban transportation system has emerged at the forefront of population-wide interventions to tackle physical inactivity. However, the effectiveness of these interventions remains understudied, especially in developing countries. Using self-reported physical activity data from pre- and post-intervention periods, this study examines the impact of bus rapid transit (BRT) and Complete Street implementation on walking and cycling levels of catchment area residents in Mexico City. Propensity score matching is applied to control for sociodemographics when evaluating intervention effects on walking for transport, walking for recreation, and cycling for transport. On average, individuals living in post-intervention conditions tend to achieve 29min more of walking for transport per week. However, the intervention effect on cycling for transport is insignificant. Using clustering techniques, intervention effects are evaluated across different sociodemographic groups. Women with low education experience the greatest increases in walking for transport. Sociodemographic clusters characterized by higher education experience improvements in recreational walking. Overall, BRT implementation and streetscape improvements enhance physical activity, specifically walking; and the impact of these interventions vary across different sociodemographic subgroups.

Hedonic value of high-speed rail services: Quantitative analysis of the students' domestic tourist attractiveness of the main Italian cities

- Transportation Research Part A: Policy and Practice---2017---Armando Cartenì,Luigi Paritota,Ilaria Henke

High-Speed Rail (HSR) is a transport mode that operates significantly faster than traditional services, using integrated and specialized rolling stock, and often dedicated tracks. These rapid transit services have profoundly impacted mobility habits on medium-long range journeys, and have also brought about social, economic, and environmental changes in the geographical

areas involved. HSR has become a successful “brand” , including not only faster trains, but also a number of other on-board services that increase rail attractiveness (e.g. restaurants, wi-fi connection, free newspapers, cinema, business areas and relaxation lounges).

Understanding the effects of transit benefits on employees’ travel behavior: Evidence from the New York-New Jersey region

- Transportation Research Part A: Policy and Practice---2017---Paola Carolina Bueno,Juan Gomez,Jonathan R. Peters,Jose Manuel Vassallo

Implementing effective travel demand management measures provides an opportunity to reduce transport dependence on the private car. There is growing acknowledgement that the strategy of implementing transit benefits may boost transit ridership and reduce personal vehicle use. This research contributes to the understanding of this issue by examining the relationship between commuter benefits and mode choice for commuting trips in the states of New York and New Jersey (US). Based on individual data from the Regional Household Travel Survey conducted by the New York Metropolitan Transportation Council and North Jersey Transportation Planning Authority, we adopted a multinomial logit model to identify the extent to which transport benefits to employees – including public transport-related, private transport-related and benefits for walking and cycling – promote changes in commuters’ modal split. The analysis shows that commuter benefits play a significant role in explaining observed travel patterns. Benefit programs that pay for auto expenses (e.g. toll payments, mileage reimbursement, free parking) are negatively correlated with transit, biking, and walking, while employer-funded benefit programs for transit passes and bike reimbursements increase their respective mode shares. This result confirms that promoting these types of measures is an effective policy to encourage the use of public transport modes, thus increasing efficiency and sustainability in daily mobility patterns.

Off the rails: The cost performance of infrastructure rail projects

- Transportation Research Part A: Policy and Practice---2017---Peter E.D. Love,Jingyang Zhou,David J. Edwards,Zahir Irani,Chun-Pong Sing

Governments in Australia place great emphasis on the development and expansion of their rail networks to improve productivity and service the increasing needs and demands from businesses and commuters. A case study approach is used to analyze the cost performance of 16 rail projects constructed by a contractor between 2011 and 2014, which ranged from AU\$3.4 to AU\$353 million. Findings indicate that scope changes during construction were the key contributors that lead to the amendment of each project’ s original contractual value. As a result, there is a need for public and private sector asset owners to establish a cost contingency using a probabilistic rather than a deterministic approach to accommodate the potential for scope changes during construction. To improve cost certainty during the construction of rail projects, it is suggested that use of collaborative forms of procurement juxtaposed with the use of Building Information Modelling and Systems Information Modelling are implemented. The utilization of such technological and process innovations can provide public and private sector asset owners charged with delivering and maintaining their rail networks with confidence projects can be delivered within budget and are resilient to unexpected events and adaptable to changing needs, uses or capacities.

What drives CO2 emissions from China’ s civil aviation? An exploration using a new generalized PDA method

- Transportation Research Part A: Policy and Practice---2017---Xiao Liu,Dequn Zhou,Peng Zhou,Qunwei Wang

Understanding the main drivers contributing to the increased CO2 emitted by airlines can inform carbon-reduction policies for the civil aviation sector. Production decomposition analysis (PDA) is a theoretical

tool widely used to investigate the factors influencing changes in CO₂ emissions. Instead of the standard constant returns to scale assumption, the study proposes a new generalized PDA method that considers the influence of changes in scale efficiency. The study used a panel data set for China's airlines during the period of 2007–2013 to conduct an empirical analysis and generate meaningful results. First, it was found that changes in Revenue Ton Kilometers is the largest factor contributing to increased civil aviation CO₂ emissions. Second, changes in potential energy intensity play a dominant role in decreasing CO₂ emissions for most airlines. Third, changes in production technology effects exert a relatively small influence on CO₂ emissions, and the effect of scale efficiency change positively contributes to curbing CO₂ emissions. Based on the PDA analysis, we propose policy implications related to civil aviation of China.

Bicycle-metro integration in a growing city: The determinants of cycling as a transfer mode in metro station areas in Beijing

- Transportation Research Part A: Policy and Practice---2017---Pengjun Zhao, Shengxiao Li

Bicycle-transit integration, in which cycling is used to as a transfer mode to/from transit station is widely believed to be one very important way of promoting a transit city and achieving efficient and sustainable urban transport systems. However, the empirical evidence for the determinants of people's choices to transfer by bicycle as a travel mode remain largely unstudied. This paper investigates this issue, using Beijing and its metro system as a case study. Using a multilevel logistic model, we found that travel distance is the most important influence on rates of cycling for transfer trips between metro stations and home or workplace. There were also socioeconomic influences, with young people being less likely to cycle and more likely to use buses. Middle- and high-income earners were more likely to drive than cycle, while low-income earners were more likely to take the bus. Personal attitudes are also influential—those who prefer cheap travel were more likely to cycle. Above results suggest

that the increasing city size and urban expansion are great challenges to cycling systems in growing cities. The presence of bicycle-sharing programs, mixed land use, and green parks in metro station areas were associated with greater rates of cycling transfer. In order to promote Bicycle-and-Ride schemes in metro station areas, education initiatives designed to influence behavior should be integrated with investment in bicycle infrastructure.

Complementarity and substitution between physical and virtual travel for instrumental information sharing in remote rural regions: A social network approach

- Transportation Research Part A: Policy and Practice---2017---Petr Matous

International development practitioners are highly optimistic that mobile phones can improve the lives of the inhabitants of remote rural areas in developing countries with an underdeveloped transportation infrastructure. However, the instrumental role of telecommunication is unclear in contexts where residents' information-sharing networks are strongly geographically constrained by their limited mobility. Empirical research on the interactions between telecommunication and travel in rural areas of developing countries is lacking.

Electronic ticketing systems as a mechanism for travel behaviour change? Evidence from Sydney's Opal card

- Transportation Research Part A: Policy and Practice---2017---Richard B. Ellison, Adrian B. Ellison, Stephen P. Greaves, Breno Sampaio

Smartcard and other forms of electronic ticketing have become integral to modern public transport systems. While aggregate ridership figures have generally been positive, little is known about the drivers behind these changes because of a lack of travel information on individuals before and after implementation of such systems. The current paper presents analysis from a naturalistic travel behaviour study of inner-city Sydney

residents that coincided with the phased introduction of the Opal smartcard system. Using a differences-in-differences methodology, results indicate significant reductions in car use of around 10min/day with commensurate increases in train use and incidental walking. This trend holds across income groups and is more pronounced for older residents. Results add further weight to the merits of simplifying ticket purchasing as part of a package of policy measures designed to increase public transport usage.

You are what you drive: Environmentalist and social innovator symbolism drives electric vehicle adoption intentions

- Transportation Research Part A: Policy and Practice---2017---Lee V. White,Nicole D. Sintov

Electric vehicles (EVs) have the potential to dramatically reduce vehicle emissions contributing to climate change without significantly reducing convenience or mobility. Despite their potential, EV market share remains low, necessitating research to identify factors that could encourage more widespread adoption. For instance, concern about climate change is associated with intent to adopt an EV, but little is known about mechanisms through which this concern may translate into action. This study builds on previous work investigating the roles of symbolic and instrumental attributes in low-emission vehicle adoption, focusing exclusively on EVs to better understand perceptions associated with their unique technical capabilities. Prior work has examined symbolism rather generally (e.g., in terms of status). We examine specific aspects of self-identity that EVs may reflect, representing the extent to which consumers perceive EVs as symbols that they are environmentalists and/or social innovators. In addition, extending prior work, we quantify the relative influence of these separate aspects of symbolism on EV adoption intentions alongside instrumental, psychological, and demographic factors. We find differing impacts of these two symbols on EV adoption intentions. Environmentalist symbolism is consistently the strongest predictor of adoption, across three dependent variables. Innovator symbolism predicts willingness to lease/buy

an EV, trailing only environmentalist symbolism in effect size, and outperforming instrumental attributes as well as psychological and demographic factors. Additionally, we examine a potential mechanism through which concern about climate change may translate into EV adoption intentions: we find that seeing EVs as environmentalist and social innovator symbols partially mediates the relationship between concern about climate change and EV adoption intentions. These results have implications for EV marketing and policy, and suggest that emphasizing the potential for EVs to reinforce specific self-identities may be a more promising strategy to increase adoption rates than emphasizing instrumental attributes such as fuel efficiency.

Get on board: Assessing an all-door boarding pilot project in Montreal, Canada

- Transportation Research Part A: Policy and Practice---2017---Ahmed El-Geneidy,Dea van Lierop,Emily Gris ,Genevi ve Boisjoly,Derrick Swallow,Lesley Fordham,Thomas Herrmann

Transit agencies often focus on developing strategies aimed at reducing travel time to increase passengers' satisfaction. One strategy used by transit agencies to reduce passenger activity time, and accordingly travel times, is the implementation of all-door boarding – a service allowing transit users to board and alight vehicles through any door. The present study uses data collected in Montreal, Canada, to assess the impacts of an all-door boarding pilot project from two points of view: (1) operationally through passenger activity time, and (2) by assessing passenger satisfaction. Operationally, the results reveal that when compared to a similar bus route that does not allow all-door boarding, the all-door boarding strategy shows a savings of five percent in passenger activity time at regular stops, while time savings at high passenger activity stops such as metro stations experienced time savings of around 19 percent. Thus, savings are maximized at stops with high passenger demand. Additionally, with regard to user perceptions, the results reveal that passengers who use the all-door boarding service are more satisfied with bus service, particularly with on time

performance. Overall, the results of this study demonstrate that all-door boarding is an effective strategy to improve the quality of service due to the associated time savings and increased customer satisfaction. Finally, the study offers important recommendations to transit planners and policy makers to effectively implement and maximize the benefits of an all-door boarding policy based on statistical analysis and on-site observations.

Forecasting greenhouse gas emissions performance of the future Australian light vehicle traffic fleet

- Transportation Research Part A: Policy and Practice---2017---Ivan Iankov,Michael A.P. Taylor,Derek Scafton

Knowledge of real-world greenhouse gas emission rates for traffic is necessary for forecasting transport greenhouse gas emissions. This paper presents greenhouse gas emission rates that assist forecasting and modelling greenhouse gas emissions from light vehicles, i.e. private passenger vehicles and light commercial vehicles under realistic traffic conditions. It develops confidence intervals for market shares by categories for fuel or energy efficiency on the Australian market for new light vehicles for the period 2016–2030. The model estimates realistic market scenarios by simulating likely variations of capital and running costs of alternatives for car buyers and by considering buyers' willingness-to-pay for fuel/energy efficiency. The results suggest that market forces will be insufficient to promote battery electric vehicles and plug-in hybrid electric vehicles in Australia. On average the widths of the 95% confidence intervals for greenhouse emission rates are about 10–15% of the magnitudes of the emission rates, so that analysts can forecast transport greenhouse gas emissions with a reasonable level of certainty. The study suggests that policy interventions to accelerate the uptake of low or zero emitting vehicles may be required.

Development of joint models for channel, store, and travel mode choice: Grocery shopping in London

- Transportation Research Part A: Policy and Practice---2017---Esra Suel,John W. Polak

The nature of shopping activity is changing in response to innovation in retailing and the growth in online channels. There is a growing interest from transport researchers, policy makers, marketing and retail businesses in understanding the implications of this change. However, existing tools and techniques developed for analysing behaviour in traditional retail environments do not adequately represent emerging complexities resulting from digital innovation. In this paper, we advance existing destination and mode choice models by incorporating online channels in a unified framework. This is a critical extension to existing transport literature on destination choice which largely ignores online activity. Specifically, we develop discrete choice models using elemental store (including both online and in-store) alternatives for joint choice of channel, store, and travel mode. We demonstrate the use of a widely-accepted consumer panel dataset with minor modifications, for the first time in transport research, together with API based data mining tools that offer great potential for enrichment.

Corporate social responsibility and classical competitive strategies of maritime transport firms: A contingency-fit perspective

- Transportation Research Part A: Policy and Practice---2017---Kum Fai Yuen,Vinh V. Thai,Yiik Diew Wong

Drawing on path dependence theory, this paper argues that the financial benefits from engaging Corporate Social Responsibility (CSR) are contingent on the primary competitive strategy employed by shipping firms. Survey data were collected from 223 shipping firms operating in Singapore and analysed using hierarchical regression modelling. The results reveal that there are greater financial benefits for shipping firms employing

the strategy of differentiation (rather than that of low-cost) to implement CSR by virtue of greater mass in existing complementary resources (operational fit) as well as inherent congruency with customers' value orientation (customer fit).

A comparative study of funnel shape bottlenecks in subway stations

- Transportation Research Part A: Policy and Practice---2017---Lishan Sun,Wei Luo,Liya Yao,Shi Qiu,Jian Rong

A bottleneck typically denotes a narrowed area that reduces the flow through a channel. Congestion is expected to form at bottlenecks such as escalator and staircase entrances with high rate of passenger flow, which could decrease walking efficiency and passenger comfort. Currently, no special treatment is adopted in most of the conventional bottlenecks in subway stations. This study conducts a series of pedestrian experiments to investigate the effectiveness of adding a funnel shape buffer zone in front of the bottleneck entrance. Different angles of funnel bottleneck are experimented under different pedestrian volumes. By analyzing factors including walking speed, individual passing time, total passing time, and time gap, it is found that funnel shape would overall improve the traffic effectiveness of the bottlenecks, especially when the flow rate is high. The recommendation of setting funnel angle depends on passenger flow level, the optimal of which should be between 46° and 65°. This study provides a rationale for agencies to improve the current pedestrian traffic efficiency at bottlenecks.

Impact of hourly parking pricing on travel demand

- Transportation Research Part A: Policy and Practice---2017---Mehdi Nourinejad,Matthew J. Roorda

Efficient parking management strategies are vital in central business districts of cities where parking is limited and congestion is intense. Hourly parking pricing

is a common parking management strategy where vehicles pay based on their parking duration (dwell time). In this paper, we derive comparative static effects for a small network to show that road pricing and hourly parking pricing are structurally different in how they influence the traffic equilibrium with elastic demand. Whereas road pricing strictly reduces demand, hourly parking pricing can reduce or induce demand depending on the parking dwell time elasticity (to the hourly parking price). When dwell time is elastic, demand always increases with parking price. However, when dwell time is inelastic, demand may increase or decrease with the parking price. Hence, hourly parking pricing can actually cause higher congestion and decay social welfare if imposed imprudently. For larger networks, we present a Variational Inequality model that characterizes the emergent equilibrium. Numerical experiments on a large network validate our analytical findings from a smaller and stylized case study. Our results also show a lower standard deviation in the parking search time (i.e., time to find a parking spot) when dwell time is highly elastic to the hourly parking price.

5years of Dutch eco-driving: Managing behavioural change

- Transportation Research Part A: Policy and Practice---2017---Ralph S. Luijt,Maarten P.F. van den Berge,Helen Y. Willeboordse,Jan H. Hoogenraad

In the past years a new management approach has been developed to stimulate and monitor energy savings at the largest Dutch Train Operating Company (TOC), Nederlandse Spoorwegen (NS). This so called “Energie Zuinig Rijden” (EZR), or eco-driving approach has led to yearly energy savings of up to 5% from 2010 to 2015.

Role of governance in the achievement of 20-fold increase in bus ridership – A case study of Taichung City

- Transportation Research Part A: Policy and Practice---2017---Liang-Tay Lin,Chao-Fu

In the face of continuing development and the demands associated with the active lifestyle of its residents, the Taichung City Government needed to construct a complete public transportation network with high quality bus service. Since 2002, the Taichung City Government has proposed a series of reforms to gradually improve bus operations. As a result, bus ridership grew more than 20 times from 13,000 per day in 2001 to 330,000 per day in 2014. These successful reforms have led to increased public acceptance of bus service and created a win-win-win situation for the government, the public and the bus companies. The main purpose of this paper is to analyze the crucial strategies and policies that resulted in the successful implementation of bus reforms in Taichung City. The causes and effects, in terms of new institutional economics, are also discussed. The results showed that before the implementation of reforms, the Taichung bus market was locked in a vicious cycle. The Taichung City Government re-shaped the market structure through fare adjustment, electronic fare payment, subsidies and promotional efforts. Through institutional change, a new market-oriented framework was created. Institutional change is a gradual process that involves numerous interactions among relevant parties and interest groups. Policy progress is not made by the government alone, but rather through limited consensus among interest groups. The results of this paper also suggested that the government play the role of initiator of a new institutional environment and provide direction for institutional evolution. The case of Taichung City bus reform provides a good reference for similar-sized cities planning to upgrade or reform their public transportation system.

Impact of high-speed rail on China' s Big Three airlines

- Transportation Research Part A: Policy and Practice---2017---Qiong Zhang, Hangjun Yang, Qiang Wang

The Chinese airline industry has grown rapidly in the last 30 years, with China' s air travel market becoming

the second largest in the world since 2005. However, the fast development of China' s high-speed rail (HSR) is challenging the airline industry' s growth. Using quarterly route level panel data of air passenger demand from 2010 to 2013, this paper analyzes the effects of HSR on China' s Big Three airlines. We find that the entry of HSR has a strong negative impact on the air transport demand, and the air demand becomes much more elastic after the introduction of parallel HSR service. Moreover, we find that while the impact of HSR on airlines is severe in thin markets, it is insignificant in thick markets. We also find that the price difference between airfare and HSR fare plays an important role when passengers choose between HSR and air transport. In terms of service levels, HSR travel time has much stronger effect on the air transport demand than HSR service frequency.

Future bus transport contracts under a mobility as a service (MaaS) regime in the digital age: Are they likely to change?

- Transportation Research Part A: Policy and Practice---2017---David Hensher

The digital age has opened up new opportunities to improve the customer experience in using public transport. Specifically, we see the role of smart technology in the hands of customers as the new rubric to deliver services that are individualised to the needs and preferences of current and future public transport users. This frontline of service delivery has become known as mobility as a service (MaaS) whereby an individual can book a service delivered through a range of possible modes of transport. At one extreme we have point-to-point car based services such as Uber, Lyft, BlaBlaCar and RydHero (for children), with futuristic suggestions of these gravitating to driverless vehicles (cars and buses). Variations around this future are bus-based options that include smart bookable 'point-via-point-to-point' services that offer up options on travel times and fares (with the extreme converting to the point-to-point car service, possibly also operated by a bus business); as well as the continuation of conventional bus services (with larger buses) where the market for

smart MaaS is difficult or inappropriate to provide (e.g., contracted (often free) school bus services). This paper, as a think piece, presents a number of positions that could potentially represent future contexts in which bus services might be offered, recognising that a hybrid multi-modal state of affairs may be the most appealing new contract setting, enabling the design of contracts to be driven by the mode-neutral customer experience, and the growing opportunity to focus on MaaS. We suggest that the adrenal rush for mobility services, however, may not deliver the full solution that supporters are suggesting.

Government versus toll funding of road projects – A theoretical consideration with an ex-post evaluation of implemented toll projects

- Transportation Research Part A: Policy and Practice---2017---James Odeck
- Socioeconomic principles to choose between government and toll funding are developed. • The principles are then tested on 25 Norwegian toll projects that have been implemented. • We find that BCAs assume government funding only even if projects are funded by tolls. • Furthermore, the marginal cost of government funds were not included in the analyses. • Even so, 50% of tolls generated higher B/C ratios as compared to government funding.

Project characteristics and performance in Europe: An empirical analysis for large transport infrastructure projects

- Transportation Research Part A: Policy and Practice---2017---Giorgio Locatelli,Diletta Colette Invernizzi,Naomi J. Brookes
- Infrastructure megaprojects are historically associated with poor delivery, both in terms of cost and schedule performance. Large Transport Infrastructure Projects (TIPs) are amongst the most controversial and are often delivered late, over budget, and providing less benefit than expected. While there is a growing theoretical body of literature addressing TIPs, empirical research

is still required to determine which TIPs characteristics affect TIPs schedule & cost performance. This paper addresses this issue, applying an empirically-based methodology to a dataset of 30 European TIPs. The results highlight the importance of financial support from the government and the strong influence of both external and internal stakeholders, mainly in relation to their early engagement and to their nationality. Technological characteristics and the presence of Special Purpose Entities are also correlated with the TIPs performance. These key findings both support and contradict the literature, and are relevant for both policy makers and project managers during the decision-making process, planning and delivery of TIPs.

The external costs of private versus public road transport in the Metropolitan Area of Santiago, Chile

- Transportation Research Part A: Policy and Practice---2017---Luis Ignacio Rizzi,Cristobal De La Maza
- We estimate marginal external costs per kilometer for car and bus in the Metropolitan Area of Santiago, Chile, in terms of congestion, road damage, accidents, air pollution and noise. Estimates are provided for both peak and off-peak periods. To carry out our analysis, we collected and integrated the output of several local studies. These estimates should contribute to a better debate on how to manage efficiently motor vehicles externalities by means of both (pigouvian) tax instruments, public transport subsidies and regulation. We also offer a comparison of our results with those reported in the literature.

Why do drivers continue driving while fatigued? An application of the theory of planned behaviour

- Transportation Research Part A: Policy and Practice---2017---Kang Jiang,Feiyang Ling,Zhongxiang Feng,Kun Wang,Cheng Shao
- Fatigued driving is one of the major contributors to

road crashes around the world. To explore factors affecting fatigued driving behaviour from the perspective of social psychology, a questionnaire was designed based on the theory of planned behaviour.

Testing for inertia effect when a new tram is implemented

- Transportation Research Part A: Policy and Practice---2017---Rosa Marina González,Ángel Simón Marrero,Elisabetta Cherchi

Ignoring the inertia effects on transport-mode choice behavior may lead to erroneous decisions in transport policy. Around changes in the transport system, the majority of studies on inertia have relied on combining Revealed Preferences (RP) and Stated Preferences (SP) obtained prior to the introduction of new transport modes and measuring inertia as the effect that the real choices have on the choices in the hypothetical new scenarios. In this study, we analyze the role of the inertia using a novel panel data from the same set of individuals composed of two waves. The first wave was gathered before a new tram came into service and consisted of a RP survey and a SP survey which included the new public tram as a hypothetical alternative. The second wave consisted of a RP survey conducted two years later, after the tram started operating. Using these two waves, we estimate panel mixed logit models and found a significant inertia effect only between the RP waves which, having accounted for changes in other factors, increases the probability of choosing the car after the tram implementation. However, we did not find inertia effect on SP, hence taking into account only the RP-SP outcomes before tram might have led to wrong conclusions about the effect of the transport intervention on the modal share. Furthermore, we compare models with and without inertia effect and conclude that the models with inertia provide better fit to data, smaller direct car elasticities and increasing asymmetric effects between the car and public transport.

Daily activity-travel scheduling behaviour of non-workers in the National Capital Region (NCR) of Canada

- Transportation Research Part A: Policy and Practice---2017---Khandker Nurul Habib,Wafic El-Assi,Md. Sami Hasnine,James Lamers

This paper uses household travel survey data (of the National Capital Region of Canada) and a comprehensive random utility maximizing travel options modelling approach to investigate non-workers' activity-travel scheduling behaviour. The empirical model reveals that the presence of children shapes the daily activity-travel patterns of non-workers by reducing the flexibility of out-of-home activity-type choices. Availability of private cars increases flexibility in travelling and increases the spread of spatial locations of out-of-home activities of non-workers. Income plays a significant role in non-workers' activity-travel behaviour and it seems that non-workers from lower to middle-income households are less active (return home early) than those living in higher income households. In general, it is found that male non-workers are less active than the female non-workers and it is also evident that non-workers living in single detached houses are less active (return home early) than those living in condos/apartments. These findings have an implication to health issues as the average age of non-workers is over 50years and the majority of detached houses are far from the central business district.

Comparing car-sharing schemes in Switzerland: User groups and usage patterns

- Transportation Research Part A: Policy and Practice---2017---Henrik Becker,Francesco Ciari,Kay W. Axhausen

Free-floating car-sharing schemes operate without fixed car-sharing stations, ahead reservations or return-trip requirements. Providing fast and convenient motorization, they attract both public transportation users and (former) car-owners. However, given their highly flexible nature and different pricing structures, previous findings on user groups and environmental impact of

station-based car-sharing may not be easily transferable. Therefore, this research uses survey data to compare user groups and usage patterns of a free-floating and station-based car-sharing service both operating in the city of Basel, Switzerland. The findings suggest, that the schemes indeed attract different user groups and are also used differently. Moreover, we see, that car-sharing membership is governed by other factors than car-sharing activity.

Leasing and profitability: Empirical evidence from the airline industry

- Transportation Research Part A: Policy and Practice---2017---Sylvain Bourjade,Regis Huc,Catherine Muller-Vibes

In this paper, we empirically measure the impact of aircraft leasing choices on airlines financial performance. We use public data on 73 airlines operating worldwide over the period 1996–2011. In estimating the impact of leasing on profitability, we control for potential endogeneity by applying robust instrumental variables estimation, while introducing a set of individual and macroeconomic factors. Our results are threefold. First, we identify a non-monotonic and concave effect of leasing on an airline's profit margin, suggesting decreasing marginal returns to leasing in this sector. This is an original finding for the industry. We also derive a confidence interval for the optimal level of leasing. Second, we show that the impact of leasing on an airline's operating profit is stronger for Low Cost Carriers than for Full Cost Carriers: deviating from the optimal level of leasing might be more harmful for a LCC than for a legacy carrier. Finally, we analyze how an airline's experience affects the relationship between leasing and profitability.

The effect on CO2 emissions of taxing truck distance in retail transports

- Transportation Research Part A: Policy and Practice---2017---Kenneth Carling,Johan Håkansson,Xiangli Meng,Niklas Rudholm

To finance transportation infrastructure and to address

social and environmental negative externalities of road transports, several countries have recently introduced or consider a distance based tax on trucks. In competitive retail and transportation markets, such tax can be expected to lower the demand and thereby reduce CO2 emissions of road transports. However, as we show in this paper, such tax might also slow down the transition towards e-tailing. Considering that previous research indicates that a consumer switching from brick-and-mortar shopping to e-tailing reduces her CO2 emissions substantially, the direction and magnitude of the environmental net effect of the tax is unclear. In this paper, we assess the net effect in a Swedish regional retail market where the tax not yet is in place. We predict the net effect on CO2 emissions to be positive, but off-set by about 50% because of a slower transition to e-tailing.

A forecasting approach for truckload spot market pricing

- Transportation Research Part A: Policy and Practice---2017---Aysenur Budak,Alp Ustundag,Bulent Guloglu

Logistics is an important sector considering the increasingly competitive nature of industry today. Large-scale companies and third-party logistics providers want the most economical and reliable forecasting mechanism for pricing the truckload spot market in the sphere of logistics and supply chains. This paper investigates the price forecasting of the truckload spot market, which is an important area for the determination of future value from the viewpoint of truckers by considering comprehensive variables. Two methodologies are used to determine truckers' spot price in the freight transport process, which are the artificial neural network and quantile regression, and a price forecasting framework is created. The framework is applied to two approaches: a route-based model and a general model in which all routes are considered together. Real data are used to demonstrate the applicability and feasibility of the proposed method. In this scope forecast performances can be assessed, the best methodology and approach can be selected, and projections can be

carried out.

ICT adoption in multimodal transport sites: Investigating institutional-related influences in international seaports terminals

- Transportation Research Part A: Policy and Practice---2017---Adrian E. Coronado Mondragon, Christian E. Coronado Mondragon, Etienne S. Coronado

Seaports represent a major component of multimodal transport networks and they are key in the operation of supply chains and global logistics. In multimodal transport networks it is well acknowledged the use of information and communication technology (ICT) can deliver benefits that include real time track and trace, visibility and reduced lead-time, among others. Given the importance of the benefits associated to the adoption of ICT in the operation of multimodal transport networks, this work uses institutional-related theories in a multiple-case study comprising seven seaports terminals located in two continents. The purpose of the study is to identify key elements that affect and influence the adoption of ICT to support interoperability and connectivity in multi-modal seaport terminal operations. The analysis is used to identify groupings of influence linked to elements comprising institutional-related theories like coercion and mimesis, part of institutional isomorphism, among others. The study shows that both government legislation and dominant organizations running ports in various geographical locations exert great influence regarding ICT adoption policies in seaport terminals. The adoption of ICT has become important given the proliferation of technologies, the increasing need for track and trace capabilities and the economic impact of seaports terminals.

Image, not environmentalism: A qualitative exploration of factors influencing vehicle purchasing decisions

- Transportation Research Part A: Policy and Practice---2017---Rebecca J. Hafner, Ian Walker, Bas Verplanken

Previous quantitative research has suggested people take environmental impact into account when choosing cars, and are largely uninfluenced by issues of image. However, neither of these claims appears to reflect current car buying behaviour in the UK. We hypothesised this may be due to the nature of the questions typically used in earlier research, which may have prompted participants to consider environmental issues, and downplay the role of image, more than they would spontaneously. The current research provides a qualitative exploration of factors important to people when deciding which car to buy. Open-ended discussion with recent car-buyers revealed the factors which were most important during the participants' decision making processes, without prompting participants to agree with ideas raised by the experimenter. These issues were explored in two studies, using a series of focus groups (Study 1), and one-on-one interviews (Study 2). In both studies, the two most central factors were issues of practicality and finance, consistent with previous research. However, unlike in previous research, both studies found image had substantial impact on purchasing decisions. Further, earlier explicit surveys claimed people often considered environmental factors when choosing a vehicle, yet these were hardly mentioned in the current studies. This highlights the importance of using a range of research methods when studying personal travel decisions. Key areas for follow-up research and implications for policy makers aiming to increase uptake sales of low-carbon cars are discussed.

Improving the electrification rate of the vehicle miles traveled in Beijing: A data-driven approach

- Transportation Research Part A: Policy and Practice---2017---Meng Li, Yinghao Jia, Zuojun Shen, Fang He

Electric vehicles (EV) are promoted as a foreseeable future vehicle technology to reduce dependence on fossil fuels and greenhouse gas emissions associated with conventional vehicles. This paper proposes a data-driven approach to improving the electrification rate of the vehicle miles traveled (VMT) by taxi fleet in Beijing. Specifically, based on the gathered real-time

vehicle trajectory data of 46,765 taxis in Beijing, we conduct time-series simulations to derive insights for the public charging station deployment plan, including the locations of public charging stations, the number of chargers at each station and their types. The proposed simulation model defines the electric vehicle charging opportunity from the aspects of time window, charging demand and charger availability, and further incorporates the heterogeneous travel patterns of individual vehicles. Although this study only examines one type of fleet in a specific city, the methodological framework is readily applicable to other cities and types of fleet with similar dataset available, and the analysis results contribute to our understanding on electric vehicle's charging behavior. Simulation results indicate that: (i) locating public charging stations to the clustered charging time windows is a superior strategy to increase the electrification rate of VMT; (ii) deploying 500 public stations (each includes 30 slow chargers) can electrify 170million VMT in Beijing in two months, if EV's battery range is 80km and home charging is available; (iii) appropriately combining slow and fast chargers in public charging stations contributes to the electrification rate; (iv) breaking the charging stations into smaller ones and spatially distributing them will increase the electrification rate of VMT; (v) feeding the information of availability of chargers in charging stations to drivers can increase the electrification rate of VMT; (vi) the impact of stochasticity embedded in the trajectory data can be significantly mitigated by adopting the dataset covering a longer period.

Modeling the uptake of plug-in vehicles in a heterogeneous car market using a consumer segmentation approach

- Transportation Research Part A: Policy and Practice---2017---Christian Brand,Celine Cluzel,Jillian Anable

There is broad agreement on the need for substantial use of low carbon vectors in the long term in the transport sector. Electrification, via mass market adoption of plug-in vehicles (i.e. battery electric and plug-in hybrid electric vehicles), has emerged as a front run-

ner for road transport across the globe, but there are concerns that the pace and extent implied by many modeling studies is problematic and that assessment of (a) the heterogeneity in the market, (b) other low carbon vectors (e.g. conventional hybrids, hydrogen fuel cell) and (c) life cycle energy and environmental impacts have been relatively neglected. This paper aims to fill these gaps by examining the timing, scale and impacts of the uptake of plug-in vehicles in the heterogeneous UK car market from a consumer perspective. To achieve this aim it (a) brings together a bespoke disaggregated model of the transport-energy-environment system (the UK Transport Carbon Model) with previous work by the authors on heterogeneity in the demand for and supply of plug-in vehicles and (b) applies the improved model to develop future low carbon scenarios that assess the potential impact of different investment pathways and policy approaches to the electrification of cars with the view to meeting the UK's legally binding carbon budgets to 2050. The results show the importance of accounting for the heterogeneity in and dynamic nature of the car market in terms of new technology adoption by private consumers, so called 'user choosers' and fleet managers, as well as accounting for potential effects on wider life cycle emissions resulting from different uptake pathways. It allows an assessment of the effectiveness of different policy instruments, market conditions (vehicle supply, private vs fleet market, vehicle segments) and social factors (consumer awareness, range "anxiety", perceived charging requirements) on different consumer segments, thus providing more policy-focused conclusions on the likely pathways to high penetration of plug-in vehicles that may be required to meet future carbon and air quality targets.

The impact of restricted driver's licenses on crash risk for older drivers: A systematic review

- Transportation Research Part A: Policy and Practice---2017---Mark Asbridge,Ediriweera Desapriya,Rachel Ogilvie,Jenny Cartwright,Vahid Mehrnoush,Takuro Ishikawa,Dinesh Nuwan Weerasinghe

As the Canadian population ages, there is an urgent need to identify evidence-informed strategies that have the potential to enhance older adults' safety and independent mobility. Previous research has demonstrated the positive impact of continued independent mobility on older adults' quality of life, through improvements in health, and community engagement. Restricted driver licensing policies have been mandated in several countries, with the goal of facilitating traffic safety and independent mobility for older drivers. Studies testing the effectiveness of these policies have produced mixed findings; a systematic examination of the impact of restricted driver licensing policies on reducing morbidity and mortality among senior drivers is warranted.

Optimal bus transit route packaging in a privatized contracting regime

- Transportation Research Part A: Policy and Practice---2017---Ashish Nayan,David Z.W. Wang

This study presents an optimization model as a methodology for the transit regulator (or a government authority) to design bus transit route packages to be tendered out to contesting operators through competitive tendering (CT). The optimal route packaging takes into account the perspectives of all stakeholders in a bus transit system- the commuters, operators and the regulator. The problem is formulated as a Mixed Integer Nonlinear Programming (MINLP) problem. To solve the formulated MINLP, we transform it into a Mixed Integer Linear Program (MILP) by using linearization techniques so that global optimality of the solution could be guaranteed. A numerical study is then performed on a real-life transit network to evaluate the model validity. The proposed methodology provides a comprehensive decision making framework for the regulator contemplating to contract out bus transit route packages through CT so as to achieve the objectives of encouraging competition, ensuring the attractiveness of the bus transit market to contesting operators and meeting commuters' expected service levels.

Private financing and mobility management of road network with tradable credits

- Transportation Research Part A: Policy and Practice---2017---Yue Bao,Ziyou Gao,Hai Yang,Meng Xu,Guangmin Wang

Tradable credits have been recognized as a powerful instrument and are increasingly used in many fields. This paper employs the tradable credits scheme on traffic mobility management and private provision of public transportation infrastructure through a novel kind of private financing of public road: build-equity-credit (BEC) scheme, hoping to achieve a triple win. Namely, the government can achieve its objectives (e.g. construction of the new road, desired traffic condition, certain vehicle emissions threshold) without its own capital, the private firm can receive its expected profit with less public' s resistance and the travelers can enjoy less congested traffic with a negligible cost. Moreover, many issues that occurred upon the termination of the traditional private financing (e.g. build-operate-transfer) scheme, such as severe congestion, explosion of travel demand and lack of management and maintenance, can be avoided in BEC. A general bi-level programming problem is formulated to model the determination of capacity of the new road and the tradable credits scheme in BEC scheme. The properties of several different BEC scenarios are investigated. Generally, the link service level in BEC is not constant but depends on multiple factors. Under some conditions, the total market value of the credits charged on the new link can offset its construction cost and the profit of the private firm can always be nonnegative.

An empirical analysis of bike sharing usage and rebalancing: Evidence from Barcelona and Seville

- Transportation Research Part A: Policy and Practice---2017---Ahmadreza Faghih-Imani,Robert Hampshire,Lavanya Marla,Naveen Eluru

Over 400 cities around the world have deployed or have plans to deploy a bike sharing system. However,

the factors that drive their usage and the amount of rebalancing they require are not known precisely. A knowledge of these factors would allow cities to design or modify their systems to increase usage while lowering rebalancing costs. We collect station-level occupancy data from two cities and transform station occupancy snapshot data into station level customer arrivals and departures to perform our analysis. Specifically, we postulate that arrivals and departures from stations can be separated into: (i) arrivals (and departures) due to consumers, and (ii) arrivals (and departures) due to the system operators for rebalancing the system. We then develop a mixed linear model to estimate the influence of bicycle infrastructure, socio-demographic characteristics and land-use characteristics on customer arrivals and departures. Further, we develop a binary logit model to identify rebalancing time periods and a regression model framework to estimate the amount of rebalancing. The research is conducted using bike sharing data from Barcelona and Seville, Spain. The resulting modeling framework provides a template for examining bicycle rebalancing in different contexts, and a tool to improve system management of bicycle sharing systems.

The impact of congestion charging on social capital

- Transportation Research Part A: Policy and Practice---2017---Luke A. Munford

We analyse a new data set to examine how congestion charging policies affect an individual's investment in social capital. We exploit a (quasi-) natural experiment - the implementation of the Western Extension Zone (WEZ) to the London Congestion Charging zone in 2007. We measure investment in social capital by using the frequency of visits to friends and family before and after the implementation of the WEZ. Using longitudinal data collected in January and November 2007 made available by Transport for London, we perform difference-in-difference analysis, using both OLS and interval regression, with the treatment group defined as those who used a car to make visits pre-WEZ. We observe large and statistically significant reductions in

visits as a result of the WEZ, with, for example, a reduction of around 20 visits a year to friends. The effect of the WEZ on the number of visits to act as an informal carer is much larger, with reductions of around 100 visits a year. Given that the changes occurred in such a small time frame (10 months), we conclude that the WEZ is likely to be the main driver of these reductions.

Beyond transport time: A review of time use modeling

- Transportation Research Part A: Policy and Practice---2017---Sergio Jara-Díaz, Jorge Rosales-Salas

Time allocation literature coming from all disciplines is reviewed and organized by means of a conceptual classification. A brief account of the origins and evolution of the modeling perspectives on time use research is presented including activity types and overall time use models. The lack of integration across disciplines is identified as a major limitation.

Challenges and prospects of applying asset management principles to highway maintenance: A case study of the UK

- Transportation Research Part A: Policy and Practice---2017---Raj Shah, Oliver McMann, Fiona Borthwick

Past models and tools that support in the decision making process based on Asset Management Principles (AMP) are lacking in terms of the effective outcomes and transparency of the process in the highway maintenance. There is also little research on how to align the decision areas when applying AMP and how to improve the inclusive effectiveness. Hence, the paper focuses on examining the challenges and prospects of applying AMP in a highway maintenance agency or department. An exploratory research method was used through an extensive review of literature and an industry survey. The findings from the literature and case study review were used to design a questionnaire and conduct the survey. The survey results revealed that the AMP are

only being implemented ineffectively in maintaining highways, and a strong commitment is required to improve the asset management capability for effective use of the asset data. It is highly recommended that the Highway Agency should issue a guideline for implementing asset management policy and also encourage associate departments to achieve asset management maturity level 3 so that ISO55000 certification can be achieved. The study concludes that there is still substantial work needed within the asset management process, particularly in highway maintenance before its effectiveness can be realised and measured.

Multi-criteria analysis model to evaluate transport systems: An application in Florianópolis, Brazil

- Transportation Research Part A: Policy and Practice---2017---Samuel Borges Barbosa,Marcelo Gitirana Gomes Ferreira,Elton Moura Nickel,Jorge Alcides Cruz,Fernando Antônio Forcellini,Jéssica Garcia,José Baltazar Salgueirinho Osório de Andrade Guerra

Urban mobility via public transport is currently one of the major challenges facing policymakers and residents. The increasing demand for transport, the growing number of vehicles on the road, and the improvement of road infrastructure in large cities are some of the trends that need to be addressed by government agencies and society as a whole. Public transport services should play an important role, providing high quality services for users, being more attractive to potential users, and providing an efficient use of urban space. However it is necessary to understand how users evaluate the available services by evaluating the objective and subjective aspects involved in the perception of service quality. The present study aims to develop a multi-criteria model to assess urban public transport, with an approach centered on user perceptions. Through the use of multi-criteria evaluation, it is possible to identify the objective and subjective factors that determine a user's opinion of the service, enabling improvements. The study is applied in a specific transport system, the Integrated Public Transport System (SIT), implemented

in Florianópolis and other Brazilian cities.

Models for estimating zone-level bike kilometers traveled using bike network, land use, and road facility variables

- Transportation Research Part A: Policy and Practice---2017---Ahmed Osama,Tarek Sayed,Alexander Y. Bigazzi

Despite the increase in studies that link bike trips with various correlates, research gaps remain, including a lack of empirical tools to predict bike kilometers traveled (BKT) using comprehensive measures. The present study evaluates the impacts of network indicators, land use, and road facility on BKT by developing zone-level ridership models. Land use and road facility data were collected for 134 traffic analysis zones (TAZs) in the City of Vancouver, Canada. In addition, graph theory was used to obtain bike network indicators for each TAZ, including measures of connectivity, continuity, linearity, slope, and length of the bike network. A full Bayesian approach, accounting for spatial random effects among the TAZs, was used to develop the models. The results suggested that more connected, dense, flat, continuous, recreational, and off-street bike networks yielded higher BKT. Models that accounted for spatial effects were found to have better fit than those that did not incorporate spatial effects, which implies the importance of considering spatial effects while modeling BKT at the aggregate level. The models provide insights about the factors that influence BKT and information about the spatial variability of the bike travel within a city, which can be useful for planning bike networks.

Value of travel time savings and willingness to pay for regional aviation

- Transportation Research Part A: Policy and Practice---2017---Rico Merkert,Matthew Beck

Despite their immense importance to regional and remote communities, regional air services are often commercially not viable and need public support. That

support, and hence the existence of such lifeline services, is often questioned by stakeholders and policy makers. While the value of these services is high to the passengers and businesses that are located in regional, rural and remote areas, there is only anecdotal and no robust evidence available on the value of such services to people who live in metropolitan areas. This paper applies mixed logit choice models to a large sample of the Sydney metropolitan area to establish, for a first time, empirical evidence on the value of travel time savings (VTTS) and the willingness to pay for regional air services. While car is the most preferred option for regional travel (chosen most), we find a median willingness to pay of \$99 per hour for leisure travel via plane and \$153 per hour for business travel. Additional analysis on VTTS for different modes across leisure versus business travel is also conducted, providing for a more detailed understanding of each traveller type and willingness to pay differences between the various groups. The findings are of substantial value to regional airlines, airports, regulators, funding bodies and policy makers as they show that regional aviation is not only invaluable to the regions but also of high value to residents and business travellers residing in metropolitan areas.

Public transit fare structure and social vulnerability in Montreal, Canada

- Transportation Research Part A: Policy and Practice---2017---David Verbich,Ahmed El-Geneidy

Research on social equity pertaining to transportation typically addresses how residents in a region have access to desirable destinations. Nonetheless, little is known about how public transit fare structures relate to social equity concerns. Some transit agencies charge more for fewer rides—weekly fares often cost more per ride than unlimited monthly fares, though monthly fares cost more upfront. For some social groups, in particular low-income earners, purchasing monthly passes may place a burden on their budget, and influence them to buy weekly passes instead. In this study, we analyze transit fare purchases of total monthly, weekly,

and three or more weekly passes during the month of September 2014 in Montreal, Canada. We discovered that fare vendors in neighborhoods with low median household income and/or with a high proportion of unemployed residents are predicted to sell more weekly fares than vendors in neighborhoods with high household income and low rates of unemployment. Monthly fare purchases were not dependent on income or unemployed residents. Moreover, using smartcard data to track individual fare cards, we found that recurring purchases of three or more weekly passes depend on income and unemployment, so neighborhoods with socially vulnerable individuals are predicted to have more riders purchasing multiple weekly fares than socially secure neighborhoods. Our findings indicate that individuals residing in marginalized neighborhoods are likely to spend more money on transit fares over the course of a month compared to those residing in wealthy neighborhoods. These findings raise concerns regarding the financial burden that the existing fare structure in the city of Montreal imposes, especially on low-income groups. The methodology and findings from this study provide insight for transport planners, particularly those concerned with providing an equitable public transit system.

On the complexity of finishing a crossing on time: Elderly pedestrians, timing and cycling infrastructure

- Transportation Research Part A: Policy and Practice---2017---Ugo Lachapelle,Marie-Soleil Cloutier

Aging population and reductions in car use by seniors have the potential to increase active transportation rates. While there are associated health benefits to this potential shift, there are also higher risks for elderly pedestrian injuries, especially at street crossings. This naturalistic study compares street crossing behaviors of different population age groups in large Québec cities through observational data, situational characteristics and environmental characteristics of location. We assess if observed crossings could be completed safely within the allocated time. Street crossing observations

on 2073 pedestrians was gathered at 135 signalized crossings during a four-month period in the summer of 2013. Mixed effect logit models are used to assess the individual, contextual, behavioral and environmental correlates of street crossing ending. Differences in age groups and other correlates are assessed for their association with the type of street crossing ending (on red light, on red hand or on both). In multivariate models, older age did not have an impact on finishing crossing on time, but many factors associated with older age were: having a walking aid, hesitating, and slowing down mid-crossing. Longer “white man silhouette” timing was also associated with reduced odds ratio of failing to finish crossing on time. The presence of cycling infrastructure increased those odds. Without walking, many elders will experience decreasing level of access. In neighborhoods with high concentrations of elderly populations, providing shorten crossing distance or longer crossing timing, may increase the convenience of walking for elderly populations. Longer signal timing may also be warranted in locations where cycling infrastructures were added to account for the increased level of difficulty.

An airline itinerary choice model that includes the option to delay the decision

- Transportation Research Part A: Policy and Practice---2017---Uzi Freund-Feinstein, Shlomo Bekhor

Choice situations with variable supply characteristics are found in many applications, including airline itinerary selection. This paper discusses the airline itinerary choice problem in dynamic supply settings. The paper develops a specially designed stated preference (SP) survey, which emulates an air travel website. The survey includes the option to delay the decision to choose an airline itinerary. The rich data set allows the estimation of discrete choice models of airline itinerary choice.

Modelling Sydney’ s light commercial service vehicles

- Transportation Research Part A: Policy and Practice---2017---Richard B. Ellison, Collins Teye, David Hensher

A frequently overlooked source of trips in Sydney (and elsewhere) is light commercial vehicles (LCVs) used by tradesmen and other service workers to travel to customers to provide commercial services. Although these trips have substantial differences from other types of trips (and vehicles), they are frequently included either as standard passenger vehicles or, alternatively, as freight, if they are considered at all. However, light commercial vehicle trips used for commercial services comprise a substantial number of vehicle trips, particularly in areas with large concentrations of businesses such as the Sydney CBD and other growing business precincts, and for this reason should be included in travel demand models. As part of a large project involving the development of a comprehensive model system for predicting passenger, service and freight travel in Sydney (MetroScan-TI), this paper outlines the estimation and application of a set of models for service vehicles. The model system includes four models, a tour generation model, a tour type model, a Statistical Local Area (SLA) choice model and a destination (or travel zone) choice model. These models are estimated using data from a subset of the Sydney Household Travel Survey (HTS) involving work trips using LCVs, as well as detailed land-use and employment data from the 2011 Australian Census. We obtain a set of behaviourally rich and geographically detailed models that incorporate feedback through the use of several inclusive value (logsum) parameters. In addition to the overview of the model system, this paper discusses the estimation results and their application to policies.

Social and urban form determinants of vehicle ownership; evidence from a developing country

- Transportation Research Part A: Policy and Practice---2017---Ali Soltani

The car is the most preferred mode of travel among

middle and high-income urban residents in Iran, where the car ownership has been growing at a rate of 15% per year and the evidence shows that vehicle ownership and use are strongly supported by urban development patterns. However, the specification of this relationship is not the same as western societies. Thus, this paper investigates the vehicle ownership and usage in three residential neighborhoods of Shiraz, a city in the southwest of Iran and its association to urban form characteristics and development pattern. The data on land use and urban form characteristics were primarily extracted from the existing secondary sources and GIS but in a disaggregated fine-grain method, whereas the data on household characteristics and vehicle ownership were purposefully collected through a household questionnaire survey. A nested logit model (NLM) based on the Discrete Choice Theory (DCT) was then applied to explore the impacts of socio-economic status (SES) and urban form factors on the car ownership choices of households. The results and the associated policy implications can be helpful in defining a strategic framework for community planning and design in order to reduce the level of car ownership and usage.

Validation of aggregate reference forecasts for passenger transport

- Transportation Research Part A: Policy and Practice---2017---Matts Andersson,Karin Brundell-Freij,Jonas Eliasson

We have compared Swedish national forecasts for passenger transport produced from 1975 to 2009 with the actual outcomes, and we found substantial differences between forecasts of passenger kilometers by mode and actual outcomes. In forecasts produced since the early 1990s, road and air traffic growth rates have generally been overpredicted. Aggregate railway growth has been fairly accurate, but commercial long-distance railway growth has been overpredicted, and the growth of subsidized intra-regional railway travel has been underpredicted (following vast unanticipated supply increases).

Vulnerability of the European air transport network to major airport closures from the perspective of passenger delays: Ranking the most critical airports

- Transportation Research Part A: Policy and Practice---2017---Augusto Voltes-Dorta,Héctor Rodríguez-Déniz,Pere Suau-Sanchez

This paper analyzes the vulnerability of the European air transport network to major airport closures from the perspective of the delays imposed to disrupted airline passengers. Using an MIDT dataset on passenger itineraries flown during February 2013, full-day individual closures of the 25 busiest European airports are simulated and disrupted passengers then relocated to minimum-delay itineraries. Aggregate delays are used to rank the criticality of each airport to the network, with the possibility of disaggregating the impact across geographical markets. The results provide useful reference values for the development of policies aimed at improving the resilience of air transport networks.

Modelling correlation patterns in mode choice models estimated on multiday travel data

- Transportation Research Part A: Policy and Practice---2017---Elisabetta Cherchi,Cinzia Cirillo,Juan de Dios Ortúzar

Understanding individual choices over time and measuring day-to-day variability in travel behaviour is important to capture the full range of travel behaviour. Although not very common, to date several multi-day travel surveys have been conducted and panel data is available to model different transport choices. However, determining the length of a panel that allows revealing variability in travel behaviour remains an open question. Also, no final agreement has been reached about modelling the various dimensions of correlation over the repeated observations. In this paper, we use the six-week panel data from the Mobidrive survey to estimate a mode choice model that accounts for correlation across individual observations over two time periods: all days of a single week and different days of

the week (e.g. all Mondays) in the wave. We first analyse these effects separately, estimating different models for each type of correlation; then we try to disentangle the relative effects of each type of correlation, estimating both types jointly. We found that both types of correlation appeared highly significant when estimated alone, while only the correlation across a given day over the six-week period remained significant, when both types were estimated jointly. This implies that for the Mobidrive panel there is much less variability in mode choice across weeks than across the days of each week. It also suggests that one week could be an appropriate length for a panel to estimate modal choice and to correctly reveal day-to-day variability.

Bayesian estimation of hazard models of airline passengers' cancellation behavior

- Transportation Research Part A: Policy and Practice---2017---Esther Chiew,Ricardo Daziano,Laurie A. Garrow

This study explores the use of Bayesian methods to estimate hazard models of airline passengers' cancellation behavior. We show how the discrete time proportional odds (DTPO) cancellation model can be rewritten as an equivalent fixed parameter discrete choice model that can be easily estimated using Bayesian methods and extended to random parameters that account for unobserved heterogeneity. The use of Bayesian methods allows us to address several limitations of existing airline cancellation models. First, because of the random parameter reformulation, it is possible to calculate individual-specific cancellation probabilities. Second, unlike existing DTPO models that forecast average cancellation probabilities only, our model can be used to forecast both means and a measure of variance (credible intervals) associated with an individual's cancellation probability. We apply the Bayesian estimation method to a dataset of tickets purchased over a two-year period by employees of a university in Atlanta, Georgia. During this time period, the major carrier in Atlanta terminated an agreement in which it allowed employees to purchase discounted fares that could be refunded or exchanged without a fee. The data allow us to in-

vestigate how passenger cancellation behavior changed when these fares were discontinued. Cancellations are reduced on average 3.3% when customers must pay to exchange their tickets. For a simulated hypothetical flight the coefficient of variation of cancellation is 43% when the state rate was offered, and 83% without state rates.

The vehicle purchase tax as a climate policy instrument

- Transportation Research Part A: Policy and Practice---2017---Lasse Fridstrøm,Vegard Østli

Since 2007, the Norwegian vehicle purchase tax includes a large CO₂ emission component. At the same time, generous tax exemptions and privileges are granted to battery electric vehicles. Continued application of the purchase tax instrument may induce large-scale penetration of electric cars into the passenger car stock, thus halving the fleet's fossil fuel consumption and greenhouse gas emissions within two or three decades. The main tangible cost of this low carbon policy is the extra cost of acquiring novel products with currently small economies of scale. This cost difference will decline over time. The main benefits consist in reduced energy consumption and greenhouse gas emissions.

Does fuel efficiency pay? Empirical evidence from the drybulk timecharter market revisited

- Transportation Research Part A: Policy and Practice---2017---Roar Adland,Harrison Alger,Justina Banyte,Haiying Jia

The time charter market for ships represents a classical example of the principal-agent problem, where shipowners can opt to invest in energy efficient ships, yet any savings in fuel expenditures accrue to the charterers. In a competitive and efficient market, ships that have more fuel-efficient designs should, all else equal, obtain a rate premium to reflect the fuel savings. In this paper we investigate empirically the determinants of timecharter rates using a comprehensive panel data set of over 9100 timecharter fixtures for bulk carriers above 40,000 DWT between January 2001 and

January 2016. We test for the presence of an energy efficiency premium using four different definitions of efficiency, while controlling for key macro, ship-specific, and contract-specific variables. Our findings suggest that the “market rate” for a standardised vessel dominates in terms of explanatory power, but that vessel age, fuel prices, place of delivery and DWT also are significant determinants across sizes. We show that the earlier findings on the energy efficiency premium in the literature are not robust when expanding the sample in time and vessel size. Using a substantially longer sample across an entire market cycle, we show that only 14–27% of fuel savings are reflected in a higher rate during normal market conditions, while the sign of the relationship flips during market “booms” such that energy inefficient vessels attract a premium. We introduce several explanations as to why there is an apparent market failure and suggest policy measures that could address this issue.

Satisfaction and uncertainty in car-sharing decisions: An integration of hybrid choice and random regret-based models

- Transportation Research Part A: Policy and Practice---2017---Jinhee Kim, Soora Rasouli, Harry Timmermans

Car-sharing systems have attracted increasingly attention as one of several sustainable transportation systems. After joining a car-sharing organization, people can use a shared-car. Because sharing a car involves other members, there is some inherent uncertainty that originates from the possible non-availability of the shared-car. This uncertainty may trigger people to apply decision-making mechanisms other than the maximization of expected utility. In addition, variable satisfaction with current mobility options may affect individuals’ decisions differently. Such uncertainty and satisfaction associated with car-sharing decisions have been largely ignored in previous studies. The present study is designed to examine the effects of latent satisfaction with current mobility options and uncertainty underlying car-sharing decisions. A random-regret minimization-based hybrid choice model is proposed

to simultaneously estimate these effects. The model allows investigating car-sharing decisions in both risky and riskless choice contexts. The parameters are estimated based on stated choice data using a Bayesian D-efficient optimal design. The results show that satisfaction significantly affects the car-sharing decision, and that car availability has a significant effect on the likelihood of joining a car-sharing organization.

The role of information systems in non-routine transit use of university students: Evidence from Brazil and Denmark

- Transportation Research Part A: Policy and Practice---2017---Sigal Kaplan, Mayara Moraes Monteiro, Marie Karen Anderson, Otto Anker Nielsen, Enilson Medeiros Dos Santos

In this study we seek to understand the relation between travel information, transit use intentions and night travel. We hypothesize that transit use is related to the perceived usefulness and the ease-of-use of the system, which are related to information quality and real-time information availability. The hypothesized relations are anchored theoretically in the Technology Acceptance Model and validated empirically in two case-studies: (i) Copenhagen (Denmark), characterized by a highly integrated transit system with an advanced web-based information system; (ii) Recife and Natal (Brazil), characterized by a lower perceived level-of-service and non-integrated information sources. Data from a tailor-made survey of 1123 university students were collected. Structural equation models were employed for explaining the use of transit as a function of the observed respondent characteristics and the latent constructs. The results show that: (i) information search quality and source explain transit use; (ii) information quality underlies level-of-service and familiarity; (iii) the use of real-time information links to information quality and familiarity; (iv) general transit use and non-routine use during night and to unfamiliar places are correlated; and (v) the behavioral framework is confirmed with the two case-studies.

Forecasting Americans' long-term adoption of connected and autonomous vehicle technologies

- Transportation Research Part A: Policy and Practice---2017---Prateek Bansal,Kara M. Kockelman

Automobile manufacturers, transportation researchers, and policymakers are interested in knowing the future of connected and autonomous vehicles (CAVs). To this end, this study proposes a new simulation-based fleet evolution framework to forecast Americans' long-term (year 2015–2045) adoption levels of CAV technologies under eight different scenarios based on 5% and 10% annual drops in technology prices; 0%, 5%, and 10% annual increments in Americans' willingness to pay (WTP); and changes in government regulations (e.g., mandatory adoption of connectivity on new vehicles). This simulation was calibrated with data obtained from a survey of 2167 Americans, regarding their preferences for CAV technologies (e.g., WTP) and their household's annual vehicle transaction decisions.

Travel satisfaction with public transport: Determinants, user classes, regional disparities and their evolution

- Transportation Research Part A: Policy and Practice---2017---Roberto F. Abenoza,Oded Cats,Yusak O. Susilo

Increasing public transport ridership while providing a service that better caters to individual travelers poses an important goal and challenge for society, particularly public transport authorities and operators. This study identifies and characterizes current and potential users of public transport in Sweden and identifies the most important determinants of travel satisfaction with Public Transport services for each segment of travelers. In addition, it investigates the changes over time of attribute importance among the different segments and the inter-segment geographical variation of overall satisfaction. The analysis is based on a dataset of almost half a million records. Travelers were clustered based on their socio-demographics, travel patterns and accessibility measures to enable the analysis of determinants

of satisfaction for different market segments. The cluster analysis results with five segments of Swedish travelers include: (i) inactive travelers; (ii) long distance commuters; (iii) urban motorist commuters; (iv) rural motorist commuters and; (v) students. By contrasting satisfaction with the importance of each quality of service attribute, three key attributes that should be prioritized by stakeholders are identified: customer interface, operation, network and length of trip time. Interestingly, the results suggest an overall similarity in the importance of service attributes among traveler segments. Nevertheless, some noticeable differences could be observed. The quality of service attributes' importance levels reveal overall changes in appreciations and consumption goals over time. The more frequent public transport user segments are more satisfied across the board and are characterized by a more balanced distribution of attribute importance while rural motorist commuters are markedly dissatisfied with service operation attributes. This work can help authorities to tailor their policies to specific traveler groups.

A comparison of flight routes in a dual-airport region using overlapping error components and a cross-nested structure in GEV models

- Transportation Research Part A: Policy and Practice---2017---Chih-Wen Yang,Hsiao-Chun Wang

This study investigates flying-route choice behavior with cross-grouping relationships. When there are different combinations of origin and destination airports for a city pair, it is important to identify the cross relations among the various flying routes. Here, this study does so using the allocation parameter of the cross-nested logit model and the overlapping error components of the error components logit model. A survey based on the stated preference method was designed to collect travelers' preferences in order to examine the distribution of choices for Taiwan–Shanghai direct flights. The empirical results reveal that airfare and access time are significant variables, and could be used as operating strategies to increase the market share of flying routes. The flying route between the two in-

ternational airports existed simultaneously within two groups, namely the leading group and the PVG group. Furthermore, comparing the models based on the criteria of interpretation, reproduction, and generalization indicated that the error components logit model can be effective in dealing with cross correlations among alternatives.

Effects of timetable related service quality on rail demand

- Transportation Research Part A: Policy and Practice---2017---Phill Wheat,Mark Wardman

This paper is concerned with the suitability of and component weightings within the composite index Generalised Journey Time (GJT). GJT is used to model rail demand in Britain and is composed of station-to-station journey time, service headway and a penalty for the need to change trains. We analyse a large data set of rail ticket sales data to explore three features of GJT. The first is to determine how GJT impacts on rail demand, including interactions with distance and value for money and exploring the effects of the size and sign of the change in GJT, distinguishing between short run and long run effects. The new evidence obtained was important given concerns over the elasticities previously recommended for use in the rail industry in Britain. Secondly, we provide evidence as to whether the weights associated with headway and interchange in GJT are appropriate. Our analysis indicates that more influence should be attached to interchange. Finally, the rail industry in Britain's approach of using GJT and fare is quite unique. We have tested how it compares with the more traditional approach of generalised cost and with the specification of separate elasticities to the component parts of GJT. This indicates that the GJT approach is preferable to the more conventional approach although there would seem to be value in further pursuing separate elasticities to the components of GJT.

Pre-announcements of price increase intentions in liner shipping spot markets

- Transportation Research Part A: Policy and Practice---2017---Gang Chen,Niels G.M. Rytter,Liping Jiang,Peter Nielsen,Lars Jensen

Carriers in liner shipping markets frequently make public announcements of general rate increase (GRI) intentions, based on which EU authorities have concerns as to whether this harms market competition. This paper aims to empirically investigate how well the GRI system works from an industrial competition perspective, which will indirectly indicate whether carriers are able to manipulate spot rates following GRI announcements. Taking the Far East-North Europe trade between 2009 and 2013 as an example, the paper first reveals the gradual increase of GRI frequency and size, which reflects carriers' attempts to restore profitability against overcapacity. However, out of all the GRI events only 28.6% were observed to be successful. Since these GRI successes must be the results of either price collusion (if any) and/or normal rate change by carriers in response to fundamental market developments, the effective collusion, if it exists, is actually lower than 28.6%. Next, we identify eight factors influencing GRI successes. To further assess their impact, we applied an ordered logit regression analysis, which, based on four of the factors involved, yields good predictability for GRI success. The four factors, in sequence of explanation power, are the total capacity of GRI carriers, the idling fleet size, the spot rate level, and the average ship-loading factor. Clearly the latter three factors are market fundamentals, which are unlikely to be influenced by an individual carrier in the short term. In actual fact, the conclusion reached is that there is little evidence that carriers can manipulate and distort spot rates through GRIs.

Overcoming the Downs-Thomson Paradox by transit subsidy policies

- Transportation Research Part A: Policy and Practice---2017---Wang, Wei (Walker),David Z.W. Wang,Fangni Zhang,Huijun Sun,Wenyi

Consider a competitive highway/transit transportation system in which travelers either drive on the bottleneck-constrained highway or take scheduled trains from home to the workplace in the morning peak hours. This paper explores the impact of bottleneck capacity expansion on transit operating schemes (fleet size and fare) and travelers' departure time and mode choices. Due to the potential occurrence of the Downs-Thomson (D-T) Paradox after highway capacity expansion, the paper investigates whether the D-T Paradox can be circumvented by implementing transit subsidy policies. The effects of different transit subsidy schemes are explored: subsidizing the transit company (cost subsidy) or the passengers (passenger subsidy) with the financial support from either government funding or road pricing revenue. For each combination of subsidy method and financial sourcing, the condition for overcoming the D-T Paradox is established.

Balancing equity and cost in rural transportation management with multi-objective utility analysis and data envelopment analysis: A case of Quinte West

- Transportation Research Part A: Policy and Practice---2017---Chialin Chen,Guyves Achdari,Kevin Majkut,Jiuh-Biing Sheu

Rural transportation management plays a critical role in the sustainable future of human society. Two emerging challenges faced by rural communities today are cost control and equity due to the increasing demand and limited operations resources available and the need to deal with the inevitable tradeoffs among multiple objectives and criteria. In this paper, we develop a new methodology for rural transportation management which takes into consideration of both the equity and cost factors under multiple objectives. We conceptualize and define equity in rural transportation management with the development of new performance measures and an analytical model for decision making with multiple desirable and undesirable objectives. We also develop a heuristic procedure based on data

envelopment analysis for characterizing and analyzing the route design choices on the frontier between costs and multi-objective measures of equity. A GIS-based decision support system is constructed to process the extensive data required in our analysis. The new methodology has been successfully implemented by Quinte Access, a not-for-profit organization in a rural community in Ontario, to help redesign bus routes with significant quantitative benefits observed in multiple performance dimensions. It is also expected that the new knowledge, insights, and decision support tools developed through this study for transportation planning, big data management, and transportation service operations can be transferred to other rural communities in order to deliver more sustainable transportation services in rural regions around the world.

Barriers to the adoption of fuel cell vehicles: A qualitative investigation into early adopters attitudes

- Transportation Research Part A: Policy and Practice---2017---Scott Hardman,Eric Shiu,Robert Steinberger-Wilckens,Thomas Turrentine

Fuel Cell Vehicles (FCVs) are now approaching wider spread consumer adoption, with some of the largest OEMs having released or about to release commercial products. However, research into consumer perceptions of FCVs has been extremely limited to date. This paper investigates automotive early adopter attitudes toward FCVs by performing interviews with high-end BEV owners. This sample was chosen as based on a preceding study it was expected that these adopters would have a greater level of awareness and knowledge of FCVs compared to the general population. It was expected that this would lead to more insightful results. In this study 5 consumer barriers to FCV adoption emerge. These are; the lack of hydrogen infrastructure, the source of hydrogen, the inability of FCVs to be recharged from home, cost issues and also concerns about hydrogen safety. This paper goes on to make recommendations on how to solve these consumer barriers stating that; hydrogen infrastructure needs to be pre-developed, hydrogen should be sustainably generated,

FCVs should have the ability to be partially charged at home, hydrogen fuel will need to be subsidised in the early market, vehicles need to be positioned in the correct markets, and safety concerns can be mitigated partly through education and outreach. Finally this paper finds that consumers do desire the range of a FCV and there is also consumer demand for FCVs ability to provide emergency back-up power.

Air Traffic Flow Management slot allocation to minimize propagated delay and improve airport slot adherence

- Transportation Research Part A: Policy and Practice---2017---Nikola Ivanov,Fedja Netjasov,Radosav Jovanović,Stefano Starita,Arne Strauss

In Europe, one of the instruments at the Network Manager' s (NM) disposal to tackle demand-capacity imbalance is to impose ground, i.e. Air Traffic Flow Management (ATFM), delays to flights. To compensate for anticipated delays and improve on-time performance, Aircraft Operators usually embed a buffer time in their schedules. The current practice for allocating ATFM delays does not take into account if flights have any remaining schedule buffer to absorb ATFM delay and reduce delay propagation to subsequent flights. Furthermore, the policy presently employed is to minimize ATFM delays, an order of magnitude of half a minute per flight, while propagated delays are approximately ten times higher. In this paper, we explore the possibility to control ATFM delay distribution in a way so as to minimize delay propagated to subsequent flights, but also to increase flights' adherence to airport slots at coordinated airports. To this aim, we propose a two-level mixed-integer optimization model to solve en-route demand-capacity imbalance problem and further improve airport slot adherence. The rationales behind the research are drawn from practical experience, while the model proposed is compatible with the one currently being used by the NM, making it easy to implement. We test the model on two real-world case studies and conduct ex post analysis to test the effects of violation of model assumptions on results.

The results show that it is possible to use the proposed methodology to lower delay propagated to subsequent flights and at the same time to improve airport slot adherence. In addition, they suggest that the current regulatory settings aiming to minimize ATFM delay minutes, as well as operational implementation thereof, are neither necessarily fully aligned with the desires and operating goals of Aircraft Operators, nor they improve the predictability of operations in the network.

Parking facilities and the built environment: Impacts on travel behaviour

- Transportation Research Part A: Policy and Practice---2017---Petter Christiansen,Øystein Engebretsen,Nils Fearnley,Jan Usterud Hanssen

Car ownership and car use depend on numerous factors, among which are parking availability at destination and at home. While the former has attracted considerable research efforts for decades the latter, home parking, has recently become subject to increasing research interest.

Economic consequences of aviation system disruptions: A reduced-form computable general equilibrium analysis

- Transportation Research Part A: Policy and Practice---2017---Zhenhua Chen,Adam Z. Rose,Fynnwin Prager,Samrat Chatterjee

The state of the art approach to economic consequence analysis (ECA) is computable general equilibrium (CGE) modeling. However, such models contain thousands of equations and cannot readily be incorporated into computerized systems to yield rapid estimates of economic impacts of various types of transportation system failures due to natural hazards, terrorist attacks or technological accidents. This paper presents a reduced-form approach to simplify the analytical content of CGE models and make them more transparent and enhance their utilization potential. The reduced-form CGE analysis is conducted by first running simulations one hundred times, varying key parameters, such as the magnitude of the initial shock, duration, location,

behavioral responses, and resilience, according to a Latin Hypercube sampling procedure. Statistical analysis is then applied to the “synthetic data” results in the form of both ordinary least-squares and quantile regression. The analysis yields linear equations that are incorporated into a computerized system and utilized along with Monte Carlo simulation methods for propagating uncertainties in economic consequences. Although our demonstration and discussion focuses on aviation system disruptions caused by terrorist attacks, the approach can be applied to a broad range of threat scenarios.

Digesting the safety effectiveness of cable barrier systems by numbers

- Transportation Research Part A: Policy and Practice---2017---Deo Chimba,Evarist Ruhazwe,Steve Allen,Jim Waters

This paper presents median cable barrier safety effectiveness by numbers as experienced on Tennessee highways. Apart from descriptive statistics and parametric tests, before and after statistical evaluation utilizing Empirical Bayes (EB) was used to estimate the cable barriers Safety Effectiveness. The findings from the descriptive statistics, paired t-test and EB evaluation were very similar which reinforces the positive safety effectiveness performances of the cable barriers in Tennessee. The study found that the statewide cable barriers Safety Effectiveness (statistical percentage change in crash frequency across all statewide cable barrier segments) for fatal crashes is 94%, incapacitating injury crashes is 92% and fatal and incapacitating injury crashes combined is also 92%. The safety effectiveness for fatal and all injury crashes combined was found to be 85%. In a direct comparison through descriptive statistics, statewide fatal crashes were reduced by 82% after the cable barriers installation while the incapacitating injury crashes were reduced by 76%. In addition, head-on crashes went down by 96% and crashes involving two or more vehicles went down by 92%. Fatalities due to median crossover crashes were reduced by 83% while number of people injured went down by 71% as a result of cable barriers. Through modeling, wider cable

offsets and inside shoulders were found to help reduce number of median related crashes while high differential elevations and high posted speed limit segments significantly had higher number of crashes compared to the opposite features. The findings can be used by state transportation agencies as a decision tool when considering installation of median cable barriers as well in determination geometry and traffic factors that play role in enhancing or worsening performance of the median cable barriers.

From trend spotting to trend ' splaining: Understanding modal preference shifts in the San Francisco Bay Area

- Transportation Research Part A: Policy and Practice---2017---Akshay Vij,Sreeta Gorri-paty,Joan L. Walker

This study examines changes in observable patterns of travel mode choice behavior over time, and attempts to explain these changes in terms of possible shifts in latent modal preferences, while controlling for the confounding influence of concurrent changes in the socioeconomic environment and transportation infrastructure. Using repeated cross-sectional travel diary data collected from individuals residing in the San Francisco Bay Area in 2000 and 2012, we develop a latent class choice model of travel mode choice behavior. Estimation results reveal ten segments across the pooled sample populations that differ from one another in terms of their demographic composition, the travel modes that they consider, and the relative importance that they attach to different level-of-service attributes, namely travel times and costs. Findings indicate shifts in latent modal preferences that exceed analogous changes in observable travel mode choice patterns. For example, private (motorized) vehicle mode shares decreased from 85.0% in 2000 to 81.2% in 2012, but the proportion of the population that only considers private vehicle when deciding how to travel is found to decline from 41.7% to 23.5% during the same period. Changes in economic and social factors and changes in the level of service of different travel modes are found to have had a marginal effect. Had modal

preferences not changed between 2000 and 2012, over and above changes in the socioeconomic environment and the transportation infrastructure, our framework predicts that private vehicle mode shares would have increased to 88.3% by 2012. Finally, shifts in modal preferences are not found to be limited to any one generation but to have cut across the entire population, reflecting broader cultural shifts that have transcended generational differences.

Would fewer people drive to work in a city without excess commuting? Explorations in the Paris metropolitan area

- Transportation Research Part A: Policy and Practice---2017---Emre Korsu,Florent Le Néchet

Urban planners have explored many solutions for reducing the energy and environmental costs of daily mobility in cities and one of them is to encourage households to embrace more efficient commuting patterns. As research on “excess commuting” has shown, the spatial distribution of housing and jobs in many cities would theoretically allow much shorter commuting distances than are actually observed. The question this paper tackles is how a more efficient commuting pattern would affect the transport modes workers use to travel to work. If workers and jobs were rematched in such a way as to minimise average commute distance, how would such a change impact the way people travel to work? While one might easily imagine an increase in the share of trips covered by soft modes of transport, there are reasons to believe that in some cases there might also be unexpected outcomes such an increase in car use. So how would people travel to work in a city where there is no “excess commuting” ? We looked for an answer to this question through empirical simulations in the case of the Paris Metropolitan Area.

Estimating the marginal costs of bridge damage due to overweight vehicles using a modified equivalent-vehicle methodology and in-service data on life-cycle costs and usage

- Transportation Research Part A: Policy and Practice---2017---Bismark R.D.K. Agbelie,Samuel

Labi,Kumares C. Sinha

Civil infrastructure managers have a profound interest in knowing the costs of infrastructure degradation caused by user operations that exceed statutory limits; that way, they are better informed to establish or revise policies related to permit fee structures for such extra-legal operations. In the specific context of vehicle weight permitting for highway bridges, past determinations have typically relied largely on bridge damage simulation using theoretical relationships between the loading and failure modes. Unlike the theory-based simulations, empirical data analysis uses observed field data and therefore are expected to yield more intuitive insights about the actual relationship between in-service loading patterns and their damage (and the cost of repair thereof). A few past studies have used such empirical approaches with some success but have generally been stymied by practical considerations including the lack of adequate translational relationships between the vehicles operating on the road and the vehicle classes typically considered in load analysis. Also, the overweight (OW) cost differences across different bridges attributes (material type, design type, functional class, and age) remain to be investigated. In a bid to overcome these limitations, this paper uses observed in-service data for vehicle loads and the life-cycle costs associated with bridge deterioration repair. The proposed methodology includes a technique that correlates AASHTO design vehicles to FHWA vehicle classes, estimates the total life-cycle cost of bridge upkeep, and allocates this cost to each user group (vehicle class) based on the axle configuration and usage frequency (vehicle-miles travelled) of that class. For each vehicle class, the marginal cost of bridge damage is determined on the basis of the incremental cost responsibility (as a result of adding that vehicle class to the traffic stream) and the typical traffic volume of that vehicle class, and were found to range from \$0.01 to as much as \$36.35per ft. length per pass of bridge, depending on OW class, and bridge functional class, material type, and age. The paper quantifies the extent to which bridge damage cost due to an overweight truck is influenced by the attributes of the truck and

the bridge. The results can be of help to agencies seeking to formulate, update, or evaluate current or future OW permitting policies from the perspective of highway bridge damage among other impacts. This effort is considered timely in the current era when several highway agencies are considering relaxation of their OW permitting policies as a part of efforts to project a business-friendly image in a bid to spur economic development in their states.

Willingness-to-pay for a bus fare reform: A contingent valuation approach with multiple bound dichotomous choices

- Transportation Research Part A: Policy and Practice---2017---Yi-Shih Chung,Yu-Chiun Chiou

The aims of this study are twofold: to measure travelers' willingness to pay (WTP) for bus travel under various travel distance for performing a bus fare reform, and to evaluate the reliability and validity of contingent valuation approach of dichotomous choice with multiple follow-up questions (DCm). To achieve so, this study designs triple-bound dichotomous choice contingent valuation scenarios, and employs multilevel interval regression to capture possible endogeneity within individuals. The estimated models using data with all three bounds, with the first two bounds, and with any specific single bound mostly gave consistent parameter significances and effect directions. However, the WTP estimated using the single third bound model demonstrated a different pattern from the other models, suggesting possible weariness effects. The analysis results also revealed yea-saying and free-riding effects, implying that respondents tended to say yes if their first two responses were yeses, and say no if their first two responses were noes. The yea-sayers had high income and low frequency in using public transit. On the other hand, the free riders significantly less supported the bus fare reform. Under well control of bound and path effects, WTP estimated by the proposed models was consistent with the WTP estimated with actual mode choice data, implying an anchor effect of current stage-based bus fares on travelers' WTP for future distance-based bus fare scheme. This study suggests

that researchers who use DCm to evaluate WTP should investigate internally inconsistent responses caused by psychological and technical factors; DCm provides robust WTP estimates if the survey has been carefully designed with potential bound and path effects well controlled. More importantly, those internally inconsistent responses also provide information that is useful to fare reform.

Improving choice model parameter estimates by jointly modelling the SP choices with corresponding elicited certainty ratings

- Transportation Research Part A: Policy and Practice---2017---Khandker Nurul Habib

The paper proposes a closed-form econometric model of joint SP choices and corresponding elicited certainty ratings. The connection between the SP choices and corresponding elicited certainty ratings is modelled through an entropy-based measure of SP choice task complexity. Empirical applications of the proposed model are presented by using two SP survey datasets collected in Vancouver and Toronto. Empirical models reveal that the SP choice task complexity, measured through SP choice entropy, directly influences SP certainty ratings. Such direct relationship proves to be important through establishing an endogenous relationship between them. It is clear that capturing such endogeneity improves the efficiency of parameter estimates of the SP choice model. However, the level and extent of such benefit gains vary by the nature and complexity of the SP survey. Empirical investigation presented in the paper proves that both efficiency gain and higher goodness-of-fit are probable with the choice contexts with higher number of choice alternatives. However, even for the smaller number of choice alternative case, efficiency in parameter estimates can be increased by proposed joint model formulation.

New walking and cycling infrastructure and modal shift in the UK: A quasi-experimental panel study

- Transportation Research Part A: Policy and Practice---2017---Yena Song,John Preston,David

Heavy dependency on car use leads to traffic congestion, pollution, and physical inactivity, which impose high direct and indirect costs on society. Promoting walking and cycling has been recognised as one of the means of mitigating such negative effects. Various approaches have been taken to enhance walking and cycling levels and to reduce the use of automobiles. This paper examines the effectiveness of infrastructure interventions in promoting walking and cycling for transport. Two related sets of panel data, covering elapsed time periods of one and two years, were analysed to track changes in travel behaviour following provision of new walking and cycling infrastructure so that modal shift from private car use to walking and cycling can be investigated. Two types of exposure measures were tested: distance from the infrastructure (a measure of potential usage), and actual usage of the infrastructure. Only the latter measure was statistically significantly associated with modal shift. This in turn suggested that infrastructure provision was not a sufficient condition for modal shift, but may have been a necessary condition. Along with the use of new infrastructure, the loss of employment, higher education, being male and being part of the ethnic majority were consistently found to be significantly and positively associated with modal shift towards walking and cycling. The findings of this study support the construction of walking and cycling routes, but also suggest that such infrastructure alone may not be enough to promote active travel.

Transport-mode competition in intra-national trade: An empirical investigation for the Spanish case

- Transportation Research Part A: Policy and Practice---2017---C. Llano,Tamara de la Mata,Jorge Diaz-Lanchas,N. Gallego

Trade within and between countries can take place by alternative transport modes. Economic and logistical complexity is fostering multimodality as well as transport-mode competition. The international trade literature has given little attention to this issue. The

aim of this paper is to analyze transport-mode competition in inter-provincial deliveries within Spain. To this end, we use a detailed dataset with fifty inter-provincial, industry-specific flows by four transport modes (road, train, ship and aircraft). We then feed this dataset into various specifications of a gravity model that incorporates cross-sectional dependence attributable to unobservable factors directly associated with the presence of transport-mode competition schemes. In considering alternative distance segments, we also test for competition effects between road and the other three modes.

The effects of dynamic capabilities, service capabilities, competitive advantage, and organizational performance in container shipping

- Transportation Research Part A: Policy and Practice---2017---Szu-Yu Kuo,Pei-Chun Lin,Chin-Shan Lu

Recent changes in the world economy have had a significant impact on container shipping in recent decades. A growing number of studies have demonstrated that service capabilities are related to competitive advantage and organizational performance. When encountering an environment characterized by economic uncertainty, the shipping industry was required to emphasize dynamic capabilities associated with adaptation to sustain competitive advantage. The purpose of this study was to examine the linkages between dynamic capabilities, service capabilities, competitive advantage, and organizational performance in container shipping using data surveys from 134 respondents in container shipping firms in Taiwan. Exploratory factor analysis was employed to identify the crucial dimensions underlying dynamic capabilities, and service capabilities. Furthermore, structural equation modeling (SEM) was used to test the research hypotheses. The research findings indicated that dynamic capabilities positively influenced both competitive advantage and service capabilities. Service capabilities and competitive advantage were positively related to organizational performance. Practical implications of the research findings for container shipping firms are discussed.

Urban commuters' valuation of travel time reliability based on stated preference survey: A case study of Beijing

- Transportation Research Part A: Policy and Practice---2017---Weibin Kou,Xumei Chen,Lei Yu,Yi Qi,Ying Wang

Regarding travel mode choices, urban commuters always consider not only travel time but also travel time reliability of different modes. In this study, schedule delays were used for measuring travel reliability. The trip scheduling model and binary logit model were used to estimate the value of travel time reliability. First, by considering the impacts of the income level and time constraint, the trip scheduling models were developed. Then, data for model calibration was collected through street-interview survey based on the stated preference (SP) approach. Finally, the model was calibrated using the collected data and the commuters' value of travel time reliability were estimated. On the basis of the model results, the influence of income level and time constraint on the value of travel time reliability was analyzed. The results revealed that the value of travel time reliability differed significantly for different income and time constraint levels, and transportation modes. The developed models for travel time reliability analysis can be applied to supporting the travel cost analysis in the future.

Preferences of travellers for using automated vehicles as last mile public transport of multimodal train trips

- Transportation Research Part A: Policy and Practice---2016---Menno D. Yap,Gongalo Correia,Bart van Arem

In the recent years many developments took place regarding automated vehicles (AVs) technology. It is however unknown to which extent the share of the existing transport modes will change as result of AVs introduction as another public transport option. This study is the first where detailed traveller preferences for AVs are explored and compared to existing modes.

Its main objective is to position AVs in the transportation market and understand the sensitivity of travellers towards some of their attributes, focusing particularly on the use of these vehicles as egress mode of train trips. Because fully-automated vehicles are not yet a reality and they entail a potentially high disruptive way on how we use automobiles today, we apply a stated preference experiment where the role of attitudes in perceiving the utility of AVs is particularly explored in addition to the classical instrumental variables and several socio-economic variables. The estimated discrete choice model shows that first class train travellers on average prefer the use of AVs as egress mode, compared to the use of bicycle or bus/tram/metro as egress. We therefore conclude that AVs as last mile transport between the train station and the final destination have most potential for first class train travellers. Results show that in-vehicle time in AVs is experienced more negatively than in-vehicle time in manually driven cars. This suggests that travellers do not perceive the theoretical advantage of being able to perform other tasks during the trip in an automated vehicle, at least not yet. Results also show that travellers' attitudes regarding trust and sustainability of AVs are playing an important role in AVs attractiveness, which leads to uncertainty on how people will react when AVs are introduced in practice. We therefore state the importance of paying sufficient attention to these psychological factors, next to classic instrumental attributes like travel time and costs, before and during the implementation process of AVs as a public transport alternative. We recommend the extension of this research to revealed preference studies, thereby using the results of field studies.

Public transit and alternative fuels – The costs associated with using biodiesel and CNG in comparison to diesel for U.S. public transit systems

- Transportation Research Part A: Policy and Practice---2016---John D. Bitzan,David G. Ripplinger

This study addresses the dearth of research that examines the impacts of alternative fuel use on operational

costs of public transit in the U.S. Specifically, the study examines the impact on operational costs of shifting diesel gallons to biodiesel or to compressed natural gas (CNG) for an unbalanced panel of 269 public transit systems in the U.S. from 2008 through 2012, using an econometric cost function approach. We find that shifting all diesel gallons to biodiesel results in operational cost increases ranging from 1 to 12 percent, with smaller cost increases being realized with increases in system size. Shifting all diesel gallons to CNG results in operational cost increases between 5 and 10 percent – again with smaller impacts for larger systems. These findings suggest that there are some economies of using biodiesel and CNG with large scale production. That is, the cost increases associated with increased fuel prices, decreased fuel economy, increased maintenance costs, and increased fueling costs associated with biodiesel and CNG are mitigated somewhat by large scale production. The findings of this study suggest that increased operational costs are an important consideration in policies aimed at encouraging the use of alternative fuels by U.S. public transit systems.

Factors affecting car ownership and mode choice in rail transit-supported suburbs of a large Chinese city

- Transportation Research Part A: Policy and Practice---2016---Qing Shen,Peng Chen,Haixiao Pan

As Chinese cities continue to grow rapidly and their newly developed suburbs continue to accommodate most of the enormous population increase, rail transit is seen as the key to counter automobile dependence. This paper examines the effects of rail transit-supported urban expansion using travel survey data collected from residents in four Shanghai suburban neighborhoods, including three located near metro stations. Estimated binary logit model of car ownership and nested logit model of commuting mode choice reveal that: (1) proximity to metro stations has a significant positive association with the choice of rail transit as primary commuting mode, but its association with car ownership is insignificant; (2) income, job status,

and transportation subsidy are all positively associated with the probabilities of owning car and driving it to work; (3) higher population density in work location relates positively to the likelihood of commuting by the metro, but does not show a significant relationship with car ownership; (4) longer commuting distance is strongly associated with higher probabilities of riding the metro, rather than driving, to work; (5) considerations of money, time, comfort, and safety appear to exert measurable influences on car ownership and mode choice in the expected directions, and the intention to ride the metro for commuting is reflected in its actual use as primary mode for journey to work. These results strongly suggest that rail transit-supported urban expansion can produce important positive outcomes, and that this strategic approach can be effectively facilitated by transportation policies and land use plans, as well as complemented by timely provision of high quality rail transit service to suburban residents.

Applying spatial-temporal analysis and retail location theory to public bikes site selection in Taipei

- Transportation Research Part A: Policy and Practice---2016---Jenhung Wang,Ching-Hui Tsai,Pei-Chun Lin

In order to turn Taipei into a sustainable, green metropolis, in 2009, the Department of Transportation of Taipei City Government launched a public bike rental system (YouBike) to meet people's daily commute and/or leisure needs. Given that users may return bikes to sites differing from their starting locations, rental stations frequently lack bikes or bike racks. This study sought to identify lacking-bike and/or lacking-bike rack hot spots utilizing spatial-temporal analysis. In addition, it applied retail location theory to determine site selection of further rental stations. Historical data indicated that shortage of bikes was much more severe than shortage of bike racks in the YouBike public bike system and lacking-bike and lacking-bike rack hot spots were clustered significantly. The study demonstrated that spatial-temporal analysis can be used to effectively identify rental stations' spatial patterns,

determine the most suitable locations for further installation of rental stations, help to provide public bike users with a more effective rental system, and greatly assist public bikes' operational management and decision-making in Taiwan.

Estimating the influence of common disruptions on urban rail transit networks

- Transportation Research Part A: Policy and Practice---2016---Huijun Sun,Jianjun Wu,Lijuan Wu,Xiaoyong Yan,Ziyu Gao

With the continuous expansion of urban rapid transit networks, disruptive incidents—such as station closures, train delays, and mechanical problems—have become more common, causing such problems as threats to passenger safety, delays in service, and so on. More importantly, these disruptions often have ripple effects that spread to other stations and lines. In order to provide better management and plan for emergencies, it has become important to identify such disruptions and evaluate their influence on travel times and delays. This paper proposes a novel approach to achieve these goals. It employs the tap-in and tap-out data on the distribution of passengers from smart cards collected by automated fare collection (AFC) facilities as well as past disruptions within networks. Three characteristic types of abnormal passenger flow are divided and analyzed, comprising (1) “missed” passengers who have left the system, (2) passengers who took detours, and (3) passengers who were delayed but continued their journeys. In addition, the suggested computing method, serving to estimate total delay times, was used to manage these disruptions. Finally, a real-world case study based on the Beijing metro network with the real tap-in and tap-out passenger data is presented.

School trips in Germany: Gendered escorting practices

- Transportation Research Part A: Policy and Practice---2016---Joachim Scheiner

Children' s trips have become a growing issue of interest in recent transport studies. This paper studies

parental escort on children' s school trips in Germany. It uses binary logit regression models to look at social and spatial context factors simultaneously, as well as considering the gendering of parental escort, i.e. the allocation of escort trips to fathers and mothers. The results generally support other studies in terms of parental and children' s sociodemographics, and trip attributes. The results for parental employment complement previous, somewhat inconsistent results. Descriptive analysis sheds some light on the interplay between escort and travel mode, as well as on age and gender structures and their intersections with spatial context. The effects of spatial context in regression are mixed. Urban locations seem to be more suitable for the independent mobility of adolescents, but less suitable for smaller children. Within municipalities escort is less common in inner city areas with mixed land-use and a well-established public transport system. Shorter distances to school in areas with mixed land-use further encourage independence. As in other countries, women carry a disproportionate burden of escorting. In large cities fathers are more involved in child escort, suggesting more gender equity.

Values of travel time in Europe: Review and meta-analysis

- Transportation Research Part A: Policy and Practice---2016---Mark Wardman,V. Phani K. Chintakayala, Gerard de Jong

This paper reports the most extensive meta-analysis of values of time yet conducted, covering 3109 monetary valuations assembled from 389 European studies conducted between 1963 and 2011. It aims to explain how valuations vary across studies, including over time and between countries. In addition to the customary coverage of in-vehicle time in review studies, this paper covers valuations of walk time, wait time, service headway, parking space search time, departure time switching, time in congested traffic, schedule delay early and late, mean lateness and the standard deviation of travel time. Valuations are found to vary with type of time, GDP, distance, journey purpose, mode, the monetary numeraire and a number of factors related to estima-

tion. Model output values of time compare favourably with earnings data, replicate well official recommended values obtained from major national studies, and are transferable across countries. These implied monetary values serve as very useful benchmarks against which new evidence can be assessed and the meta-model provides parameters and values for countries and contexts where there is no other such evidence.

Public service obligations for air transport in the United States and Europe: Connectivity effects and value for money

- Transportation Research Part A: Policy and Practice---2016---Michael D. Wittman, Florian Allroggen, Robert Malina

Public service obligations (PSOs) are used by governments in many countries, including the United States and 11 countries in Europe, to mandate a minimum level of commercial air transportation service, especially for small or rural communities. This paper analyzes PSOs in these 12 countries for the year 2010 using the recently proposed Global Connectivity Index to measure direct and indirect market access and a novel subsidy database covering 90% of PSO movements in these countries to assess value-for-money.

Do the organizational forms affect passenger satisfaction? Evidence from Chinese public transport service

- Transportation Research Part A: Policy and Practice---2016---Chunqin Zhang, Zhicai Juan, Weite Lu, Guangnian Xiao

This paper presents a discussion on the relationship between organizational forms (including the ownership structure and the contractual practices) and passenger satisfaction of Chinese public transport service. To test this proposition, an original rich data set covering 4702 respondents and 58 public transport operators of 13 cities for the period 2013–2014 is used. We firstly estimate the passenger satisfaction based on customer satisfaction theory and PLS-SEM, and then take into consideration the mixed logit model to assess the effect

between them. Conclusions drawn from the study are summarized as follows: ① The effect of organizational forms on the passenger satisfaction of public transport service is confirmed. ② Public transport services franchised to public ownership offer higher passenger satisfaction than those franchised to private ownership and mixed ownership. ③ Public transport services regulated by the management contracts incite more passenger satisfaction than those regulated by net cost contracts and gross cost contracts.

Can environmental awareness explain declining preference for car-based mobility amongst generation Y? A qualitative examination of learn to drive behaviours

- Transportation Research Part A: Policy and Practice---2016---Debbie Hopkins

Preference for private, motorised transportation grew substantially throughout the global North, during the 20th Century. Through this time rates of licencing, and car ownership, and vehicle kilometres travelled (VKT) rose across age groups. This had a range of environmental and social equity implications, and ignited a priority for investment in road infrastructure. The system of automobility was cemented by lock-in through the assemblage of infrastructure, technologies, policies and behaviours supporting, and frequently requiring, car based mobility. Yet recent evidence has shown that generation Y (18–35year olds) are practicing mobility in different ways to earlier generations. Stabilising and declining rates of VKT, licencing and vehicle ownership have been identified in a range of industrialised countries. Adopting an interdisciplinary approach, this paper draws from theories of social practice and the theory of planned behaviour, as two traditions to examine what people ‘do’, focusing on the social and the individual respectively. It examines the motivations to learn to drive (LTD), and the preference for driving in New Zealand, a highly car-dependent country, empirically drawing from 51 qualitative interviews. A series of meta-themes are presented and used to explain intended and actual behaviour relating to driving practices. The empirical research finds

a diversity of highly nuanced interpretations of LTD, some of which reflect individual characteristics, whilst other interpretations are best understood grounded in a wider societal reading of contemporary trends and meanings. Frequently, justification for learning to drive goes beyond the competency and capacity to drive independently. Implications for policy and planning are detailed.

Bikeshare trip generation in New York City

- Transportation Research Part A: Policy and Practice---2016---Robert Noland,Michael J. Smart,Ziye Guo

Cities around the world and in the US are implementing bikesharing systems, which allow users to access shared bicycles for short trips, typically in the urban core. Yet few scholars have examined the determinants of bikeshare station usage using a fine-grained approach. We estimate a series of Bayesian regression models of trip generation at stations, examining the effects bicycle infrastructure, population and employment, land use mix, and transit access separately by season of the year, weekday/weekend, and user type (subscriber versus casual). We find that bikeshare stations located near busy subway stations and bicycle infrastructure see greater utilization, and that greater population and employment generally predict greater usage. Our findings are nuanced, however; for instance, those areas with more residential population are associated with more trips by subscribers and on both weekdays and non-working days; however, the effect is much stronger on non-working days. Additional nuances can be found in how various land use variables affect bikeshare usage. We use our models, based on 2014 data, to forecast the trips generated at new stations opened in 2015. Results suggest there is large variation in predictive power, partly caused by variation in weather, but also by other factors that cannot be predicted. This leads us to the conclusion that the nuances we find in our inferential analysis are more useful for transportation planners.

Driving to safety: How many miles of driving would it take to demonstrate autonomous vehicle reliability?

- Transportation Research Part A: Policy and Practice---2016---Nidhi Kalra,Susan M. Paddock

How safe are autonomous vehicles? The answer is critical for determining how autonomous vehicles may shape motor vehicle safety and public health, and for developing sound policies to govern their deployment. One proposed way to assess safety is to test drive autonomous vehicles in real traffic, observe their performance, and make statistical comparisons to human driver performance. This approach is logical, but it is practical? In this paper, we calculate the number of miles of driving that would be needed to provide clear statistical evidence of autonomous vehicle safety. Given that current traffic fatalities and injuries are rare events compared to vehicle miles traveled, we show that fully autonomous vehicles would have to be driven hundreds of millions of miles and sometimes hundreds of billions of miles to demonstrate their reliability in terms of fatalities and injuries. Under even aggressive testing assumptions, existing fleets would take tens and sometimes hundreds of years to drive these miles—an impossible proposition if the aim is to demonstrate their performance prior to releasing them on the roads for consumer use. These findings demonstrate that developers of this technology and third-party testers cannot simply drive their way to safety. Instead, they will need to develop innovative methods of demonstrating safety and reliability. And yet, the possibility remains that it will not be possible to establish with certainty the safety of autonomous vehicles. Uncertainty will remain. Therefore, it is imperative that autonomous vehicle regulations are adaptive—designed from the outset to evolve with the technology so that society can better harness the benefits and manage the risks of these rapidly evolving and potentially transformative technologies.

Can feedback from in-vehicle data recorders improve driver behavior and reduce fuel consumption?

- Transportation Research Part A: Policy and Practice---2016---Galit Toledo,Yoram Shiftan

This paper evaluates the effectiveness of feedback, based on In-Vehicle Data Recorders (IVDR), to improve driving behavior, increase driving safety, and reduce fuel consumption. We developed a framework for driving-behavior measurement, incorporating second-by-second data collected by IVDRs. IVDR units were installed in over 150 vehicles driven by more than 350 drivers for over a year. The experiment was divided into three stages. The first stage was a “blind” , control stage, with no feedback. The second stage incorporated verbal feedback given only to riskiest drivers. In the third stage all drivers received a bi-weekly written report about their driving performance. Safety events, such as braking, lateral acceleration or speeding, were recorded. Supplementary data regarding safety related events and fuel consumption were also collected. Safety incidents and fuel consumption were modeled as a function of IVDR measurement-based events, in order to identify which events best reflect safety incidents and excessive fuel consumption. Our results show that braking events best explain safety incidents, and all events together best explain fuel consumption. In addition, we found that for the riskiest drivers, feedback significantly reduced the IVDR events. Our models show that feedback can lead to a reduction of 8% in safety incidents, and 3–10% in fuel consumption, with a larger reduction obtained for large vehicles.

A multi-dimensional view of transport-related social exclusion: A comparative study of Greater Perth and Sydney

- Transportation Research Part A: Policy and Practice---2016---Xia, Jianhong(Cecilia),Joshua Nesbitt,Rebekah Daley,Arfanara Najnin,Todd Litman,Surya Prasad Tiwari

Transport-related social exclusion is a complex issue. It can be studied from a variety of angles, be influenced

by a number of factors, and affect diverse population groups. This study investigates transport-related social exclusion from a multi-dimensional view. Transport inequity was measured based on different development stages of a region using the Lorenz Curve and Gini index, and compared socio-economic characteristics, such as housing affordability, employment self-sufficiency, urban sprawl, and transport-mode share at different degrees of spatial aggregation. Two hierarchical spatial aggregation levels are used: (1) Sydney – Perth; (2) Inner – Middle – Outer sectors. Spatial gaps of transport-related social exclusion are identified for both cities and a number of policy implications are considered to provide suggestions to improve transport-related social inclusion in both cities.

Intra-household bargaining for school trip accompaniment of children: A group decision approach

- Transportation Research Part A: Policy and Practice---2016---Alireza Ermagun,David Levinson

This paper tests a group decision-making model to examine the school travel behavior of students 6–18years old in the Minneapolis-St. Paul Metropolitan area. The school trip information of 1737 two-parent families with a student is extracted from Travel Behavior Inventory data collected by the Metropolitan Council between the Fall 2010 and Spring 2012. The model has four distinct characteristics including: (1) considering the student explicitly in the model, (2) allowing for bargaining or negotiation within households, (3) quantifying the intra-household interaction among family members, and (4) determining the decision weight function for household members. This framework also covers a household with three members, namely, a father, a mother, and a student, and unlike other studies it is not limited to dual-worker families. To test the hypotheses we build two models, each with and without the group-decision approach. The models are separately built for different age groups, namely students 6–12 and 12–18years old. This study considers a wide range of variables such as work status of parents, age

and gender of students, mode of travel, and distance to school. The findings of this study demonstrate that the elasticities of the two modeling approaches differ not only in the value, but in the sign in some cases. In 63% of the cases the unitary household model underestimates the results. More precisely, the elasticities of the unitary household model are as much as 2 times more than that of the group-decision model in 20% of cases. This is a direct consequence of model misspecification that misleads both long- and short-term policies where the intra-household bargaining and interaction is overlooked in travel behavior models.

Does an increase in subsidies lead to changes in air fares? Empirical evidence from Spain

- Transportation Research Part A: Policy and Practice---2016---Xavier Fageda,Juan Jiménez González,Jorge Valido

This paper examines the impact on prices of various regulatory changes in residents' flight subsidies implemented in Spain in recent years. It draws on a large sample of domestic routes for the period 2003–2013 to estimate a price equation that accounts for the panel data and the potential endogeneity of specific explanatory variables. Price differences were not found between the treated routes (routes affected by the discounts) and the control routes (routes not affected by the discounts). This is the case regardless of the discount percentage on prices that island residents enjoy.

Operations of a shared, autonomous, electric vehicle fleet: Implications of vehicle & charging infrastructure decisions

- Transportation Research Part A: Policy and Practice---2016---T. Donna Chen,Kara M. Kockelman,Josiah P. Hanna

There are natural synergies between shared autonomous vehicle (AV) fleets and electric vehicle (EV) technology, since fleets of AVs resolve the practical limitations of today's non-autonomous EVs, including traveler range anxiety, access to charging infrastructure, and charging time management. Fleet-managed AVs

relieve such concerns, managing range and charging activities based on real-time trip demand and established charging-station locations, as demonstrated in this paper. This work explores the management of a fleet of shared autonomous electric vehicles (SAEVs) in a regional, discrete-time, agent-based model. The simulation examines the operation of SAEVs under various vehicle range and charging infrastructure scenarios in a gridded city modeled roughly after the densities of Austin, Texas.

Development of destination choice models for pedestrian travel

- Transportation Research Part A: Policy and Practice---2016---Kelly J. Clifton,Patrick A. Singleton,Christopher D. Muhs,Robert J. Schneider

Most research on walking behavior has focused on mode choice or walk trip frequency. In contrast, this study is one of the first to analyze and model the destination choice behaviors of pedestrians within an entire region. Using about 4500 walk trips from a 2011 household travel survey in the Portland, Oregon, region, we estimated multinomial logit pedestrian destination choice models for six trip purposes. Independent variables included terms for impedance (walk trip distance), size (employment by type, households), supportive pedestrian environments (parks, a pedestrian index of the environment variable called PIE), barriers to walking (terrain, industrial-type employment), and traveler characteristics. Unique to this study was the use of small-scale destination zone alternatives. Distance was a significant deterrent to pedestrian destination choice, and people in carless or childless households were less sensitive to distance for some purposes. Employment (especially retail) was a strong attractor: doubling the number of jobs nearly doubled the odds of choosing a destination for home-based shopping walk trips. More attractive pedestrian environments were also positively associated with pedestrian destination choice after controlling for other factors. These results shed light on determinants of pedestrian destination choice behaviors, and sensitivities in the models highlight potential policy-levers to increase walking activity. In addition,

the destination choice models can be applied in practice within existing regional travel demand models or as pedestrian planning tools to evaluate land use and transportation policy and investment scenarios.

Accuracy of the Gothenburg congestion charges forecast

- Transportation Research Part A: Policy and Practice---2016---Jens West,Maria Börjesson,Leonid Engelson

This paper explores the accuracy of the transport model forecast of the Gothenburg congestion charges, implemented in 2013. The design of the charging system implies that the path disutility cannot be computed as a sum of link attributes. The route choice model is therefore implemented as a hierarchical algorithm, applying a continuous value of travel time (VTT) distribution. The VTT distribution was estimated from stated choice (SC) data. However, based on experience of impact forecasting with a similar model and of impact outcome of congestion charges in Stockholm, the estimated VTT distribution had to be stretched to the right. We find that the forecast traffic reductions across the cordon and travel time gains were close to those observed in the peak. However, the reduction in traffic across the cordon was underpredicted off-peak. The necessity to make the adjustment indicates that the VTT inferred from SC data does not reveal the travellers' preferences, or that there are factors determining route choice other than those included in the model: travel distance, travel time and congestion charge.

Understanding engagement and disengagement from pro-environmental behaviour: The role of neutralization and affirmation techniques in maintaining persistence in and desistance from car use

- Transportation Research Part A: Policy and Practice---2016---Chijioke Dike Uba,Andreas Chatzidakis

Despite mounting evidence that car use is a prime

culprit of global warming, our love affair with the car persists. General awareness of the environmental consequences of car usage is high but fails to correspond to moderated car use. This paper contributes to an understanding of how university students' environmental beliefs affect decisions to engage in continued car use (persistence) and/or to discontinue or reduce car use (desistance). The aim of the research presented here was to explore the range of neutralizations and counter-neutralizations (affirmations) employed by students and to examine the ways in which they are used to justify and maintain either persistence or desistance in car use. The research consisted of six focus group sessions with thirty-four UK-based Higher Education students. Analysis of the study's data highlights the range of neutralizations and counter-neutralizations employed by students in social settings. The article discusses the usefulness of neutralization theory in accounting for actual and/or intended non-environmentally friendly behaviour such as car use. In addition, the study's findings are discussed in relation to prior research and to potential implications for public policy interventions which favour moderating car usage.

How does our natural and built environment affect the use of bicycle sharing?

- Transportation Research Part A: Policy and Practice---2016---Iderlina Mateo-Babiano,Richard Bean,Jonathan Corcoran,Dorina Pojani

Public bicycle-sharing programs (PBSP) are short-term bicycle hire systems. In recent years their popularity has soared. This study examined Brisbane's CityCycle scheme, the largest PBSP in Australia, and investigated the role of (natural and built) environmental features on usage. The study addressed four research questions: (1) What are the dynamics of PBSP use in terms of travel time, speed, and distance? (2) What is the relationship between PBSP participation and cycling infrastructure? (3) How does land-use affect PBSP usage? (4) How does topography affect PBSP usage? To answer these four questions, the authors analysed large existing datasets on CityCycle usage,

land-use, topography, and cycling infrastructure, which were each obtained through multiple sources. Correlation and regression analysis were employed to establish significant relationships amongst variables. It was found that: most users take short trips within the free initial period provided under the CityCycle scheme and do not incur any charges other than for membership; PBSP use is strongly correlated with the length of off-road bikeways near each CityCycle station; CityCycle is more frequently used on weekends for recreational purposes; loop journeys, which are also associated with leisure trips, are popular in Brisbane, especially on weekends; leisure trips are taken at a relatively slower pace than utilitarian trips; during weekdays, a tri-modal peak is clearly evident, with PBSP commute trips in the morning and evening peaks and a smaller but significant peak around lunchtime; and users avoid returning CityCycle bicycles to stations located on hilltops. These findings can collectively enhance both the siting and design of PBSP, thereby optimizing investments in sustainable mobility.

Options for reducing noise from roads and railway lines

- Transportation Research Part A: Policy and Practice---2016---Kurt Heutschi,Erik Bühlmann,Jakob Oertli

The fundamental noise generation mechanisms of road and rail vehicles are discussed with attention to noise abatement measures. Based on an evaluation of publicly available tire noise data and the European road traffic noise emission model CNOSSOS, it is shown that on the road side there is a significant noise reduction potential in the usage of low-noise tires. From a three months measurement campaign a noise model was derived to predict the maximal sound pressure level of heavy duty vehicles during a pass-by in 7.5m distance with the parameters vehicle speed and number of axles. With help of recently published information about external costs caused by heavy duty vehicles and the noise prediction tool, a model was developed to derive a money equivalent that can be used as a bonus/malus in a heavy duty vehicle fee. As a mea-

sure at the infrastructure, the installation of low-noise pavements is an effective, durable and economically attractive measure. Recent experiences with different technologies from all over the world are compiled and evaluated. On the rail side, an overview of the possible noise reduction strategies is given, followed by a discussion of the current policy and legislation in the EU and on the national level of different European countries.

Logistic performance evaluation of provinces in Turkey: A GIS-based multi-criteria decision analysis

- Transportation Research Part A: Policy and Practice---2016---Eren Özceylan,Cihan Çetinkaya,Mehmet Erbaş,Mehmet Kabak

Logistics performance evaluation of provinces is considered in this study. To do so, a three-step solution approach is developed: (i) determination of 16 geographic and economic indicators, (ii) using geographic information system to assign a logistics score and (iii) prioritizing the indicators and ranking the provinces using multi-criteria decision analysis tools. Proposed methodology is applied to 81 provinces in Turkey as a case study. Results show that the provinces of Istanbul, Izmir, and Hatay are the pioneers. The proposed methodology provides the ability to analyze the impacts of indicators on logistics performance and create a logistics performance map of countries.

Increased productivity efforts yield few rewards in the knowledge economy

- Transportation Research Part A: Policy and Practice---2016---Ashley Nunes

Population aging is reducing access to knowledge workers even as they are becoming more important to economic growth. Thus far, corporations and governments alike have made the intuitive yet untested assumption that working the existing workforce harder and longer can alleviate the economic fallout. This is based on the ‘success’ similar efforts have previously seen in production industries characterized by physical inputs. Our study provides evidence that these successes

may not carry over to industries, such as transportation that are reliant on intellectual skill. It is shown that meeting productivity goals by increasing the job demands of knowledge workers, specifically air traffic controllers, compromises the provision of new kinds of value added. Furthermore, it is demonstrated for the first time that increasing job duration exacerbates the effects of job demand on human performance. Coping with staffing shortages by asking that knowledge workers simply ‘do more’ may impede rather than stimulate economic growth.

Measuring vulnerability of urban metro network from line operation perspective

- Transportation Research Part A: Policy and Practice---2016---Sun, Daniel (Jian),Shituo Guan

Urban metro systems are subject to recurring service disruption for various reasons, such as mechanical or electrical failure, adverse weather, or other accidents. In recent years, studies on metro networks have attracted increasing attention because the consequence of operational accidents is barely affordable. This study proposes to measure the metro network vulnerability from the perspective of line operation by taking the Shanghai metro network as a case study. As opposed to previous studies that focused largely on disruption of important nodes or links, this study investigates the disruption from the line operation perspective. Betweenness centrality (BC) and passenger betweenness centrality (PBC), number of missed trips, weighted average path length, and weighted global efficiency were analyzed considering relative disruption probability of each line. Passenger flow distribution and re-distribution were simulated for different disruption scenarios based on all-or-nothing assignment rule. The results indicate that the metro lines carrying a large number of passengers generally have a significant impact on the network vulnerability. The lines with circular topological form also have a significant influence on passenger flow re-distribution in case of a disruption. The results of this study provide suggestions on metro system administration for potential improvement of the performance of operation, and passengers

may meanwhile have an improved alternate plan for their commute trip when a disruption occurs.

Weather, transport mode choices and emotional travel experiences

- Transportation Research Part A: Policy and Practice---2016---Lars Böcker,Martin Dijst,Jan Faber

With climate change high on the political agenda, weather has emerged as an important issue in travel behavioural research and urban planning. While various studies demonstrate profound effects of weather on travel behaviours, limited attention has been paid to subjective weather experiences and the psychological mechanisms that may (partially) underlie these effects. This paper integrates theoretical insights on outdoor thermal comfort, weather perceptions and emotional experiences in the context of travel behaviour. Drawing on unique panel travel diary data for 945 Greater Rotterdam respondents (The Netherlands), this paper aims to investigate how and to what extent weather conditions affect transport mode choices, outdoor thermal perceptions and emotional travel experiences. Our findings point out that observed dry, calm, sunny and warm but not too hot weather conditions stimulate cycling over other transport modes and – via mechanisms of thermal and mechanical comfort – lead to more pleasant emotions during travel. Overall, public transport users have less pleasant emotional experiences than users of other transport modes, while active mode users appear most weather sensitive. The theoretical contributions and empirical findings are discussed in the context of climate change and climate-sensitive urban planning.

How and why do men and women differ in their willingness to use automated cars? The influence of emotions across different age groups

- Transportation Research Part A: Policy and Practice---2016---Christoph Hohenberger,Matthias Spörrle,Isabell M. Welpé

Current research on willingness to use automated cars indicates differences between men and women, with the latter group showing lower usage intentions. This study aims at providing a first explanation of this effect. Research from other fields suggests that affective reactions might be able to explain behavioral intentions and responses towards technology, and that these affects vary depending on age levels. By examining a sample of 1603 participants representative for Germany (in terms of biological sex, age, and education) we found evidence that affective responses towards automotive cars (i.e., anxiety and pleasure) explain (i.e., mediate) the effect of biological sex on willingness to use them. Moreover, we found that these emotional processes vary as a function of respondent age in such a way that the differential effect of sex on anxiety (but not on pleasure) was more pronounced among relatively young respondents and decreased with participants' age. Our results suggest that addressing anxiety-related responses towards automated cars (e.g., by providing safety-related information) and accentuating especially the pleasurable effects of automated cars (e.g., via advertising) reduce differences between men and women. Addressing the anxiety-related effects in order to reduce sex differences in usage intentions seems to be less relevant for older target groups, whereas promoting the pleasurable responses is equally important across age groups.

Numerical analysis of electric bus fast charging strategies for demand charge reduction

- Transportation Research Part A: Policy and Practice---2016---Nan Qin,Azwirman Gusrialdi,R. Paul Brooker,Ali T-Raissi

Electric transit buses have been recognized as an important alternative to diesel buses with many environmental benefits. Electric buses employing lithium titanate batteries can provide uninterrupted transit service thanks to their ability of fast charging. However, fast charging may result in high demand charges which will increase the fuel costs thereby limiting the electric bus market penetration. In this paper, we simulated daily charging patterns and demand charges

of a fleet of electric buses in Tallahassee, Florida and identified an optimal charging strategy to minimize demand charges. It was found that by using a charging threshold of 60–64%, a \$160,848 total saving in electricity cost can be achieved for a five electric bus fleet, comparing to a charging threshold of 0–28%. In addition, the impact of fleet sizes on the fuel cost was investigated. Fleets of 4 and 12 buses will achieve the lowest cost per mile driven when one fast charger is installed.

Forecasting passenger travel demand for air and high-speed rail integration service: A case study of Beijing-Guangzhou corridor, China

- Transportation Research Part A: Policy and Practice---2016---Zhi-Chun Li,Dian Sheng

This paper investigates the mode choice behavior of inter-city passengers among air transport, high-speed rail (HSR), and air and high-speed rail (AH) integration services. Stated preference survey has been conducted for four typical city pairs that are located in the Beijing-Guangzhou corridor, China. Modal split models are proposed and calibrated based on the collected survey data. The proposed models are used to identify the key factors affecting passengers' mode choices and to estimate the modal split of passenger travel demand for some inter-city transportation markets of China. Sensitivity analyses are also performed to reveal the market potential of the AH integration service in China. It has been found: (i) when the inter-city travel distance exceeds a threshold, passengers become less sensitive to the connection time of the AH service, (ii) the most competitive haul distance for the AH service is between 1200km and 1600km, and (iii) the en route travel time is the most important factor affecting the market share of the AH service.

Time-dependent congestion pricing system for large networks: Integrating departure time choice, dynamic traffic assignment and regional travel surveys in the Greater Toronto Area

- Transportation Research Part A: Policy and Practice---2016---Aya Aboudina,Hossam Abdel-

Congestion pricing is one of the widely contemplated methods to manage traffic congestion. The purpose of congestion pricing is to manage traffic demand generation and supply allocation by charging fees (i.e., tolling) for the use of certain roads in order to distribute traffic demand more evenly over time and space. This study presents a framework for large-scale variable congestion pricing policy determination and evaluation. The proposed framework integrates departure time choice and route choice models within a regional dynamic traffic assignment (DTA) simulation environment. The framework addresses the impact of tolling on: (1) road traffic congestion (supply side), and (2) travelers' choice dimensions including departure time and route choices (demand side). The framework is applied to a simulation-based case study of tolling a major freeway in Toronto while capturing the regional effects across the Greater Toronto Area (GTA). The models are developed and calibrated using regional household travel survey data that reflect the heterogeneity of travelers' attributes. The DTA model is calibrated using actual traffic counts from the Ontario Ministry of Transportation and the City of Toronto. The case study examined two tolling scenarios: flat and variable tolling. The results indicate that: (1) more benefits are attained from variable pricing, that mirrors temporal congestion patterns, due to departure time rescheduling as opposed to predominantly re-routing only in the case of flat tolling, (2) widespread spatial and temporal re-distributions of traffic demand are observed across the regional network in response to tolling a significant, yet relatively short, expressway serving Downtown Toronto, and (3) flat tolling causes major and counterproductive rerouting patterns during peak hours, which was observed to block access to the tolled facility itself.

Formal characterization of an efficient driving evaluation process for companies of the transport sector

- Transportation Research Part A: Policy and Practice---2016---Xabiel G. Pañeda, Roberto Garcia, Gabriel Diaz, Alejandro G. Tuero, Laura

Public institutions and private companies all around the world agree that road transport is one of the main sectors responsible for global warming. With this in mind, all of them have designed actions to increase efficiency and reduce fuel consumption and emissions. A favorite for the companies is eco-driving because it can improve the fleet performance without a great investment. However, although these programs have achieved promising results in the majority of the experiences, the figures are not so encouraging in the long term. In many cases this decrease is produced by fuzzy reward programs or the total lack of them. Nevertheless, any coherent reward program, in order to be effective, must be associated with a complete and fair evaluation process which takes into account all the different aspects and complexities related with driving. In this paper, we propose a formal characterization of an efficient driving evaluation process which starts with a review of many different driving recommendation systems. These recommendations are used as seeds to build a set of formal competences that any eco driver must have, as well as the learning outcomes associated with each competence. A set of patterns of driving behaviors are defined, that allow confirming any of the learning outcomes. The definition also comprises a set of Key Performance Indicators (KPIs) for each learning outcome. These KPIs allow measuring the progress associated with each competence. Finally, we also propose some relevant differences that must be taken into account for the goals associated with each KPI, depending on the domain of application: type and road geometry, vehicle type (automatic or manual, passengers, cargo or not, public or private), amount of traffic, weather. Some examples of this driver characterization have been included to demonstrate the process.

Map-induced journey-planning biases for a simple network: A Docklands Light Railway study

- Transportation Research Part A: Policy and Practice---2016---Maxwell J. Roberts,Doug Rose

A usability study was conducted to identify the most effective prototype Docklands Light Railway map for installation on trains. This comprised a series of tasks that required station finding and also planning of routes between pairs of stations, with response time and accuracy as measures of performance. In addition, subjective ratings of map design were collected via questionnaire-based evaluations, and also ranked preferences between designs. A clear best-option was easily identifiable as a result of this research. The existing design was associated with the most journey planning errors, and two of the prototypes were associated with inefficient journey choices. The latter finding suggested that respondents were using unsophisticated planning strategies that were put at a disadvantage by certain route depictions. This has wider implications for suggestions that schematic maps should maintain topographical relationships in order to facilitate appropriate journey choices, with the danger that the inevitable increased complexity of line trajectories for such designs would simultaneously reduce the ability of passengers to identify the most appropriate routes.

The Northern Sea Route competitiveness for oil tankers

- Transportation Research Part A: Policy and Practice---2016---Olivier Faury,Pierre Cariou

This article proposes a decision model for a ship-owner who contemplates the benefits of sailing north via the Northern Sea Route (NSR) or south via the Suez Canal Route (SCR) when transporting oil products from Russia to Asia. The decision is based on potential cost and transit time savings that change on a monthly basis according to sailing conditions and the area along the NSR. This study is applied to a 1A Ice-Class Panamax tanker vessel sailing through the NSR compared to a

Panamax tanker vessel sailing through the SCR. It concludes that the NSR provides a competitive advantage in the months from August to November when conservative assumptions on ice conditions (higher bound) are considered for the level of ice thickness encountered along the route and from July to November when a lower bound is assumed.

Optimal pricing for travelcards under income and car ownership inequities

- Transportation Research Part A: Policy and Practice---2016---Sergio Jara-Díaz,Diego Cruz,César Casanova

Travelcards are used in many parts of the developed world as a form of payment for public transport that is convenient for frequent users. In essence it involves a one-time payment T at the beginning of a period that covers all trips within that period. Carbajo (1988) applies the two-part tariff approach to find the optimal (welfare maximizing) value for T assuming a nil effect of T on the demand schedule of each and every individual (no income effect). Here we deal with an urban area where individual trips increase with income, but where car ownership – correlated with income – makes the public transport share diminish towards high income segments. A theoretical model is developed to find the optimal values (maximum social welfare with a budget constraint) for T and, simultaneously, for a single ticket P , considering the effect of T on available income as well as differences across individuals regarding car ownership. The model is applied using parameters associated with monthly travel in Santiago, Chile, where both income and car ownership are highly concentrated and correlated, and where travelcards do not exist. We obtain that the two richest segments choose to pay for the single ticket and the other eight choose to buy the travelcard, increasing equity. Sensitivity analysis regarding public transport quality, increased car ownership and poverty reduction show relatively marginal changes regarding optimal prices and preferred form of payment.

A novel peer-to-peer congestion pricing marketplace enabled by vehicle-automation

- Transportation Research Part A: Policy and Practice---2016---Scott Le Vine,John Polak

This paper proposes a novel concept of congestion pricing based on voluntary peer-to-peer exchange of money between motorists in exchange for one ceding priority to another in a traffic stream. While in the classical congestion charging paradigm payments are compulsory and flow only towards the system operator, in the proposed marketplace participation is voluntary and motorists directly compensate each other. A particular motorist may find that he/she is a ‘payer’ at certain points in a given journey and a ‘payee’ at others.

Airport demand management: The operations research and economics perspectives and potential synergies

- Transportation Research Part A: Policy and Practice---2016---David Gillen,Alexandre Jacquillat,Amedeo R. Odoni

Airport demand management aims to mitigate air traffic congestion by limiting the imbalances between demand and capacity at busy airports through administrative measures (e.g., slot controls) or economic incentives (e.g., congestion pricing, slot auctions). This paper provides an integrated synthesis of the contributions of the fields of operations research/management science (OR/MS) and economics on the subject matter. From an operating standpoint, assessing the benefits of demand management requires estimates of airport capacity and models of airport on-time performance. From a managerial standpoint, the design of demand management mechanisms can be supported by decision-making models of flight scheduling. From an economic standpoint, the welfare impact of congestion pricing, slot controls and slot auctions depends on the market structure at the airport. This paper proposes an integrated framework that underscores the interdependencies between these operating, managerial and economic aspects to foster cross-disciplinary approaches toward

more effective demand management policies at busy airports worldwide.

Interplay between electricity and transport sectors – Integrating the Swiss car fleet and electricity system

- Transportation Research Part A: Policy and Practice---2016---Ramachandran Kannan,Stefan Hirschberg

Electric vehicles are seen as a future mobility option to respond to long term energy and environmental problems. The 2050 Swiss energy strategy envisages 30–75% introduction of electric cars by 2050, which is designed to support the goal of decarbonising the energy sector. While the Swiss government has decided to phase out nuclear electricity, deployment of electric cars can affect electricity supply and emission trajectories. Therefore, potential interactions between the electricity and transport sectors must be considered in assessing the future role of electric mobility. We analyse a set of scenarios using the Swiss TIMES energy system model with high temporal resolution. We generate insights into cross-sectoral trade-offs between electricity supply and electrification/decarbonisation of car fleets. E-mobility supports decarbonisation of car fleet even if electricity is supplied from large gas power plants or relatively low cost sources of imported electricity. However, domestic renewable based electricity generation is expected to be too limited to support e-mobility. Stringent abatement targets without centralised gas power plants render e-mobility less attractive, with natural gas hybrids becoming cost effective. Thus the cost effectiveness of electric mobility depends on policy decisions in the electricity sector. The substitution of fossil fuels with electricity in transport has the potential to reduce revenues from fuel taxation. Therefore it is necessary to ensure consistency between electricity sector and transport energy policies.

Airlines’ reaction to high-speed rail entries: Empirical study of the Northeast Asian market

- Transportation Research Part A: Policy and Practice---2016---Yulai Wan,Hun-Koo Ha,Yuichiro

We investigate the impact of the commencement of high-speed rail (HSR) services on airlines' domestic available seats on affected routes in China, Japan, and South Korea. The study is based on a dataset covering the 1994–2012 period. We use the propensity score matching method to pair HSR affected routes with routes without HSR services. The difference-in-difference approach is used to estimate the impact of HSR entry. We find that HSR entries may, on average, lead to a more significant drop in airlines' seat capacity in China than in Japan and Korea given similar HSR service speed. In China, HSR services with a maximum speed about 200km/h can produce strong negative impacts on medium-haul air routes but induce more air seat capacity on long-haul routes. HSR services with a maximum speed of 300km/h have little extra impact on medium-haul routes but a strong negative impact on long-haul routes. Finally, although HSR has a strong negative impact in Japan's short-haul and medium-haul air markets, little impact is observed in its long-haul markets.

Crash analysis at intersections in the CBD: A survival analysis model

- Transportation Research Part A: Policy and Practice---2016---Saeed Asadi Bagloee, Mohsen Asadi

Enhancing the safety level of urban roads especially in CBDs is paramount. Due to a large number of intersections in what is usually a grid road system in the CBDs, we investigate crashes occurring in and around an intersection. The question of interest in this study is: does the nature of crashes at intersections differ from those of the roads at midblock? Stated more precisely, considering the intersection as a reference point, does the distance to the reference point (i.e. midblock locations on the roads) correlate with different types of crashes compared to that of the intersection? A right answer can lead traffic engineers and safety auditors to propose different safety measures at intersections and the midblock locations. As a pilot study, we collected the last

9years crash data of the CBD of Melbourne, Australia. For the first time, we employ Survival Analysis models -including Exponential, Weibull, and Log-logistic- to investigate a space-dependent phenomenon (i.e. accidents at proximity to the intersection). Of the outcome, highlights are: (i) police presence at busy intersections during busy night outs and weekends highly improves the pedestrian safety (ii) raised crossings at midblock locations lower likelihood of crashes of pedestrians as well as cars, (iii) lighting conditions at intersections must be watched and kept at a high level. (iv) Severity, likelihood, and location have no known association with the level of congestion. In other words, safety is first, always and everywhere. The results can be of interest to traffic authorities and policy makers in reinforcing traffic calming measures in the cities. The codes developed in this study are made available to the research community to be used in further studies.

Are railways really that bad? An evaluation of rail systems performance in Europe with a focus on passenger rail

- Transportation Research Part A: Policy and Practice---2016---Anna Fraszczyk, Thomas Lamb, Marin Marinov

With a large number of railway development projects in Europe and worldwide, which once completed will be serving rail passengers of the future, this paper aims to take a step back and evaluate current railway systems performance. The objectives are to compare statistical data on various passenger-related parameters of the railway system in a number of selected European countries and draw conclusions on the level of their performance when compared to the European average.

Commuting trip satisfaction in Beijing: Exploring the influence of multimodal behavior and modal flexibility

- Transportation Research Part A: Policy and Practice---2016---Zidan Mao, Dick Ettema, Martin Dijst

In the past decade, many studies have explored the

relationship between travelers' travel mode and their trip satisfaction. Various characteristics of the chosen travel modes have been found to influence trip experiences; however, apart from the chosen modes, travelers' variability in mode use and their ability to vary have not been investigated in the trip satisfaction literature. This current paper presents an analysis of commuting trip satisfaction in Beijing with a particular focus on the influence of commuters' multimodal behavior on multiple workdays and their modal flexibility for each commuting trip. Consistent with previous studies, we find that commuting trips by active modes are the most satisfying, followed by trips by car and public transport. In Beijing, public transport dominates. Urban residents increasingly acquire automobiles, but a strict vehicle policy has been implemented to restrict the use of private cars on workdays. In this comparatively constrained context for transport mode choice, we find a significant portion of commuters showing multimodal behavior. We also find that multimodal commuters tend to feel less satisfied with trips by alternative modes compared with monomodal commuters, which is probably related to their undesirable deviation from habitual transport modes. Furthermore, the relationship between modal flexibility and trip satisfaction is not linear, but U-shaped. Commuters with high flexibility are generally most satisfied because there is a higher possibility for them to choose their mode of transport out of preference. Very inflexible commuters can also reach a relatively high satisfaction level, however, which is probably caused by their lower expectations beforehand and the fact that they did not have an alternative to regret in trip satisfaction assessments.

How much is too much for tolled road users: Toll saturation and the implications for car commuting value of travel time savings?

- Transportation Research Part A: Policy and Practice---2016---David Hensher, Chinh Q. Ho, Wen Liu

The current practice of forecasting the demand for new tolled roads typically assumes that car users are

prepared to pay a higher toll for a shorter journey, and they will keep doing so as long as the toll cost is not higher than their current value of travel time savings. Practice ignores the possibility that there could be a point when motorists stop driving on toll roads due to a toll budget constraint. The unconstrained toll budget assumption may be valid in networks where the addition of a new toll road does not result in a binding budget constraint that car users may have for using toll roads (although it could also be invoked for existing tolled routes through a reduction in use of a tolled route). In a road network like Sydney which offers a growing number of (linked) tolled roads, the binding budget constraint may be invoked, and hence including additional toll links might in turn reduce the car users' willingness to pay for toll roads to save the same amount of travel time. When this occurs, car users are said to reach a toll saturation point (or threshold) and begin to consider avoiding one or more toll roads. Whilst toll saturation has important implications for demand forecasting and planning of toll roads, this type of behaviour has not been explored in the literature. We investigate the influence that increasing toll outlays has on preferences of car commuters to use one or more tolled roads as the number of tolled roads increases. The Sydney metropolitan area offers a unique laboratory to test this phenomenon, with nine tolled roads currently in place and another five in planning. The evidence supports the hypothesis that the value of travel time savings decreases as a consequence of toll saturation.

Analyzing the gap between the QOS demanded by PT users and QOS supplied by service operators

- Transportation Research Part A: Policy and Practice---2016---Bryan Epstein, Moshe Givoni

This research evaluated the effectiveness of tendered bus public transportation (PT) in improving the attractiveness of that service in order to promote sustainable mobility. This was accomplished by characterizing the gap between the quality of service (QOS) supplied by contract regimes and that which is demanded by pas-

sengers. Analysis of a customer satisfaction survey aimed at bus users provided insight into their ranking of 14 QOS parameters while 13 active service contracts were analyzed for their impact on QOS. In-depth interviews with relevant experts completed the complex narrative that is Israel's policy of privatization in PT. Both qualitative and quantitative analyses helped identify those QOS parameters most in demand by passengers and impacted by contracts. The results show that the gap is minimal, high demand parameters receive increased priority in contracts. In addition this research documented an evolution in the method contracts employed to provide QOS. Late model contracts define an increasingly higher minimum QOS; but also strongly limit the operator's ability to make service changes. This is a trend which should improve QOS in Israel but reduce the incentive for operator enacted QOS initiatives. Despite its obvious success to date, it might be time to change again the contract regime for the provision of competitive bus services in Israel.

Investigating preference heterogeneity in Value of Time (VOT) and Value of Reliability (VOR) estimation for managed lanes

- Transportation Research Part A: Policy and Practice---2016---Md Sakoat Hossan,Hamidreza Asgari,Xia Jin

This paper presents an empirical study in investigating user heterogeneity of Value of Time (VOT) and Value of Reliability (VOR). Combined Revealed Preference (RP) and Stated Preference (SP) data were used to understand traveler choice behavior regarding the usage of managed lanes (MLs). The data were obtained from the South Florida Expressway Stated Preference Survey, which focused on automobile drivers who had traveled on the I-75, I-95, or SR 826 corridors in South Florida. Mixed logit modeling was applied and indicated an average value of \$13.55 per hour for VOT and \$16.13 per hour for VOR. Potential sources of heterogeneity in user sensitivities to time, reliability, and cost were identified and quantified by adding interaction effects of the variables in the mixed logit model. The findings indicated that various socioeco-

nomic demographic characteristics and trip attributes contributed to the variations in VOT and VOR at different magnitudes. The results of this study contribute to a better understanding on what attributes lead to higher or lower VOT and VOR and to what extent. These findings can be incorporated into the demand forecasting process and lead to better estimates and enhanced analytical capabilities in various applications, such as toll feasibility studies, pricing strategy and policy evaluations, and impact analysis.

Centralized resource allocation with emission resistance in a two-stage production system: Evidence from a Taiwan's container shipping company

- Transportation Research Part A: Policy and Practice---2016---Ming-Miin Yu,Li-Hsueh Chen

This paper proposes a centralized network data envelopment analysis model that combines the centralized data envelopment analysis model and network data envelopment analysis to allocate resources among sub-units. In the proposed model, this paper also considers the situations in which undesirable outputs are jointly produced with desirable outputs, the reduction of undesirable outputs is associated with the reduction of energy inputs, and some inputs are dedicated to the specific sub-unit while some inputs are shared among sub-units. To comprehensively investigate this issue, two cases are discussed. One case explores the situation in which common inputs are shared among the first process of sub-units, while the other case explores the situation in which common inputs are also shared among two processes of sub-units. The proposed model is illustrated in an empirical example of 14 Asian shipping routes operated by a Taiwanese container shipping company. In order to avoid organizational resistance, minor and major adjustment policies are demonstrated. The minor adjustment policy transfers inputs among routes but maintains the original levels of input resources, whereas the major adjustment policy reduces the total amount of input resources. The results provide valuable information for the centralized decision-maker on how to reallocate resources among the sub-units.

Towards a more equitable distribution of resources: Using activity-based models and subjective well-being measures in transport project evaluation

- Transportation Research Part A: Policy and Practice---2016---Nahmias-Biran, Bat-hen, Yoram Shiftan

In this paper, we develop an innovative and comprehensive transport evaluation criterion to better account for equity considerations in transport project evaluation. This work explores transportation benefits from the consumer's perspective to accessibility as a key benefit generated by any transportation project. To assess the full benefits of transportation project implementation for various consumers and calculate the improvement in accessibility, it is best to use Activity-Based Models (ABM). ABMs have two important advantages for equity analysis, which have not been utilized in the literature so far: first, ability to analyze results by various groups of the population; second, these models can utilize the Activity Based Accessibility (ABA) measure to estimate the overall benefits from transport investments and policies. The ABA measure allows one person to have different accessibilities for different choice situations, depending on his/her characteristics. We suggest including social and spatial factors in social welfare assessment by introducing the concept of accessibility gains to key social activities. Specifically, it is suggested to incorporate subjective well-being consideration into a new evaluation framework "Equity Benefit Analysis" (EBA). we use an alternative measure, "Subjective Value of Accessibility gains" (SVOA), which is based on the ABM accessibility measure as well as on Subjective Well-Being (SWB) measure, as the key benefit taken into account in the evaluation process. The SVOA is not intended to replace the current practice of analyzing equity by comparing various impacts on different groups of the population, but can aid by providing policymakers with a single measure advancing both equity and efficiency considerations and facilitating comparison among alternatives. Initial case study results indicate the SVOA can show higher benefits to policies focusing on the needs of vulnerable

social groups that compared traditional measures.

Determining the role of bicycle sharing system infrastructure installation decision on usage: Case study of montreal BIXI system

- Transportation Research Part A: Policy and Practice---2016---Ahmadreza Faghih-Imani, Naveen Eluru

The traditional quantitative approach to studying Bicycle Sharing System (BSS) usage involves examining the influence of BSS infrastructure (such as number of BSS stations and capacity), transportation network infrastructure, land use and urban form, meteorological data, and temporal characteristics. These studies, as expected, conclude that BSS infrastructure (number of stations and capacity) have substantial influence on BSS usage. The earlier studies consider usage as a dependent variable and employ BSS infrastructure as an independent variable. Thus, in the models developed, the unobserved factors influencing the measured dependent variable (BSS usage) also strongly influence one of the independent variables (BSS infrastructure). This is a classic violation of the most basic assumption in econometric modeling i.e. the error component in the model is not correlated with any of the exogenous variables. The model estimates obtained with this erroneous assumption are likely to over-estimate the impact of BSS infrastructure. Our research effort proposes an econometric framework that remedies this drawback. We propose a measurement equation to account for the installation process and relate it to the usage equations thus correcting for the bias introduced in earlier research efforts by formulating a multi-level joint econometric framework. The econometric models developed have been estimated using data compiled from April 2012 to August 2012 for the BIXI system in Montreal. The model estimates support our hypothesis and clearly show over-estimation of BSS infrastructure impacts in models that neglect the installation process. An elasticity analysis to highlight the advantages of the proposed econometric model is also conducted.

An application of the directional distance function with the number of accidents as an undesirable output to measure the technical efficiency of state road transport in India

- Transportation Research Part A: Policy and Practice---2016---Debdatta Pal,Subrata K. Mitra

By using the directional distance function (DDF) of data envelopment analysis (DEA), this study measures the technical efficiency of 37 Indian state road transport undertakings (SRTUs) for the year 2012–13. We employ the DDF as a tool for analyzing a joint production function with both desirable and undesirable outputs (i.e., the number of accidents). A comparison between the results with and without accidents shows that several SRTUs have experienced significant changes in their efficiency scores as well as in their rankings after accounting for the undesirable output. This indicates the importance of including the number of accidents – a safety standard – as representative of the undesirable output in computing the efficiency scores of SRTUs. The results of the Tobit model indicate that SRTUs with greater vehicle productivity are more efficient under both conventional DEA and DDF approaches. We also employed zero-truncated negative binomial model to assess the factors influencing the number of road accident experienced by the Indian SRTUs and found that the accident count was significantly influenced by fleet utilization and vehicle productivity.

The role of transportation sectors in the Korean national economy: An input-output analysis

- Transportation Research Part A: Policy and Practice---2016---Min-Kyu Lee,Seung-Hoon Yoo

The transportation industry has been playing an important role in the economic development of Korea and, thus, has become a critical factor in sustaining the well-being of the Korean people. This paper attempts to analyze the economic impacts of four transportation modes using input-output (I-O) analysis, with specific application to Korea. To this end, we apply the I-O models to the Korean I-O tables generated by the

Bank of Korea, paying particular attention to the four transportation sectors in Korea (rail, road, water, and air transportations), considering them as exogenous, and then determining their impacts. Specifically, the production-inducing effects, supply shortage effects, sectoral price effects, forward linkage effects, and backward linkage effects of the four transportation modes are quantitatively derived over the period 2000–2010. For example, the production-inducing effect of a KRW 1.0 production or investment in transportation is larger in the petroleum and transportation equipment sectors than in other sectors. Furthermore, the rail and road transportation sectors have greater supply shortage effects than the other transportation sectors. Finally, the potential uses of the results of this analysis are presented from the perspective of policy instruments, and policy implications are discussed.

Perceived service quality of paratransit in developing countries: A structural equation approach

- Transportation Research Part A: Policy and Practice---2016---Farzana Rahman,Tanmay Das,Md Hadiuzzaman,Sanjana Hossain

This paper develops empirical models for evaluating the service quality (SQ) of paratransit. Specifically, several models are developed based on structural equation modeling (SEM) using twenty-four SQ variables. To calibrate those models, a data set of 2008 paratransit users of Dhaka City are utilized, who were interviewed with a structured questionnaire to know their experience, level of satisfaction and opinion about the existing service as well as their expectations. SEM reveals the observed and latent SQ variables and their relationship with the overall SQ of paratransit. Among the different models developed, the best one is selected using statistical parameters and resemblance with real life expectations. Out of twenty-four SQ variables, ‘Punctuality and Reliability’ and ‘Service Features’ are respectively found to be the observed and latent variables having the greatest influence on the paratransit SQ. Moreover, the effect of heterogeneity among users on the performance of the best model is investi-

gated. All the study findings support the data collected from the paratransit users. The research outcomes can be utilized by the city transportation officials of developing countries to improve the overall paratransit performance to attract new users as well as retain the current ones.

Who knows about kids these days? Analyzing the determinants of youth and adult mobility in the U.S. between 1990 and 2009

- Transportation Research Part A: Policy and Practice---2016---Evelyn Blumenberg, Kelcie Ralph, Michael Smart, Brian D. Taylor

The 2000s was a decade of transitions for teens and young adults. In comparison with previous generations of youth, those living in the developed world (i) faced the harshest economic climate in decades, (ii) lived with their parents longer and were more likely to return back home as young adults, (iii) used information and communication technologies (ICTs) extensively, and (iv) in the U.S., were subject to increasingly stringent graduated driver's licensing (GDL) regulations. All were dramatic societal changes to be sure, but how did they affect youth travel behavior? Some argue dramatically and enduringly, but usually with fragmentary evidence. We examine data from the three most recent U.S. national travel surveys and find that, with one exception, after controlling for personal, household, locational, and travel factors, the effects of factors associated with various societal trends on person-kilometers traveled (PKT) are surprisingly muted. The exception is that decreased employment is associated with substantially lower PKT; however, this effect is 32% greater among older (ages 27–61) than younger (ages 20–26) adults, suggesting that economic factors, rather than changes in youth travel preferences, were at the root of declines in personal travel in the U.S. during the 2000s.

Red-light running traffic violations: A novel time-based method for determining a fine structure

- Transportation Research Part A: Policy and Practice---2016---Fatemeh Baratian-

Ghorghi, Huaguo Zhou, Wesley C. Zech

In 2016, the monetary fine for a red-light running (RLR) traffic violation varies widely in the U.S., with a fine of \$50 in North Carolina and as much as \$490 in California. Currently, a scientific method for determining the monetary fine based on the safety impacts associated with such violations does not exist, thereby causing disparities in fine structures. This study develops a novel fine structure for RLR traffic violations based upon the estimated economic impact of potential crashes by RLR violations and estimated delays caused by providing all-red intervals to prevent potential conflicts. A physical model is developed to determine the crash probability at a discrete time after the traffic signal turns red. The Highway Capacity Software is also employed to estimate additional delay incurred by road users. Considering that the use of red-light cameras is increasing in the nation, while it is often criticized as a revenue instrument, policymakers need to develop an objective fine structure that closely reflects the risk a RLR vehicle poses to other drivers.

The role of the air transport service in interregional long-distance students' mobility in Italy

- Transportation Research Part A: Policy and Practice---2016---Mattia Cattaneo, Paolo Malighetti, Stefano Paleari, Renato Redondi

This study investigates the role of air transport service in the attractiveness of universities to national students, examining how it might stimulate local economic development by attracting highly skilled labor. Examining the flow of Italian university students at the provincial level in 2003–2012, we find that the air transport service affects university attractiveness for long-distance students living at least 300km from their university. Specifically, accessibility increases with the proximity of universities to airports, when low-cost carriers serve university routes and more alternative airports exist at the origin. Further, our results suggest that, over the last decade, air transport service has facilitated mobility of long-distance students from southern areas

to universities in the north of Italy, where students generally move to increase their future prospects.

A spatial autoregressive panel model to analyze road network spillovers on production

- Transportation Research Part A: Policy and Practice---2016---Inmaculada Álvarez,Javier Barbero,José Zofío

The production function approach is used to introduce the effect of public infrastructure on economic growth focusing on its spillover effects. We improve the existing literature both from a conceptual and methodological perspective. As regressors we incorporate variables related to the new concepts of internal and imported transport infrastructure capital stocks, which are actually used in commercial flows, calculated by network analysis performed in GIS. The internally used capital stock represents own infrastructure that benefits accessing markets within the region itself, while the imported capital stock captures the spillover effect associated to the use of the infrastructure situated in neighboring regions. From a methodological perspective, we introduce spatial interdependence into these models, applying the most recent spatial econometric techniques based on instrumental variables estimation in spatial autoregressive panel models in comparison with Maximum Likelihood estimation methods. We illustrate the methodology with Spanish provincial panel data for the period 1980–2007. Results support the hypothesis that the imported capital has a positive spillover effect on production.

Why do urban travelers select multimodal travel options: A repertory grid analysis

- Transportation Research Part A: Policy and Practice---2016---Thomas Clauss,Sebastian Döppe

The increasing number of travelers in urban areas has led to new opportunities for local government and private mobility providers to offer new travel modes besides and in addition to traditional ones. Multimodal travel provides an especially promising opportunity.

However, until now the underlying reasons why consumers choose specific alternatives have not been fully understood. Hence, the design of new travel modes is mainly driven by obvious criteria such as environmental friendliness and convenience but might not consider consumers' real or latent needs. To close this research gap, sixty in-depth interviews with urban travelers were conducted. To identify the perceptual differences of customers among different travel modes, the repertory grid technique as an innovative, structured interview method was applied. Our data show that urban travelers distinguish and select travel alternatives based on 28 perceptual determinants. While some determinants associated with private cars such as privacy, flexibility and autonomy are key indicators of travel mode choice, costs and time efficiency also play a major role. Furthermore, by comparing travel modes to an ideal category, we reveal that some perceptual determinants do not need to be maximized in order to fulfill customer needs optimally. A comparison of consumers' perceptual assessments of alternative travel modes identifies specific advantages and disadvantages of all alternatives, and provides fruitful implications for government and private mobility providers.

Home-based telework in France: Characteristics, barriers and perspectives

- Transportation Research Part A: Policy and Practice---2016---Anne Aguilera,Virginie Lethiais,Alain Rallet,Laurent Proulhac

The aim of this article is to explain the gap between high social expectations, particularly in terms of reducing commuting frequency, increasing productivity and improving work-life balance, and the reality of home-based telework. We use three French databases which give information about employers but also employees. We highlight that telework is not only a fairly restricted phenomenon but also one that lacks impetus; it is mainly an informal working arrangement. The main reasons raised by both employees and employers are the uncertain advantages coupled with immediate disadvantages. The conclusion examines different contextual factors that could alter this cost-benefits

dilemma and foster the development of home-based telework.

Impacts of information technology and urbanization on less-than-truckload freight flows in China: An analysis considering spatial effects

- Transportation Research Part A: Policy and Practice---2016---Linglin Ni,Wang, Xiaokun (Cara),Dapeng Zhang

Understanding the relationship between socioeconomic factors and the Less-than-Truckload (LTL) freight flows is important for transportation planners and policy makers. This paper explores the impacts of information technology, urbanization on LTL freight flows by using a spatial autocorrelation model with freight flow data from a leading LTL company in China. The results show that all IT variables and urbanization variables have positive effects on freight flows. Distance, as expected, is negatively correlated with the freight flow volume. The application of the spatial autocorrelation model further shows that origin dependence, destination dependence and OD dependence are all significant, justifying the consideration of spatial interdependence. Finally, policy implications are discussed based on the estimated results. These findings shed light on the impacts of internet and urbanization on freight transportation, and contribute to the design of freight policies and the development of the LTL industry.

How experience of use influences mass-market drivers' willingness to consider a battery electric vehicle: A randomised controlled trial

- Transportation Research Part A: Policy and Practice---2016---Stephen M. Skippon,Neale Kinneer,Louise Lloyd,Jenny Stannard

Uptake of electric vehicles (EVs) by consumers could reduce CO₂ emissions from light duty road transport, but little is known about how mass-market consumer drivers will respond to them. Self-Congruity theory proposes that products are preferred whose symbolic

meanings are congruent with personal identity. Further, Construal Level theory suggests that only those who are psychologically close to a new product category through direct experience with it can make concrete construals related to their lifestyles; most drivers lack this for EVs. For instance, potential performance benefits of EVs might offset range limitations for consumers who have such direct experience. The effect of direct experience was tested in a randomised controlled trial with 393 mass-market consumer drivers. An experimental group were given direct experience of a modern battery electric vehicle (BEV), and a control group an equivalent conventional car. Despite rating the performance of the BEV more highly than that of the conventional car, willingness to consider a BEV declined after experience, particularly if the range of the BEV considered was short. The participants willing to consider a short-range BEV were those high in self-congruity, for whom the BEV could act as a strong symbol of personal identity.

Commuters' willingness-to-pay for improvement of transfer facilities in and around metro stations – A case study in Kolkata

- Transportation Research Part A: Policy and Practice---2016---Shubhajit Sadhukhan,Uttam K. Banerjee,Bhargab Maitra

Although several cities in India are developing the metro system, there are lacunas associated with transfer facilities in and around metro stations. The present work aims to investigate the perception of commuters of Kolkata city, India in terms of their willingness-to-pay (WTP) for improvement of transfer facilities. A stated preference survey instrument was designed to collect choice responses from metro commuters and the database was analysed by developing random parameter logit (RPL) models. The decomposition effects of various socioeconomic and trip characteristics on mean estimates were also investigated in random parameter logit models with heterogeneity. The work indicates significantly high WTP of metro commuters as compared to the average metro fare for improvement of various qualitative attributes of transfer facility such as

‘facility for level change’ , ‘visual communication’ , ‘pedestrian crossing’ , and ‘pedestrian environment’ . The WTP values are also found to vary across different groups of commuter formed on the basis of ‘trip purpose’ , ‘monthly household income’ , ‘station type’ and ‘metro fare’ . ‘Work trip’ commuters are found to have higher WTP for improvement of access time, pedestrian environment and use of an escalator over the elevator. On the other hand, ‘high-income group’ commuters have shown higher WTP for improvement of access time, pedestrian crossing, and pedestrian environment. While ‘high fare group’ commuters have higher WTP for access time and pedestrian environment, heterogeneity is also observed in WTP for facility for level change, pedestrian crossing, and pedestrian environment across commuters using different ‘station type’ (underground, at-grade, and elevated). The findings from the study provide a basis for formulating policies for the improvement of transfer facilities in and around metro stations giving due attention to the preference of commuters having different socioeconomic and trip characteristics.

A mixed logit model for predicting exit choice during building evacuations

- Transportation Research Part A: Policy and Practice---2016---Ruggiero Lovreglio,Achille Fonzone,dell’ Olio, Luigi

Knowledge on human behaviour in emergency is crucial to increase the safety of buildings and transportation systems. Decision making during evacuations implies different choices, of which one of the most important concerns is the escape route. The choice of a route may involve local decisions on alternative exits from an enclosed environment. This study investigates the effect of environmental (presence of smoke, emergency lighting and distance of exit) and social factors (interaction with evacuees close to the exits and with those near the decision-maker) on local exit choice. This goal is pursued using an online stated preference survey carried out making use of non-immersive virtual reality. A sample of 1503 participants is obtained and a mixed logit model is calibrated using these data. The model

shows that the presence of smoke, emergency lighting, distance of exit, number of evacuees near the exits and the decision-maker and flow of evacuees through the exits significantly affect local exit choice. Moreover, the model indicates that decision making is affected by a high degree of behavioural uncertainty. Our findings support the improvement of evacuation models and the accuracy of their results, which can assist in designing and managing building and transportation systems. The main aim of this study is to enrich the understanding of how local exit choices are made and how behavioural uncertainty affects these choices.

Crossing the bridge: The effects of time-varying tolls on curbing congestion

- Transportation Research Part A: Policy and Practice---2016---Kate Foreman

This paper estimates the traffic volume and travel time effects of the road congestion pricing implemented on the San Francisco-Oakland Bay Bridge. I employ both difference-in-differences and regression discontinuity approaches to analyze previously unexploited data for the two years spanning the price change and obtain causal estimates of the hourly average treatment effects of the policy. I find evidence of peak spreading in traffic volume and decreases in travel time during peak hours. I also find suggestive evidence of substitution to a nearby bridge and decreases in travel time variability. In addition, I calculate own- and cross-price elasticities.

A note on the distortionary effects of revenue-neutral tolls in a bottleneck congestion game

- Transportation Research Part A: Policy and Practice---2016---Nicholas Janusch

This note demonstrates how the redistribution of revenue from a Pigouvian policy can distort incentives and handicap the social objectives of the policy by creating a moral hazard problem. Based on the Levinson (2005) game theory model, I develop a three-player bottleneck congestion game that emulates a repeated prisoner’s dilemma and derive efficient tolls. This conceptual

game demonstrates the distortionary effects from a revenue-neutral toll policy with lump-sum revenue redistribution and the equity-efficiency tradeoff.

Understanding travel behaviour change during mega-events: Lessons from the London 2012 Games

- Transportation Research Part A: Policy and Practice---2016---Stephen D. Parkes,Ann Jopson,Greg Marsden

This paper presents results from a longitudinal study of the travel behaviour change associated with the London 2012 Olympic and Paralympic Games (the ‘Games’). The research examines commuter travel behaviour through a panel approach enabling an understanding of individual behaviour across three waves (before, during and after), with the study utilising unique access to a Transport for London panel study (n=1132). The findings indicate that a substantial amount of change occurred during the Games (54% made at least one change), with reducing or re-timing journeys being the most likely adaptations made. A key objective of this work was to advance the discussion about the theoretical constructs that are most applicable in the study of behaviour change associated with disruptive events, which was done through the application and critical evaluation of the Transtheoretical Model. The insights from the stages of change element of the model were relatively limited but the analysis shows significant differences in the underlying factors explaining change according to the type of change made (reduce, re-time, re-mode and re-route). Whilst the long-term behavioural impacts of events like the Games appear small, the study has uncovered a need to consider these behavioural choices as distinct rather than under the collective term of “travel behaviour change”, as is current practice.

Evaluation of energy consumption of vehicles in EU Trans-European Transport Network

- Transportation Research Part A: Policy and Practice---2016---Zbigniew Burski,Izabela

Mijalska-Szewczak,Jacek Wasilewski,Małgorzata Szczepanik

The paper presents the results of field tests evaluating energy consumption in the vehicles of Trans-European Transport Network (TEN-T) of selected EU countries: Poland, Germany and France. The energy consumption of vehicles in a highway system was assessed based on the telemetry analysis systems for traction parameters, tachograph record of digital speed waveform and their statistical analysis. The empirical cumulative distribution functions of speed transitions (acceleration, deceleration) were used to determine the kinetic energy losses of the vehicle (fuel consumption). To assess the statistical significance of differences between cumulative distribution functions the Smirnov–Kolmogorov test was used.

New light rail transit and active travel: A longitudinal study

- Transportation Research Part A: Policy and Practice---2016---Andy Hong,Marlon G. Boarnet,Douglas Houston

We use panel data to investigate the before-and-after impact of a new light rail transit line on active travel behavior. Participants were divided into a treatment group and a control group (residing $\frac{1}{2}$ mile from a new light rail transit station, respectively). Self-reported walking (n=204) and accelerometer-measured physical activity (n=73) were obtained for both groups before and after the new light rail transit opened. This is the first application of an experimental-control group study design around light rail in California, and one of the first in the U.S. Our panel design provides an opportunity for stronger causal inference than is possible in the much more common study designs that use cross-sectional data. It also provides an opportunity to examine how an individual’s previous activity behavior influences the role that new light rail transit access plays in promoting active travel behavior. The results show that, when not controlling for subject’s before-opening walking or physical activity, there was no significant relationship between treatment group

status and after-opening walking or physical activity. However, when controlling for an interaction between baseline walking/physical activity and treatment group membership, we found that living within a half-mile of a transit station was associated with an increase in walking and physical activity for participants who previously had low walking and physical activity levels. The results were opposite for participants with previously high walking and physical activity levels. Future policy and research should consider the possibility that sedentary populations may be more responsive to new transit investments, and more targeted “soft” approaches in transit service would be needed to encourage people to make healthy travel choices.

Public preference for data privacy – A pan-European study on metro/train surveillance

- Transportation Research Part A: Policy and Practice---2016---Sunil Patil,Bhanu Patruni,Dimitris Potoglou,Neil Robinson

This paper presents a pan-European application of a stated preference discrete choice experiment for eliciting respondents’ preferences for various data-privacy settings in the context of security and surveillance of train/metro facilities in Europe. Results show that respondents across the 27 European Union Member States (EU27) prefer some Closed Circuit Television Cameras (CCTV) surveillance across in all countries, except Sweden where the most advanced type of CCTV with face recognition capabilities is preferred. Most respondents prefer that CCTV data is stored for future use rather than just being used for real-time monitoring, with the exception of respondents in Greece. However, an intermediate period of storage (15days) is preferred over a shorter or longer duration (45days). Respondents across the EU27 are averse to police force outside their home country having access to CCTV data. Respondents prefer the presence of unarmed security personnel over absence of security personnel. The majority of respondents are averse to any kind of security checks. However, in Belgium, France, Italy, Spain and the UK there is a preference for randomly selected people to go through a metal detector or full

body scanner. Further this study shows that preferences also vary by age and gender. Overall, analysis of the data illustrates the complexity of the privacy over security debate as it pertains to transportation infrastructures. In particular, the increased use of transportation user data for various reasons (efficiency, safety and security) can pose complex social and ethical challenges to users, especially around perceptions of consent, accountability and transparency.

Capacity and safety analysis of hard-shoulder running (HSR). A motorway case study

- Transportation Research Part A: Policy and Practice---2016---Marco Guerrieri,Raffaele Mauro

Operational motorway conditions can be improved by introducing traffic flow management and control systems, such as ramp metering (RM), high occupancy vehicle (HOV) lanes, real-time variable speed limits (VSLs), reversible lanes (RL), automated highway systems (AHS) and hard-shoulder running (HSR). The effects of such devices need to be examined in terms of capacity and safety. This paper examines the case study of the Italian motorway A22, which is supposed to be equipped with an HSR system implemented along 128km in order to reduce congestion with consequent improvement in levels of service (LOS). We studied the traffic processes (capacity, flow distribution between lanes, reliability, etc.) and estimated the expected capacity and safety conditions. These latter were studied with the method provided by the Highway Safety Manual (HSM), as well as by undertaking sensitivity analyses to quantify the expected changes in crash frequency at varying HSR activation hours (from 30 to 200h) in a year. It has been observed that HSR activation does not involve significant variations in the general safety conditions in the presence of a considerable capacity increase up to 35%. Moreover, have been identified the cases which require speed limit implementation (with VSLs system) in function of the values of reliability and velocity process V , and also suggested a speed limit sign system.

Cost overruns in transportation infrastructure projects: Sowing the seeds for a probabilistic theory of causation

- Transportation Research Part A: Policy and Practice---2016---Peter E.D. Love,Dominic Ahiaga-Dagbui,Zahir Irani

Understanding the cause of cost overruns in transportation infrastructure projects has been a topic that has received considerable attention from academics and the popular press. Despite studies providing the essential building blocks and frameworks for cost overrun mitigation and containment, the problem still remains a pervasive issue for Governments worldwide. The interdependency that exists between ‘causes’ that lead to cost overruns materialising have largely been ignored when considering the likelihood and impact of their occurrence. The vast majority of the cost overrun literature has tended to adopt a deterministic approach in examining the occurrence of the phenomenon; in this paper a shift towards the adoption of pluralistic probabilistic approach to cost overrun causation is proposed. The establishment of probabilistic theory incorporates the ability to consider the interdependencies of causes so to provide Governments with a holistic understanding of the uncertainties and risks that may derail the delivery and increase the cost of transportation infrastructure projects. This will further assist in the design of effective mitigation and containment strategies that will ensure future transportation infrastructure projects meet their expected costs as well as the need of taxpayers.

Does uncertainty make cost-benefit analyses pointless?

- Transportation Research Part A: Policy and Practice---2016---Disa Asplund,Jonas Eliasson

Cost-benefit analysis (CBA) is widely used in public decision making on infrastructure investments. However, the demand forecasts, cost estimates, benefit valuations and effect assessments that are conducted as part of CBAs are all subject to various degrees of uncertainty. The question is to what extent CBAs, given

such uncertainties, are still useful as a way to prioritize between infrastructure investments, or put differently, how robust the policy conclusions of CBA are with respect to uncertainties. Using simulations based on real data on national infrastructure plans in Sweden and Norway, we study how investment selection and total realized benefits change when decisions are based on CBA assessments subject to several different types of uncertainty. Our results indicate that realized benefits and investment selection are surprisingly insensitive to all studied types of uncertainty, even for high levels of uncertainty. The two types of uncertainty that affect results the most are uncertainties about investment cost and transport demand. Provided that decisions are based on CBA outcomes, reducing uncertainty is still worthwhile, however, because of the huge sums at stake. Even moderate reductions of uncertainties about unit values, investment costs, future demand and project effects may increase the realized benefits infrastructure investment plans by tens or hundreds of million euros. We conclude that, despite the many types of uncertainties, CBA is able to fairly consistently separate the wheat from the chaff and hence contribute to substantially improved infrastructure decisions.

Individual transport emissions and the built environment: A structural equation modelling approach

- Transportation Research Part A: Policy and Practice---2016---Siqi Song,Mi Diao,Chen-Chieh Feng

Increasing CO₂ emissions from the transport sector have raised substantial concerns among researchers and policy makers. This research examines the impact of the built environment on individual transport emissions through two mediate variables, vehicle usage and vehicle type choice, within a structural equation modelling (SEM) framework. We find that new-urbanism-type built environment characteristics, including high density, mixed land use, good connectivity, and easy access to public transport systems help reduce transport CO₂ emissions. Such mitigating effect is achieved largely through the reduced vehicle miles travelled (VMT)

and is enhanced slightly by the more efficient vehicles owned by individuals living in denser and more diverse neighborhoods, all else being equal. Our research findings provide some new evidence that supports land use policies as an effective strategy to reduce transport CO2 emissions.

The effect of non-recreational transport cycling on use of other transport modes: A cross-sectional on-line survey

- Transportation Research Part A: Policy and Practice---2016---Julie Hatfield,Soufiane Boufous

Accurate modelling of the health and environmental benefits of non-recreational transport cycling requires information about its effects on the use of other transport modes. Relevant research has not focussed on cycling for transport in a general context (as opposed to bikeshare), nor allowed for multi-modal trips. The influence of trip- and personal-characteristics on whether cycling replaces car-driving have yet to be considered. The present study aimed to address these research gaps. An on-line cross-sectional survey was completed by 1525 Australians who cycle for transport at least once per week. For the most recent trip completed (at least partly) by bicycle participants provided trip distance, and percentage travelled by car, public transport (PT), and walking. They also provided the percentage travelled by each mode for the same trip before taking up transport cycling; and a hypothetical future trip when riding is not possible. Compared to the same trip before, fifty percent of recent trips reduced car use, and around 1/3 eliminated a 100%-car trip. Reduced car use was significantly less likely for trips under 7.5km, commuting, females, respondents under 55, and regular cyclists. Reduced car use was less likely for respondents who started riding because it is flexible, and more likely for those who started riding to avoid parking. Car-use was reduced by an average of 6.2km per trip, and each bicycle-km cycled replaced 0.5 car-km. Participants report that since taking up cycling, even when they cannot use their bike, they use cars less and use PT more compared to before they took up cycling. Results suggest that previous studies underestimated the ex-

tent to which transport cycling replaces car travel, and highlights trip types and population groups to target with cycling promotion strategies. Information about the per-trip and per-bicycle-km replacement of car, PT and walking may be used for more accurate estimation of the benefits of transport cycling than has hitherto been possible.

The impact of high-speed rail investment on economic and environmental change in China: A dynamic CGE analysis

- Transportation Research Part A: Policy and Practice---2016---Zhenhua Chen,Junbo Xue,Adam Z. Rose,Kingsley E. Haynes

This study investigates the impact of high-speed rail investment on the economy and environment in China using a computable general equilibrium (CGE) model. The analysis is implemented in a dynamic recursive framework capturing long-run capital accumulation and labor market equilibrium. A national level impact was simulated through direct impact drivers including land use conversion, output expansion, cost reduction, productivity increase, transport demand substitution and induced demand. The results suggest that rail investment in China over the past decade has been a positive stimulus to the economy, while the effect on CO2 emissions generation has been large. Overall, the economic impacts of rail investment are achieved primarily through induced demand and output expansion, whereas the contribution from a reduction of rail transportation costs and rail productivity increases were modest. In addition, negligible negative impacts were found from land use for rail development and the substitution effect among other modes. Emissions reduction from substitution of rail for other modes was small and offset by output expansion due to lowered rail transport costs and induced demand.

Airline network choice and market coverage under high-speed rail competition

- Transportation Research Part A: Policy and Practice---2016---Changmin Jiang,Anming Zhang

While the existing literature has focused on the short-term impacts, this paper investigates the long-term impacts of high-speed rail (HSR) competition on airlines. An analytical model is developed to study how an airline may change its network and market coverage when facing HSR competition on trunk routes. We show that prior to HSR competition, an airline is more likely to adopt a fully-connected network and cover fewer fringe markets if the trunk market is large. Under HSR competition, the airline will, for a given network structure, have a greater incentive to cover more fringe (regional or foreign) markets if the trunk market is large, or the airline network is close to hub-and-spoke. Further, the airline will, for any given market coverage, move towards a hub-and-spoke network when the trunk market is large, or the number of fringe markets covered by the airline network is large. Both effects are more prominent when the decreasing rate of airline density economies is large. We further show that HSR competition can induce the airline to adopt network structure and market coverage that are closer to the socially optimal ones, thereby suggesting a new source of welfare gain from HSR based on its long-term impacts on airlines. Implications for operators, policy makers and specific countries (such as China) are also discussed.

Air transport and high-speed rail competition: Environmental implications and mitigation strategies

- Transportation Research Part A: Policy and Practice---2016---D' Alfonso, Tiziana, Changmin Jiang, Valentina Bracaglia

We build a duopoly model to shed light on the environmental impact of HSR-air transport competition, capturing the effects of induced demand, schedule frequency and HSR speed. The net environmental effect can be negative since there is a trade-off between the substitution effect – how many passengers using the HSR are shifted from air transport – and the traffic generation effect – how much new demand is generated by the HSR. We conduct a simulation study based on the London-Paris market where HSR has served 70%

of the market. The introduction of HSR is detrimental to LAP, while it is beneficial to GHG emissions. HSR entry increases neither LAP nor GHG emissions when the ratio between HSR and air transport emissions is relatively low. Moreover, competition is more likely to be detrimental to the environment when the weight of the social welfare in HSR objective function is high. Since the magnitude of the environmental friendliness of HSR compared to air transport hinges on the mix of energy sources used to generate the electricity (which is heavily constrained by the country in which HSR operates), regulators should assess the implications of HSR entry taking into account the energy policy and mitigation strategies available to transport modes.

How could the collaboration between airport and high speed rail affect the market?

- Transportation Research Part A: Policy and Practice---2016---Mikio Takebayashi

This paper discusses the possibility of collaboration between airport and high speed rail (HSR) to improve the airport's gateway function. We apply the model which consists of three players, carriers, passengers, and the airport. In order to estimate the impact of the collaboration, we carry out some numerical computations with the model under the twin hub three zones network. Our results show that the collaboration between HSR and the smaller demand airport can reduce the congestion at the bigger demand airport, which suggests the collaboration can be preferable for carriers and passengers; it would improve the social welfare.

Congestion spill effects of Heathrow and Frankfurt airports on connection traffic in European and Gulf hub airports

- Transportation Research Part A: Policy and Practice---2016---Renato Redondi, Sveinn Vidar Gudmundsson

We develop two stage fixed-effects single-spill and double-spill models for congestion connection spills of London Heathrow and Frankfurt airports on 9 hub

airports in Europe and the Gulf. Our panel data covers connection traffic from 1997 to 2013 for Heathrow and 1997 to 2011 for Frankfurt. The single-spill results support strongly that the connection spills from Heathrow's capacity limitations do strengthen competing hub airports of major alliance groups and to a lesser degree one Gulf hub. The double-spill model for Heathrow and Frankfurt shows nearly asymmetric overall spill characteristics between the two airports. Our results underline the influence of airline network strategies on congestion spills as European airline networks are shaped by alliances and umbrella mergers. Thus, the airline network perspective in airport capacity expansion decisions needs to play a greater role, as indicated by our asymmetric results for overall spill effects between Heathrow and Frankfurt airports.

Airport capacity choice under airport-airline vertical arrangements

- Transportation Research Part A: Policy and Practice---2016---Yibin Xiao,Xiaowen Fu,Anming Zhang

This study investigates the effects of airport-airline vertical arrangements on airport capacity choices under demand uncertainty. A multi-stage game is analysed, in which competing airlines contribute to capacity investments and share airport revenues. Our analytical results suggest that for a profit-maximising airport, such a vertical arrangement leads to higher capacity but may not increase its profit, whereas for a welfare-maximising airport, such an arrangement has no effect on capacity or welfare. Capital cost savings brought by airport-airline cooperation, if any, always lead to higher capacity, and to higher profit for a profit-maximising airport and higher welfare for a welfare-maximising airport. Numerical simulations reveal that win-win outcomes may be achieved for an airport and its airlines without government intervention.

The factors affecting pollution and noise environmental costs of the current aircraft fleet: An econometric analysis

- Transportation Research Part A: Policy and Practice---2016---Mattia Grampella,Gianmaria Martini,Davide Scotti,Giovanni Zambon

We study the factors affecting pollution, noise annoyance and global warming costs produced by aviation, considering all the fleet currently operating. We analyze different aircraft-engine combinations, leading to a dataset of about 1,500 different observations, with relevant variability in terms of externalities produced. Our econometric analysis shows that aircraft age is a main determinant of environmental costs: a 1-year younger aircraft leads to a 0.32% in costs. We found a complementary relation among pollution, noise annoyance and global warming: the impact of age on them has the same sign. We also show that aircraft size has a positive impact on costs: this implies that wide aircrafts generate higher per flight costs than medium, small and light ones. On the contrary, when looking at per-seat environmental costs, aircraft category is found to have a negative impact. However, these contrasting results tend to disappear if we include in the analysis market demand and flight frequency, with medium size aircraft performing better, in environmental terms, than both small and wide category aircraft. Hence, policy makers, in designing incentives towards an environmentally sustainable aviation, should take into account that aircraft size and market demand are crucial in terms of environmental costs: if demand is very low small aircraft may outperform larger ones, while if demand is sufficiently large medium aircraft are, on average, more environmentally friendly.

Economic effects of air transport market liberalization in Africa

- Transportation Research Part A: Policy and Practice---2016---Megersa Abate

Although the aviation industry is increasingly becoming important for Africa's economic development and

integration, the ability of airlines to access foreign markets remains hindered by restrictive regulatory policies. Attempts have been made to fully liberalize the intra-African air transport market. Except for general assertions about the merits/demerits of liberalization, our empirical understanding of the welfare effects of such policies in Africa remains rudimentary. This study empirically measures the economic effects of air transport liberalization, mainly on two supply side variables: fare and service quality, measured as departure frequency. The empirical models evaluate how air fares and departure frequency respond to measures of openness in air services agreements, while controlling for other determinants. The results show up to 40% increase in departure frequency in routes that experienced some type of liberalization compared to those governed by restrictive bilateral air service agreements. Furthermore, there is a relatively larger increase in departure frequency in routes which experienced partial liberalization compared to fully liberalized ones. This can be explained by the diminishing marginal effect of progressive liberalization on departure frequency. While the effect of liberalization is substantial in improving service quality, there is no evidence of its fare reducing effect.

Managing corporate social responsibility strategies of airports: The case of Taiwan's Taoyuan International Airport Corporation

- Transportation Research Part A: Policy and Practice---2016---Yu-Hern Chang, Chung-Hsing Yeh

Airports need to manage corporate social responsibility (CSR) strategies for sustainable development. This paper develops a new structured approach for airports to evaluate, prioritize and categorize CSR strategies, using Taiwan's Taoyuan International Airport Corporation (TIAC) as an example. Based on TIAC's CSR-related activities, 18 CSR strategies grouped into 5 CSR goals (corporate governance and finance, green airport and environmental management, service quality and social relationship, employee and work environment management, and safety and security)

are identified using the CSR value chain and diamond framework. The pairwise comparison method used in analytic hierarchy process and the decision-making trial and evaluation laboratory method are used respectively to evaluate the relative importance, feasibility and achievability of these 18 strategies and to analyze their causal relationships via expert questionnaire surveys. A new method is developed to plan and manage the implementation of CSR strategies by incorporating the viewpoints of both internal and external stakeholders, thus reflecting the practical effects and strategic implications of the CSR implementation. The result suggests that TIAC's CSR strategies in relation to airport safety and security, service quality and corporate governance are most significant and have a high implementation priority. This paper contributes to the airport industry and CSR research by proposing a proactive mechanism for quantitatively evaluating, prioritizing and categorizing CSR strategies.

Benchmarking airports with specific safety performance measures

- Transportation Research Part A: Policy and Practice---2016---Leonard MacLean, Alex Richman, Stuart MacLean

The purpose of this paper is to develop safety performance measures and test the measures on data for air traffic management failure events. Failure events are classified by the severity of the consequence of occurrence, resulting in the rate of occurrence in severity categories. The safety measures are standard statistics calculated from this "distribution" for comparison of airport operations by stochastic ordering. For comparisons a benchmark is developed from the aggregation of failure data on a set of comparable airports. Airport performance is then compared with the benchmark using the defined safety measures. The benchmark comparison was implemented with failure data for major airports in Canada from 2005 to 2012. The results show a number of patterns and anomalies and some airports perform poorly in comparison to a class of similar operations. We conclude by suggesting benchmarking safety measures as a natural addition to the

information system on aviation safety compiled by a national regulatory body to unravel anomalies such as implementation problems of a safety management system.

Willingness to accept longer commutes for better salaries: Understanding the differences within and between couples

- Transportation Research Part A: Policy and Practice---2016---Matthew J. Beck,Stephane Hess

This paper reports on an analysis aiming to understand differences across individual people in their willingness to accept increased commuting time in return for higher salary, using Hierarchical Bayes (HB) analysis of a dataset collected in Sweden. We find that socio-demographic and attitudinal differences are significant in explaining the variations in values of time for individuals, in particular income, who drives when carpooling and hours worked per week. Additionally we also examine the values of individuals when their choices also impact on the salary and commute of their partner, finding that incomes, income differentials, driving behaviour when carpooling, division of housework and car user decisions significantly explain the values assigned to others and variations in an individual's own values once their partner is affected. The overall richness of the results reflect the benefits that posterior analysis can bring, and highlight the computational efficiency of Bayesian methods in producing such conditionals at an individual level.

Estimating economic losses of industry clusters due to port disruptions

- Transportation Research Part A: Policy and Practice---2016---Yi Zhang,Jasmine Siu Lee Lam

Seaport operations are highly important for industries which rely heavily on imports and exports. A reliable evaluation of port risks is essential to govern the normal running of seaborne transportation and thus the industrial economies. The occurrence of a breakdown in the trade facilitators, such as ports, will disrupt the smooth flow of supply chains for the industries.

The estimation of the economic loss for an industry when a port gets disrupted is a challenging task as the relationship between the port and industry clusters is complex. This study aims to develop a systematic framework for performing economic loss estimation of industry clusters due to port disruptions. The whole risk assessment is split into three stages focusing on the establishment of a network flow model, economic estimations and evaluating risk mitigation strategies. The proposed idea is demonstrated by a case study on Shenzhen port and its related manufacturing industries. A dynamic inventory control strategy used by manufacturers is found to be beneficial for mitigating port disruption risks.

A data-driven approach to manpower planning at U.S.–Canada border crossings

- Transportation Research Part A: Policy and Practice---2016---Mengqiao Yu,Yichuan Ding,Charles Lindsey,Cong Shi

We investigate the staffing problem at Peace Arch, one of the major U.S.–Canada border crossings, with the goal of reducing time delay without compromising the effectiveness of security screening. Our data analytics show how the arrival rates of vehicles vary by time of day and day of week, and that the service rate per booth varies considerably by the time of day and the number of active booths. We propose a time-varying queueing model to capture these dynamics and use empirical data to estimate the model parameters using a multiple linear regression. We then formulate the staffing task as an integer programming problem and derive a near-optimal workforce schedule. Simulations reveal that our proposed workforce policy improves on the existing schedule by about 18% in terms of average delay without increasing the total work hours of the border staff.

Modeling taxi drivers' decisions for improving airport ground access: John F. Kennedy airport case

- Transportation Research Part A: Policy and Practice---2016---M. Anil Yazici,Camille

Taxi service is an important component of airport ground access, which affects the economic competitiveness of an airport and its potential positive impact on the surrounding region. Airports across the globe experience both taxi shortages and excesses due to various factors such as the airport's proximity to the city center, timing and frequency of flights, and the fare structure. Since taxi drivers are independent entities whose decisions affect the taxi supply at airports, it is important to understand taxi drivers' decision mechanisms in order to suggest policies and to maintain taxi demand and supply equilibrium at the airports. In this paper, New York City (NYC) taxi drivers' decisions about airport pick-ups or cruising for customers at the end of each trip is modeled using logistic regression based on a large taxi GPS dataset. The presented approach helps to quantify the potential impacts of parameters and to rank their influence for policy recommendations. The results reveal that spatial variables (mainly related to proximity) have the highest impact on taxi drivers' airport pickup decisions, followed by temporal, environmental and driver-shift related variables. Along with supplementary information from unstructured taxi driver interviews, the model results are used to suggest policies for the improvement of John F. Kennedy (JFK) airport's ground access and passenger satisfaction, i.e. the implementation of taxi driver frequent airport server punch cards and a time-specific ride share program.

Supporting the adoption of electric vehicles in urban road freight transport – A multi-criteria analysis of policy measures in Germany

- Transportation Research Part A: Policy and Practice---2016---Tessa T. Taefi,Jochen Kreutzfeldt,Tobias Held,Andreas Fink

Policies in Germany to support electric vehicles, which are free of exhaust emissions, mostly focus on urban road passenger transport. However, road freight vehicles are a main source of the traffic air pollutants and noise emissions in cities. Available vehicle types,

tour planning and purchase decisions in urban road freight transport differ from the passenger transport segment. The political and scientific literature lacks a comprehensive discussion of specific policy measures to support electric urban road freight vehicles. This article contributes to the existing body of knowledge, by undertaking a multi-criteria analysis of policy measures to support battery electric freight vehicles based on the rating by two stakeholder groups, "policymakers" and "freight electric vehicle users". These stakeholders rate 23 policy measures as suggested in the literature or which are implemented in European countries. In comparing and ranking the rating results of the groups, we find that the discordance between the groups can be large and offers noticeable insight and room for future research and practice. Although financial support of electric vehicles is often named in the literature as the primary measure to overcome the total cost of ownership gap of freight electric vehicles, the current study shows that the effect of special legal measures and supporting the setup of company-charging infrastructure are underestimated by the policymakers. Recommendable policy options – beyond several fiscal measures – are to request emission-free vehicles in municipal tenders, to allow drivers with a class B license to drive freight EVs over 3.5tons, or to implement a city toll on the long-term. The practicability of other policy measures depends on the local implementation goals of the municipality. Hence, a transparent debate on the aim of supporting electric freight mobility is as necessary as choosing measures targeted at the freight transportation segment.

Influence of composition, amount and life span of passenger cars on end-of-life vehicles waste in Belgium: A system dynamics approach

- Transportation Research Part A: Policy and Practice---2016---Dirk Inghels,Wout Dullaert,Birger Raa,Grit Walther

The increasing worldwide production of passenger cars depletes natural resources and increases the number of end-of-life vehicles (ELVs) to be processed. Lack of landfill capacity and a growing scarcity of natural

resources have lead to severe ELV reuse and recovery targets in the European Union (EU). This paper examines the main influencing parameters affecting the amount and composition of ELV waste originating from passenger cars to be treated in Authorized Treatment Facilities (ATFs). Moreover the effect of a changing number, composition and life span of passenger cars on the ability to meet the ambitious EU ELV Directive 2000/53/EC targets in 2015 is examined for Belgium. Using system dynamics, the aforementioned changing parameters are studied from 1990 and projected to 2030. The model results show that the total annual weight of ELV waste to be reused and recycled in Belgium is expected to grow over the coming years despite the economic downturn of 2008 and its effect on GDP growth. Moreover it shows that Belgium can sustainably achieve the ambitious EU ELV Directive 2000/53/EC targets in 2015 and thereafter if it continues to invest in waste treatment of ELV plastics. The availability of higher amounts of ELV plastics proves to be favourable to trigger investments in their reusing and recycling. We demonstrate that this can be realized by reducing export of discarded passenger cars, shortening the life span of passenger cars or shortening the time for investing in additional plastic recovery.

Towards a common measure of greenhouse gas related logistics activity using data envelopment analysis

- Transportation Research Part A: Policy and Practice---2016---R. Holden,Bing Xu,P. Greening,M. Piecyk,P. Dadhich

Monitoring company emissions from freight transport is essential if future greenhouse gas (GHG) reductions are to be realised. Modern economies are characterised increasingly by lower density freight movements. However, weight-based measures of freight transport activity (tonne-kilometre, tonnes lifted) are not good at describing volume-limited freight. After introducing the need for performance measurement, the problem of benchmarking is outlined in more detail. A context-dependent undesirable output data envelopment analysis (DEA) model, designed to be sensitive

to business context, is then tested on a simulated set of fleet profiles. DEA can produce more consistent measures of good-practice, compared to ratio-based key performance indicators (KPI), providing emission reduction targets for companies and an aggregate reporting tool.

We can all get along: The alignment of driver and bicyclist roadway design preferences in the San Francisco Bay Area

- Transportation Research Part A: Policy and Practice---2016---Rebecca L. Sanders

Two trends in the United States—growth in bicycling and enthusiasm for complete streets—suggest a need to understand how various roadway users view roadway designs meant to accommodate multiple modes. While many studies have examined bicyclists’ roadway design preferences, there has been little investigation into the opinions of non-bicyclists who might bicycle in the future. Additionally, little research has explored the preferences of the motorists who share roads with cyclists—despite the fact that motorists compose the vast majority of roadway users in the United States and similarly developed countries.

Impact of information intervention on travel mode choice of urban residents with different goal frames: A controlled trial in Xuzhou, China

- Transportation Research Part A: Policy and Practice---2016---Jichao Geng,Ruyin Long,Hong Chen

In order to assess the degree to which specific groups will adapt their travel behaviors after certain intervention, this study utilized a cluster analysis to discuss three segments’ distinct goal frames, social-demographic properties, travel modes, and habitat, and then carried out an information intervention controlled trial to discover three segments’ modal split shifts. The results indicate that the information have consistent and distinct impacts on travel mode choice by clusters. This consistency is embodied in the simultaneous and significant increase in travel times by

green modes (walking, non-powered bicycle, or bus) and in the small but non-significant effects on reducing car use in the three clusters. The distinctness of the impacts is that information have a more effective influence on subjects with gain goal frames because their travel times by all three green modes greatly improved. Subjects with the hedonic goal frame are the least sensitive to information, with the only significant increase in travel times being by non-powered bicycle. This research also addressed the “attitude-behavior gap”, weather impacts, and goal-oriented prompts. The findings suggest that policy interventions should be designed to improve public transit features, especially the bicycle system, rather than only to constrain car use, and that tailored policies should be targeted to specific groups with different goal frames.

Key events and multimodality: A life course approach

- Transportation Research Part A: Policy and Practice---2016---Joachim Scheiner,Kiron Chatterjee,Eva Heinen

Since the large majority of households have access to one or more cars in the developed world, encouraging multimodal travel behaviours has become a goal for many cities. Multimodality refers to the use of more than one transport mode within a given period of time. While correlates of multimodality have been identified from cross-sectional data, there is very little known about the circumstances over time in which individuals become more or less multimodal. This paper is the first to fully adopt the mobility biography approach to study changes in multimodality over time at the individual level. Multimodality is measured using four continuous indicators of mode use in a seven-day period: the share in trips made by the most commonly used mode (primary mode), the Herfindahl-Hirschman Index, Shannon’s entropy, and the number of modes used. The paper uses the German Mobility Panel (GMP) for the period 1994–2012. The results demonstrate that some of the life course events studied are significantly associated with changes in multimodality. Specifically, a child moving out of the household

increases the multimodality of parents. Leaving the labour market increases multimodality, while entering the labour market conversely reduces multimodality. Changes in car access and driver licence holding have significant effects as well. An improvement to the public transport system in the neighbourhood increases multimodality, and vice versa. Reduced parking space availability also increases multimodality. The latter two findings endorse ‘carrot and stick’ transport policies as means of creating a more balanced use of transport modes.

Preference heterogeneity in mode choice based on a nationwide survey with a focus on urban rail

- Transportation Research Part A: Policy and Practice---2016---Zuduo Zheng,Simon Washington,Paul Hyland,Keith Sloan,Yulin Liu

The provision of efficient and effective urban public transport and transport policy requires a deep understanding of the factors influencing urban travellers’ choice of travel mode. The majority of existing literature reports on the results from single cities. This study presents the results of a nationwide travel survey implemented to examine multiple modes of urban passenger transport across five mainland state capitals in Australia, with a focus of urban rail. The study aims to explore differences in mode choices among surveyed travellers sampled from the five cities by accounting for two types of factors: service quality and features of public transport, and socio demographic characteristics. A stated preference approach is adopted to elicit people’s valuation of specified mode-choice related factors and their willingness to pay. In particular, the availabilities of wireless and laptop stations – two factors rarely examined in the literature, were also considered in the SP survey. The survey data were analysed using mixed logit models. To test for preference heterogeneity, socio-demographic factors were interacted with random parameters, and their influences on marginal utilities simulated. The analysis reveals that intercity differences, user group status, gender, income, and trip purposes partially explain observed preference heterogeneity.

Vicious or virtuous circles? Exploring the vulnerability of drivers to break low urban speed limits

- Transportation Research Part A: Policy and Practice---2016---Alan Tapp, Clive Nancarrow, Adrian Davis, Simon Jones

Levels of support for 20mph limits in Great Britain are consistently high. However, these positive attitudes are not translating into similarly positive behaviour changes in terms of complying with these new speed limits. Recent research from the authors studied the complex relationship between support and compliance, with qualitative findings suggesting that copycat driving could create a ‘vicious circle effect’ that leads to increased levels of non-compliance. However it is also possible that an alternative ‘virtuous circle’ effect may emerge from the high levels of societal support for 20mph limits pressurising drivers to comply with speed limits. In this work the authors investigated these issues and we report on data and analysis of a large scale survey of drivers and residents undertaken in Great Britain. We explain the origins of vicious and virtuous circles in driver behaviour and study the data from the survey, offering an analysis of attitudes and claimed behaviours that has implications for policy-makers and professionals working with low urban speed limits. We discuss the issues for speed limit enforcement, making reference to the public relations ‘battle’ for public opinion. It is concluded that normative compliance, triggered by community and other campaigning, may be the most realistic mechanism for countering the difficulties of government funding in promoting compliance.

Establishing parking generation rates/models of selected land uses for Palestinian cities

- Transportation Research Part A: Policy and Practice---2016---Khaled Al-Sahili, Jamil Hamadneh

Estimating parking demand in Palestine requires more oriented studies towards parking generation to enrich

transportation planning, design, and management. Using regional or international models and rates of parking demand may not be appropriate for Palestine. This research is conducted to establish a reference for provision of parking supply for three major types of land uses, which are residential, office, and retail.

The impact of urban rail transit on commercial property value: New evidence from Wuhan, China

- Transportation Research Part A: Policy and Practice---2016---Tao Xu, Ming Zhang, Paulus T. Aditjandra

The interaction between rail transit and the urban property market is a vital foundation for planning transit-based policy such as Value Capture and Transit Oriented Development (TOD). Yet only few studies have reported the impact of transit access on commercial property value. This paper presents empirical evidence from Wuhan, China, to enrich the knowledge in the subject area. Spatial autoregressive models were employed to estimate the commercial value capture, based on 676 observations along Wuhan’s metro rail line through the main business districts. Value appreciation was discovered within the 400m radius of road network distance from Metro stations. The transit access premiums present as two tiers: 16.7% for the 0–100m core area and approximately 8.0% within the 100–400m radius. The result demonstrates the potential benefit of adopting value capture and optimising TOD planning to support sustainable urban rail transit investment. Amid rapid urbanisation in China, the evidence reported here could help better inform cities, across the developing world and beyond, of the benefits of adopting rail transit-based policy.

Implications of the cost of public funds in public transit subsidization and regulation

- Transportation Research Part A: Policy and Practice---2016---Yanshuo Sun, Qianwen Guo, Paul Schonfeld, Zhongfei Li

This paper identifies some implications of the cost of public funds (CF) in public transit subsidization

and regulation. Regulation is considered because a monopolistic operator is assumed. A social welfare maximization model is proposed, subject to individual rationality and vehicle capacity constraints. Optimality conditions are provided and a key formula is derived about CF's role in balancing the need to cover the fixed operation cost through fares on the operator's side and the effort to maintain the user surplus on the passengers' side. Major findings from this model's formulation include: (1) CF determines the extent to which the passengers' surplus is compromised in order to cover the fixed part of the operating cost, and (2) subsidy is unjustified when CF exceeds the critical shadow price of the financial constraint. Analytical relations are illustrated through numerical examples.

What drives the drivers? Predicting turnover intentions in the Belgian bus and coach industry

- Transportation Research Part A: Policy and Practice---2016---Steven Lannoo,Elsy Verhofstadt

The bus industry is characterized by demanding jobs and high turnover rates. In this study we gather essential insights that can help companies and industry-level policy makers increase the attractiveness of the profession and design effective retention policies. We compare the factors that induce Belgian drivers to leave their current organization with those inducing them to leave the industry. Key factors increasing the likelihood to consider quitting the company are a negative work-life balance, a lack of social support and a temporary contract. Dominant factors to consider quitting the bus driver profession are a lack of fulfillment, a demanding job environment and a negative work-life balance.

Can market power be controlled by regulation of core prices alone? An empirical analysis of airport demand and car rental price

- Transportation Research Part A: Policy and Practice---2016---Achim I. Czerny,Zijun Shi,Anming Zhang

Many firms offer “core” and “side” goods in the sense that side-good consumption is conditional on core-

good consumption. Airports are a common example where the supply of runway and terminal capacity is the core good and the supply of various concession services (for example, car rental services) is the side good. While side-good supply can be responsible for a major share in total revenue, monopoly regulation typically concentrates on the control of core-good prices (“core prices” in short). Whether market power can indeed be effectively controlled by the regulation of core prices alone then depends on whether core-good consumption is a function of the price for side goods. This study empirically shows that a one-dollar increase in the daily car rental price reduces passenger demand at 199 US airports by more than 0.36%. A major implication of our findings is that for the case of airports, the effective control of market power may require regulation of both prices for core and side goods.

Comparing travel mode and trip chain choices between holidays and weekdays

- Transportation Research Part A: Policy and Practice---2016---Liya Yang,Qing Shen,Zhibin Li

Choices of travel mode and trip chain as well as their interplays have long drawn the interests of researchers. However, few studies have examined the differences in the travel behaviors between holidays and weekdays. This paper compares the choice of travel mode and trip chain between holidays and weekdays tours using travel survey data from Beijing, China. Nested Logit (NL) models with alternative nesting structures are estimated to analyze the decision process of travelers. Results show that there are at least three differences between commuting-based tours on weekdays and non-commuting tours on holidays. First, the decision structures in weekday and holiday tours are opposite. In weekday tours people prefer to decide on trip chain pattern prior to choosing travel mode, whereas in holiday tours travel mode is chosen first. Second, holiday tours show stronger dependency on cars than weekday tours. Third, travelers on holidays are more sensitive to changes in tour time than to the changes in tour cost, while commuters on weekdays are more sensitive to tour cost. Findings are helpful for improving travel

activity modeling and designing differential transportation system management strategies for weekdays and holidays.

Combining traffic efficiency and traffic safety in countermeasure selection to improve pedestrian safety at two-way stop controlled intersections

- Transportation Research Part A: Policy and Practice---2016---Zhao Yang,Yuanyuan Zhang,Offer Grembek

Decision makers are encouraged to consider multiple objectives (such as traffic efficiency, safety, and environment) together to make decisions. Although there are methods to evaluate each objective respectively, there are few reports or research papers showing how to incorporate these objectives and put it in practice. Thus, this study aims to develop a procedure to incorporate traffic efficiency into the traffic safety countermeasure (CM) selection process. To illustrate the procedure, the economic benefits of four pedestrian safety improvements at crosswalks of major-streets at two-way stop controlled intersections (TWSC) were calculated, considering not only the safety benefits but also the efficiency impacts. First, for each countermeasure the efficiency impacts were calculated as the average delay reduction for both pedestrians and motorists. Sensitivity analysis was conducted to examine how the crucial parameters, including vehicular volume, pedestrian volume, and motorist yield rate, offset the average vehicle and pedestrian delay. Next, the safety impacts were calculated as the crash reduction benefits for different CMs using safety performance functions (SPFs) and crash modification factors (CMFs). Finally, the equivalent uniform annual return (EUAR) method was used to combine the countervailing effects of efficiency and safety by evaluating the economic effectiveness of different CMs. The Monte Carlo (MC) simulation method was used to conduct uncertainty analysis by using random sampling from probability descriptions of uncertain input variables to generate a probabilistic description of results. The findings showed that, first, CMs can have tradeoff impacts for pedestrians and motorists. Second, the efficiency impacts accounted

for a large proportion of the total impacts, which can significantly affect the selection of CMs. Third, the rankings of the CMs differ depending on whether the safety impacts alone are considered, or whether both safety and efficiency impacts are integrated. The study illustrates the detailed process of evaluating projects considering multiple objectives for multiple road users. This process offers policy and decision makers a solid and practical reference using existing guidebooks. The findings also explain how safety and efficiency objectives can countervail with each other in improving pedestrian safety at TWSC.

The cost of equity: Assessing transit accessibility and social disparity using total travel cost

- Transportation Research Part A: Policy and Practice---2016---Ahmed El-Geneidy,David Levinson,Ehab Diab,Genevieve Boisjoly,David Verlich,Charis Loong

Social equity is increasingly incorporated as a long-term objective into urban transportation plans. Researchers use accessibility measures to assess equity issues, such as determining the amount of jobs reachable by marginalized groups within a defined travel time threshold and compare these measures across socioeconomic categories. However, allocating public transit resources in an equitable manner is not only related to travel time, but also related to the out-of-pocket cost of transit, which can represent a major barrier to accessibility for many disadvantaged groups. Therefore, this research proposes a set of new accessibility measures that incorporates both travel time and transit fares. It then applies those measures to determine whether people residing in socially disadvantaged neighborhoods in Montreal, Canada experience the same levels of transit accessibility as those living in other neighborhoods. Results are presented in terms of regional accessibility and trends by social indicator decile. Travel time accessibility measures estimate a higher number of jobs that can be reached compared to combined travel time and cost measures. However, the degree and impact of these measures varies across

the social deciles. Compared to other groups in the region, residents of socially disadvantaged areas have more equitable accessibility to jobs using transit; this is reflected in smaller decreases in accessibility when fare costs are included. Generating new measures of accessibility combining travel time and transit fares provides more accurate measures that can be easily communicated by transportation planners and engineers to policy makers and the public since it translates accessibility measures to a dollar value.

Value of time – A citizen perspective

- Transportation Research Part A: Policy and Practice---2016---Niek Mouter,Caspar Chorus

The dominant empirical approach to infer Value of Time is based on experiments in which respondents are typically asked to make hypothetical travel choices as if they were paying travel costs from their own budget, in exchange for personal travel time gains. However, many scholars have argued that such travel choice decisions of individuals in their role of consumer of mobility are likely to be a poor proxy of how they in their role of citizen believe government should spend tax money to generate travel time gains for large numbers of travelers. So far, this possible deviation between what we call ‘consumer VoT’ and ‘citizen VoT’ has not been studied empirically. In this paper, we fill this gap, by designing a Stated Choice experiment with eight different frames; some representing a typical consumer choice situation, others gradually approaching a citizen perspective. We find that individuals’ willingness to pay from previously collected tax money for travel time gains created by a government policy, is significantly higher than their willingness to pay, from their after tax income, for time gains obtained by choosing a different route. This result implies that citizen VoT is higher than consumer VoT. This difference does not stem from a stronger willingness to spend previously collected tax money compared to spending one’s own income, but from a difference in the value attached to travel gains: a travel time gain resulting from government action is valued more than the same travel time gain obtained by one’s own route choices. This and a range of

other empirical results are discussed in depth, in light of the conceptual differences between preferences of individuals in a role of consumer or citizen.

Integrating land use and transport practice through spatial metrics

- Transportation Research Part A: Policy and Practice---2016---Julio A. Soria-Lara,Francisco Aguilera-Benavente,Aldo Arranz-López

Despite the growing development of tools that can integrate land use and transport, the desired integration is still illusive in daily practice. To address this gap, the current study uses spatial metrics, a set of methods traditionally used for studying changes in the spatial structure of landscapes, which are translated into the domain of transport planning. It examines how spatial metrics can be integrated into “Land Use Transport” strategy-making, and how useful they are according to the practitioners’ perceptions. A Light Rail Transit corridor in Granada (Spain) provides the empirical focus of this research. Land use characteristics such as: land use mixing, land use diversity and green areas connectivity were successfully studied using spatial metrics, and they were used to map three “Land Use Transport” strategies: (i) proximity dynamics and non-motorised modes; (ii) modal shift from cars to Light Rail Transit system; (iii) shared spaces between motorised and non-motorised modes. Practitioners perceived that spatial metrics could improve the “Land Use Transport” strategy-making process in comparison with traditional methods used in practice. However, certain shortcomings related to the usability of spatial metrics are also highlighted and discussed. This study concludes with a reflection on research challenges for adapting spatial metrics to transport practice.

A novel dynamic segmentation model for identification and prioritization of black spots based on the pattern of potential for safety improvement

- Transportation Research Part A: Policy and Practice---2016---Mohammad Reza

Road segmentation is one of the most important steps in identification of high accident-proneness segments of a road. Based on the ratio of the Potential to Safety Improvement (PSI) along the road, the objective of the paper is to propose a novel dynamic road segmentation model. According to the fundamental model assumption, the determined segments must have the same pattern of PSI. Experimental results obtained from implementation of the proposed method took four Performance Measures (PMs) into consideration; namely, Crash Frequency, Crash Rate, Equivalent Property Damage Only, and Expected Average Crash Frequency with Empirical Bayes adjustment into the accident data obtained from Highway 37 located between two cities in Iran. Results indicated the low sensitivity of the method to PMs. In comparison with the real high accident-proneness segments, identified High Crash Road Segments (HCRS) obtained from the model, demonstrated the potential of the method to recognize the position and length of high accident-proneness segments accurately. Based on the road repair and maintenance costs limitation index for safety improvement, in an attempt to compare the proposed method of road segmentation with conventional ones, results demonstrated the efficient performance of the proposed method. So as to identify 20 percent HCRS located on a road, the proposed method showed an improvement of 38 and 57 percent in comparison with the best and worst outcomes derived from conventional road segmentation methods.

Valuing crowding in public transport: Implications for cost-benefit analysis

- Transportation Research Part A: Policy and Practice---2016---Marco Batarce,Juan Carlos Muñoz,Juan de Dios Ortúzar

This paper investigates the valuation of crowding in public transport trips and its implications in demand estimation and cost-benefit analysis. We use a choice-based stated preference survey where crowding levels

are represented by means of specially designed pictures, and use these data to estimate flexible discrete choice models. We assume that the disutility associated with travelling under crowded conditions is proportional to travel time. Our results are consistent with and extend previous findings in the literature: passenger density has a significant effect on the utility of travelling by public transport; in fact, the marginal disutility of travel time in a crowded vehicle (6standing-passengers/m²) is 2.5 times higher than in a vehicle with available seats. We also compare the effects of different policies for improving bus operations, and the effect of adding crowding valuation in cost-benefit analysis. In doing that, we endogenise the crowding level as the result of the equilibrium between demand and supplied bus capacity. Our results indicate that important benefits may be accrued from policies designed to reduce crowding, and that ignoring crowding effects significantly overestimate the bus travel demand the benefits associated with pure travel time reductions.

Travel mode choice among same-sex couples

- Transportation Research Part A: Policy and Practice---2016---Nicholas J. Klein,Michael J. Smart

Same-sex partnered individuals are far more likely to use transit, walk, and cycle, and to a lesser extent, use carpools than are people in straight couples. As society becomes more tolerant, gay and lesbian populations are an increasingly visible social group, yet they have received scant attention by transportation scholars. This paper builds on this nascent literature by documenting and attempting to explain these dramatic differences by controlling for factors known to influence mode choice.

Paradoxes of reservation-based intersection controls in traffic networks

- Transportation Research Part A: Policy and Practice---2016---Michael W. Levin,Stephen D. Boyles,Rahul Patel

Reservation-based intersection control is a revolutionary idea for using connected autonomous vehicle technologies to improve intersection controls. Vehicles individually request permission to follow precise paths through the intersection at specific times from an intersection manager agent. Previous studies have shown that reservations can reduce delays beyond optimized signals in many demand scenarios. The purpose of this paper is to demonstrate that signals can outperform reservations through theoretical and realistic examples. We present two examples that exploit the reservation protocol to prioritize vehicles on local roads over vehicles on arterials, increasing the total vehicle delay. A third theoretical example demonstrates that reservations can encourage selfish route choice leading to arbitrarily large queues. Next, we present two realistic networks taken from metropolitan planning organization data in which reservations perform worse than signals. We conclude with significantly positive results from comparing reservations and signals on the downtown Austin grid network using dynamic traffic assignment. Overall, these results indicate that network-based analyses are needed to detect adverse route choices before traffic signals can be replaced with reservation controls. In asymmetric intersections (e.g. local road-arterial intersections), reservation controls can cause several potential issues. However, in networks with more symmetric intersections such as a downtown grid, reservations have great potential to improve traffic.

Cash flow sensitivities during normal and crisis times: Evidence from shipping

- Transportation Research Part A: Policy and Practice---2016---Wolfgang Drobetz,Rebekka Haller,Iwan Meier

Using a system of equations model, we analyze how cash flow shocks influence the investment and financing decisions of shipping firms in different economic environments. Even financially healthy shipping firms felt strong negative effects on their financing activities during the recent crisis. These firms were nevertheless able to increase long-term debt. Banks internalized

the impact of foreclosure decisions on vessel prices and avoided an industry-wide collateral channel effect. Even during benign economic conditions, financially weak shipping firms underinvest because of their inability to raise sufficient external capital. The substitution between long- and short-term debt during the pre-2008 crisis periods shows that the composition of financing sources is more indicative of whether firms face financial constraints than the pure size of the financing-cash flow sensitivities. An analysis of firms' excess cash holdings confirms the importance of financial flexibility.

Valuation of strategic options in public-private partnerships

- Transportation Research Part A: Policy and Practice---2016---Gabriel Power,Mark Burris,Sharada Vadali,Dmitry Vedenov

This paper investigates the feasibility of and develops an economic valuation model for strategic options in Comprehensive Development Agreements (CDAs). A CDA is a form of public-private partnership whereby the right to price and collect revenues from toll roads is leased to a private entity for a long but finite period of time. In exchange, this provides local and state governments with a quick influx of cash and/or additional infrastructure. Uncertainty associated with such long-term leases is of substantial public concern. This paper examines five different strategic options, namely a buyout option, a conditional buyout option, a revenue-sharing option, and two types of minimum revenue guarantee options. The buyout option in particular could give the public sector additional control over the future use of leased facilities and address potential concerns regarding long-run uncertainty and possible unforeseen windfalls for the private sector. The paper's contributions include the analysis, feasibility assessment and valuation of several strategic options, sensitivity analysis of the solutions, an economic consumer demand-based revenue model for purposes of cash flow simulation, and analysis of option price sensitivity to "moneyness". The main conclusion is that strategic options can provide useful risk reduction, but generally have significant value relative to the lease

itself. By scaling down payoffs, options could be realistically included in CDAs and other PPPs. For some parameter values, option values to the developer and public authority are offsetting, allowing for costless risk reduction.

Cycling near misses: Their frequency, impact, and prevention

- Transportation Research Part A: Policy and Practice---2016---Rachel Aldred

This paper explores cyclists' experiences of non-injury incidents, arguing that these are important for cycling experience and uptake as well as for injury prevention. It discusses different types of non-injury incident collected in a recent survey of UK cyclists. These are everyday occurrences that in some cases have a substantially negative impact on cycling experiences. This article explores the impact of different incident types on people cycling both immediately and in the future. It analyses what near misses tell us about cyclists' experience of problems related to road user behaviour and culture, and infrastructural conditions for cycling. The paper explores what cyclists experiencing near misses think might have prevented them. Based on this and on a comparison with common types of injury incidents, summary recommendations are made for policy and future research.

Exchange rate and transport cost sensitivities of bilateral freight flows between the US and China

- Transportation Research Part A: Policy and Practice---2016---Junwook Chi

This paper explores the long-run impacts of gross domestic product, exchange rate, and transport costs on bilateral air and ocean freight flows between the US and China. The study employs a cointegration framework by using export and import data over the period of 2003:Q1-2014:Q2. Results show that gross domestic product is the key determinant of bilateral freight flows, indicating that real income of a trading partner is a driving force of the bilateral freight flows

between the US and China. In examining the sensitivities of the bilateral trade flows, air freight flows are found to be more responsive to a real income change than ocean freight flows. The bilateral exchange rate is a significant factor affecting the freight flows from China to the US, suggesting that a US dollar appreciation against the Chinese yuan increases the inflows of Chinese commodities to the US. The impacts of the bilateral exchange rate and transport cost are found to vary at industry and commodity levels. These findings support the importance of employing disaggregate data in the bilateral freight flow analysis.

Great Britain adults' opinions on cycling: Implications for policy

- Transportation Research Part A: Policy and Practice---2016---Alan Tapp, Adrian Davis, Clive Nancarrow, Simon Jones

In its neglect of cycling, the transport policy history of Great Britain is typical of many car-dependent societies. Policy inertia with respect to sustainable travel may be driven by the assumptions that, firstly, most households have access to the use of a car and are keen to preserve the mobility advantages the current system offers them, and secondly that environmental and health considerations should be subjugated to economic priorities. Thus, in spite of warm words about cycling, pro-car policies tend to dominate.

The factors influencing bicycling in the Bangalore city

- Transportation Research Part A: Policy and Practice---2016---Meghna Verma, T.M. Rahul, Peesari Vamshidhar Reddy, Ashish Verma

Bicycling, in an urban context, have many benefits, compared with motorized transports, like reduced carbon footprint, and lower maintenance, health, social and infrastructural costs. The present paper analyses the various factors contributing to a low percentage of bicycling in the Bangalore city and elicits certain policy aspects to improve the attractiveness of bicycling. The study focuses mainly on the behavioral aspects of

commuters pertaining to their childhood and current scenario, and uses a face-to-face questionnaire survey for data collection. These behavioral aspects indicated a commuter's perception about social expectation, convenience and bicycling infrastructure using a 5-point Likert scale measurement. Information is also collected about factors that might motivate bicycling, and about demographic variables like age, gender, income, etc. The study used a statistical z-test to identify the most influential attitudinal factors and to check whether the various factors are significantly different. The results gave a clear picture about the most dominant attitudinal factors that resulted in the stoppage of bicycling during a commuter's childhood, and that acted as a deterrent to their bicycle usage in a current scenario. The study determined a need for changing the attitude of people towards cycling by programs that would create a positive image for cycling. There was also a need for segregated cycle lanes and signals at intersections so that people could feel safe while travelling on cycles.

Statistical and machine learning approach for planning dial-a-ride systems

- Transportation Research Part A: Policy and Practice---2016---Nikola Marković,Kim, Myungseob (Edward),Paul Schonfeld

Door-to-door transportation service for elderly and persons with disabilities is often called dial-a-ride (DAR), and is usually provided by transit agencies through private contractors. Growth in DAR ridership is reported across the United States and this tendency will likely continue due to aging population. Such trends encourage development of models that can provide decision support in planning new DAR systems or expanding existing ones. Several statistical models were previously developed to predict the required DAR system capacity, given various characteristics of the service region, level-of-service requirements and operator constraints. Our work contributes to this line of research by proposing statistical and machine learning approaches that provide more accurate predictions over a wider range of scenarios. This is accomplished through transformation of variables and application

of generalized linear model and support vector regression. Proposed models are built into an online tool that can help transit planners and policy makers: (a) estimate the capacity and operating cost of a DAR system needed to provide the desired level of service, (b) explore tradeoffs between system costs and levels of service, and (c) compare the cost of providing DAR service with other transportation alternatives (e.g., taxi, conventional transit).

Car dependent practices: Findings from a sequence pattern mining study of UK time use data

- Transportation Research Part A: Policy and Practice---2016---Giulio Mattioli,Jillian Able,Katerina Vrotsou

This paper identifies three main understandings of the notion of 'car dependence' in transport research: a micro-social understanding (dependence as an attribute of individuals), a macro approach (attribute of societies or local areas as whole), and a meso-level understanding, where it refers to trips – or rather to the activities that people travel to undertake. While the first two approaches have been dominant, this paper further develops the third, addressing questions as to whether and why certain activities are inherently more difficult to switch away from the car. At the theoretical level, it builds on theories of social practice to put forward the notion of 'car dependent practices'. At the empirical level, it demonstrates that the application of sequence pattern mining techniques to time use data allows the identification of car and mobility intensive activities, arguably representing the trace of car dependent practices. Overall, the findings of this mining exercise suggest that the emphasis of existing literature on escorting children, shopping and carrying heavy goods as car dependent trip purposes is not misplaced. Our analysis adds to this knowledge by contextualising the information by providing detailed quantitative analysis of a larger, richer set of activities hitherto overlooked in transport policy. The article concludes by illustrating the policy implications of the approach adopted and the findings generated, dis-

cussing possible strategies to steer practices in a more sustainable direction by creating material alternatives to the ‘cargo function’ of car travel.

Quasi-landlord port financing in China: Features, practice and a contract theory analysis

- Transportation Research Part A: Policy and Practice---2016---Jihua Zhang

Since the 1970s and 80s, landlord port has been the dominant port financing model in western large and medium-sized container ports. In China, many prospective port projects have also explored a landlord port financing model. However, some evidence suggests that landlord port financing in China is a variant of the international mainstream landlord port financing model. Based on an explanation of their unique features and practices, this paper analyzes the Chinese quasi-landlord port financing model from a contract theory perspective, in which it can be viewed as a double-level principal-agent relationship and two-layer profit distribution contract with three participants: the state-owned assets administration department, the port investment company and the operators. Furthermore, the results show that in the Chinese quasi-landlord port financing model, whether in the case of both joint venture and port land lease (fixed rent), or in the case of both joint venture and port land transfer, the optimal incentive scheme is the same as in the international landlord port financing model with profit sharing rent or mixed rent.

Changes to commute mode: The role of life events, spatial context and environmental attitude

- Transportation Research Part A: Policy and Practice---2016---Ben Clark,Kiron Chatterjee,Steve Melia

It has been suggested that commuting behaviours become habitual and that changes to commute mode are more likely at the time of major life events. However, evidence to support this has so far been limited to

analyses of small-scale samples. To address this evidence gap, we use two waves of panel data from the UK Household Longitudinal Study (2009/10 and 2010/11) to identify and explain the prevalence of individual change in commute mode from year to year amongst a representative sample of the English working population ($n=15,200$). One third of those that cycle or get the bus to work, and one quarter of those that walk to work, are shown to change commuting mode by the following year. Car commuting is more stable, with only one in ten car commuters changing mode by the following year. Commute mode changes are found to be primarily driven by alterations to the distance to work which occur in association with changing job or moving home. Switching to non-car commuting becomes much more likely (9.2 times) as the distance to work drops below three miles. High quality public transport links to employment centres are shown to encourage switches away from car commuting and mixed land uses are shown to encourage switches to active commuting (walking and cycling). Switches away from car commuting are found to be more likely (1.3 times) for those with a pro-environmental attitude. The attitude orientation is shown to precede the behaviour change, demonstrating evidence of ‘cause and effect’. Overall, the study shows that changes in commuting behaviour are strongly influenced by life events, spatial context and environmental attitude.

Assessing the usage and level-of-service of pedestrian facilities in train stations: A Swiss case study

- Transportation Research Part A: Policy and Practice---2016---Flurin S. Hänseler,Michel Bierlaire,Riccardo Scarinci

A framework for assessing the usage and level-of-service of rail access facilities is presented. It consists of two parts. A dynamic demand estimator allows to obtain time-dependent pedestrian origin-destination demand within walking facilities. Using that demand, a traffic assignment model describes the propagation of pedestrians through the station, providing an estimate of prevalent traffic conditions in terms of flow, walking

times, speed and density. The corresponding level-of-service of the facilities can be directly obtained. The framework is discussed at the example of Lausanne railway station. For this train station, a rich set of data sources including travel surveys, pedestrian counts and trajectories has been collected in collaboration with the Swiss Federal Railways. Results show a good performance of the framework. To underline its practical applicability, a six-step planning guideline is presented that can be used to design and optimize rail access facilities for new or existing train stations. In the long term, the framework may also be used for crowd management, involving real-time monitoring and control of pedestrian flows.

Integrating congestion pricing and transit investment planning

- Transportation Research Part A: Policy and Practice---2016---Ruoyun Chen,Linda Nozick

This paper develops a mathematical model and solution procedure to identify an optimal zonal pricing scheme for automobile traffic to incentivize the expanded use of transit as a mechanism to stem congestion and the social costs that arise from that congestion. The optimization model assumes that there is a homogenous collection of users whose behavior can be described as utility maximizers and for which their utility function is driven by monetary costs. These monetary costs are assumed to be the tolls in place, the per mile cost to drive, and the value of their time. We assume that there is a system owner who sets the toll prices, collects the proceeds from the tolls, and invests those funds in transit system improvements in the form of headway reductions. This yields a bi-level optimization model which we solve using an iterative procedure that is an integration of a genetic algorithm and the Frank–Wolfe method. The method and solution procedure is applied to an illustrative example.

Urban rail investment and transit-oriented development in Beijing: Can it reach a higher potential?

- Transportation Research Part A: Policy and Practice---2016---Jiawen Yang,Jige Quan,Bin Yan,Canfei He

As a response to severe urban congestion, megacities in China have sped up investment in urban rail transit. How effective urban rail investment and relevant planning activities can attract development in China's megacities has rarely been studied. Using eight years' land transaction data in Beijing (2004–2011), this research finds that the market environment in general supports higher density development around transit stations. However, relevant land market regulations and planning practices may prevent the development outcome from reaching its market potential. City governments should adjust existing planning and policy efforts, including more transparent and open process for station location selection, a better articulated investment program that improves transit service, social service and infrastructure quality in suburbs, a shift toward transaction modes of more competition, and a development guidance that grants density bonus to projects closer to metro stations.

Integrating the mean–variance and scheduling approaches to allow for schedule delay and trip time variability under uncertainty

- Transportation Research Part A: Policy and Practice---2016---Hao Li,Huizhao Tu,David Hensher

Uncertainty of travel times and the impact on travel choice behavior has been recognized as an increasingly important research direction in the past decade. This paper proposes an extension to the popular scheduling approach to model traveler's departure time choice behavior under uncertainty, with the main focus on a richer representation of uncertainty. This more general approach incorporates a separate term to reflect the risk aversion associated with uncertainty. Recognizing the correlation between expected schedule delay and

travel time variability, the schedule delay components in the generalized approach are defined in terms of expected travel time, which differs from the scheduling approach. This approach is developed based on the analytical investigation of the relationship between the expected schedule delay and the mean and standard deviation of travel time. An analytical equivalence was found between the scheduling approach and the general approach given a departure time t . To investigate the empirical performance of the generalized approach, two state preference (SP) data sets are used; one from China with a symmetric travel time distribution and the other from Australia with an asymmetric distribution. Both studies show empirical evidence of an equivalence in respect of statistical fit between the generalized and the scheduling approaches, as found from analytical investigations. The Chinese study gives support in the generalized model to including both the mean–variance and the scheduling effects; whereas the Australian study finds only the mean–variance specification has statistical merit. Despite the different travel contexts, it is noteworthy in both empirical settings, that the parameter estimate for arriving earlier than the preferred arrival time (PAT) in the generalized model is positive. This suggests that commuters tend to prefer to arrive earlier in order to guarantee he/she will not be late. This paper contributes to a better understanding of performances of different reliability measures and their relationships. The practical value of the various unreliability measures is provided showing that these indicators are easy to obtain for inclusion in project appraisal.

Short-term planning and policy interventions to promote cycling in urban centers: Findings from a commute mode choice analysis in Barcelona, Spain

- Transportation Research Part A: Policy and Practice---2016---Lindsay M. Braun, Daniel A. Rodriguez, Tom Cole-Hunter, Albert Ambros, David Donaire-Gonzalez, Michael Jerrett, Michelle A. Mendez, Mark J. Nieuwenhuijsen, Audrey de Nazelle

Cycling for transportation has become an increasingly important component of strategies to address public health, climate change, and air quality concerns in urban centers. Within this context, planners and policy makers would benefit from an improved understanding of available interventions and their relative effectiveness for cycling promotion. We examined predictors of bicycle commuting that are relevant to planning and policy intervention, particularly those amenable to short- and medium-term action.

The value of transportation accessibility in a least developed country city – The case of Rajshahi City, Bangladesh

- Transportation Research Part A: Policy and Practice---2016---Suman K. Mitra, Jean-Daniel M. Saphores

Little appears to be known about the capitalization of transportation accessibility in South Asian housing markets, which typically differ from those of industrialized countries. This study starts addressing this gap by providing empirical evidence about the nature and the magnitude of the value of accessibility as reflected by residential rents in Rajshahi City, Bangladesh. Results of our SARAR spatial hedonic model estimated on 526 observations from a random sample collected via in-person interviews indicate that the rent of a multi-unit dwelling decreases by 0.0239% for every 1% increase in network access distance to the nearest major road. Moreover, proximity (within 400m) to a primary school and to a healthcare facility commands rent premiums of respectively 93.55BDT (\$1.40) and 109.45BDT (\$1.64). Surprisingly, whether access roads are paved or not does not statistically impact rents, probably because of the dominance of walking, rickshaws use, and biking, combined with the rarity of personal cars. Likewise, proximity to bus stops and to train stations is not reflected in rents of multi-family dwellings, likely because buses and trains in Rajshahi City only provide regional and national service. Differences in estimates of our spatial models between maximum likelihood (ML) and generalized spatial two-stage-least-squares illustrate the danger of relying on

ML in the presence of heteroskedasticity. These results should be useful for planning transportation infrastructure funding measures in least developed country cities like Rajshahi City.

An integrated assessment of alternative land-based passenger transport policies: A case study in Tenerife

- Transportation Research Part A: Policy and Practice---2016---Yeray Hernández González,Serafín Corral Quintana

Over recent decades, there have been numerous cases of land-based transport policies that have lacked clear and coherent strategies. This has not only hampered the resolution of issues like road congestion, but has also created new ones (e.g. strong social opposition to new train infrastructures). The absence of such strategies highlights the need for long-term transport policies with a wider vision of the issues, since land-based transport cannot be considered from just a technical perspective.

Exposing the role of exposure: Public transport network risk analysis

- Transportation Research Part A: Policy and Practice---2016---O. Cats,M. Yap,N. van Oort

Network risk assessment takes into consideration the probability that adverse events occur and the impacts of such disruptions on network functionality. In the context of transport networks, most studies have focused on vulnerability, the reduction in performance indicators given that a disruption occurs. This study presents and applies a method to explicitly account for exposure in identifying and evaluating link criticality in public transport networks. The proposed method is compared with conventional measures that lack exposure information. A criticality assessment is performed by accounting for the probability of a certain event occurring and the corresponding welfare loss. The methodology was applied for a multi-modal public transport network in the Netherlands where data concerning disruptions was available. The results

expose the role of exposure in determining link criticality and overall network vulnerability. The findings demonstrate that disregarding exposure risks prioritizing links with high passenger volumes over links with a higher failure probability that are significantly more critical to network performance. The inclusion of exposure allows performing a risk analysis and has consequences on assessing mitigation measures and investment priorities.

Taxi apps, regulation, and the market for taxi journeys

- Transportation Research Part A: Policy and Practice---2016---Simon Harding,Milind Kandlikar,Sumeet Gulati

This paper attempts to provide a starting point for discussion on how smartphone-based taxi applications (‘apps’) have changed the market for taxi journeys and the resulting implications for taxi market regulation. The paper focuses on the taxi apps and their impact on taxi markets. It provides a brief history of taxi regulation before outlining the underlying economic rationales of its current form in many parts of the world, characterised as the “QQE” framework (quantity, quality and economic controls on operators). It argues that current regulation assumes that taxi markets are subject to three sets of problems that require correction by regulatory intervention, namely: those associated with credence goods, problems related to open access and those resulting from transactions occurring in a thin market. It is then proposed that taxi apps solve both the credence good and thin market problems whilst largely mitigating the problems associated with open access. The paper then presents some potential problems for taxi apps, namely the potential for instability on supply and demand sides, collusion and monopoly. It also discusses concerns about driver background checks and safety. The paper concludes by arguing that instead of restricting the growth of the taxi market, regulators should focus on reducing the likelihood of monopoly and collusion in a taxi market led by apps.

A utility-based travel impedance measure for public transit network accessibility

- Transportation Research Part A: Policy and Practice---2016---Neema Nassir,Mark Hickman,Ali Malekzadeh,Elnaz Irannezhad

A utility-based travel impedance measure is developed for public transit modes that is capable of capturing the passengers' behaviour and their subjective perceptions of impedance when travelling in the transit networks. The proposed measure is time-dependent and it estimates the realisation of the travel impedance by the community of passengers for travelling between an origin-destination (OD) pair.

Comparing high-end and low-end early adopters of battery electric vehicles

- Transportation Research Part A: Policy and Practice---2016---Scott Hardman,Eric Shiu,Robert Steinberger-Wilckens

Battery electric vehicle adoption research has been on going for two decades. The majority of data gathered thus far is taken from studies that sample members of the general population and not actual adopters of the vehicles. This paper presents findings from a study involving 340 adopters of battery electric vehicles. The data is used to corroborate some existing assumptions made about early adopters. The contribution of this paper, however, is the distinction between two groups of adopters. These are high-end adopters and low-end adopters. It is found that each group has a different socio-economic profile and there are also some psychographic differences. Further they have different opinions of their vehicles with high-end adopters viewing their vehicles more preferentially. The future purchase intentions of each group are explored and it is found that high-end adopters are more likely to continue with ownership of battery electric vehicles in subsequent purchases. Finally reasons for this are explored by comparing each adopter group's opinions of their vehicles to their future purchase intentions. From this it is suggested that time to refuel and range for low-end battery electric vehicles should be improved

in order to increase chances of drivers continuing with BEV ownership.

Using the sustainable modified TAM and TPB to analyze the effects of perceived green value on loyalty to a public bike system

- Transportation Research Part A: Policy and Practice---2016---Shang-Yu Chen

This article explores the effects of perceived green value, perceived green usefulness, perceived pleasure to use, subjective norms and perceived behavioral control on green loyalty to a public bike system. The mediators between perceived green value and green loyalty and a moderator of general attitude toward protecting the natural environment are also discussed. The aim of this research was to understand how to establish green loyalty via the other dimensions based on the sustainable modified technology acceptance model (modified TAM), the theory of planned behavior (TPB), and a moderator. The findings reveal that perceived pleasure to use and subjective norms have the strongest power to influence loyalty for both users and non-users. The implications of this finding are that fun in people's lives has a strong influence on sustainable continuous use of public bikes, and that subjective norms are more effective for non-users. In addition, environmental attitude has stronger moderating effects for non-users than for users on perceived green usefulness, perceived pleasure and subjective norms. Therefore, governmental policies should promote the attitude of protecting the natural environment, perceptions of pleasure, and subjective norms so as to increase green loyalty to public bike-sharing.

Driving decisions of older adults receiving meal delivery: The influence of individual characteristics, the built environment, and neighborhood familiarity

- Transportation Research Part A: Policy and Practice---2016---Daniel Baldwin Hess,J. Travis Norton, JiYoung Park,Debra A. Street

Access and mobility are key ingredients to independence and life satisfaction for older adults. This research addresses a series of gaps in scholarly literature on driving behavior among community-dwelling older adults, particularly those who rely on in-home supportive services to age in place. We explore the influence of a series of factors, including individual attributes, family and household structure, general mobility, and weather preparedness on driving behavior. Using survey data for Meals on Wheels clients in the Town of Tonawanda, New York, a stable first-ring suburb with much aging in place, we construct binary logit models to explore the factors explaining the decision to drive or not. Our findings suggest that age is positively associated, but at a diminishing rate, with driving when health and functional limitations are controlled for; women have lower propensities than men for driving; those who drive have higher overall mobility; driving is negatively associated with mixed land uses near home; housing tenure (duration in years) is positively associated with driving. Weather-related variables are not statistically significant, but this does not diminish the potentially significant impacts of extreme weather events on mobility among older adults.

Social welfare analysis of investment public–private partnership approaches for transportation projects

- Transportation Research Part A: Policy and Practice---2016---Omid M. Rouhani,R. Richard Geddes,H. Oliver Gao,Germà Bel

This paper has two objectives: (i) to introduce a new approach in order to gain widespread support for road pricing; and (ii) to develop a detailed social welfare analysis for road pricing schemes. We first describe our novel approach that stimulates public support for road pricing, which we refer to as an investment public–private partnership, or IP3. This approach returns a significant portion of the economic value created by road pricing back to the citizens who own the newly priced facility. We then present a social welfare framework that estimates the benefits and costs of using the IP3 approach on an urban transportation

network. A P3 project's impact on overall social welfare provides a more comprehensive evaluation criterion than the often-used Value for Money (VfM) analysis. Apart from several theoretical studies, a detailed social welfare analysis that includes all major P3 project stakeholders is absent from the literature. We use Fresno, California as our case study in order to conduct a welfare analysis on IP3s. Our results show that system-optimal tolling favors average users, but that government—and consequently taxpayers—should pay for costly tolling systems (negative profits). In contrast, unlimited profit-maximizing tolls raise substantial profits for government, for the infrastructure's citizen-owners, and for the private sector, but the average user is worse off. From a social-welfare perspective, one should search for a Pareto improvement under which all major stakeholders are better off. Our estimates indicate that a mixed public and private tolling scheme offers such an improvement.

Guidance for transport planning and policymaking in the face of an uncertain future

- Transportation Research Part A: Policy and Practice---2016---Glenn Lyons,Cody Davidson

Uncertainty of outcome is widely recognised as a concern facing decision-makers and their advisors. In a number of spheres of policy, it appears uncertainty has intensified in the face of globalisation, economic instability, climate change, technological innovation and changing consumer preferences. How can planners and policymakers plan for an uncertain future? There is growing interest in, and use of, techniques that can help decision-making processes where deep uncertainty is involved. This paper is based upon one of the most recent international examples of a foresight exercise employed to examine uncertainty – specifically that which concerns uncertainty over the nature and extent of future demand for car travel. The principal focus of the paper is on the insights and guidance this examination of uncertainty brings forth for transport planning and policymaking. To accommodate deep uncertainty requires a flexible and open approach in terms of how policy and investment possibilities are formulated and

judged. The paper argues for a focus upon the Triple Access System of spatial proximity, physical mobility and digital connectivity as a framework for policy and investment decisions that can harness flexibility and resilience. Uncertainty becomes an opportunity for decision-makers with the realisation that they are shaping the future rather than (only) responding to a predicted future. The paper outlines two forms of policymaking pathway: regime-compliant (in which adherence to trends and the nature of the world we have known pushes policy) and regime-testing (in which the nature of the world as we have known it is brought into question and vision pulls policy decisions). Stronger orientation towards regime-testing to assist in managing an uncertain future is advocated.

Stochastic frontier estimation of budgets for Kuhn–Tucker demand systems: Application to activity time-use analysis

- Transportation Research Part A: Policy and Practice---2016---Abdul Rawoof Pinjari,Bertho Augustin,Vijayaraghavan Sivaraman,Ahmadreza Faghih Imani,Naveen Eluru,Ram M. Pendyala

We propose a stochastic frontier approach to estimate budgets for the multiple discrete–continuous extreme value (MDCEV) model. The approach is useful when the underlying time and/or money budgets driving a choice situation are unobserved, but the expenditures on the choice alternatives of interest are observed. Several MDCEV applications hitherto used the observed total expenditure on the choice alternatives as the budget to model expenditure allocation among choice alternatives. This does not allow for increases or decreases in the total expenditure due to changes in choice alternative-specific attributes, but only allows a reallocation of the observed total expenditure among different alternatives. The stochastic frontier approach helps address this issue by invoking the notion that consumers operate under latent budgets that can be conceived (and modeled) as the maximum possible expenditure they are willing to incur. The proposed method is applied to analyze the daily out-of-home activity participation and time-use patterns in a sur-

vey sample of non-working adults in Florida. First, a stochastic frontier regression is performed on the observed out-of-home activity time expenditure (OH-ATE) to estimate the unobserved out-of-home activity time frontier (OH-ATF). The estimated frontier is interpreted as a subjective limit or maximum possible time individuals can allocate to out-of-home activities and used as the time budget governing out-of-home time-use choices in an MDCEV model. The efficacy of this approach is compared with other approaches for estimating time budgets for the MDCEV model, including: (a) a log-linear regression on the total observed expenditure for out-of-home activities and (b) arbitrarily assumed, constant time budgets for all individuals in the sample. A comparison of predictive accuracy in time-use patterns suggests that the stochastic frontier and log-linear regression approaches perform better than arbitrary assumptions on time budgets. Between the stochastic frontier and log-linear regression approaches, the former results in slightly better predictions of activity participation rates while the latter results in slightly better predictions of activity durations. A comparison of policy simulations demonstrates that the stochastic frontier approach allows for the total out-of-home activity time expenditure to either expand or shrink due to changes in alternative-specific attributes. The log-linear regression approach allows for changes in total time expenditure due to changes in decision-maker attributes, but not due to changes in alternative-specific attributes.

Vehicle value of travel time savings: Evidence from a group-based modelling approach

- Transportation Research Part A: Policy and Practice---2016---Chinh Ho,Corinne Mulley,Yoram Shiftan,David Hensher

The value of travel time savings (VTTS) accounts for a majority of the total user benefits in economic appraisal of transport investments. This means that having an accurate estimate of VTTS for different segments of travel continues to retain currency, despite there being a rich literature on estimates of VTTS for different travel modes, travel purposes, income groups,

life cycles, and distance bands. In contrast, there is a dearth of research and evidence on vehicle VTTS, although joint travel by car is an important segment of travel. This paper fills this gap by developing a group-based modelling approach to quantify the vehicle VTTS and compares this with the VTTS for a driver with and without a passenger. An online survey was conducted in Sydney in 2014 and the data used to obtain a number of new empirical estimates of vehicle and driver VTTS. The new evidence questions the validity of various assumptions adopted in current practice for valuing the time savings of car passengers and multiple occupant cars.

Identifying environmental justice communities for transportation analysis

- Transportation Research Part A: Policy and Practice---2016---Dana Rowangould,Alex Karner,Jonathan London

Environmental justice (EJ) refers to policy and advocacy intended to achieve equitable protection from environmental harms and access to benefits across demographic groups. Research has shown that low-income communities and communities of color are often exposed to greater harms and enjoy fewer benefits from transportation systems than the general population. However, federally-mandated EJ analyses rarely conclude that projects could result in disproportionate impacts to these communities. This paper investigates the methods used to define EJ communities—a key analytical step for which there is little specific guidance—as a potential driver of variation in observed EJ outcomes. Using a case study of transit accessibility in Fresno County, California, the paper contrasts three methods for the identification of EJ communities: (1) a commonly used threshold-based approach that groups geographic areas using demographics, (2) a population-weighted approach that calculates weighted means of performance measures, and (3) community-based identification of EJ areas. The analysis indicates that the first method is appropriate for targeting transportation investments but not for assessing EJ outcomes, while the second two methods are appropriate for assessing

EJ outcomes. Importantly, the method used to define EJ communities can substantially affect the analytical outcome, potentially shifting a finding of inequity from null to positive or vice versa. These results have important implications for transportation planning agencies and transportation service providers that conduct EJ and equity analyses, as a finding of inequity may lead to design changes or mitigations.

State-of-the-practice assessment of climate change adaptation practices across metropolitan planning organizations pre- and post-Hurricane Sandy

- Transportation Research Part A: Policy and Practice---2016---Michelle Oswald Beiler,Leylin Marroquin,Sue McNeil

Metropolitan Planning Organizations (MPOs) throughout the United States are identifying goals and implementation strategies to reduce the impacts of climate change through transportation adaptation initiatives. Using vulnerability assessments as well as adaptation practices that support mitigation, MPOs are beginning to integrate climate change planning into the long range planning process. Evaluating the state-of-the-practice of adaptation planning and adaptation in support of mitigation is useful in that it helps identify gaps and areas of improvement. Therefore, this research investigates the state-of-the-practice of MPO adaptation planning using the Mid-Atlantic region as a case study. Surveys, administered in 2012 and 2014, are used to identify the level of progress of MPOs with regard to climate change adaptation practices as well as barriers before and after Hurricane Sandy. A cross-sectional analysis using GIS (Geographic Information Systems) maps the results of the surveys and spatially compares regional trends. The results of the case study suggest growing interest in adaptation efforts such as floodplain area designations and efforts to enhance coordination and collaboration as transportation jurisdictions respond to the potential climate change impacts. In addition, MPOs with dense, smaller geographic areas prioritize inter-jurisdictional collaboration as high, suggesting that they are more reliant on other agencies to

maintain inter-connectivity of transportation networks and further implement adaptation planning practices.

An impact analysis of traffic image information system on driver travel choice

- Transportation Research Part A: Policy and Practice---2016---Hooi Ling Khoo,K.S. Asitha

A driver is one of the main components in a transportation system that influences the effectiveness of any active demand management (ADM) strategies. As such, the understanding on driver behavior and their travel choice is crucial to ensure the successful implementation of ADM strategies in alleviating traffic congestion, especially in city centres. This study aims to investigate the impact of traffic information dissemination via traffic images on driver travel choice and decision. A relationship of driver travel choice with respect to their perceived congestion level is developed by an integrated framework of genetic algorithm-fuzzy logic, being a new attempt in driver behavior modeling. Results show that drivers consider changing their travel choice when the perceived congestion level is medium, in which changing departure time and diverting to alternative roads are two popular choices. If traffic congestion escalates further, drivers are likely to cancel their trip. Shifting to public transport system is the least likely choice for drivers in an auto-dependent city. These findings are important and useful to engineers as they are required to fully understand driver (user) sensitivity to traffic conditions so that relevant active travel demand management strategies could be implemented successfully. In addition, engineers could use the relationships established in this study to predict drivers' response under various traffic conditions when carrying out modeling and impact studies.

Indicators of reliability and vulnerability: Similarities and differences in ranking links of a complex road system

- Transportation Research Part A: Policy and Practice---2016---Eduardo Leal de Oliveira,Licínio da Silva Portugal,Walter Porto Junior

This article investigates two performance attributes of road networks, reliability and vulnerability, analyzing their similarities as well as the differences that justify distinct definitions, based on consolidation of recent studies. We also discuss the indicators found in the literature for these two performance attributes. Since various authors treat vulnerability as an aspect of reliability instead of a specific attribute, we carried out an application to a complex road network representative of the city of Rio de Janeiro to check the suitability of this approach. The results show that the vulnerability indicators are more strongly affected by the characteristics of alternative routes while the reliability metrics are more sensitive to the congestion level. The conclusion is that reliability and vulnerability should be treated distinctly for evaluating the performance of road network links.

Feeder-trunk or direct lines? Economies of density, transfer costs and transit structure in an urban context

- Transportation Research Part A: Policy and Practice---2016---Antonio Gschwender,Sergio Jara-Díaz,Claudia Bravo

A feeder-trunk scheme has been labeled as superior in urban areas due to the presence of economies of density (decreasing average operating cost) along the avenues served by trunk lines. We compare this structure against three types of direct lines structures (no transfers) to serve a stylized public transport network where several flows converge into a main avenue, simultaneously optimizing fleet and vehicle sizes considering both users' and operators' costs. The best structure is shown to depend not only on the total passenger volume but also on demand imbalance, demand dispersion in the origins and the length of the trunk line. The region where the feeder-trunk structure dominates depends largely on the value assigned to the pure transfer penalty.

Assessment of the taxi service in Doha

- Transportation Research Part A: Policy and Practice---2016---Khaled Shaaban,Inhi Kim

This research focuses on passengers' satisfaction of the taxi service in Doha, Qatar. Qatar is a rich developing country where taxis are widely considered as a public transportation service due to the limited use of the existing bus service and the profoundly dominant use of private car by expats and Qatari locals. The main objective of this research is to identify the quality attributes of the current taxi service. A descriptive analysis relating the demographic, accessibility, and trip purposes to taxi users in general in Doha with overall service satisfaction was conducted. A Structural Equation Model was used to assess the taxi service attributes that influence the users' perceived satisfaction. Two models were developed: one was a relationship between the demographic and satisfaction of the users while the other was between the trip time and the satisfaction of the users. The first model supports the premise that income is the greatest attribute in the demographic followed by marital status, age, and occupation. On the other hand, the latter model demonstrated that waiting time is the most contributing variable among the times spent by taxi users followed by walking from work to a station, journey time, and walking from home to a station.

Explaining “peak car” with economic variables

- Transportation Research Part A: Policy and Practice---2016---Anne Bastian,Maria Börjesson,Jonas Eliasson

Many western countries have seen a plateau and subsequent decrease of car travel during the 21st century. What has generated particular interest and debate is the statement that the development cannot be explained by changes in traditional explanatory factors such as GDP and fuel prices. Instead, it has been argued, the observed trends are indications of substantial changes in lifestyles, preferences and attitudes to car travel; what we are experiencing is not just a temporary plateau, but a true “peak car”. However, this study shows that the traditional variables GDP and fuel price are in fact sufficient to explain the observed trends in car traffic in all the countries included in our study: the United States, France, the United Kingdom,

Sweden and (to a large extent) Australia and Germany. We argue that the importance of the fuel price increases in the early 2000s has been underappreciated in the studies that shaped the later debate. Results also indicate that GDP elasticities tend to decrease with rising GDP, and that fuel price elasticities tend to increase at high price levels and during periods of rapid price increases.

Waiting time perceptions at transit stops and stations: Effects of basic amenities, gender, and security

- Transportation Research Part A: Policy and Practice---2016---Yingling Fan,Andrew Guthrie,David Levinson

Waiting time in transit travel is often perceived negatively and high-amenity stops and stations are becoming increasingly popular as strategies for mitigating transit riders' aversion to waiting. However, beyond recent evidence that realtime transit arrival information reduces perceived waiting time, there is limited empirical evidence as to which other specific station and stop amenities can effectively influence user perceptions of waiting time. To address this knowledge gap, the authors conducted a passenger survey and video-recorded waiting passengers at different types of transit stops and stations to investigate differences between survey-reported waiting time and video-recorded actual waiting time. Results from the survey and video observations show that the reported wait time on average is about 1.21 times longer than the observed wait time. Regression analysis was employed to explain the variation in riders' reported waiting time as a function of their objectively observed waiting time, as well as station and stop amenities, weather, time of the day, personal demographics, and trip characteristics. Based on the regression results, most waits at stops with no amenities are perceived at least 1.3 times as long as they actually are. Basic amenities including benches and shelters significantly reduce perceived waiting times. Women waiting for more than 10min in perceived insecure surroundings report waits as dramatically longer than they really are, and longer than

do men in the same situation. The authors recommend a focus on providing basic amenities at stations and stops as broadly as possible in transit systems, and a particular focus on stops on low-frequency routes and in less safe areas for security measures.

Commuters' behavior towards upgraded bus services in Greater Beirut: Implications for greenhouse gas emissions, social welfare and transport policy

- Transportation Research Part A: Policy and Practice---2016---Ali Chalak,Hani Al-Naghi,Alexandra Irani,Maya Abou-Zeid

Climate change is one of the most critical environmental challenges faced in the world today. The transportation sector alone contributes to 22% of carbon emissions, of which 80% are contributed by road transportation. In this paper we investigate the potential private car greenhouse gas (GHG) emissions reduction and social welfare gains resulting from upgrading the bus service in the Greater Beirut Area. To this end, a stated preference (SP) survey on mode switching from private car to bus was conducted in this area and analyzed by means of a mixed logit model. We then used the model outputs to simulate aggregate switching behavior in the study area and the attendant welfare and environmental gains and private car GHG emissions reductions under various alternative scenarios of bus service upgrade. We recommend a bundle of realistic bus service improvements in the short term that will result in a reasonable shift to buses and measurable reduction in private car emissions. We argue that such improvements will need to be comprehensive in scope and include both improvements in bus level of service attributes (access/egress time, headway, in-vehicle travel time, and number of transfers) and the provision of amenities, including air-conditioning and Wi-Fi. Moreover, such a service needs to be cheaply priced to achieve reasonably high levels of switching behavior. With a comprehensively overhauled bus service, one would expect that bus ridership would increase for commuting purposes at first, and once the habit for it is formed, for travel purposes other than commuting,

hence dramatically broadening the scope of private car GHG emissions reduction. This said, this study demonstrates the limits of focused sectorial policies in targeting and reducing private car GHG emissions, and highlights the need for combining behavioral interventions with other measures, most notably technological innovations, in order for the contribution of this sector to GHG emissions mitigation to be sizable.

Achieving political acceptability for new transport infrastructure in congested urban regions

- Transportation Research Part A: Policy and Practice---2016---Jonas Westin,Joel P. Franklin,Stef Proost,Pierre Basck,Charles Raux

This paper analyzes the efficiency and political acceptability of road pricing and infrastructure policies targeted at relieving urban congestion. It combines a stylized transport model of an urban road network with a model of the political process that incorporates interactions between voters, citizen interest groups and politicians to explore the possibilities to reach political acceptability for efficient transport policies. In a numerical illustration, the paper compares a set of pricing and investment policies in terms of efficiency and acceptability. The illustration shows how conflicting interests can lead to non-efficient policies being chosen.

Scheduling decision styles on leisure and social activities

- Transportation Research Part A: Policy and Practice---2016---Tomás Ruiz,Khandker Nurul Habib

This paper investigates scheduling decisions associated with different types of leisure and social activities. Correlations among decisions and self-selection biases are explicitly investigated by using a sample selection model with a bivariate probit selection rule. A dataset collected in the first wave of a recent activity-travel scheduling panel survey carried out in Valencia (Spain) was used for empirical investigation. Significant differences are revealed in the empirical models for leisure

and social activities in planning decisions, including different effects of temporal, companionship and demographic factors. The findings of the empirical model have important implications to travel behavior and activity-travel scheduling model developments. These results confirm the existence of different mechanisms underlying the activity-travel decision processes when leisure and social activities are of concerns. Results provide significant insights into enhancing the performances of an activity scheduling model by capturing accurate activity-travel scheduling tradeoffs in flexible activity types e.g. leisure and social activities.

Why do some motorbike riders wear a helmet and others don't? Evidence from Delhi, India

- Transportation Research Part A: Policy and Practice---2016---Michael Grimm,Carole Treibich

Road traffic accident fatalities lead to important private and social costs in the metropolitan areas of most low and middle income countries. An important share of these fatalities is due to injuries to the head and the neck. Helmets can provide efficient protection, but many drivers do not use them. We focus on helmet use behavior among motorbike users in Delhi. We use a detailed data set collected for the purpose of the study. To guide our empirical analysis, we rely on a model in which drivers decide on self-protection and self-insurance. The empirical findings suggest that risk-averse drivers are more likely to wear a helmet and that this has no systematic effect on speed. Helmet use also increases with education. Drivers who show a higher awareness of road risks seem to be both more likely to wear a helmet and to speed less. Controlling for risk awareness, we observe that drivers tend to compensate between speed and helmet use. The results can provide a basis for awareness-raising policies. They also show that improvements to the road infrastructure risk leading to risk-compensating behavior.

Willingness-to-pay for road safety improvement

- Transportation Research Part A: Policy and Practice---2016---Mohamed Mouloud Had-dak,Marie Lefèvre,Nathalie Havet

Few studies have explored, to date, the issue of the monetary valuation of non-fatal injuries caused by road traffic accidents. The present paper seeks to raise interest in this question and to estimate, by contingent valuation, French households' willingness-to-pay (WTP) to improve their road safety level and reduce their risk of non-fatal injuries following a road accident. More precisely, a Tobit and a type-II Tobit model were estimated to identify factors for WTP. The results highlighted the significant positive influence of injury severity on WTP. Experience of road traffic accidents seemed to play an important role, positively influencing valuation of non-fatal injury.

The effect of slow zones on ridership: An analysis of the Chicago Transit Authority "El" Blue Line

- Transportation Research Part A: Policy and Practice---2016---Margarita Bernal,Eric W. Welch,P.S. Sriraj

Transit agencies frequently upgrade rail tracks to bring the system to a state of good repair (SGR) and to improve the speed and reliability of urban rail transit service. For safety during construction, agencies establish slow zones in which trains must reduce speed. Slow zones create delays and schedule disruptions that result in customer dissatisfaction and discontinued use of transit, either temporarily or permanently. While transit agencies are understandably concerned about the possible negative effects of slow zones, empirical research has not specifically examined the relationship between slow zones and ridership. This paper partially fills that gap. Using data collected from the Chicago Transit Authority (CTA) Customer Experience Survey, CTA Slow Zone Maps, and, the Automatic Fare Collection System (AFC), it examines whether recurring service delays due to slow zones affect transit rider behavior and if the transit loyalty programs, such as smart card systems, increase or decrease rider defections. Findings suggest that slow zones increase headway deviation which reduces ridership. Smart card customers are more sensitive to slow zones as they are more likely to stop using transit as a result

of delay. The findings of this paper have two major policy implications for transit agencies: (1) loyalty card users, often the most reliable source of revenue, are most at risk for defection during construction and (2) it is critical to minimize construction disruptions and delays in the long run by maintaining state of good repair. The results of this paper can likely be used as the basis for supporting immediate funding requests to bring the system to an acceptable state of good repair as well as stimulating ideas about funding reform for transit.

Efficient contracting and incentive agreements between regulators and bus operators: The influence of risk preferences of contracting agents on contract choice

- Transportation Research Part A: Policy and Practice---2016---David Hensher, Chinh Ho, Louise Knowles

Contracts that govern transactions between regulators and operators are an important feature of service delivery in public transport. This paper reviews the literature on efficient contracting in general and its application to public transport contracts and found little empirical evidence on the influence of risk preferences of contracting agents on contract choice, a fundamental premise of classical contracting theory. Departing from the existing literature, this paper develops a choice experiment to study public transport operators' preferences for different contractual forms. People involved in the public transport industry across Australia are invited to do the survey but the respondents are mainly bus operators in New South Wales. The respondents are offered two hypothetical contracts with different risk profiles and incentives and asked to indicate their preferences as well as their acceptance to provide the services under the contract they prefer. A non-linear scaled multinomial logit model is estimated to establish the role of risk allocation on contract preference of bus operators and the optimal amount of risks and incentives, conditioned on the operators' attitude towards risk. The results help authorities design performance-based contracts to obtain their objectives

while maintaining the operators' level of satisfaction.

Using vehicle simulations to understand strategies for accommodating oversize, overweight vehicles at roundabouts

- Transportation Research Part A: Policy and Practice---2016---Ranjit Prasad Godavorthy, Eugene Russell, Dean Landman

There is considerable evidence that roundabouts are the safest and most efficient form of traffic control for most intersections. The potential use of roundabouts with all their inherent benefits may be greatly diminished if they are not able to accommodate oversize/overweight (OSOW) vehicles, sometimes called "Superloads." The problem, therefore, is how to accommodate OSOW vehicles without sacrificing the integrity, safety and other benefits of roundabouts.

A study of human mobility behavior dynamics: A perspective of a single vehicle with taxi

- Transportation Research Part A: Policy and Practice---2016---Can-Zhong Yao, Ji-Nan Lin

In this paper, we first research on the distance distribution of human mobility with single vehicle based on the driving data from a taxi company in South China. Different from conventional exponential distribution, we discover the mobility distance with taxi follows power-law distribution. Further, we proposed a model which may explain the mechanism for the power-law distribution: mobility distance is constrained by time and fare. Specifically, the relationship between fare and mobility distance follows piecewise function, and responds to individual sensitivity; the relationship between time and mobility distance follows significant logarithmic relationship. These two factors, especially the logarithmic relationship between time and mobility distance, may contribute to a power-law distribution instead of an exponential one. Finally, with a simulation model, we verify the significant power-law distribution of human mobility behavioral distance with a single vehicle, by supplementing factors of waiting time and fare.

Research of highway runway clearance rules

- Transportation Research Part A: Policy and Practice---2016---Hao Geng,LiangCai Cai,XiaoLei Chong,Bin Shao,HaiFu Wang

Aiming at the problems in the highway runway clearance condition evaluation, according to the improved obstruction requirement of highway runway, the inner transitional surface (ITS) and outer transitional surface (OTS) range are calculated and analyzed in detail, the shape range of the ITS and OTS is pointed out, the methods of calculating the intersecting line and the key various points among ITS, runway strip (RS), inner horizontal surface (IHS) in terminal clearance zone (TCZ), including among OTS, IHS and outer horizontal surface (OHS) in side clearance zone (SCZ) are put forward. Furthermore, obstruction requirement when aircraft are placed on apron of the near highway sections is considered, then the corresponding steps of evaluation are proposed. The procedural design of highway runway clearance condition evaluation is realized by means of software to program. The superelevation condition of the obstacle in the clearance of the highway runway is calculated and analyzed by actual examples. All these have provided a theoretical basis for exactly determining the position, altitude and the superelevation value of the obstacle in the highway runway clearance zone.

Marginal railway track renewal costs: A survival data approach

- Transportation Research Part A: Policy and Practice---2016---Mats Andersson,Gunilla Björklund,Mattias Haraldsson

In this paper, renewal costs for railway tracks are investigated using survival analysis. The purpose is to derive the effect from increased traffic volumes on rail renewal cycle lengths and to calculate associated marginal costs. A flow sample of censored data containing almost 1300 observations on the Swedish main railway network is used. We specify Weibull regression models, and estimate deterioration elasticities for total tonnage as well as for passenger and freight tonnages

separately. Marginal costs are calculated as a change in present values of renewal costs from premature renewal following increased traffic volumes. The marginal cost for total tonnage is estimated to approximately SEK 0.002 per gross ton kilometre.

The effect of contract renewal and competitive tendering on public transport costs, subsidies and ridership

- Transportation Research Part A: Policy and Practice---2016---Arnoud Mouwen,Jos van Ommeren

In this paper, we aim to estimate the effect of contract renewal as well as competitive tendering on public transport costs, subsidies, and ridership. More specifically, we examine to what extent (multiple) contract renewals and introduction of competitive tendering for long-term public transport contracts affect ridership, operational costs and subsidies in concession areas governed by public transportation authorities from 2001 until 2013 in the Netherlands. Our identification strategy improves on the literature as we are able to control for all time-invariant unobserved factors, such as network and area characteristics by using panel data. We show that when renewing long-term contracts, operational costs are reduced by at least 10%, whereas subsidies fall even stronger. For contracts that are renewed at least twice, the reduction in costs is even more substantial and in the order of 16%. We find that the effect of competitive tendering is completely absent, suggesting that the threat of competitive tendering is sufficient in a market where the majority of concessions is competitive tendered. Contract renewal not only reduces costs and subsidies, but simultaneously increases public transport ridership by 7.7%. Furthermore the vehicle-hours elasticity of operational costs is 0.40, pointing to strong economies of density. The geographical scale elasticity of operational costs is around one, which indicates constant returns to scale with respect to the geographical size of the concession area. This suggest that the current size of the Dutch concession area is optimal with respect to costs.

Hurricane evacuation demand models with a focus on use for prediction in future events

- Transportation Research Part A: Policy and Practice---2016---Kecheng Xu,Rachel A. Davidson,Linda K. Nozick,Tricia Wachtendorf,Sarah E. DeYoung

Although substantial literature exists on understanding hurricane evacuation behavior, few studies have developed models that can be used for predicting evacuation rates in future events. For this paper, we develop new ordered probit models for evacuation using survey data collected in the hurricane-prone state of North Carolina in 2011 and 2012. Since all covariates in the models are available from the census or based on location, the new models can be applied to predict evacuation rates for any future hurricane. The out-of-sample predictive power of the new models are evaluated at the individual household level using cross validation, and the aggregated level using available data from Hurricane Irene (2011), Hurricane Isabel (2003) and Hurricane Floyd (1999). Model results are also compared with an existing participation rate model, and a logistic regression model available from the literature. Results at the individual household level suggests approximately 70% of households' evacuation behavior will be predicted correctly. Errors are evenly divided between false positives and false negatives, and with accuracy increasing to 100% as the percentage of people who actually evacuate goes to zero or all and decreasing to about 50% when the population is divided and about half of all households actually evacuate. Aggregate results suggest the new models compare favorably to the available ones, with average aggregate evacuation rate errors of five percentage points.

Bicycle lane priority: Promoting bicycle as a green mode even in congested urban area

- Transportation Research Part A: Policy and Practice---2016---Saeed Asadi Bagloee,Majid Sarvi,Mark Wallace

The main obstacles to boosting the bicycle as a mode of transport are safety concerns due to interactions with

motorized traffic. One option is to separate cyclists from motorists through exclusive bicycle priority lanes. This practice is easily implemented in uncongested traffic. Enforcing bicycle lanes on congested roads may degenerate the network, making the idea very hard to sell both to the public and the traffic authorities. Inspired by Braess Paradox, we take an unorthodox approach to seeking latent misutilized capacity in the congested networks to be dedicated to exclusive bicycle lanes. The aim of this study is to tailor an efficient and practical method to large size urban networks. Hence, this paper appeals to policy makers in their quest to scientifically convince stakeholder that bicycle is not a secondary mode, rather, it can be greatly accommodated along with other modes even in the heart of the congested cities. In conjunction with the bicycle lane priority, other policy measures such as shared bicycle scheme, electric-bike, integration of public transport and bicycle are also discussed in this article. As for the mathematical methodology, we articulated it as a discrete bilevel mathematical programming. In order to handle the real networks, we developed a phased methodology based on Branch-and-Bound (as a solution algorithm), structured in a less intensive RAM manner. The methodology was tested on real size network of city of Winnipeg, Canada, for which the total of 30 road segments – equivalent to 2.77km bicycle lanes – in the CBD were found.

Help or hindrance? The travel, energy and carbon impacts of highly automated vehicles

- Transportation Research Part A: Policy and Practice---2016---Zia Wadud,Don MacKenzie,Paul Leiby

Experts predict that new automobiles will be capable of driving themselves under limited conditions within 5–10years, and under most conditions within 10–20years. Automation may affect road vehicle energy consumption and greenhouse gas (GHG) emissions in a host of ways, positive and negative, by causing changes in travel demand, vehicle design, vehicle operating profiles, and choices of fuels. In this paper, we identify specific mechanisms through which automation

may affect travel and energy demand and resulting GHG emissions and bring them together using a coherent energy decomposition framework. We review the literature for estimates of the energy impacts of each mechanism and, where the literature is lacking, develop our own estimates using engineering and economic analysis. We consider how widely applicable each mechanism is, and quantify the potential impact of each mechanism on a common basis: the percentage change it is expected to cause in total GHG emissions from light-duty or heavy-duty vehicles in the U.S. Our primary focus is travel related energy consumption and emissions, since potential lifecycle impacts are generally smaller in magnitude. We explore the net effects of automation on emissions through several illustrative scenarios, finding that automation might plausibly reduce road transport GHG emissions and energy use by nearly half – or nearly double them – depending on which effects come to dominate. We also find that many potential energy-reduction benefits may be realized through partial automation, while the major energy/emission downside risks appear more likely at full automation. We close by presenting some implications for policymakers and identifying priority areas for further research.

The impacts of changing flight demands and throughput performance on airport delays through the Great Recession

- Transportation Research Part A: Policy and Practice---2016---Amy Miyoung Kim

Several significant events between 2007 and 2009 impacted flight demands and the abilities of the three major New York area airports to handle demand. This paper assesses the results of applying a probabilistic simulation method – which isolates the individual contributions of changes in flight demand and changes in airport throughput performance to changes in flight delays – to diagnose how these different events may have caused operational changes at these airports, and in turn, how the results may be used to inform policies for appropriate countermeasures. The analysis revealed two key observations. Firstly, certain patterns

in throughput performance shifts caused the most significant delays, and were more likely to have been caused by controller staffing issues rather than caps. Secondly, relatively constant average delays from one year to the next may result from significant demand drops accompanied by large throughput performance degradations at an airport. This suggests that not only operational limitations on capacity encourage airlines to reduce schedules, but that changed demands can also impact throughput performance. Overall, the analysis indicates that caps may not have provided their fully intended delay benefits. Although they successfully reduced overall flight demands at LGA and JFK, they also directly limited throughput performance at critical times, in turn limiting delay benefits. In addition, demands at the busiest times of the day appear to be relatively inelastic to these operational limitations, insofar as demand profiles at EWR and JFK remained “peaky” in 2008 and 2009. Also, the recession was largely responsible for reducing demands at the airports in 2009, but the delay benefits of this were dampened by a corresponding throughput performance degradation. Based on the above observations, a more direct demand management policy combined with policies that focus on maintaining high staffing capabilities at critical times of the day may be considered, to reduce the likelihood of major queue formation on days that do experience sustained demands. The results also suggest that a more flexible caps system, particularly during times of heavy queues, could be explored. Although airport practitioners have keen understandings of how their airports operate, without the support of quantitative analysis tools, it can be more difficult to argue the need for appropriate countermeasures. An analysis such as the one presented here can provide the detailed quantitative substantiation required to build cases for these targeted policy directives and infrastructure investments.

Evaluating the added-value of online bus arrival prediction schemes

- Transportation Research Part A: Policy and Practice---2016---Oded Cats,Gerasimos Loutos

Online predictions of bus arrival times have the potential to reduce the uncertainty associated with bus operations. By better anticipating future conditions, online predictions can reduce perceived and actual passenger travel times as well as facilitate more proactive decision making by service providers. Even though considerable research efforts were devoted to the development of computationally expensive bus arrival prediction schemes, real-world real-time information (RTI) systems are typically based on very simple prediction rules. This paper narrows down the gap between the state-of-the-art and the state-of-the-practice in generating RTI for public transport systems by evaluating the added-value of schemes that integrate instantaneous data and dwell time predictions. The evaluation considers static information and a commonly deployed scheme as a benchmark. The RTI generation algorithms were applied and analyzed for a trunk bus network in Stockholm, Sweden. The schemes are assessed and compared based on their accuracy, reliability, robustness and potential waiting time savings. The impact of RTI on passengers waiting times are compared with those attained by service frequency and regularity improvements. A method which incorporates information on downstream travel conditions outperforms the commonly deployed scheme, leading to a 25% reduction in the mean absolute error. Furthermore, the incorporation of instantaneous travel times improves the prediction accuracy and reliability, and contributes to more robust predictions. The potential waiting time gains associated with the prediction scheme are equivalent to the gains expected when introducing a 60% increase in service frequency, and are not attainable by service regularity improvements.

When it comes to container port efficiency, are all developing regions equal?

- Transportation Research Part A: Policy and Practice---2016---Ancor Suárez-Alemán,Javier Morales Sarriera,Tomas Serebrisky,Lourdes Trujillo

In this paper we carry out a container port performance analysis of the developing world between 2000

and 2010, using both parametric and nonparametric approaches. From a unique dataset – our sample covers 70 developing countries, 203 ports, and 1750 data points–, we examine the evolution and drivers of productivity and efficiency changes across developing regions. We show that productivity growth rates between 2000 and 2010 vary significantly and that this heterogeneity is explained by pure efficiency changes rather than scale efficiency of technological changes. Therefore, we carry out a detailed efficiency analysis to determine the drivers of port efficiency. Time series results show an upward trend for port efficiency in developing regions, as it increased from 51 percent in 2000 to 61 percent in 2010. Our analysis indicates that private sector participation, the reduction of corruption in the public sector, improvements in liner connectivity and the existence of multimodal links increase the level of port efficiency in developing regions.

Observing dynamic behavioural responses due to the extension of a tram line by using panel survey

- Transportation Research Part A: Policy and Practice---2016---Nursitihazlin Ahmad Termida,Yusak O. Susilo,Joel P. Franklin

Using a four-wave panel survey of individuals' trips and psychological attributes collected among residents along a new tram line extension in the city of Stockholm, Sweden, this study aims to investigate factors that determine the individuals' learning and decision-making processes in using a new transport option. This includes investigating which group of travellers have used the new tram extension earlier than others, and integrated the tram extension as a part of their daily travel patterns. This paper also describes the design and construction of the four-wave panel data collection, which was collected from two weeks before and up to seven months after the opening of the new option. Descriptive analysis shows that within a seven-month period, 79% of the respondents tried the new tram extension but only 14.9% of them adopted the new option as their daily travel mode. During the observed period, about 49.3% of the respondents migrated be-

tween travel modes for non-discretionary trips. Further multivariate analysis shows that middle-income travellers and travellers who owned car(s) used the new tram extension earlier than others. The effect of past experience on the current use of the tram extension on a day-to-day basis was also examined by using a mixed logit model with panel data. The purpose of the model is to examine whether individuals' daily experiences with the new tram extension that result from repeated previous choices would affect their decisions to maintain using the new option in subsequent waves.

Free public transport: A socio-cognitive analysis

- Transportation Research Part A: Policy and Practice---2016---Mario Cools,Yannick Fabbro,Tom Bellemans

In this study, the modal shift potential of introducing a free alternative (free public transportation) and of changing the relative prices of transportation is examined. The influence of a cognitive analysis on the zero-price effect is also analyzed. The data used for the analysis stem from a stated preference survey with a sample of approximately 670 respondents that was conducted in Flanders, Belgium. The data are analyzed using a mixed logit model. The modeling results yield findings that confirm the existence of a zero-price effect in transport, which is in line with the literature. This zero-price effect is increased by the forced cognitive analysis for shopping trips, although not for work/school or recreational trips. The results also demonstrate the importance of the current mode choice in hypothetical mode choices and the importance of car availability. The influence of changing relative prices on the modal shift is found to be insignificant. This might be partially because the price differences were too small to matter. Hence, an increase in public transport use can be facilitated by the introduction of free public transport, particularly when individuals evaluate the different alternatives in a more cognitive manner. These findings should be useful to policy makers evaluating free public transport and considering how best to target and promote relevant policy.

The best of times and the worst of times: A new best–worst measure of attitudes toward public transport experiences

- Transportation Research Part A: Policy and Practice---2016---Matthew J. Beck,John M. Rose

Attitudes play an important role in determining individual transit behaviour and the measurement of attitudes is relied on by public transit authorities' world over. Given their role in behaviour and policy making, the accurate measurement of attitudes is of critical importance. Traditional satisfaction scales are prone to bias and on their own they are only a partial measure of attitudes. Given that satisfaction scales have been used to assist with large scale transport infrastructure investment decisions, to aid policy makers examining reactions to alternative policy changes and reform, and to measure the success of new initiatives, deriving robust satisfaction scales should be of critical importance. This paper introduces a dual version of best–worst scaling as an alternative measure of satisfaction. Best–worst scaling is free of the biases inherent in traditional response scales and is ideal for handling the comparative evaluation of large amount of attributes, particularly those which are inherently qualitative. The paper makes a further innovative contribution by proposing a model structure for the joint estimation of satisfaction and importance. Our model shows a better delineation between the attributes used to measure attitudes towards bus use and a more detailed understanding of the relationship between importance and satisfaction; enabling transport operators to better understand what counts most and assess their performance.

Prioritizing new bicycle facilities to improve low-stress network connectivity

- Transportation Research Part A: Policy and Practice---2016---Michael B. Lowry,Peter Furth,Tracy Hadden-Loh

This paper introduces a new method to prioritize bicycle improvement projects based on accessibility to important destinations, such as grocery stores, banks,

and restaurants. Central to the method is a new way to classify “bicycling stress” using marginal rates of substitution which are commonly developed through empirical behavioral research on bicyclist route choice. MRS values are input parameters representing bicycling stress associated with the number of lanes and speed limit of a street. The method was programmed as a geographic information system tool and requires commonly available data. The tool is demonstrated on three improvement scenarios that were recently proposed for Seattle, Washington. The full build-out scenario consists of 771 projects that include various new bike lanes, protected bike lanes, and multi-use trails. The tool produces priority rankings based on a project’s ability to improve low-stress connectivity between homes and important destinations. The analysis identifies specific areas and neighborhoods that can be expected to exhibit better bikeability. Transportation planners can use the tool to help communicate anticipated project impacts to decision-makers and the public.

Using GIS to interpret automated speed enforcement guidelines and guide deployment decisions in mobile photo enforcement programs

- Transportation Research Part A: Policy and Practice---2016---Yang Li,Amy Miyoung Kim,Karim El-Basyouny,Ran Li

Automated speed enforcement (ASE) guidelines are designed to guide enforcement agencies in operating ASE programs that are effective in improving traffic safety. Given that appropriate deployment decisions are essential to a program’s effectiveness, a number of deployment priorities are generally included in most ASE guidelines. However, when implementing the guidelines, most descriptions of deployment goals are so qualitative that they might have multiple quantitative interpretations, and thus affecting the identification of specific deployment considerations. In addition, limited research has been done to improve the process by which guidelines are implemented. Therefore, this paper proposes quantitative measures for an ASE program, in order to facilitate interpretation of the main

ASE principles and improve deployment decisions. To illustrate the various types of high-priority deployment considerations, a case study in the city of Edmonton in the province of Alberta, Canada is presented. It explores the deployment outcomes of the mobile photo enforcement (MPE) program in Edmonton, in relation to six priorities identified in the provincial enforcement guidelines. Two performance measures, spatial coverage and enforcement intensity, are assessed for priority sites and non-priority sites. Moreover, the distance halo effects of MPE are considered in the review of spatial coverage. All findings are visualized using Geographic Information Systems, such that high priority sites and coverage of these sites in the historical deployment can be visually assessed. A better understanding of the governing ASE guidelines and how to implement them can help enforcement agencies to improve decision-making and resource allocation, thereby increasing program effectiveness and efficiency.

A hybrid simulation-assignment modeling framework for crowd dynamics in large-scale pedestrian facilities

- Transportation Research Part A: Policy and Practice---2016---Ahmed Abdelghany,Khaled Abdelghany,Hani Mahmassani

This paper presents a hybrid simulation-assignment modeling framework for studying crowd dynamics in large-scale pedestrian facilities. The proposed modeling framework judiciously manages the trade-off between ability to accurately capture congestion phenomena resulting from the pedestrians’ collective behavior and scalability to model large facilities. We present a novel modeling framework that integrates a dynamic simulation-assignment logic with a hybrid (two-layer or bi-resolution) representation of the facility. The top layer consists of a network representation of the facility, which enables modeling the pedestrians’ route planning decisions while performing their activities. The bottom layer consists of a high resolution Cellular Automata (CA) system for all open spaces, which enables modeling the pedestrians’ local maneuvers and movement decisions at a high level of detail. The

model is applied to simulate the crowd dynamics in the ground floor of Al-Haram Al-Sharif Mosque in the City of Mecca, Saudi Arabia during the pilgrimage season. The analysis illustrates the model's capability in accurately representing the observed congestion phenomena in the facility.

How flexible is flexible? Accounting for the effect of rescheduling possibilities in choice of departure time for work trips

- Transportation Research Part A: Policy and Practice---2016---Mikkel Thorhauge, Elisabetta Cherchi, Jeppe Rich

In departure time studies it is crucial to ascertain whether or not individuals are flexible in their choices. Previous studies have found that individuals with flexible work times have a lower value of time for late arrivals. Flexibility is usually measured in terms of flexible work start time or in terms of constraints in arrival time at work. Although used for the same purpose, these two questions can convey different types of information. Moreover, constraints in departure time are often related not only to the main work activity, but to all daily activities. The objective of this paper is to investigate the effect of constraints in work and in other daily trips/activities on the willingness to shift departure time and the willingness to pay for reducing travel time and travel delay. We set up a survey to collect detailed data on the full 24-hour out-of-home activities and on the constraints for each of these activities. We then built a stated preference experiment to infer preferences on departure time choice, and estimated a mixed logit model, based on the scheduling model, to account for the effects of daily activity schedules and their constraints. Our results show that measuring flexibility in terms of work start time or constraints at work does not provide exactly the same information. Since one-third of the workers with flexible working hours in the survey indicated that they have restrictions on late work-arrival times, their willingness to pay will be overestimated (almost doubled) if flexibility information is asked only in terms of fixed/flexible working hours. This clearly leads to different conclu-

sion in terms of demand sensitivity to reschedule to a later departure time. We also found that having other activities and constraints during the day increases the individuals' willingness to pay to avoid being late at work, where the presence of constraints on daily activities other than work is particularly relevant for individuals with no constraints at work. The important impact of these findings is that if we neglect the presence of constraints, as is common practise in transport models, it will generally lead to biased value-of-time estimates. Results clearly show that the shift in the departure time, especially towards a late departure time, is strongly overestimated (the predicted shift is more than double) when the effect of non-work activities and their constraints is not accounted for.

Why experience changes attitudes to congestion pricing: The case of Gothenburg

- Transportation Research Part A: Policy and Practice---2016---Maria Börjesson, Jonas Eliasson, Carl Hamilton

Many cities have seen public support for congestion charges increase substantially after charges have been introduced. Several alternative explanations of this phenomenon have been suggested, but so far little evidence has been available to assess the relative importance of these explanations. We study attitudes to congestion pricing in Gothenburg before and after congestion charges were introduced in January 2013. Attitudes to the charges did indeed become more positive after the introduction, just as in previous cities. Using a two-wave postal survey, we separate contributions to the attitude change from a number of sources: benefits and costs being different than anticipated, use of hypothecated revenues, reframing processes, and changes in related attitudes such as attitudes to environment, equity, taxation and pricing measures in general. We conclude that the dominant reason for the attitude change is status quo bias, rather than any substantial changes in beliefs or related attitudes, although some of these factors also contribute. Contrary to a common belief, nothing of the attitude change is due to benefits being larger than anticipated.

Will a higher free-flow speed lead us to a less congested freeway?

- Transportation Research Part A: Policy and Practice---2016---Sheng-Xue He

An approach based on cell transmission model (CTM) is proposed to estimate the impact of variable free-flow speeds (FFS) on the performance of a freeway system. Based on the basic CTM, four typical freeway control strategies consisting of non control, local ramp metering, coordinated ramp metering and global control are first formulated. Then the method of adjusting model parameters to the changed free-flow speeds is presented. Among the adjustments, an experimental function based on Fan and Seibold (2014) is proposed to change the jam density. Several useful measures are defined to estimate and compare the performances of different freeways. The following three main observations are obtained from numerical experiments. (a) With the gradually increasing FFS, the throughput of freeway will increase at the beginning and then change to decrease. (b) With the increasing FFS, the average delay of vehicles will decrease at the beginning and then change to increase. (c) A series of free-flow speeds associate with the best performance of freeway. These observations are theoretically analyzed through investigating the location and capacity of bottleneck. Study shows that in general the actual bottleneck capacity will increase at the beginning and then change to decrease with the continually increasing FFS. In view of the positive correlation between traffic delay and bottleneck capacity, the theoretical analysis confirms the numerical observations. The findings of this study can deepen the understanding of freeway systems and help management agents adopt proper measures to improve the performance of the whole system.

Airline delays, congestion internalization and non-price spillover effects of low cost carrier entry

- Transportation Research Part A: Policy and Practice---2016---William E. Bendinelli,Humberto F.A.J. Bettini,Alessandro Oliveira

This paper develops an econometric model of flight delays to investigate the influence of competition and dominance on the incentives of carriers to maintain on-time performance. We consider both the route and the airport levels to inspect the local and global effects of competition, with a unifying framework to test the hypotheses of 1. airport congestion internalization and 2. the market competition-quality relationship in a single econometric model. In particular, we examine the impacts of the entry of low cost carriers (LCC) on the flight delays of incumbent full service carriers in the Brazilian airline industry. The main results indicate a highly significant effect of airport congestion self-internalization in parallel with route-level quality competition. Additionally, the potential competition caused by LCC presence provokes a global effect that suggests the existence of non-price spillovers of the LCC entry to non-entered routes.

Improving strategic policies for pedestrian safety enhancement using classification tree modeling

- Transportation Research Part A: Policy and Practice---2016---Soyoung Jung,Xiao Qin,Cheol Oh

Pedestrian safety enhancement is a key component in reducing traffic fatalities in the Republic of Korea. The purpose of this study was to review, validate, specify, and prioritize Korea' s strategic policies for pedestrian safety enhancement using the classification tree method to model pedestrian injury severities. The findings show that pedestrian age and movement type are the two primary variables contributing to pedestrian fatalities and severe injuries. Traffic operation, road class, crash location, driver violation, and at-fault vehicle type are all secondary variables associated with pedestrian fatalities and severe injuries. Factors that contributed to crashes were compared with strategic policies for senior zones and school zones, road safety facilities, safe walking environments, and legal obligations of the driver in order to understand why certain policies are ineffective versus effective. Consequently, this study provides prescriptive analysis and specific insights pertaining to strategic policies

for pedestrian safety enhancements, which can be employed in other countries for the similar purpose. For further research, this study suggests combining several other data-mining techniques with nationwide data collection.

A model of behavioural adaptation as a contributor to the safety-in-numbers effect for cyclists

- Transportation Research Part A: Policy and Practice---2016---Jason Thompson,Giovanni Savino,Mark Stevenson

The safety in numbers (SiN) effect is often invoked as a mechanism by which increasing numbers of vulnerable road users introduced into a transport network can result in reduced per-capita risk of collision resulting in injury or death. Mechanisms underlying SiN's function, however, have not been well described. Extending previous agent-based modelling work, this study explored the potential role of behavioural adaptation of drivers to the presence of cyclists that followed patterns of Rescorla–Wagner (R–W) learning models. Results indicated that SiN effects consistent with those present in real-world studies were replicable in a simulated environment, and that R–W model input settings were able to control the strength of the SiN effect in combination with the influence of increased cyclist density. The combined theoretical and simulation model presented here provides a novel means by which the potential safety effects of cycling policy settings and interventions may be academically and practically explored.

Guidance for new policy developments on railway noise and vibration

- Transportation Research Part A: Policy and Practice---2016---Eulalia Peris,James Woodcock,Gennaro Sica,Calum Sharp,Andy T. Moorhouse,David C. Waddington

Noise and vibration are two of the main problems associated with railways in residential areas. To ensure quality of life and well-being of inhabitants living in

the vicinity of railway paths, it is important to evaluate, understand, control and regulate railway noise and vibration. Much attention has been focused on the impact of noise from railway traffic but the consideration of railway-induced vibration has often been neglected. This paper aims to provide policy guidance based on results obtained from the analyses of relationships estimated from ordinal logit models between human response, railway noise exposure and railway vibration exposure. This was achieved using data from case studies comprised of face-to-face interviews (N=931), internal vibration measurements (N=755), and noise calculations (N=688) collected within the study “Human Response to Vibration in Residential Environments” by the University of Salford, UK. Firstly, the implications of neglecting vibration in railway noise policies are investigated. The findings suggest that it is important to account for railway induced vibrations in future noise and transport policies, as neglecting vibrations results in an underestimation of people highly annoyed by noise. Secondly, implications of neglecting different types of railway sources are presented. It was found that the impact of noise and vibration from maintenance operations should be better understood and should be taken into account when assessing the environmental impact of railways in residential environments. Finally, factors that were found to influence railway vibration annoyance are presented and expressed as weightings. The data shows that factors specific to a particular residential area should also be taken into account in future vibration policies as the literature shows that attitudinal, socio-demographic and situational factors have a large influence on vibration annoyance responses. This work will be of interest to researchers and environmental health practitioners involved in the assessment of vibration complaints, as well as to policy makers, planners and consultants involved in the design of buildings and railways.

Willingness-to-pay for alternative fuel vehicle characteristics: A stated choice study for Germany

- Transportation Research Part A: Policy and Practice---2016---André Hackbarth, Reinhard Madlener

In the light of European energy efficiency and clean air regulations, as well as an ambitious electric mobility goal of the German government, we examine consumer preferences for alternative fuel vehicles (AFVs) based on a Germany-wide discrete choice experiment among 711 potential car buyers. We estimate consumers' willingness-to-pay and compensating variation (CV) for improvements in vehicle attributes, also taking taste differences in the population into account by applying a latent class model with 6 distinct consumer segments. Our results indicate that about 1/3 of the consumers are oriented towards at least one AFV option, with almost half of them being AFV-affine, showing a high probability of choosing AFVs despite their current shortcomings. Our results suggest that German car buyers' willingness-to-pay for improvements of the various vehicle attributes varies considerably across consumer groups and that the vehicle features have to meet some minimum requirements for considering AFVs. The CV values show that decision-makers in the administration and industry should focus on the most promising consumer group of 'AFV aficionados' and their needs. It also shows that some vehicle attribute improvements could increase the demand for AFVs cost-effectively, and that consumers would accept surcharges for some vehicle attributes at a level which could enable their private provision and economic operation (e.g. fast-charging infrastructure). Improvement of other attributes will need governmental subsidies to compensate for insufficient consumer valuation (e.g. battery capacity).

Modeling the cost sensitivity of intermodal inland waterway terminals: A scenario based approach

- Transportation Research Part A: Policy and Practice---2016---Martijn Smid, Sander

Dekker, Bart Wiegman

Cost characteristics of differently sized inland waterway terminals (IWTs) have not received much scientific attention. This observation is remarkable given the importance of costs in transportation decision-making. Classification of differently sized IWTs and their cost structure will lead to more insight into the container cost per terminal. Therefore, the goal of our research was to determine both the characteristics of the cost structure associated with different inland waterway (IWW) container terminal types and the sensitivity of the system to cost/TEU changes in input and operational conditions. We show that terminals with a higher container throughput encounter fewer costs, and can therefore charge a lower price. Assumed delays of 2h per day on the waterside cause a 4.7–6.6% cost increase per container, mainly caused by extra labor costs. It is also assumed that the changing climate will influence terminal operations and results in extreme water levels (lasting two weeks occurring four times a year) causing a cost increase of 1.0–3.4%. Subsidies can cause cost reductions of 0.3–10.4% depending on the exact form, with the smaller terminals benefiting more because their investment costs are higher relative to operational costs. A subsidy can lower costs by up to 10.4%, but it is questionable whether small and medium terminals will have a lower cost price than the market price, showing that it is important for small and medium terminals to quickly grow in size.

The residential parking rent price elasticity of car ownership in Japan

- Transportation Research Part A: Policy and Practice---2016---Hajime Seya, Kumiko Nakamichi, Yoshiki Yamagata

By using household-level micro data captured through the National Survey of Family Income and Expenditure for 2004, this study evaluates the residential parking rent price elasticity of car ownership in Japan. It analyzes the number of cars owned by a household, using various attributes including expenditure for renting a parking space on a monthly basis. The estimation

results derived from the IV-ordered probit model show that the absolute value of parking rent price elasticity of car ownership is, at most, 0.48, which is fairly small (i.e., inelastic). The elasticity value varies depending on city size; for megacities, elasticity is always negative for car ownership, whereas for middle-sized or small cities, towns, and villages, elasticity is positive for one-car ownership and negative for the ownership of more than one car. Hence, when the price of parking increases, some people may switch from more than one car to one car and some people in megacities may switch from one to zero cars. Indeed, the net effect of a price increase may be that non-car ownership increases in megacities and one-car ownership increases in other cities.

Substitution between cars within the household

- Transportation Research Part A: Policy and Practice---2016---Bruno De Borger, Ismir Mulalic, Jan Rouwendal

In this paper we study the demand for car kilometres in two-car households, focusing on the substitution between cars of different fuel efficiency in response to fuel price changes. We use a large sample of detailed Danish data on two-car households to estimate – for each car owned by the household – own and cross-price effects of increases in fuel costs per kilometre. The empirical results show that failure to capture substitution between cars within the household can result in substantial misspecification biases. Ignoring substitution, the basic model yielded fuel price elasticities of

0.98 and 1.41 for the primary and secondary cars, respectively. Accounting for substitution effects, these figures reduce to, respectively, 0.32 and 0.45. Consistent with substitution behaviour, we find that the fuel price elasticity of fuel demand exceeds the elasticity of kilometre demands with respect to the fuel price; the difference strongly increases at the highest deciles of the distribution of kilometre demand. Extending the model to account for driver heterogeneity and the role of car characteristics confirmed the relevance of substitution between cars within the household. We found strong evidence of substitution from the secondary to the primary car, especially if the latter is

a more recent car with more horsepower. In general, the results of this paper emphasise the importance of behavioural differences related to the position of the most fuel efficient car in the household, suggesting that households' fuel efficiency choices are related to their price sensitivity.

Modelling the relationship between travel behaviours and social disadvantage

- Transportation Research Part A: Policy and Practice---2016---Karen Lucas, John Bates, José Moore, Juan Antonio Carrasco

The purpose of this paper is to model the travel behaviour of socially disadvantaged population segments in the United Kingdom (UK) using the data from the UK National Travel Survey 2002–2010. This was achieved by introducing additional socioeconomic variables into a standard national-level trip end model (TEM) and using purpose-based analysis of the travel behaviours of certain key socially disadvantaged groups. Specifically the paper aims to explore how far the economic and social disadvantages of these individuals can be used to explain the inequalities in their travel behaviours.

High speed rail and tourism: Empirical evidence from Spain

- Transportation Research Part A: Policy and Practice---2016---Daniel Albalade, Xavier Fageda

This paper evaluates how changes in the provision of high-speed rail (HSR) services affect tourism outcomes in Spain, a tourist country with the newest and longest HSR network in Europe. To do so it employs an empirical strategy based on the differences-in-differences panel data method with double fixed effects. Data are provided by Spain's National Statistics Institute (INE) and cover 50 provinces over a 15-year time span (1998–2013). Our results provide mixed evidence about the impact of HSR accessibility on tourist outcomes. On the one hand, we find that air traffic is negatively affected by HSR and air traffic is a strong predictor of tourist arrivals. This suggests a negative indirect effect

of HSR on tourist outcomes. On the other hand, HSR may have a positive (weak) direct effect on tourism. However, such result is conditioned on the measure of HSR accessibility and econometric technique used. Thus, the net effect of HSR on tourism outcomes is not consistently positive. This pattern might be attributed to a network design that does not respond to ridership needs and which has a substitution effect on air transportation, the main mode for long-distance tourist mobility.

A study on the determinants of private car ownership in China: Findings from the panel data

- Transportation Research Part A: Policy and Practice---2016---Na Wu, Shengchuan Zhao, Qi Zhang

This study examines the determinants of private car ownership in China. The target cities are 32 provincial capital cities and the target period is from 2001 to 2011. In order to capture the individual effects (heterogeneity), the fixed and random effect models are adopted and compared, in which 8 explanatory variables are selected to include economic characteristics, urban characteristics, and transportation characteristics. Moreover, double natural logarithm model is employed to measure the elastic relationship between the private car ownership and regressors. The estimated results show that the fixed effect model performs better than pooled regression model and the random effect model. In addition, there are variations of private car ownership among cities and regions. Finally, the influence of factors responsible for these variations is also presented and discussed in this paper.

The impacts of built environment on home-based work and non-work trips: An empirical study from Iran

- Transportation Research Part A: Policy and Practice---2016---Roya Etminani-Ghasrodashti, Mahyar Ardeshiri

This paper aims to explore the impact of built environment attributes in the scale of one quarter-mile buffers

on individuals' travel behaviors in the metropolitan of Shiraz, Iran. In order to develop this topic, the present research is developed through the analysis of a dataset collected from residents of 22 neighborhoods with variety of land use features. Using household survey on daily activities, this study investigates home-based work and non-work (HBW and HBN) trips. Structural equation models are utilized to examine the relationships between land use attributes and travel behavior while taking into account socio-economic characteristics as the residential self-selection. Results from models indicate that individuals residing in areas with high residential and job density, and shorter distance to sub-centers are more interested in using transit and non-motorized modes. Moreover, residents of neighborhoods with mixed land uses tend to travel less by car and more by transit and non-motorized modes to non-work destinations. Nevertheless, the influences of design measurements such as street density and internal connectivity are mixed in our models. Although higher internal connectivity leads to more transit and non-motorized trips in HBW model, the impacts of design measurements on individuals travel behavior in HBN model are significantly in contrast with research hypothesis. Our study also shows the importance of individuals' self-selection impacts on travel behaviors; individuals with special socio-demographic attributes live in the neighborhoods with regard to their transportation patterns. The findings of this paper reveal that the effects of built environment attributes on travel behavior in origins of trips do not exactly correspond with the expected predictions, when it comes in practice in a various study context. This study displays the necessity of regarding local conditions of urban areas and the inherent differences between travel destinations in integrating land use and transportation planning.

Characterisation of and reflections on the synergy of bicycles and public transport

- Transportation Research Part A: Policy and Practice---2016---R. Kager, L. Bertolini, M. Te Brömmelstroet

The bicycle is often understood as a disjointed 'feeder'

mode that provides access to public transport. We argue that combined use of the bicycle and public transport should be understood in a broader perspective, especially where bicycles link to higher speed and higher capacity public transport, such as the train. Cycling and public transport can have a symbiotic relationship forming a hybrid, distinct transport mode, which should be reflected in transport planning. The bicycle is as a way to soften the rigid nature of public transport and thus accommodate diverse individual travel needs and situations. Public transport can be seen as a means to dramatically extend cycling's speed and spatial reach. We combine a system perspective with conceptual analysis to explore how, why and when this reconsideration is important. We use the Netherlands as illustrative case because of the relative maturity of its bicycle–train connections. The case shows that the synergy between rather opposite yet highly complementary aspects, high speed of the train, high accessibility of the bicycle and flexibility in combining both sub-modes, are the fundamental characteristics to understand the functioning of this system in a wider spatial context. In our conclusion we propose a research agenda, to further explore the relevance of this system for land-use and transport planning and distil wider implications for the international debate.

Influential factors in port infrastructure tariff formulation, implementation and revision

- Transportation Research Part A: Policy and Practice---2016---Yapa Mahinda Bandara,Hong-Oanh Nguyen

The process of formulation, revision and approval of port infrastructure tariffs is complex and involves different stakeholders. The extant literature focuses more on port pricing research but pays less attention to the practice of port infrastructure tariff setting. This paper aims to identify and analyses the influential factors in the port infrastructure tariff formulation process using survey data collected from 67 port authorities. Exploratory factor analysis (EFA) is first conducted before confirmatory factor analysis (CFA) is applied to analyse the latent factors underlying port infrastruc-

ture tariff setting. The analysis results suggested the four factors influential to infrastructure tariff practice, namely tariff policies, transparency, tariff regulation and stakeholder participation. The paper also presents the implications for port authorities, management and stakeholders.

Optimizing charging station locations for urban taxi providers

- Transportation Research Part A: Policy and Practice---2016---Johannes Asamer,Martin Reinthaler,Mario Ruthmair,Markus Straub,Jakob Puchinger

Recently, electric vehicles are gaining importance which helps to reduce dependency on oil, increases energy efficiency of transportation, reduces carbon emissions and noise, and avoids tail pipe emissions. Because of short daily driving distances, high mileage, and intermediate waiting time, fossil-fuelled taxi vehicles are ideal candidates for being replaced by battery electric vehicles (BEVs). Moreover, taxi BEVs would increase visibility of electric mobility and therefore encourage others to purchase an electric vehicle. Prior to replacing conventional taxis with BEVs, a suitable charging infrastructure has to be established. This infrastructure consists of a sufficiently dense network of charging stations taking into account the lower driving ranges of BEVs.

An empirical assessment of factors affecting the accuracy of target-year synthetic populations

- Transportation Research Part A: Policy and Practice---2016---Lu Ma,Sivaramakrishnan Srinivasan

This study contributes by presenting an empirical assessment of the accuracy of the target-year populations synthesized with different base-year populations, data-fusion methods, and control tables. Forty-five synthetic populations were generated for 12 census tracts in Florida for this purpose. The empirical results indicate the value of synthesizing base-year populations

more accurately by accommodating multi-level controls. Although fewer controls are typically available for target years, the use of multi-level controls in the target year with appropriate synthesis methods does benefit the accuracy of the synthetic population. This study also establishes that the magnitude of the overall error in the synthesized population appears to be linearly related to the magnitude of the input errors introduced via the control tables. The improvements in accuracy are statistically significant and hold after controlling for differences in population sizes and growth rates for the different census tracts. Overall, efforts to accurately synthesize base-year populations and to good forecasts of target-year controls can help synthesize accurate target-year populations.

An activity pattern – destination land use choice model of low income households of informal settlements – Case study of Delhi

- Transportation Research Part A: Policy and Practice---2016---S.L.N. Sarma Sadhu,Geetam Tiwari

Various transportation studies carried out in India, while estimating the travel demand, do not take into consideration the travel characteristics of different income groups. The conventional transportation travel demand model lacks the ability to address the travel needs of the urban poor. This paper explores the factors influencing the travel destinations of urban poor living in informal settlements and finds that travel times have a significant negative impact on the choice to travel and influences the choice of the destinations. The study also finds that the inhabitants of informal settlements are adversely affected by urban policies that displace them and rehabilitate them far from their employment opportunities and that the travel characteristics of low income households living in informal settlements are significantly different from higher income households.

Transition to a cyclable city: Latent variables affecting bicycle commuting

- Transportation Research Part A: Policy and Practice---2016---Begoña Muñoz,Andres Monzon,Elena López

An understanding of the key factors influencing bicycle commuting is essential for developing effective policies towards a cyclable city. This paper contributes to this line of research by proposing a methodology for including cycling-related indicators in mobility surveys based on the Theory of Planned Behaviour (TPB), and applying an exploratory factor analysis (EFA) to evaluate the structure of latent variables associated with bicycle commuting. The EFA identified six cycling latent variables: Lifestyle, Safety and comfort, Awareness, Direct disadvantages, Subjective norm, and Individual capabilities. These were complemented with a latent variable related to habit: Non-commuting cycling habit. Statistical differences and regression analysis were applied with the cycling latent variables. The study also includes the relationship between objective factors and bicycle commuting, which reveals minor associations. This methodology was applied to the “starter cycling city” of Vitoria-Gasteiz (Spain). The results confirm that in this context – in transition to a cyclable city – safety and comfort issues are not the main barriers for all commuters, although more progress needs to be made to normalise cycling. A set of customised policy initiatives is recommended in the light of the research findings, including marketing campaigns to encourage non-commuting cycling trips, bicycle measures to target social groups as opposed to individuals, bicycle-specific programs such as “Bike-to-work Days” , and cycling courses.

Index numbers for monitoring transit service quality

- Transportation Research Part A: Policy and Practice---2016---Juan de Oña,Rocío de Oña,Laura Eboli,Gabriella Mazzulla

The measurement of transit service quality is very important for guaranteeing a transport supply charac-

terized by satisfactory service levels for the passengers. Even more important is the monitoring of the levels of service quality over time, which can be very useful to determine if the goals established by the transport planners are being met or exceeded. The status and evolution of transit service quality can be monitored through periodic and regular updating of the opinions expressed by the passengers about the service during the well-known Customer Satisfaction Surveys, allowing the effect of policies to be evaluated and specific interventions to be introduced. In this work, just the issue of monitoring service quality based on users' opinions is approached, and the index numbers usually applied in the economic and industrial field are proposed for this purpose. Index numbers permit to study the fluctuations or variations of a variable or more variables over time, providing a powerful measurement for making comparisons and predictions of the analyzed concept. The index numbers were calculated on the basis of data collected from Customer Satisfaction Surveys addressed to the passengers of the metropolitan public service of Granada (Spain). The analyzed time period has been established from 2007 to 2013. Interesting results derive from the calculation of the index numbers. Since both perceptions and importance rates are considered in this methodology, the results can inform, not only on the satisfaction tendencies but also on the trend on customers' priorities, which is actually the expected quality. Therefore, policies could more efficiently be designed to adjust the service to the users' real needs.

Urban transport interchanges: A methodology for evaluating perceived quality

- Transportation Research Part A: Policy and Practice---2016---Sara Hernandez, Andres Monzon, Rocio de Oña

Travel patterns in urban areas are becoming increasingly complex, and many public transport users need to transfer between different modes to complete their daily trips. Transport interchanges play a key role as urban transport network nodes, and the quality of the service provided in an urban transport interchange therefore

has a direct influence on travellers' daily experience. This study proposes a useful methodological framework to identify the potential strengths and weaknesses of urban transport interchanges and to manage resources more efficiently. It is based on a two-step analytical procedure combining the classification and regression tree model and importance-performance analysis. A travellers' attitudinal survey was carried out in the Moncloa transport interchange (Madrid, Spain) and the methodological framework was applied to the data collected. The greatest strengths of the interchange from the users' point of view are the information provision through signposting, the features of the internal design of the interchange which have a direct influence on aspects related to safety performance, and security conditions, particularly during day-time.

A zonal inference model based on observed smart-card transactions for Santiago de Chile

- Transportation Research Part A: Policy and Practice---2016---Sebastián Tamblay, Patricia Galilea, Paula Iglesias, Sebastián Raveau, Juan Carlos Muñoz

The collection of origin-destination data for a city is an important but often costly task. This way, there is a need to develop more efficient and inexpensive methods of collecting information about citizens' travel patterns. In this line, this paper presents a generic methodology that allows to infer the origin and destination zones for an observed trip between two public transport stops (i.e., bus stops or metro stations) using socio-economic, land use, and network information. The proposed zonal inference model follows a disaggregated Logit approach including size variables. The model enables the estimation of a zonal origin-destination matrix for a city, if trip information passively collected by a smart-card payment system is available (in form of a stop-to-stop matrix). The methodology is applied to the Santiago de Chile's morning peak period, with the purpose of serving as input for a public transport planning computational tool. To estimate the model, information was gathered from different sources and processed into a unified framework; data included a

survey conducted at public transport stops, land use information, and a stop-to-stop trip matrix. Additionally, a zonal system with 1176 zones was constructed for the city, including the definition of its access links and associated distances. Our results shows that, *ceteris paribus*, zones with high numbers of housing units have higher probabilities of being the origin of a morning peak trip. Likewise, health facilities, educational, residential, commercial, and offices centres have significant attraction powers during this period. In this sense, our model manages to capture the expected effects of land use on trip generation and attraction. This study has numerous policy implications, as the information obtained can be used to predict the impacts of changes in the public transport network (such as extending routes, relocating their stops, designing new routes or changing the fare structure). Further research is needed to improve the zonal inference formulation and origin–destination matrix estimation, mainly by including better cost measures, and dealing with survey and data limitations.

What is behind fare evasion in urban bus systems? An econometric approach

- Transportation Research Part A: Policy and Practice---2016---Pablo Guarda,Patricia Galilea,Laurel Paget-Seekins,Juan de Dios Ortúzar

Fare evasion is a problem in many public transport systems around the world and policies to reduce it are generally aimed at improving control and increasing fines. We use an econometric approach to attempt explaining the high levels of evasion in Santiago, Chile, and guide public policy formulation to reduce this problem. In particular, a negative binomial count regression model allowed us to find that fare evasion rates on buses increase as: (i) more people board (or alight) at a given bus door, (ii) more passengers board by a rear door, (iii) buses have higher occupancy levels (and more doors) and (iv) passengers experience longer headways. By controlling these variables (*ceteris paribus*), results indicate that evasion is greater during the afternoon and evening, but it is not clear

that it is higher during peak hours. Regarding socio-economic variables, we found that fare evasion at bus stops located in higher income areas (municipalities) is significantly lower than in more deprived areas. Finally, based on our results we identified five main methods to address evasion as alternatives to more dedicated fine enforcement or increased inspection; (i) increasing the bus fleet, (ii) improving the bus headway regularity, (iii) implementing off-board payment stations, (iv) changing the payment system on board and (v) changing the bus design (number of doors or capacity). Our model provides a powerful tool to predict the reduction of fare evasion due to the implementation of some of these five operational strategies, and can be applied to other bus public transport systems.

Estimating the bus user time benefits of implementing a median busway: Methodology and case study

- Transportation Research Part A: Policy and Practice---2016---Jaime Gibson,Marcela A. Munizaga,Camila Schneider,Alejandro Tirachini

This paper presents a general framework to estimate the bus user time benefits of a median busway including the effects on travel time and access time. Unlike previous models, we take into account the effects of geometry and the interaction with the demand structure. Models for predicting the bus in-vehicle time benefits of a median dual carriageway busway against mixed traffic condition on 2 and 3 lanes roads are estimated using data from a case study in Santiago (Chile), using a bus travel time model empirically estimated and considering different base case situations, including mixed traffic operations and bus lanes. Results of the application show that the expected in-vehicle time savings of a median busway might be reduced by access time losses due to increased walking distances and road crossing delays. Also, that net time benefits can vary significantly according to the base situation and the structure of demand considered. These findings point out to the need of including a wider set of impacts when studying the benefits of median busways, beyond in-vehicle time savings only. The empirical work

presented here is completely based on passive data coming from GPS and smartcards, what makes easier and cheaper to conduct this type of analysis as well as to do it with a comprehensive scope at an early stage of the development of a BRT project. This framework can be extended to other types of dedicated bus lanes provided that a corresponding bus travel time savings model is available.

Analyzing the theoretical capacity of railway networks with a radial-backbone topology

- Transportation Research Part A: Policy and Practice---2016---Francisco A. Ortega Riejos,Eva Barrena,J. David Canca Ortiz,Gilbert Laporte

In this work we propose a mechanism to optimize the capacity of the main corridor within a railway network with a radial-backbone or X-tree structure. The radial-backbone (or X-tree) structure is composed of two types of lines: the primary lines that travel exclusively on the common backbone (main corridor) and radial lines which, starting from the common backbone, branch out to individual locations. We define possible line configurations as binary strings and propose operators on them for their analysis, yielding an effective algorithm for generating an optimal design and train frequencies. We test our algorithm on real data for the high speed line Madrid–Seville. A frequency plan consistent with the optimal capacity is then proposed in order to eliminate the number of transfers between lines as well as to minimize the network fleet size, determining the minimum number of vehicles needed to serve all travel demand at maximum occupancy.

Assessment of schedule-based and frequency-based assignment models for strategic and operational planning of high-speed rail services

- Transportation Research Part A: Policy and Practice---2016---Ennio Cascetta,Pierluigi Coppola

Despite some substantial limitations in the simulation of low-frequency scheduled services, frequency-based

(FB) assignment models are by far the most widely used in practice. They are less expensive to build and less demanding from the computational viewpoint with respect to schedule-based (SB) models, as they require neither explicit simulation of the timetable (on the supply side), nor segmentation of OD matrices by desired departure/arrival time (on the demand side).

Freight Demand Management and the Potential of Receiver-Led Consolidation programs

- Transportation Research Part A: Policy and Practice---2016---José Holguín-Veras,Iván Sánchez-Díaz

The paper defines the field of Freight Demand Management (FDM), and positions it as an important component of transportation policy and management. To establish the rationale for FDM, the paper studies the effects of the agent interactions at the core of supply chains, and identifies the important role played by the receivers of supplies in determining when and how deliveries are made. The paper classifies the various modalities of FDM, and summarizes the real-life experiences of their implementation. To illustrate the potential of FDM, the paper analyzes Receiver-Led Consolidation (RLC) programs. The paper provides background on consolidation programs, and estimates a behavioral model to shed light on the factors explaining receivers' interest in cargo consolidation. The resulting model is used to estimate expected participation in a RLC program in New York City. These results are complemented with freight-trip generation analyses, and a behavioral micro-simulation to estimate potential reductions in freight traffic and vehicle-miles-traveled. The results show that RLC programs could bring significant benefits to large metropolitan areas, reducing freight vehicle-miles-traveled and congestion levels.

Determinants of ground transport modal choice in long-distance trips in Spain

- Transportation Research Part A: Policy and Practice---2016---Pelayo Arbués,José F. Baños,Matías Mayor,Patricia Suárez

In transport economics, modeling modal choice is a fundamental key for policy makers trying to improve the sustainability of transportation systems. However, existing empirical literature has focused on short-distance travel within urban systems. This paper contributes to the limited number of investigations on mode choice in medium- and long-distance travel. The main objective of this research is to study the impacts of socio-demographic and economic variables, land-use features and trip attributes on long-distance travel mode choice. Using data from 2007 Spanish National Mobility Survey we apply a multilevel multinomial logit model that accounts for the potential problem of spatial heterogeneity in order to explain long-distance travel mode choice. This approach permits us to compute how the probability of choosing among private car, bus and train varies depending on the traveler spatial location at regional level. Results indicate that travelers characteristics, trip features, cost of usage of transport modes and geographical variables have significant impacts on long-distance mode choice.

Elasticities of fuel and traffic demand and the direct rebound effects: An econometric estimation in the case of Norway

- Transportation Research Part A: Policy and Practice---2016---James Odeck,Kjell Johansen

We estimate the elasticities of fuel and travel demand with respect to fuel prices and income in the case of Norway. Furthermore, we derive the direct rebound effects that explain the degree to which a fuel price increase is “offset” in the form of greater fuel use and/or travel due to improvements in vehicle fuel efficiency. For this purpose, we use and compare two alternative econometric approaches: the error correction model (ECM) and the dynamic model. Our initial assumption is that one should not be indifferent with respect to the approach used to derive elasticities. The data used are for the period 1980–2011. Our results indicate the following: (1) the dynamic model fits the data better than the ECM model does; (2) the estimated elasticities of fuel demand with respect to price and income are 0.26 and 0.06 in the short run and

0.36 and 0.09 in the long run. For travel demand, the respective elasticities are 0.11 and 0.06 in the short run and 0.24 and 0.13 in the long run, implying inelastic demands for fuel and travel demand; and (3) rebound effects indicate that 0.26% and 0.06% of fuel savings as a result of fuel price increase will be offset in the form of more fuel use in the short run and in the long run, respectively, if fuel efficiency increases by 1%. Our policy recommendations are that policies should not be indifferent to the methods used to derive elasticities. We contend that it is crucial to seriously consider rebound effects in policy making because basic elasticity estimates exaggerate the impact of fuel price increases.

Multimodal travel groups and attitudes: A latent class cluster analysis of Dutch travelers

- Transportation Research Part A: Policy and Practice---2016---Eric Molin,Patricia Mokhtarian,Maarten Kroesen

For developing sustainable travel policies, it may be helpful to identify multimodal travelers, that is, travelers who make use of more than one mode of transport within a given period of time. Of special interest is identifying car drivers who also use public transport and/or bicycle, as this group is more likely to respond to policies that stimulate the use of those modes. It is suggested in the literature that this group may have less biased perceptions and different attitudes towards those modes. This supposition is examined in this paper by conducting a latent class cluster analysis, which identifies (multi)modal travel groups based on the self-reported frequency of mode use. Simultaneously, a membership function is estimated to predict the probability of belonging to each of the five identified (multi)modal travel groups, as a function of attitudinal variables in addition to structural variables. The results indicate that the (near) solo car drivers indeed have more negative attitudes towards public transport and bicycle, while frequent car drivers who also use public transport have less negative public transport attitudes. Although the results suggest that in four of the five identified travel groups, attitudes are con-

gruent with travel mode use, this is not the case for the group who uses public transport most often. This group has relatively favorable car attitudes, and given that many young, low-income travelers belong to this group, it may be expected that at least part of this group will start using car more often once they can afford it. Based on the results, challenges for sustainable policies are formulated for each of the identified (multi)modal travel groups.

The potential of electromobility in Austria: Evidence from hybrid choice models under the presence of unreported information

- Transportation Research Part A: Policy and Practice---2016---Francisco J. Bahamonde-Birke, Tibor Hanappi

This paper analyses the impact of the introduction of electromobility in Austria, focusing specifically on the potential demand for electric vehicles in the automotive market. We estimate discrete choice behavioral mixture models considering latent variables; these allows us to deal with this potential demand as well as to analyze the effect of different attributes of the alternatives over the potential market penetration. We find out that some usual assumptions regarding electromobility also hold for the Austrian market (e.g. proclivity of green-minded people and reluctance of older individuals), while others are only partially valid (e.g. the power of the engine is not relevant for purely electric vehicles). Along the same line, it is established that some policy incentives would have a positive effect for the demand for electrical cars, while others – such as an annual Park and Ride subscription or a one-year-ticket for public transportation – would not increase the willingness-to-pay for electromobility. Our work suggests the existence of reliability thresholds concerning the availability of charging stations.

Tarmac delay policies: A passenger-centric analysis

- Transportation Research Part A: Policy and Practice---2016---Chiwei Yan, Vikrant Vaze, Allison Vanderboll, Cynthia Barnhart

In this paper, we analyze the effectiveness of the 2010 Tarmac Delay Rule from a passenger-centric point of view. The Tarmac Delay Rule stipulates that aircraft lift-off, or an opportunity for passengers to deplane, must occur no later than 3h after the cabin door closure at the gate of the departure airport; and that an opportunity for passengers to deplane must occur no later than 3h after the touchdown at the arrival airport. The Tarmac Delay Rule aims to protect enplaned passengers on commercial aircraft from excessively long delays on the tarmac upon taxi-out or taxi-in, and monetarily penalizes airlines that violate the stipulated 3-h tarmac time limit. Comparing the actual flight schedule and delay data after the Tarmac Delay Rule was in effect with that before, we find that the Rule has been highly effective in reducing the frequency of occurrence of long tarmac times. However, another significant effect of the rule has been the rise in flight cancellation rates. Cancellations result in passengers requiring rebooking, and often lead to extensive delay in reaching their final destinations. Using an algorithm to estimate passenger delay, we quantify delays to passengers in 2007, before the Tarmac Delay Rule was enacted, and compare these delays to those estimated for hypothetical scenarios with the Tarmac Delay Rule in effect for that same year. Our delay estimates are calculated using U.S. Department of Transportation data from 2007. Through our results and several sensitivity analyses, we show that the overall impact of the current Tarmac Delay Rule is a significant increase in passenger delays, especially for passengers scheduled to travel on the flights which are at risk of long tarmac delays. We evaluate the impacts on passengers of a number of rule variations, including changes to the maximum time on the tarmac, and variations in that maximum by time-of-day. Through extensive scenario analyses, we conclude that a better balance between the conflicting objectives of reducing the frequency of long tarmac times and reducing total passenger delays can be achieved through a modified version of the existing rule. This modified version involves increasing the tarmac time limit to 3.5h and only applying the rule to flights with planned departure times before 5pm. Finally, in order to implement the Rule more effectively,

we suggest the tarmac time limit to be defined in terms of the time when the aircraft begin returning to the gate instead of being defined in terms of the time when passengers are allowed to deplane.

Addressing electric vehicle (EV) sales and range anxiety through parking layout, policy and regulation

- Transportation Research Part A: Policy and Practice---2016---Henry A. Bonges, Anne C. Lusk

Electric Vehicles (EV) are highly beneficial due to their reliance on electricity and Climate Change response yet EV sales are lower than would be expected due to range anxiety. If a potential buyer cannot be assured of having constantly-available and compatible charging stations, they will not purchase an EV. To increase the sales of EVs through improved charger availability, this paper examines parking configurations, charger design, convenient “EV only” parking, free charging, etiquette in unplugging another’s vehicle, and legislation. Data were derived from academic publications, trade market press, conversations, personal observations, and laws. The results show that chargers are often in a lot’s corner and thus accessible only to one vehicle, EV owners leave their charged car in the space, drivers use EV spaces for parking, etiquette cards are not understood, and legislation makes it illegal to unplug another’s EV. Improvements include less convenient charger spots, an octopus charger in the middle of the parking lot, modest charging fees to foster turnover, chargers that indicate an EV is charged, education and legislation about etiquette cards, and legislation that allows an individual to unplug another’s charged EV. Improvements to charging should be implemented simultaneously to lessen range anxiety and realize the environmental benefits from reductions in gasoline consumption and mobile source air pollution.

The impact of advance purchase deadlines on airline consumers’ search and purchase behaviors

- Transportation Research Part A: Policy and Practice---2015---Susan L. Hotle, Marco

Castillo, Laurie A. Garrow, Matthew J. Higgins

Airlines frequently use advance purchase ticket deadlines to segment consumers. Few empirical studies have investigated how individuals respond to advance purchase deadlines and price uncertainties induced by these deadlines. We model the number of searches (and purchases) for specific search and departure dates using an instrumental variable approach that corrects for price endogeneity. Results show that search and purchase behaviors vary by search day of week, days from departure, lowest offered fares, variation in lowest offered fares across competitors, and market distance. After controlling for the presence of web bots, we find that the number of consumer searches increases just prior to an advance purchase deadline. This increase can be explained by consumers switching their desired departure dates by one or two days to avoid higher fares that occur immediately after an advance purchase deadline has passed. This reallocation of demand has significant practical implications for the airline industry because the majority of revenue management and scheduling decision support systems currently do not incorporate these behaviors.

The effect of attitudes on reference-dependent preferences: Estimation and validation for the case of alternative-fuel vehicles

- Transportation Research Part A: Policy and Practice---2015---Stefan Mabit, Elisabetta Cherchi, Anders F. Jensen, Jørgen Jordal-Jørgensen

Several recent studies in transportation have analysed how choices made by individuals are influenced by attitudes. Other studies have contributed to our understanding of apparently non-rational behaviour by examining how choices may reflect reference-dependent preferences. This paper examines how reference-dependent preferences and attitudes together may explain individual choices. In a modelling framework based on a hybrid choice model allowing for both concepts, we investigate how attitudes and reference-dependent preferences interact and how they affect willingness-to-pay measures and demand elasticities. Using a data set

with stated choices among alternative-fuel vehicles, we see that allowing for reference-dependent preferences improves our ability to explain the stated choices in the data and that the attitude (appreciation of car features) explains part of the preference heterogeneity across individuals. The results indicate that individuals have reference-dependent preferences that could be explained by loss aversion and that these are indeed related to an individual's attitude towards car features. The models are validated using a large hold-out sample. This shows that the inclusion of attitudes improves the models' ability to explain behaviour in the hold-out sample. While neither reference-dependent preferences nor the attitude affect the average willingness-to-pay measures in our sample, their effect on choice behaviour has implications for policy recommendations as segments with varying attitudes and reference values will act differently when affected by policy instruments related to the demand for alternative-fuel vehicles, e.g. subsidies.

Anticipating PEV buyers' acceptance of utility controlled charging

- Transportation Research Part A: Policy and Practice---2015---Joseph Bailey, Jonn Axsen

Utility controlled-charging (UCC) of plug-in electric vehicles (PEVs) could potentially align vehicle charging with the availability of intermittent, renewable electricity sources. We investigated the case of a nightly charging program where the electric utility can control home PEV charging. To explore consumer acceptance of this form of UCC, we implemented a web-based survey of new vehicle buyers in Canada (n=1470). The survey assessed interest in PEVs, explained UCC, and elicited openness to UCC through attitudinal questions and a stated choice experiment. We find potential for UCC support among one-half to two-thirds of respondents interested in purchasing a PEV, depending on the scenario. However, some respondents express concerns with privacy and loss of control. To quantify preferences for UCC, we estimated a latent class choice model where respondents chose between different PEV charging programs. The model identified four distinct

respondent segments (or classes) that vary in their acceptance of UCC, as well as their valuation of renewable electricity, saving money on their electrical bill, and undergoing charging inconvenience. The overall sample was more sensitive to cost incentives than to renewable incentives, where cost-based UCC programs garnered 63–78% enrollment while renewable-based programs garnered only 49–59% enrollment. Overall, we observe the potential for widespread acceptance of UCC programs among Canadian PEV buyers, but program design and deployment will need to carefully acknowledge the various motivations and concerns of different vehicle buyer segments.

Investigating the impacts of weather variability on individual's daily activity-travel patterns: A comparison between commuters and non-commuters in Sweden

- Transportation Research Part A: Policy and Practice---2015---Chengxi Liu, Yusak O. Susilo, Anders Karlström

Understanding travel behaviour change under various weather conditions can help analysts and policy makers incorporate the uniqueness of local weather and climate within their policy design, especially given the fact that future climate and weather will become more unpredictable and adverse. Using datasets from the Swedish National Travel Survey and the Swedish Meteorological and Hydrological Institute that spans a period of thirteen years, this study explores the impacts of weather variability on individual activity-travel patterns. In doing so, this study uses an alternative representation of weather from that of directly applying observed weather parameters. Furthermore, this study employs a holistic model structure. The model structure is able to analyse the simultaneous effects of weather on a wide range of interrelated travel behavioural aspects, which has not been investigated in previous weather studies. Structural equation models (SEM) are applied for this purpose. The models for commuters and non-commuters are constructed separately. The analysis results show that the effects of weather can be even more extreme when considering indirect effects

from other travel behaviour indicators involved in the decision-making processes. Commuters are shown to be much less sensitive to weather changes than non-commuters. Variation of monthly average temperature is shown to play a more important role in influencing individual travel behaviour than variation of daily temperature relative to its monthly mean, whilst in the short term, individual activity–travel choices are shown to be more sensitive to the daily variation of the relative humidity and wind speed relative to the month mean. Poor visibility and heavy rain are shown to strongly discourage the intention to travel, leading to a reduction in non-work activity duration, travel time and the number of trips on the given day. These findings depict a more comprehensive picture of weather impact compared to previous studies and highlight the importance of considering interdependencies of activity travel indicators when evaluating weather impacts.

A ‘placeful’ station? The community role in place making and improving hedonic value at local railway stations

- Transportation Research Part A: Policy and Practice---2015---Matthew Alexander,Kathy Hamilton

In recent years, railway stations have come to be seen as non-places within society, points of transit and nothing more. The role of the station in place making is disputed with stations seen as both creating and destroying a sense of place within a community. Our study is located within the railway stations of Scotland and explores how local communities have been empowered to reclaim, customise, and re-appropriate stations to simultaneously create a sense of place and better promote their community to the outside world. Drawing on ethnographic research we refute the notion that stations are somehow ‘placeless’. We show how through a process of legitimisation, a sense of ownership and appropriation of the station environment, communities are able to transform the station, improving hedonic value and recapturing a sense of place.

Policy measures to promote electric mobility – A global perspective

- Transportation Research Part A: Policy and Practice---2015---Theo Lieven

Research that addresses policy measures to increase the adoption of electric vehicles (EVs) has discussed government regulations such as California’s Zero Emission Vehicle (ZEV) or penalties on petroleum-based fuels. Relatively few articles have addressed policy measures designed to increase the adoption of EVs by incentives to influence car buyers’ voluntary behavior. This article examines the effects of such policy measures. Two of these attributes are monetary measures, two others are traffic regulations, and the other three are related to investments in charging infrastructure. Consumer preferences were assessed using a choice-based conjoint analysis on an individual basis by applying the hierarchical Bayes method. In addition, the Kano method was used to elicit consumer satisfaction. This not only enabled the identification of preferences but also why preferences were based on either features that were “must-haves” or on attributes that were not expected but were highly attractive and, thus, led to high satisfaction. The results of surveys conducted in 20 countries in 5 continents showed that the installation of a charging network on freeways is an absolute necessity. This was completely independent from the average mileage driven per day. High cash grants were appreciated as attractive; however, combinations of lower grants with charging facilities resulted in similar preference shares in market simulations for each country. The results may serve as initial guidance for policymakers and practitioners in improving their incentive programs for electric mobility.

Can Hong Kong price-manage its cross-harbor-tunnel congestion?

- Transportation Research Part A: Policy and Practice---2015---C.K. Woo,Y.S. Cheng,Raymond Li,A. Shiu,S.T. Ho,I. Horowitz

Hong Kong drivers face daily congestion, especially at the Cross Harbor Tunnel (CHT) whose tolls are sub-

stantially lower than those of the drivers' other two tunnel options: the Eastern Harbor Crossing (EHC) and the Western Harbor Crossing (WHC). In 2013, the Hong Kong Special Administrative Region (HKSAR) Government issued a consultation paper, seeking public comments on three toll-change proposals that would raise the CHT's tolls and lower the EHC's tolls. The WHC's tolls would remain unchanged due to its congested connecting roads. Using monthly crossing data available from the HKSAR's Transport Department for 2000–2012, this paper uses a Generalized Leontief demand system to document that the usage patterns of the three tunnels is price-responsive. Hence, we conclude that the proposed toll changes are likely to be effective in transportation demand management, by shifting a portion of the CHT's usage to the EHC and WHC, thereby relieving the CHT's congestion.

Accessibility and transport infrastructure improvement assessment: The role of borders and multilateral resistance

- Transportation Research Part A: Policy and Practice---2015---María Henar Salas-Olmedo, Patricia García, Javier Gutiérrez

The market potential indicator is a commonly used tool in transport planning for evaluating the potential economic effects derived from improvements in transport infrastructures. The general assumption is that exports from a given region will rise with increased accessibility, thus benefiting economic activities. However, the specification of the market potential model is typically very simple and ignores both the impact of competing rivals and the role of international borders, which leads to unrealistic results. Spatial interaction models on bilateral trade have already proved that international trade is affected by multilateral resistance, borders, adjacency, language or currency. Nevertheless, apart from some recent analyses that simply calibrate the distance decay parameter from trade datasets, these variables have hardly been integrated into research on market potential. This paper sets out to demonstrate that more realistic results are obtained by calibrating the distance-decay parameter and introducing the im-

pact of competing rivals and border effects into the market potential formulation. The proposed model is then applied to the assessment of the accessibility impacts of new road transport infrastructure in the European Union between 2001 and 2012, which shows that the greatest improvements in accessibility were experienced by peripheral countries with high road infrastructure investment.

The variation in the value of travel-time savings and the dilemma of high-speed rail in China

- Transportation Research Part A: Policy and Practice---2015---Jian Zhao, Yunyi Zhao, Ying Li

This paper examines the variation in the value of travel-time savings (VTTS), a fundamental element determining the market demand for high-speed rail. Following a review of time allocation theories, a time allocation model for general travel behavior is proposed as a further elaboration of Evans' (1972) activities analysis. There are relationships among activities that can be expressed using a linear inequality to show the constraints on the arrangement of activities. This model indicates that two or more activities can be simultaneously rearranged to improve time management, which may be a source of variation in VTTS. This time allocation model can explain why large-scale high-speed rail construction in China faces significant market risks and a high likelihood of economic loss. Data from a new ticket sales and booking system for railway passengers indicate that passengers prefer conventional overnight sleeper trains, rather than high-speed trains, for long-distance travel, which supports the analysis of the time allocation model.

Comparison of road freight transport trends in Europe. Coupling and decoupling factors from an Input–Output structural decomposition analysis

- Transportation Research Part A: Policy and Practice---2015---Ana Alises, José Manuel Vassallo

Decoupling road freight transport from economic growth has been acknowledged by the European Union

as a key means to improving sustainability. It is therefore important to identify both the coupling and decoupling drivers of road freight transport demand in order to determine possible factors that may contribute to reduce road transport in the future without curbing economic development. This research proposes an Input–Output (IO) structural decomposition analysis (SDA) to explain road freight transport in terms of a set of key factors that have strongly influenced road freight demand in recent decades in European countries—such as economic growth, economic structure and the evolution of road transport intensity (including improvements in both supply and transport systems). This methodological approach allows us to quantify and compare their contribution in different European countries to either increase or decrease road freight transport demand. The empirical basis for this analysis is a dataset of nine European countries which have IO tables and road transport data available from 2000 to 2007, comprising data on domestic production, imports and exports as well as tonne-kms for 11 types of commodity classes. The results show that, as a whole, aggregate road transport demand has grown—driven mainly by economic activity—but this growth has been strongly curbed in some countries by changes in road freight transport intensity and moderately by the dematerialization of the economy. International transport has been also proven to be a key factor driving road freight transport volumes. Moreover, the increased penetration of foreign operators in national haulage markets appears to have reinforced the final decoupling levels observed in some cases.

Competitive tendering versus performance-based negotiation in Swiss public transport

- Transportation Research Part A: Policy and Practice---2015---Massimo Filippini,Martin Koller,G. Masiero

The purpose of this study is to assess differences in the levels of cost efficiency of bus lines operated under competitively tendered contracts and performance-based negotiated contracts. Following the revision of the

Swiss railways act in 1996, regional public authorities were given the choice between two different contractual regimes to procure public passenger transport services. We directly compare the impact of competitive tendering and performance-based negotiation by applying a stochastic frontier analysis to the complete dataset of bus lines (n=630) operated by the main Swiss company (Swiss Post) at the same time (in 2009) throughout the country. The overall results show that the differences in the levels of cost efficiency between the two contractual regimes are not significant. Our findings are in line with recent evidence of cost convergence between competitive tendering and performance-based negotiation, and suggest that the practice of using both contractual regimes is challenging for the operators in terms of competitive pressure. The threat of competitive tendering may have a disciplining effect on negotiation since it prevents bus companies from bargaining inadequate rents and inducing asymmetric information advantages.

On finite sample performance of confidence intervals methods for willingness to pay measures

- Transportation Research Part A: Policy and Practice---2015---Valerio Gatta,Edoardo Maruccci,Luisa Scaccia

This paper systematically compares finite sample performances of methods to build confidence intervals for willingness to pay measures in a choice modeling context. It contributes to the field by also considering methods developed in other research fields. Various scenarios are evaluated under an extensive Monte Carlo study. Results show that the commonly used Delta method, producing symmetric intervals around the point estimate, often fails to account for skewness in the estimated willingness to pay distribution. Both the Fieller method and the likelihood ratio test inversion method produce more realistic confidence intervals for small samples. Some bootstrap methods also perform reasonably well, in terms of effective coverage. Finally, empirical data are used to illustrate an application of the methods considered.

Threshold free shipping policies for internet shoppers

- Transportation Research Part A: Policy and Practice---2015---Wen-Hsien Huang,Yi-Ching Cheng

This study examines how consumers evaluate and respond to two economically equivalent but different forms of threshold free shipping (TFS) policy: piece-based or dollar-based (e.g., Regular: \$25; free shipping on orders of “4 items” as opposed to “\$100”) offered by an online store. We first demonstrate that a piece-based TFS will result in a higher intention to shop than a dollar-based TFS. However, this effect is attenuated when information about the shipping charge is present (e.g., “\$4.99 flat rate shipping. Free shipping on orders of _____”) or when the time restriction for the TFS policy is short (e.g., “today only”). Finally, the effect of the TFS policy on intention to shop is shown to be mediated by the consumer’s evaluation of the offer. The observations have important implications for internet retailers.

A model for exploring the relationship between payment structures, fatigue, crash risk, and regulatory response in a heavy-vehicle transport system

- Transportation Research Part A: Policy and Practice---2015---Jason Thompson,Sharon Newnam,Mark Stevenson

Investigations of heavy vehicle crashes have predominantly taken a reductionist view of accident causation. However, there is growing recognition that broader economic factors play a significant role in producing conditions that exacerbate crash risk, especially in the area of fatigue. The aim of this study was to determine whether agent-based modelling (ABM) may be usefully applied to explore the effect of driver payment methods on driver fatigue, crash-risk, and the response of enforcement agencies to major heavy-vehicle crashes. Simulation results showed that manipulation of payment methods within agent-based models can

produce similar patterns of behaviour among simulated drivers as that observed in real world studies. Simulated drivers operating under ‘per-km’ and ‘per-trip’ piece rate incentive systems were significantly more likely to drive while fatigued and subsequently incur all associated issues (loss of license, increased crash risk, increased fines) than those paid under ‘flat-rate’ wage conditions. Further, the pattern of enforcement response required under ‘per-km’ and ‘per-trip’ systems was significantly higher in response to greater numbers of major crashes than in flat-rate regimes. With further refinement and collaborative design, ABMs may prove useful in studying the potential effects of economic policy settings within freight or other transport systems ahead of time.

Bike-sharing stations: A maximal covering location approach

- Transportation Research Part A: Policy and Practice---2015---Ines Frade,Anabela Ribeiro

The promotion of sustainable alternatives to motorized individual mobility has been seen in the past few decades as one of the cornerstones in a strategy to reduce the negative externalities related to the transportation sector. Bicycle sharing is increasingly popular as a sustainable transport system and the number of bike sharing schemes has grown significantly worldwide in recent years. One of the most important elements in implementation of these systems is the location of the stations. In fact the non-optimal locating of bike sharing compromises its success.

Drivers’ parking location choice under uncertain parking availability and search times: A stated preference experiment

- Transportation Research Part A: Policy and Practice---2015---Emmanouil Chaniotakis,Adam J. Pel

To assess parking pricing policies and parking information and reservation systems, it is essential to understand how drivers choose their parking location.

A key aspect is how drivers' behave towards uncertainties towards associated search times and finding a vacant parking spot. This study presents the results from a stated preference experiment on the choice behaviour of drivers, in light of these uncertainties. The attribute set was selected based on a literature review, and appended with the probabilities of finding a vacant parking spot upon arrival and after 8min (and initially also after 4min, but later dropped to reduce the survey complexity). Efficient Designs were used to create the survey design, where two rounds of pilot studies were conducted to estimate prior coefficients. Data was successfully collected from 397 respondents. Various random utility maximisation (RUM) choice models were estimated, including multinomial logit, nested logit, and mixed logit, as well as models accounting for panel effects. These model analyses show how drivers appear to accept spending time on searching for a vacant parking spot, where parking availability after 8min ranks second most important factor in determining drivers' parking decisions, whilst parking availability upon arrival ranks fourth. Furthermore, the inclusion of heterogeneity in preferences and inter-driver differences is found to increase the predictive power of the parking location choice model. The study concludes with an outlook of how these insights into drivers' parking behaviour can be incorporated into traffic assignment models and used to support parking systems.

Critical assessment of five methods to correct for endogeneity in discrete-choice models

- Transportation Research Part A: Policy and Practice---2015---Cristian Guevara

Endogeneity often arises in discrete-choice models, precluding the consistent estimation of the model parameters, but it is habitually neglected in practical applications. The purpose of this article is to contribute in closing that gap by assessing five methods to address endogeneity in this context: the use of Proxys (PR); the two steps Control-Function (CF) method; the simultaneous estimation of the CF method via Maximum-Likelihood (ML); the Multiple Indicator So-

lution (MIS); and the integration of Latent-Variables (LV). The assessment is first made qualitatively, in terms of the formulation, normalization and data needs of each method. Then, the evaluation is made quantitatively, by means of a Monte Carlo experiment to study the finite sample properties under a unified data generation process, and to analyze the impact of common flaws. The methods studied differ notably in the range of problems that they can address; their underlying assumptions; the difficulty of gathering proper auxiliary variables needed to apply them; and their practicality, both in terms of the need for coding and their computational burden. The analysis developed in this article shows that PR is formally inappropriate for many cases, but it is easy to apply, and often corrects in the right direction. CF is also easy to apply with canned software, but requires instrumental variables which may be hard to collect in various contexts. Since CF is estimated in two stages, it may also compromise efficiency and difficult the estimation of standard errors. ML guarantees efficiency and direct estimation of the standard errors, but at the cost of larger computational burden required for the estimation of a multifold integral, with potential difficulties in identification, and retaining the difficulty of gathering proper instrumental variables. The MIS method appears relatively easy to apply and requiring indicators that may be easier to obtain in various cases. Finally, the LV approach appears as the more versatile method, but at a high cost in computational burden, problems of identification and limitations in the capability of writing proper structural equations for the latent variable.

Transport resilience and vulnerability: The role of connectivity

- Transportation Research Part A: Policy and Practice---2015---Aura Reggiani, Peter Nijkamp, Diego Lanzi

This paper aims to adopt a critical stance on the relevance and interpretation of the recently emerging concepts of resilience and vulnerability in transportation studies. It makes a clear distinction between engineering and ecological interpretations of these concepts

and offers a systematic typology of various studies in this field. A core element in the study is the linkage between the aforementioned concepts and connectivity/accessibility in transport networks. The methodological findings in the study are put in perspective by addressing also such concepts as robustness, reliability and friability of transport systems.

A new measure of resilience: An application to the London Underground

- Transportation Research Part A: Policy and Practice---2015---D' Lima, Minette,Francesca Medda

The many varied views on resilience indicate that it is an important concept which has significance in many disciplines, from ecology to psychology to risk/disaster management. Therefore, it is important to be able to quantifiably measure the resilience of systems, and thus be able to make decisions on how the resilience of the system can be improved. In this paper we will work with the definition, due to Pimm (1991), that resilience is “how fast a variable that has been displaced from equilibrium returns to it.” We will think of a system as being more or less resilient depending on the speed with which a system recovers from disruptive events or shocks. Here we consider systems which revert to an equilibrium state from shocks, and introduce a measure of resilience by providing a quantification of the rapidity of these systems’ recovery from shocks.

Planning for the unexpected: The value of reserve capacity for public transport network robustness

- Transportation Research Part A: Policy and Practice---2015---Oded Cats,Erik Jenelius

Public transport networks (PTN) are subject to recurring service disruptions. Most studies of the robustness of PTN have focused on network topology and considered vulnerability in terms of connectivity reliability. While these studies provide insights on general design principles, there is lack of knowledge concerning the effectiveness of different strategies to reduce the impacts

of disruptions. This paper proposes and demonstrates a methodology for evaluating the effectiveness of a strategic increase in capacity on alternative PTN links to mitigate the impact of unexpected network disruptions. The evaluation approach consists of two stages: identifying a set of important links and then for each identified important link, a set of capacity enhancement schemes is evaluated. The proposed method integrates stochastic supply and demand models, dynamic route choice and limited operational capacity. This dynamic agent-based modelling of network performance enables to capture cascading network effects as well as the adaptive redistribution of passenger flows. An application for the rapid PTN of Stockholm, Sweden, demonstrates how the proposed method could be applied to sequentially designed scenarios based on their performance indicators. The method presented in this paper could support policy makers and operators in prioritizing measures to increase network robustness by improving system capacity to absorb unexpected disruptions.

A framework to analyze the vulnerability of European road networks due to Sea-Level Rise (SLR) and sea storm surges

- Transportation Research Part A: Policy and Practice---2015---Hande Demirel,Mert Kompil,Françoise Nemry

This study proposes a framework to explore the concepts of exposure, vulnerability and connectivity in EU road network and to assess the potential transportation infrastructure sensitivities towards Sea-Level Rise (SLR) and storm surges. The magnitude and significance of impacts were determined and knowledge of network robustness was built up based on existing climate data and on future trends. Various spatial databases were integrated and a four-stage transport model was used to explore the likely impacts of network degradation. The pattern of the network was assessed via both node- and link-based measurements, where different road databases, namely TRANS-TOOLS and Tele Atlas/TomTom, were employed in order to analyze the impact of spatial resolution within network connectivity analyses. This general framework developed for

European Union, was tested on a specific and articulated case study area; namely, the north-east coastal region of Spain. The research conducted, yielded useful methods for the analysis of network vulnerability, where impacts are more significant in regional accessibility patterns. Accessibility indicators at the regional level changed drastically, with some regions showing up to a 26% decrease. According to the results of network connectivity indicators, the changes in network topology have reduced the number of alternative routes and placed more pressure on the transport system. The implementation of this framework and quantitative assessment methodologies outlined in this paper could be employed to assist policy makers to recognize the opportunities that may arise or diminish the adverse effects.

Reprint of “Modelling the resilience, friability and costs of an air transport network affected by a large-scale disruptive event”

- Transportation Research Part A: Policy and Practice---2015---Milan Janić

This paper deals with developing a methodology for estimating the resilience, friability, and costs of an air transport network affected by a large-scale disruptive event. The network consists of airports and airspace/air routes between them where airlines operate their flights. Resilience is considered as the ability of the network to neutralize the impacts of disruptive event(s). Friability implies reducing the network's existing resilience due to removing particular nodes/airports and/or links/air routes, and consequently cancelling the affected airline flights. The costs imply additional expenses imposed on airports, airlines, and air passengers as the potentially most affected actors/stakeholders due to mitigating actions such as delaying, cancelling and rerouting particular affected flights. These actions aim at maintaining both the network's resilience and safety at the acceptable level under given conditions.

Competitiveness of container terminal operating companies in South Korea and the industry–university–government network

- Transportation Research Part A: Policy and Practice---2015---Junghyun Yoon,Hee Yong Lee,John Dinwoodie

Burgeoning container port facilities have fostered intensified competition among container terminal operating companies (CTOCs). However, despite research into their survival strategies which identified antecedents of competitiveness including hard factors such as facilities, available cargo and cargo processing ability, softer factors spanning human resource management, networks and strategic alliances with universities and government agencies in industry–university–government (I–U–G) networks have been overlooked. This study aims to examine both hard and softer antecedents of competitiveness as perceived by 152 professionals in South Korean CTOCs; empirical relationships among these antecedents, I–U–G networks, and competitiveness itself; and the significance of the I–U–G network in establishing and improving competitiveness. Posited antecedents of competitiveness included human resources, facilities, service quality, customer orientation, reputation, and government support policy as independent variables; the I–U–G network as a moderating variable; and competitiveness as a dependent variable. Empirical structural relationships revealed that excepting government support policy, each variable significantly affected CTOC competitiveness. Further, the I–U–G network moderated the relationships between the antecedents of competitiveness and competitiveness. Because an effective I–U–G network was pivotal in controlling CTOC competitiveness, improved competitiveness requires not only differentiation of human resources, facilities, service quality, customer orientation, and reputation factors but also I–U–G network developments.

Measuring risk aversion to guide transportation policy: Contexts, incentives, and respondents

- Transportation Research Part A: Policy and Practice---2015---Vinayak V. Dixit,Rami C.

Road pricing may provide a solution to increasing traffic congestion in metropolitan areas. Route, departure time and travel mode choices depend on risk attitudes as commuters perceive the options as having uncertain effects on travel times. We propose that Experimental Economics methods can deliver data that uses real consequences and where the context can be varied by the researcher. The approach relies on the controlled manipulation of contexts, similar to what is done in the Stated Choice approach, but builds in actual consequences, similar to the Revealed Preference approach. This paper investigates some of the trade-offs between the cost of conducting Experimental Economics studies and the behavioral responses elicited. In particular, we compare responses to traditional lottery choice tasks to the route choice tasks in simulated driving environments. We also compare students (a low cost convenient participant pool) to field participants recruited from the driving population. While we see initial differences across our treatment groups, we find that their risk taking behavior converge with minimal repetition.

Gauging interventions for sustainable travel: A comparative study of travel attitudes in Berlin and London

- Transportation Research Part A: Policy and Practice---2015---Jens Kandt, Philipp Rode, Christian Hoffmann, Andreas Graff, Duncan Smith

So-called ‘soft’ policy instruments that respond to the psychological aspects of travel are regularly acknowledged as necessary complements to ‘hard’ infrastructure investments to effectively promote sustainable travel in cities. While studies investigating subjective orientations among travellers have proliferated, open questions remain including the role of recent technological advances, the expansion of alternative mobility services, locally specific mobility cultures and residential selection. This paper presents the methods, results and policy implications of a comparative

study aiming to understand mobility attitudes and behaviours in the wider metropolitan regions of Berlin and London. We specifically considered information and communication technology (ICT), new types of mobility services such as car sharing, electric cars and residential preferences. In each region, we identified six comparable segments with distinct attitudinal profiles, socio-demographic properties and behavioural patterns. Geocoding of the home address of respondents further revealed varying contextual opportunities and constraints that are likely to influence travel attitudes. We find that there is significant potential for uptake of sustainable travel practices in both metropolitan regions, if policy interventions are designed and targeted in accordance with group-specific needs and preferences and respond to local conditions of mobility culture. We identify such interventions for each segment and region and conclude that comparative assessment of attitudinal, alongside geographical, characteristics of metropolitan travellers can provide better strategic input for realistic scenario-building and ex-ante assessment of sustainable transport policy.

Latent air travel preferences: Understanding the role of frequent flyer programs on itinerary choice

- Transportation Research Part A: Policy and Practice---2015---Michael Seelhorst, Yi Liu

Many studies have used air itinerary choice data to identify preferences and tradeoffs of various flight service attributes, such as travel time, number of connections, and fare. Little has been done, however, to estimate the effect Frequent Flyer Programs (FFPs) have on itinerary choice. The goal of this paper is to quantify the impact of FFP membership on itinerary choice and identify discrete patterns of unobserved preference heterogeneity. For this purpose, we apply two modeling techniques using a set of stated preference data collected on 830 individuals. A Multinomial Logit Model (MNL) is first estimated and Willingness-To-Pay (WTP) values are calculated for the choice of flying an airline with which the individual has FFP membership compared with another airline where the individual

has no FFP membership. These WTP estimates vary across different trip purposes and levels of FFP status. Our results indicate that FFP membership plays a strong role in airline choice, particularly for individuals with elite membership. We then capture random heterogeneity through the use of latent class models, using sociodemographic variables as class-membership covariates. The latent class model results indicate three groups of individuals with very different sets of preferences, particularly for FFP membership. The discrete segmentation indicates one class with very low WTP, one class with average WTP, and one class with extremely large WTP values. These results provide evidence that latent class models capture preference heterogeneity much better than the MNL model for air itinerary choice, particularly when considering the effects of FFP membership.

Commute duration and health: Empirical evidence from Brazil

- Transportation Research Part A: Policy and Practice---2015---Rodrigo Oliveira,Klebson Moura,Jorge Viana,Robson Tigre,Breno Sampaio

There have been many empirical studies associating commuting time and health outcomes in the last few decades. Their general conclusion is that commuting and health are negatively related. The validity of their findings, however, is questionable, given their lack of good identification strategies to correctly account for omitted variables. In this paper, we analyze this relationship using a large and unique nationally representative sample of Brazilian individuals, coupled with the use of propensity score matching techniques, and the application of an exhaustive set of standard falsification tests and sensitivity analysis that may prevent one from claiming a causal link between the two variables. Our results indicate that individuals with more than one hour of commuting appear to have statistically higher probability, ranging from 1.9 to 4.6 percentage points, of reporting bad health status when compared to a person whose commuting time is less than one hour.

Application of SFCA pedestrian simulation model to the signalized crosswalk width design

- Transportation Research Part A: Policy and Practice---2015---A. Lili Lu,B. Gang Ren,C. Wei Wang,D. Ching-Yao Chan

This study presents a new approach for specifying the design of the signalized crosswalk width. Based on the analysis of the characteristics of bi-direction pedestrian flows at the subject signalized crosswalk, a crossing time (CT) estimation model is proposed and developed by taking the time lag of pedestrian platoons as well as bi-direction effects into consideration. Subsequently, two important indicators (proportion of delay in the crossing time, i.e. PDC, and local density level, i.e. LDL) are introduced into the evaluation of pedestrian crossing efficiency and comfort level respectively. It is shown in our work that CT, PDC, and LDL can be successfully obtained with the implementation of cellular automaton into the pedestrian simulation model by incorporating social forces (SFCA). Moreover, the relationships among CT, PDC, and LDL as well as the crosswalk width and pedestrian demand are modeled and illustrated. By synthesizing all indicators, a method is introduced to determine the recommended maximum and minimum widths for signalized crosswalks under different pedestrian demand volumes. Our methodologies demonstrate that they may help traffic engineers and specialists make a sensible choice of the crosswalk width. The outcome of our work will further give traffic engineers and practitioners new insights for the design and planning of signalized pedestrian crosswalks and constitute an important contribution to the understanding and evaluation of pedestrian movements in this aspect.

Evaluating road network damage caused by natural disasters in the Czech Republic between 1997 and 2010

- Transportation Research Part A: Policy and Practice---2015---Michal Bíl,Rostislav Vodák,Jan Kubeček,Martina Bílová,Jiří Sedoník

Road networks play a vital role in maintaining a func-

tioning modern society. Many events perceptibly affect the transport supply along these networks, especially natural disasters such as floods, landslides, and earthquakes. Contrary to more common disruptions of traffic from accidents, or maintenance closures, natural disasters are capable of destroying large numbers of roads and usually cover vast areas. When evaluating network damage no single measure alone is able to describe the full extent of network destruction. In this study, we investigated six highly damaging natural disasters, which occurred in the Czech Republic between 1997 and 2010. They were all induced by extreme rainfall or by rapid snowmelt and resulted in floods and landslides. Their impacts are evaluated with respect to the damage to road networks and decreased serviceability. For mutual comparison of the impacts and their analysis we used several criteria, described in the paper, related to economic impacts, physical harm to individuals and infrastructures, and the effects on connectivity and serviceability. We also introduced a new measure based on the network efficiency index which takes into account the importance of nodes based on their population. Moreover, we provide a detailed analysis of one such event in July 1997 that significantly affected the road network of the Zlín region.

The capitalization of subway access in home value: A repeat-rentals model with supply constraints in Beijing

- Transportation Research Part A: Policy and Practice---2015---Weizeng Sun,Siqi Zheng,Rui Wang

Urban rail transit enhances accessibility of the communities it serves and often contributes to the value of local real properties. A small number of studies have gone beyond the traditional cross-sectional hedonic analysis to use repeat-sales data in the US for more robust estimation of rail transit's impact on property value. While the empirical literature generally supports the positive capitalization of rail transit in home value, it has produced widely varied estimates and failed to incorporate the theoretical insight that more elastic housing supply would reduce the extent of local ameni-

ties' capitalization in home value. Observing Beijing's rapid expansion of subway lines during the late 2000s, this study uses repeat rental transactions from 2005 to 2011 to investigate how home value reacts to the change in the home's distance to nearest subway station. Repeat-rentals estimates suggest a rent-distance elasticity of -0.02 , 70% below the cross-sectional hedonic estimate. Moreover, using the unique history of state-owned enterprise relocations as instrument for intra-city variation in land supply, we find that the capitalization of subway proximity in home value is weaker where land supply is more elastic. Our findings support the significant bias caused by omitted variables in the hedonic estimates and confirm housing supply's role in explaining the intra-city spatial variation in estimates.

Maximizing net benefits for conventional and flexible bus services

- Transportation Research Part A: Policy and Practice---2015---Kim, Myungseob (Edward),Paul Schonfeld

Transit ridership is usually sensitive to fares, travel times, waiting times, and access times, among other factors. Therefore, the elasticities of demand with respect to such factors should be considered in modeling bus transit services and must be considered when maximizing net benefits (i.e. "system welfare" = consumer surplus+producer surplus) rather just minimizing costs. In this paper welfare is maximized with elastic demand relations for both conventional (fixed route) and flexible-route services in systems with multiple dissimilar regions and periods. As maximum welfare formulations are usually too complex for exact solutions, they have only been used in a few studies focused on conventional transit services. This limitation is overcome here for both conventional and flexible transit services by using a Real Coded Genetic Algorithm to solve such mixed integer nonlinear welfare maximization problems with constraints on capacities and subsidies. The optimized variables include service type, zone sizes, headways and fares. We also determine the maximum welfare threshold between optimized conventional and

flexible services) and explore the effects of subsidies. The proposed planning models should be useful in selecting the service type and optimizing other service characteristics based on local geographic characteristics and financial constraints.

Determinants of air cargo traffic in California

- Transportation Research Part A: Policy and Practice---2015---Paulos Ashebir Lakew,Yeow Chern Andre Tok

Studies on the economic impacts of air cargo traffic have been gaining traction in recent years. The slowed growth of air cargo traffic at California's airports, however, has raised pressing questions about the determinants of air cargo traffic. Specifically, it would be useful to know how California's air cargo traffic is affected by urban economic characteristics. Accordingly, this study estimates the socioeconomic determinants of air cargo traffic across cities in California. We construct a 7-year panel (2003–2009) using quarterly employment, wage, population, and traffic data for metro areas in the state. Our results reveal that the concentrations of both service and manufacturing employment impact the volume of outbound air cargo. Total air cargo traffic is found to grow faster than population, while the corresponding domestic traffic grows less than proportionally to city size. Wages play a significant role in determining both total and domestic air cargo movement. We provide point estimates for traffic diversion between cities, showing that 80% of air cargo traffic is diverted away from a small city located within 100 miles of a large one. Using socioeconomic and demographic forecasts prepared for California's Department of Transportation, we also forecast metro-level total and domestic air cargo tonnage for the years 2010–2040. Our forecasts for this period indicate that California's total (domestic) air cargo traffic will increase at an average rate of 5.9% (4.4%) per year.

Incorporating socio-political criteria into the maintenance prioritization of Chilean urban pavement networks

- Transportation Research Part A: Policy and Practice---2015---Pablo Godoy,Claudio Mourgues,Alondra Chamorro

Managing urban pavement networks presents additional challenges when compared to the management of interurban pavements. In particular, the prioritization of maintenance activities – which is critical when resources are limited – requires special considerations. Within these considerations, there are socio-political criteria that are not formally considered in current UPMS (Urban Pavement Management Systems). In practice, decision makers consider these socio-political factors but without a formal procedure and proper information, leading to decisions based on subjective information, which lack traceability and reliability.

Viewpoints of adults with and without Autism Spectrum Disorders on public transport

- Transportation Research Part A: Policy and Practice---2015---Marita Falkmer,Tania Barnett,Chiara Horlin,Olov Falkmer,Jessica Siljehav,Sofi Fristedt,Hoe C. Lee,Derserri Y. Chee,Anders Wretstrand,Torbjörn Falkmer

Public transport is low cost, allows for independence, and facilitates engagement and participation for non-drivers. However, the viewpoints of individuals with cognitive disabilities are rarely considered. In Australia, the prevalence of Autism Spectrum Disorders (ASD) is approximately 1% and increasing. Many individuals with ASD do not possess a driver's licence, indicating that access to public transport is crucial for their independence. However, at present, there is no research on the opinions of adults with ASD on public transport.

What are the determinants in making people free riders in proof-of-payment transit systems?

Evidence from Italy

- Transportation Research Part A: Policy and Practice---2015---Benedetto Barabino,Sara Salis,Bruno Useli

Nowadays, in proof-of-payment transit systems, fare evasion is provoking strong interest in public transport companies (PTCs) due to the relevant economic losses, social inequity and increased levels of violence affecting personal security. Therefore, there is the need to recognize possible fare evaders. By using 2177 on-board personal interviews, gathered from an Italian PTC, and logistic regression models, we isolate determinants of possible free-rider passengers and, hence, those whom it might be advisable to target in order to capitalize on the effect of the application of countermeasures on fare evasion put forward by the local PTC. We show that males, younger than 26years, with a low education level, unemployed and/or students and without an alternative mode of transport other than the bus are more probably fare evaders. Moreover, people who make trips of shorter than 15min, who are systematic users and are not satisfied with the service are possible fare evaders. Finally, we found that a low level of inspection, knowledge of fines and previous ticket violations are determinants which make people more prone to evade fares. These outcomes are very useful, because, to the best of our knowledge, they represent the first empirical contribution showing the determinants which help evaluate the propensity to be a fare evader, in probabilistic terms. Moreover, they could help PTCs understand who might be a fare evader, in order to anticipate suitable countermeasures.

Home-based telecommuting and intra-household interactions in work and non-work travel: A seemingly unrelated censored regression approach

- Transportation Research Part A: Policy and Practice---2015---Seung-Nam Kim,Sangho Choo,Patricia Mokhtarian

Although telecommuting has become a popular option as a new mode of working, no theoretical or empirical consensus has been reached on its potential for substituting or generating travel. This study aims to evaluate the impact of a household head's telecommuting on household travel while controlling for the interdependence within a household and across travel purposes, by applying seemingly unrelated censored regression models to data from the 2006 Household Travel Survey in the Seoul Metropolitan Area. In terms of vehicle kilometers traveled, the analysis shows that telecommuters' non-commute and non-work trips as well as his/her household members' non-work trips are greater than those of non-telecommuters and their household members', whereas telecommuting partially reduces commuting trips. However, an analysis stratified by household type reveals that the difference for household members is significant only in households with less than one vehicle per employed member: in such households (with insufficient vehicles available), the vehicle otherwise used for mandatory travel, such as for the household head's commute, can be used for non-commute purposes or by other household members if the household head does not use it for commuting. This implies that, when vehicle travel budgets of a given household are limited, this compensatory travel mechanism can make optimum use of limited resources (i.e., vehicles), but offsets the travel-substituting effect of telecommuting. Accordingly, to more precisely estimate the impact of telecommuting-promotion policies and apply them as part of travel demand management strategies, their counteracting effects among household members should be considered.

Demi-flexible operating policies to promote the performance of public transit in low-demand areas

- Transportation Research Part A: Policy and Practice---2015---Feng Qiu,Jinxing Shen,Xuechi Zhang,Chengchuan An

The efforts of providing attractive transport service to residents in sparse communities have previously focused on operating flexible transit services. This pa-

per identifies a new category of transit policies, called demi-flexible operating policies, to fill the gap between flexible transit services and conventional fixed-route systems. The passenger cost function is defined as the performance measure of transit systems and the analytic work is performed based on a real-world flag-stop transit service, in which we compare its system performance with another two comparable systems, the fixed-route and flex-route services, at expected and unexpected demand levels in order to be closer to reality. In addition, the dynamic-station policy is introduced to assist the flex-route service to better deal with unexpectedly high demand. Experiments demonstrate the unique advantages of demi-flexible operating policies in providing affordable, efficient, and reliable transport service in low-demand operating environments and this work is helpful to optimize the unifying framework for designing public transit in suburban and rural areas.

Collecting a multi-dimensional three-weeks household time-use and activity diary in the Bandung Metropolitan Area, Indonesia

- Transportation Research Part A: Policy and Practice---2015---Dimas B.E. Dharmowijoyo, Yusak O. Susilo, Anders Karlström, Lili Somantri Adiredja

This paper describes a comprehensive panel data collection and analysis at household level, including detailed travel behaviour variables and comprehensive in-home and out-of-home activities, individual cognitive habits and affective behaviours, the rate of physical activity, as well as health related quality of life (QoL) information in the Bandung Metropolitan Area (BMA) of Indonesia. To our knowledge, this is the first attempt to collect an individual's activity diary over an extended period as it captures the multi-tasking activities and multidisciplinary factors that underlie individual activity-travel patterns in a developing country. Preliminary analyses of the collected data indicate that different beliefs, anticipated emotions, support and attachment to motorised modes significantly correlate with different groups of occupation, gender, age, activity participation, multi-tasking activities, and physical

health, but not with different social and mental health. This finding highlights the reason why implementing car reduction policies in Indonesia, without breaking or changing the individual's habits and influencing his/her attitudes have not been fruitful. The results also show that endorsing more physical activities may result in a significant reduction in the individual's motorised mode use, whilst individuals who demonstrate a tendency to use their spare time on social activities tend to have better social health conditions. Furthermore, undertaking multi-tasking out-of-home discretionary activities positively correlates with better physical health. All these highlight the importance of properly understanding and analysing the complex mechanisms that underlie these fundamental factors that shape individual daily activity-travel patterns in developing countries. This type of multidisciplinary approach is needed to design better transport policies that will not only promote better transport conditions, but also a healthier society with a better quality of life.

Organizational adoption behavior of CO2-saving power train technologies: An empirical study on the German heavy-duty vehicles market

- Transportation Research Part A: Policy and Practice---2015---Claudio S. Seitz, Oliver Beuttenmüller, Orestis Terzidis

This study analyzes the preference structure of buyer groups that influences their willingness to select CO2-saving power train technologies for medium-duty and heavy-duty vehicles (HDV). Based on the Technology–Organization–Environment framework for organizational adoption decision making and organizational buying criteria a theoretical construct was developed. Variables were validated in exploratory preliminary research and subsequently tested based on factor analysis using 27 survey items in a quantitative web-based study among 177 organizations operating HDV in Germany. Knowledge, experience, use and purchase consideration concerning alternative power train technologies and further measures to reduce fuel consumption were additionally queried. Based on a multiple linear regression

analysis, key findings show that at the current stage of market maturity environmental attitude and corporate social responsibility exert the strongest significant influence on willingness to select CO₂-saving power train technologies. A hierarchical cluster analysis revealed six customer groups in order to yield behavioral market segmentation. Hereby it is shown that the performed transportation tasks do not determine the preference structures. Early adopting organizations are larger than average and driven by non-economic aspects as image or corporate social responsibility, whereas the mass market awaits lower purchasing prices. Crossing this chasm will be a major challenge for policymaker and manufacturers.

Collective public-transport tickets and anticipated majority choice: A model of student tickets

- Transportation Research Part A: Policy and Practice---2015---Achim Voß

In Germany, many universities have student tickets that are bargained for between student representatives and public transport companies, approved by referendum, and mandatory for all students. They allow the use of public transport at no additional cost. I analyze such a scenario in a theoretical model as an example of a flat-rate ticket for public transport which is implemented by majority decision. The mandatory character of the ticket reduces transaction costs like marketing and ticket inspection, reducing the ticket price and thus the students' commuting expenses. However, there is a countervailing effect. Students face and rationally expect zero marginal monetary commuting costs, so that new students choose a place of residence which is relatively far from the university. This in turn raises the equilibrium ticket price. It may even be the case that students would be better off if such a ticket had never existed. Nonetheless, they always vote for it in referenda, because accepting the high price is optimal given their place of residence. After laying out the model, I analyze an optimal policy, which consists, for example, of subsidizing student dorms at an efficient distance to the city center.

The impact of transit station areas on the travel behaviors of workers in Denver, Colorado

- Transportation Research Part A: Policy and Practice---2015---Gregory J. Kwoka,E. Eric Boschmann,Andrew R. Goetz

Transit development is one planning strategy that seeks to partially overcome limitations of low-density single use car oriented development styles. While many studies focus on how residential proximity to transit influences the travel behaviors of individuals, the effect of workplace proximity to transit is less understood. This paper asks, does working near a light rail transit station influence the travel behaviors of workers differently than workers living near a station? We begin by examining workers' commute mode based on their residential and workplace proximity to transit station areas. Next, we analyze the ways in which personal travel behaviors differ between those who drive to work and those who do not. The data came from a 2009 travel behavior survey in the Denver, Colorado metropolitan area, which contains 8000 households, 16,000 individuals, and nearly 80,000 trips. We measure sustainable travel behaviors as reduced mileage, reduced number of trips, and increased use of non-car transportation. The results of this study indicate that living near a transit station area by itself does not increase the likelihood of using non-car modes for work commutes. But if the destination (work) is near a transit station area, persons are less likely to drive a car to work. People who both live and work in a transit station area are less likely to use a car and more likely to take non-car modes for both work and non-work (personal) trips. Especially for persons who work near a transit station area, the measures of personal trips and distances show a higher level of mobility for non-car commuters than car commuters – that is, more trips and more distant trips. The use of non-car modes for personal trips is most likely to occur by non-car commuters, regardless of their transit station area relationship.

Direct and indirect influences on employed adults' travel in the UK: New insights from the National Travel Survey data 2002–2010

- Transportation Research Part A: Policy and Practice---2015---Kaveh Jahanshahi,Ying Jin,Ian Williams

Recent years saw a continuing shift in labour force composition, e.g. greater participation of women and a prominent rise in part-time workers. There are as yet relatively few recent studies that examine systematically the influences on the travel of employed adults from such perspectives, particularly regarding possible transport disadvantages of the fastest growing segments of workers. A robust analysis requires systematic data on a wide range of explanatory variables and multiple travel outcomes including accessibility, mobility and trip frequency for different trip purposes. The UK NTS data does meet the majority of this demanding data requirement, but its full use has so far been hampered by methodological difficulties. To overcome complex endogeneity problems, we develop novel, integrated structural equation models (SEMs) to uncover the influences of latent land use characteristics, indirect influences on car ownership, interactions among trip purposes as well as residents' self-selection and spatial sorting. This general-purpose method provides a new, systematic decomposition of the influences on travel outcomes, where the effects of each variable can be examined in turn with robust error terms. The new insights underline two direct policy implications. First, it highlights the contributions of land use planning and urban design in restraining travel demand in the 2000s, and their increasing influence over the decade. Secondly, it shows that there may still be a large mobility disadvantage among the fastest growing segments of workers, particularly in dense urban areas. This research further investigates trend breaking influences before and after 2007 through grouped SEM models, as a test of the methodology for producing regular and timely updates regarding the main influences on personal travel from a system level.

A problem of limited-access special lanes. Part I: Spatiotemporal studies of real freeway traffic

- Transportation Research Part A: Policy and Practice---2015---Michael J. Cassidy,Kwangho Kim,Wei Ni,Weihua Gu

Most special-use freeway lanes in the US, whether reserved for carpools, toll-paying commuters or both, are physically separated from the adjacent regular-use lanes by some form of barrier. Vehicle movements in and out of a special lane of this type are permitted only at select access points along the route. The barrier at each select point might open for a distance of 400m or so. Limiting access in this way is said to reduce the “turbulence” that might otherwise occur were the special lane not to have a barrier, such that vehicles could instead enter or exit that lane anywhere along its length.

A problem of limited-access special lanes. Part II: Exploring remedies via simulation

- Transportation Research Part A: Policy and Practice---2015---Michael J. Cassidy,Kwangho Kim,Wei Ni,Weihua Gu

Spatiotemporal analyses of freeway sites in Part I have shown that special-lane access points are prone to become bottlenecks. These can degrade traffic flows, sometimes in all lanes. Part II explores select impacts of re-designing the means of entering and exiting a special lane, and of altering the policy governing its use. Parametric tests were conducted using a computer simulation model that was calibrated to one of the sites studied in Part I; one with a buffer-separated carpool lane. Though less reliable than what might have been observed via experiments in real settings, the simulated findings seem to offer useful insights nonetheless.

Low cost carrier competition and route entry in an emerging but regulated aviation market – The case of China

- Transportation Research Part A: Policy and Practice---2015---Xiaowen Fu,Zheng Lei,Kun Wang,Jia Yan

Although China lags behind other liberalized aviation markets in low cost carrier (LCC) development, its largest LCC, Spring Airlines, has achieved rapid growth in traffic volume and revenue, as well as consistent profitability, since its inauguration in 2005. Our empirical study on the Chinese domestic market suggests that Spring adopts a “cream skimming” strategy to enter high-priced routes, allowing the carrier to achieve both a very high load factor and considerable profitability. Spring’s capacity and market share on individual routes are constrained to low levels, likely due to government regulation and/or a “puppy dog” strategy adopted by the carrier. As a result, Spring is able to achieve fast growth without triggering price wars. To incumbent full service carriers, high speed rail (HSR) services impose much more significant competitive pressure than low cost carriers. Similar to LCCs in developed markets, Spring prefers to serve markets with high traffic volumes out of its operational base in Shanghai. Overall, Spring’s entry decision is not significantly affected by competition, either from full service airlines or HSR services. Our investigation suggests that LCCs have potential to introduce more competition but are yet to be a “game changer” in China. Further deregulation of the domestic market is needed.

Serving vs. settling: What drives the establishment of low-cost carriers’ foreign bases?

- Transportation Research Part A: Policy and Practice---2015---Klemens Klein,Sascha Albers,Florian Allroggen,Robert Malina

This paper uses a probit model on a cross-sectional dataset of 202 airports and 29 airlines to assess the drivers for the establishment of foreign bases by European low-cost carriers (LCCs). We find that managerial, organizational, and environmental factors impact on foreign base establishment. In particular, there is evidence that the presence of a growth-oriented firm leader and the strategic importance of an airport for an airline significantly increase the probability of the presence of bases, while national unit labor costs, the

volatility of flight operations and the membership of an LCC in an airline group significantly decrease this probability.

The impact of Gulf carrier competition on U.S. airlines

- Transportation Research Part A: Policy and Practice---2015---Martin Dresner,Cuneyt Eroglu,Christian Hofer,Fabio Mendez,Kerry Tan

Gulf carriers, such as Emirates Airline, Etihad Airways, and Qatar Airways, have expanded aggressively and are creating an increasingly dense global network. These carriers’ future growth prospects, however, hinge on their ability to gain access to markets in Europe and America, for example. Existing bilateral agreements stifle the Gulf carriers’ ambitious expansion plans in some instances, and incumbent carriers lobby to restrict further market access. To contribute to this debate, the objective of this research is to empirically examine the effects of Gulf carrier competition on U.S. carriers’ passenger volumes and fares in international route markets. Based on data obtained from the U.S. Department of Transportation, the empirical results suggest that greater competition by Gulf carriers in U.S. international markets is associated with (1) significant growth in U.S.–Middle East traffic volumes and (2) small but statistically significant traffic losses and fare reductions for U.S. carriers in route markets connecting the U.S. with Africa, Asia, Australia and Europe.

The effect of code-share agreements on the temporal profile of airline fares

- Transportation Research Part A: Policy and Practice---2015---Marco Alderighi,Alberto Gaggero,Claudio Piga

This paper aims at investigating how the pricing strategy of European airlines is affected by code-share agreements on international routes. Our data cover several routes linking the main UK airports to many European destinations and includes posted fares collected at different days before departure. By analyzing the temporal profile of airline fares, we identify three main

results. First, code-share increases fares especially for early bookers. Second, the higher prices in code-shared flights are offered by marketing carriers. Finally, in single operator code-shared flights (unilateral code-share), the pricing profile is flatter than under parallel code-share.

Multiple hub network and high-speed railway: Connectivity, gateway, and airport leakage

- Transportation Research Part A: Policy and Practice---2015---Mikio Takebayashi

This paper considers the relation between the role of airport as gateway (inter-intra transit airport) and the connectivity between air transport and high-speed rail (HSR) transport to discuss the possibility of a multiple gateway system with HSR. We deal with both international and domestic transport markets in the model analysis. In the international markets, only airlines compete against each other, while in the domestic market airlines and HSR compete against each other. The results suggest that the improvement of connectivity between air and HSR at the airport increases its international passengers, and therefore, that strengthens its role as gateway, for example, gathering more inter-intra transit passengers. However, the results also suggest that the demand of the area which the airport belongs to affects the role of airport as gateway.

Effects of corruption on efficiency of the European airports

- Transportation Research Part A: Policy and Practice---2015---Laingo Manitra Randrianarisoa, Denis Bolduc, Yap Yin Choo, Tae Hoon Oum, Jia Yan

The effect of corruption on airport productive efficiency is analyzed using an unbalanced panel data of major European airports from 2003 to 2009. We first compute the residual (or net) variable factor productivity using the multilateral index number method and then apply robust cluster random effects model in order to evaluate the importance of corruption. We find strong

evidence that corruption has negative impacts on airport operating efficiency; and the effects depend on the ownership form of the airport. The results suggest that airports under mixed public-private ownership with private majority achieve lower levels of efficiency when located in more corrupt countries. They even operate less efficiently than fully and/or majority government owned airports in high corruption environment. We control for economic regulation, competition level and other airports' characteristics. Our empirical results survive several robustness checks including different control variables, three alternative corruption measures: International Country Risk Guide (ICRG) corruption index, Corruption Perception Index (CPI) and Control of Corruption Index (CCI). The empirical findings have important policy implications for management and ownership structuring of airports operating in countries that suffer from higher levels of corruption.

Drivers of customer satisfaction with public transport services

- Transportation Research Part A: Policy and Practice---2015---Arnoud Mouwen

This paper aims to improve the understanding of the drivers of customer satisfaction with public transport (PT). The methodology provides a relevant contribution to the previous studies since it highlights the complex interaction between the level and composition of satisfaction, negative social safety experiences (NSSes), urban settings, and the PT mode used.

A multi-layered risk exposure assessment approach for the shipping industry

- Transportation Research Part A: Policy and Practice---2015---Stephen Vander Hoorn, Sabine Knapp

Maritime administration and coastal states have become more aware of the need to enhance risk mitigation strategies primarily due to increased worldwide shipping activities, changing safety qualities of the world fleet and limited resources to deploy mitigation strategies. This paper introduces an innovative multi-layered

framework to assess, predict and mitigate potential harm. The proposed approach addresses known restrictions of risk assessments in shipping. These restrictions are the lack of scalability to apply risk assessments over large areas using an automated routine, the absence of recognizing that the world fleet is heterogeneous, the lack of integrating location specific environmental conditions such as wind, currents or waves and most importantly, the lack of recognizing the uncertainties associated with each factor especially for predictions. The proposed framework is based on the idea of integrating various layers representing the most important factors that can influence risk in order to estimate and predict risk exposure for a given area. As proof of concept of the underlying ideas, the outcome of a pilot project with the Australian Maritime Safety Authority is presented which demonstrates the integration of the first two layers and is based on a unique and comprehensive combination of data. The results of selected endpoints of risk exposure compare well with observations. The article also discusses the integration of the remaining layers including the recognition and addition of uncertainties in the future.

Sailing into a dilemma

- Transportation Research Part A: Policy and Practice---2015---Claudia Hermeling, Jan Henrik Klement, Simon Koesler, Jonathan Köhler, Dorothee Klement

On the basis of a joint economic and legal analysis, we evaluate the effects of a “regional” (European) emission trading scheme aiming at reducing emissions of international shipping. The focus lies on the question which share of emissions from maritime transport activities to and from the EU can and should be included in such a system. Our findings suggest that the attempt to implement an EU maritime ETS runs into a dilemma. It is not possible to design a system that achieves emission reductions in a cost efficient manner and is compatible with international law.

Modeling the impact of government guarantees on toll charge, road quality and capacity for Build-Operate-Transfer (BOT) road projects

- Transportation Research Part A: Policy and Practice---2015---Zhuo Feng, Shui-Bo Zhang, Ying Gao

Government guarantees are frequently used to attract private investors’ participation into Build-Operate-Transfer (BOT) road projects. In this paper, we investigate the impact of government guarantees on toll charge, road quality and road capacity by taking perspective of the private investor. The main results are: (1) Minimum traffic guarantee increases toll charge while decreasing road quality. Under a low guarantee level, minimum traffic guarantee has no impact on road capacity. However, it improves road capacity when a high guarantee level is performed. (2) Under minimum revenue guarantee, if the guarantee level is sufficiently high, the optimal toll charge will be sufficiently large, but road quality and road capacity will approach zero. (3) Price compensation guarantee decreases toll charge and increases both road quality and road capacity. This paper further investigates the impact of government guarantees when the contract is auctioned. We find that auction reduces the impact of government guarantees on toll charge while failing to affect the impact of government guarantees on road quality and capacity. Some policy implications are also derived from our model results.

Assessing CO2 emissions of electric vehicles in Germany in 2030

- Transportation Research Part A: Policy and Practice---2015---Patrick Jochem, Sonja Babrowski, Wolf Fichtner

Electric vehicles are often said to reduce carbon dioxide (CO₂) emissions. However, the results of current comparisons with conventional vehicles are not always in favor of electric vehicles. We outline that this is not only due to the different assumptions in the time of charging and the country-specific electricity generation mix, but also due to the applied assessment method.

We, therefore, discuss four assessment methods (average annual electricity mix, average time-dependent electricity mix, marginal electricity mix, and balancing zero emissions) and analyze the corresponding CO₂ emissions for Germany in 2030 using an optimizing energy system model (PERSEUS-NET-TS). Furthermore, we distinguish between an uncontrolled (i.e. direct) charging and an optimized controlled charging strategy. For Germany, the different assessment methods lead to substantial discrepancies in CO₂ emissions for 2030 ranging from no emissions to about 0.55kg/kWhel (110g/km). These emissions partly exceed the emissions from internal combustion engine vehicles. Furthermore, depending on the underlying power plant portfolio and the controlling objective, controlled charging might help to reduce CO₂ emissions and relieve the electricity grid. We therefore recommend to support controlled charging, to develop consistent methodologies to address key factors affecting CO₂ emissions by electric vehicles, and to implement efficient policy instruments which guarantee emission free mobility with electric vehicles agreed upon by researchers and policy makers.

Competitiveness and macroeconomic impacts of reduced wait times at U.S. land freight border crossings

- Transportation Research Part A: Policy and Practice---2015---Misak Avetisyan,Nathaniel Heatwole,Adam Rose,Bryan Roberts

We analyze the macroeconomic and trade impacts of reducing wait times by adding one customs officer at each of the twelve major land freight crossings of the U.S. The change in wait time stemming from staffing changes is first estimated on the basis of primary data and then translated into changes in freight costs through a logistical model. The transportation cost changes are then fed into a multi-country computable general equilibrium model. We find that adding one customs officer at each land border crossing would, on average per crossing, generate an increase in U.S. GDP of \$350 thousand and 3.58 additional jobs.

On passenger saturation flow in public transport doors

- Transportation Research Part A: Policy and Practice---2015---Rodrigo Fernández,Alejandra Valencia,Sebastian Seriani

In previous studies the authors have shown passengers' boarding and alighting times for the Transantiago system obtained at the Pedestrian Accessibility and Movement Environment Laboratory (PAMELA) of University College London. Following this line of research, the aim of this paper is to demonstrate the existence of pedestrian saturation flows in public transport doors and show some values of this variable under different conditions. The methodology to achieve this aim was real-scale experiments performed in both PAMELA and the Human Dynamics Laboratory at Universidad de los Andes in Santiago de Chile. Different groups of people getting off a mock-up of a public transport vehicle were recorded by means of video cameras. The videos were then visually processed to find values of passenger saturation flow according to door configurations. The variables studied were the vertical gap between the platform and the vehicle chassis and the width of the door. Results indicate that it is possible to define values of passenger saturation flows for different characteristics of public transport doors. These values proved to be statistically sensitive to both the vertical gap and the width of the door. In addition, results indicate that there seems to be both a vertical gap and a door width for which the flow of passenger reaches its optimum rate.

Of “white crows” and “cash savers:” A qualitative study of travel behavior and perceptions of ridesharing in Denmark

- Transportation Research Part A: Policy and Practice---2015---Jesper Riber Nielsen,Harald Hovmøller,Pascale-L. Blyth,Benjamin K. Sovacool

Based on original research collected through semi-structured research interviews and five focus groups throughout Denmark, this study explores Danish perceptions about ad hoc, acquaintance-based, and

organization-based ridesharing (“carpooling”). Using a grounded, qualitative factor analysis approach, it investigates the elements that influence the adoption (and non-adoption) of ridesharing and identifies market segments and business models that may enable planners to overcome existing barriers. The article finds that Danish drivers and commuters appear to be split on the topic. Negative perceptions reported by respondents include lack of availability and difficulty finding rides, viewing ridesharing as unsafe or unsecure, and expectations of social awkwardness, among others. Positive perceptions reported include cost savings compared to public and private transport, greater flexibility of travel times, and the ability to socialize with vehicle occupants. These contrasting views lead us to conclude that existing theories and models of ridesharing behavior may need to be fundamentally rethought, both in Denmark and possibly elsewhere. Our results also suggest that ridesharing efforts framed around climate change or environmental sustainability will not likely be successful in Denmark.

The impact of competition on container port (in)efficiency

- Transportation Research Part A: Policy and Practice---2015---Gabriel Figueiredo De Oliveira,Pierre Cariou

There are many studies on container port efficiency and that seek to understand what factors, such as technical and scale efficiency, private versus public terminal management or macro-economic factors, play on the efficiency score of a given port. There are fewer studies that focus on the role played by the inter-port competitive environment. This role remains difficult to assess. In fact, on the one hand, a port subject to high inter-port competition may record higher efficiency scores due to the pressure from the competitive environment. On the other hand, a port subject to high competition may be forced to over-invest and could therefore records a lower efficiency score. This article investigates this issue and examines how the degree of competition measured at different levels (local, regional and global level) impacts the efficiency score of a given container

port. To do so, we implement a truncated regression with a parametric bootstrapping model. The model applied to information gathered for 200 container ports in 2007 and 2010 leads to the following conclusions: port efficiency decreases with competition intensity when measured in a range of 400–800km (regional level); and the effect from competition is not significant when competition is measured at a local (less than 300km) or at a global (more than 800km) level. Estimates also show a tendency for ports who invested from 2007 to 2010 to experience a general decrease in efficiency scores, an element which could be explained by the time lag between the investment and the subsequent potential increase in container throughput.

Engineering condition assessment of cycling infrastructure: Cyclists’ perceptions of satisfaction and comfort

- Transportation Research Part A: Policy and Practice---2015---J.C. Calvey,J.P. Shackleton,M.D. Taylor,R. Llewellyn

The UK National Cycle Network comprises 23,660km of cycling and walking paths of which a significant percentage is dedicated off-road infrastructure. This represents a significant civil engineering infrastructure asset that currently contributes to the provision of a sustainable transport mode option nationwide. Commuting and recreational cyclists have observed the often hazardous conditions on these paths. There are various simple measures that could be taken to improve the maintenance of such off-road paths. Reliance on walk-over surveys (direct visual inspection) and path users notifying the local authority may not be tackling maintenance in a resource efficient manner. The proposed inspection method includes the use of an instrumented bicycle to examine cycle path condition through user perception of satisfaction and quality. A questionnaire was conducted to identify the attributes of off-road cycling infrastructure people find most important in relation to their personal satisfaction. An exploratory factor analysis was undertaken on perception study data to elucidate the determination of the variables associated with perceived user satisfaction.

The study has shown that people find maintenance issues to be of high importance, especially surface issues. From exploratory factor analysis of results, satisfaction has been found to load with comfort and safety. Field testing was then conducted using subjective user opinions and objective vibration data. These results were then used to assist the creation of dedicated user perception based surface condition rating-scales.

Why early adopters engage in interpersonal diffusion of technological innovations: An empirical study on electric bicycles and electric scooters

- Transportation Research Part A: Policy and Practice---2015---Sebastian Seebauer

Early adopters promoting electric vehicles in their social network may speed up market uptake of this technology. Apart from their opinion leader status, few previous research details the motivations which turn early adopters into advocates for innovation who approach the non-adopters among their family and friends, or casual acquaintances.

Factors affecting public transportation usage rate: Geographically weighted regression

- Transportation Research Part A: Policy and Practice---2015---Yu-Chiun Chiou,Rong-Chang Jou,Cheng-Han Yang

As the number of private vehicles grows worldwide, so does air pollution and traffic congestion, which typically constrain economic development. To achieve transportation sustainability and continued economic development, the dependency on private vehicles must be decreased by increasing public transportation usage. However, without knowing the key factors that affect public transportation usage, developing strategies that effectively improve public transportation usage is impossible. Therefore, this study respectively applies global and local regression models to identify the key factors of usage rates for 348 regions (township or districts) in Taiwan. The global regression model, the Tobit regression model (TRM), is used to estimate

one set of parameters that are associated with explanatory variables and explain regional differences in usage rates, while the local regression model, geographically weighted regression (GWR), estimates parameters differently depending on spatial correlations among neighbouring regions. By referencing related studies, 32 potential explanatory variables in four categories, social-economic, land use, public transportation, and private transportation, are chosen. Model performance is compared in terms of mean absolute percentage error (MAPE) and spatial autocorrelation coefficient (Moran' I). Estimation results show that the GWR model has better prediction accuracy and better accommodation of spatial autocorrelation. Seven variables are significantly tested, and most have parameters that differ across regions in Taiwan. Based on these findings, strategies are proposed that improve public transportation usage.

Testing personalized outreach as an effective TDM measure

- Transportation Research Part A: Policy and Practice---2015---William Riggs

Urban college campuses often face challenges providing maximum transportation accessibility. Many believe strategies to 'push' and 'pull' individuals out of private automobiles will reduce emissions and mitigate the need for parking. This study focuses on UC Berkeley' s evaluation of a program that conducts targeted outreach to encourage shifts away from driving. The program provides customized information on commute alternatives, and is evaluated using descriptive as well as inferential statistics, focusing on effectiveness. Although the sample size is small, the findings show that a large component of program participants (8%) changed modes. Interviews with commuters evaluated potential barriers, including the adequacy, safety and convenience of alternatives. The study concluded that information alone is not adequate to draw individuals away from autos; other efforts to reach patrons must make driving alternatives easy and appealing. More research is needed on the interplay between outreach efforts and mode shift. Additional research and pol-

icy outcomes for urban campuses include: (1) a focus on information technology aided ride matching or car-pooling; and (2) an increased focus on the telework environment. These strategies can assist urban campuses to refine comprehensive transportation demand management programs.

Empirical distributions of vehicle use and fuel efficiency across space: Implications of asymmetry for measuring policy incidence

- Transportation Research Part A: Policy and Practice---2015---Jonathan A. Cook,James Sanchirico,Deborah Salon,Jeffrey Williams

Concerns about local air pollution and climate change have prompted all levels of government to consider a variety of policies to reduce vehicle dependence and fuel consumption, as the transportation sector is one of the largest sources of local and global emissions. Because many of the policy options under consideration are market-based (e.g., gasoline tax, carbon tax), it is important to consider how the impacts would vary across space and affect different subpopulations. Evaluating incidence is relevant for both the expected costs and benefits of a particular policy, however detailed data on vehicle-miles traveled (VMT) and fuel consumption allowing for the distributions of these variables to be estimated at a fine geographic scale is rarely available. This paper uses a unique dataset with more than 20million vehicles in California to derive estimates of VMT and fuel consumption in order to examine the spatial distribution of impacts for an increase in the price of gasoline as well as the consequences of using different statistics for policy evaluation. Results show that VMT and fuel consumption distributions are not symmetrically distributed and vary significantly within transportation planning regions. To understand the potential implications of this asymmetry, we do a back of the envelope comparison using the mean and mode of the VMT or fuel consumption distribution for policy analysis. We find that assuming a symmetric distribution can lead to a divergence of 20–40% from the estimates based on the empirical distribution. Our results, therefore, introduce caution in interpreting the

incidence of policies targeting the transportation sector based on averages.

Assessment of spatial transferability of an activity-based model, TASHA

- Transportation Research Part A: Policy and Practice---2015---Farhana Yasmin,Catherine Morency,Matthew J. Roorda

Spatial transferability has been recognized as a useful validation test for travel demand models. To date, however, transferability of activity-based models has not been frequently assessed. This paper assesses the spatial transferability of an activity-based model, TASHA (Travel Activity Scheduler for Household Agents), which has been developed for the Greater Toronto Area (GTA), Canada. TASHA has been transferred to the context of the Island of Montreal, Canada using the 2003 Origin–Destination (O–D) travel survey and the 2001 Canadian Census. It generates daily schedules of activities (individual and joint) for each individual in this region. The modelled activity attributes (frequency, start time, duration and distance) from TASHA and observed attributes from the 2003 O–D travel survey are compared for five different activities (i.e. work, school, shopping, other, and return to home). At the aggregate level, TASHA provides quite reasonable outcomes (in some cases – better results than for the Toronto Area) for all four attributes for work, school and return to home activities with few exceptions (for instance, school start time). The model outcomes are also promising for shopping frequency and start times; however, TASHA provides larger differences for average shopping durations and distances. Only the forecasts for all four attributes for the ‘other’ activity type differ greatly with the observed attributes for the Montreal Island. These large differences most likely indicate the differences in behaviour between the Montreal Island and the Toronto Area. In general, we conclude that re-estimation of model parameters and the use of local activity attribute distributions (frequency, start time and duration) is a desirable step in the transfer of the TASHA model from one context to another.

Do Atlanta residents value MARTA? Selecting an autoregressive model to recover willingness to pay

- Transportation Research Part A: Policy and Practice---2015---Gregory S. Macfarlane,Laurie A. Garrow,Juan Moreno-Cruz

Understanding homeowners' marginal willingness-to-pay (MWTP) for proximity to public transportation infrastructure is important for planning and policy. Naïve estimates of MWTP, however, may be biased as a result of spatial dependence, spatial correlation, and/or spatially endogenous variables. In this paper we discuss a class of spatial autoregressive models that control for these spatial effects, and apply them to sample data collected for the Atlanta, Georgia housing market. We provide evidence that a general-to-specific model selection methodology that relies on the generality of the spatial Durbin model (SDM) should be preferred to the classical specific-to-general methodology that begins with an assumption of no spatial effects. We show that applying the SDM raises the estimate of MWTP for transit proximity in Atlanta but also widens its confidence interval, relative to ordinary linear regression. This finding may have implications for risk estimations in land value capture forecasts and transportation policy decisions.

Public transit and labor market outcomes: Analysis of the connections in the French agglomeration of Bordeaux

- Transportation Research Part A: Policy and Practice---2015---Florent Sari

This paper investigates the links between public transport and labor market outcomes in the French agglomeration of Bordeaux. Our objective is to analyze the effects and consequences of the construction of a tramway line in some neighborhoods and municipalities of the agglomeration. These localizations are confronted to isolation and concentration of unfavorable socio-economic characteristics. Among other things, this line has permitted to facilitate the access to the

historical job center of Bordeaux for inhabitants concerned. We use difference-in-differences methods to compare labor market outcomes of inhabitants who benefit from this better access with others who do not, before and after the construction. Results show that if unemployment rate has globally decreased on the period observed, the decrease is more important for neighborhoods located close to tramway stations. More generally, it seems that the tramway project helped to reduce some socio-economic inequalities in the agglomeration of Bordeaux.

Failure rates and data driven policies for vehicle safety inspections in Pennsylvania

- Transportation Research Part A: Policy and Practice---2015---Dana Peck,H. Scott Matthews,Paul Fischbeck,Chris T. Hendrickson

Rail, truck, commercial bus, and aircraft have federally mandated safety inspection programs in the United States, while inspections of personal vehicles, which make up the majority of passenger miles, are optionally imposed at the state level. In recent years, some states have chosen to eliminate the vehicle safety inspection program because of budget constraints and concerns about program effectiveness. Currently, 26 states have a schedule for conducting safety inspections, but Pennsylvania is one of thirteen states that currently require all personal light duty vehicles to be inspected every year. The remaining states have completely eliminated safety inspection programs. However, as automobiles become safer, Pennsylvania legislators are now pushing to phase out the inspection program to reduce the costs of owning a vehicle. This study combines Pennsylvania vehicle registration data with two large samples of results from state safety inspections. We find that the state safety inspection fail rate for light-duty vehicles is 12–18%, well above the often-cited rate of 2%. Vehicles that are older than three years old or have more than about 30,000 miles can have much higher rates. When analyzing new vehicles, less than or equal to one year old, it is found that even these vehicles have a failure rate greater than zero. Furthermore, while the vehicle fleet appears to be getting safer over the past few years

by improvements in technology or other external circumstances, the inspection failure rate does not appear to be trending toward zero in the near future. We also show that accurate inspection data is limited and often incorrectly analyzed. Lastly, the importance of vehicle maintenance over a vehicle's lifetime is proven to be evident, since regular usage causes vehicles to deteriorate. We conclude that vehicle safety inspections should continue to be implemented in order to keep driving conditions safe.

The same mode again? An exploration of mode choice variability in Great Britain using the National Travel Survey

- Transportation Research Part A: Policy and Practice---2015---Eva Heinen,Kiron Chatterjee

The main focus of travel behaviour research has been explaining differences in behaviour between individuals (interpersonal variability) with less emphasis given to the variability of behaviour within individuals (intrapersonal variability). The subject of this paper is the variability of transport modes used by individuals in their weekly travel. Our review shows that previous studies have not allowed the full use of different modes in weekly travel to be taken into account, have used categorical variables as simple indicators of modal variability and have only considered a limited set of explanatory indicators in seeking to explain modal variability. In our analysis we use National Travel Survey data for Great Britain. We analyse modal variability with continuous measures of modal variability (Herfindahl–Hirschman Index, the difference in mode share between the primary and secondary mode, the total number of modes used). Taking inspiration from Hägerstrand (1970), we conceive that modal variability is determined by different types of spatial mobility constraints and find that reduced modal variability is predicted for having mobility difficulties, being aged over 60, being non-white, working full-time, living in smaller settlement, lower household income, having regular access to a car, having no public transport pass/season ticket and not owning a bicycle. The findings can support a change in perspective in transport

policy from encouraging people to replace the use of one mode with another to encouraging people to make a change to their relative use of different transport modes.

Price effects of airlines frequent flyer programs: The case of the dominant firm in Chile

- Transportation Research Part A: Policy and Practice---2015---Claudio Agostini,Diego Inostroza,Manuel Willington

Frequent flyer programs create a switching cost for the consumer and allow firms to obtain rents, for example, by exploiting the principal agent problem existing between the employee who travel and purchases the ticket and the employer paying for that ticket. In Chile LAN is the dominant airline in domestic markets and the only one that has a frequent flyer program (FFP); it faces some competition from two small carriers. Using a unique dataset for Chile, collected by ourselves from airlines websites in 2011 and 2012, we estimate the impact of the dominant airline FFP. For this purpose, we compare for each route the fares between airlines and between weekday trips (that accumulate full miles and are mainly for business purposes) and weekend trips (that accumulate less than full miles and are mainly for leisure purposes). The results show that the differential premium LAN is able to charge for weekday trips due to the FFP is around 35%. Three particularities of the Chilean market help the econometric identification: there is only one hub for all airlines (the capital city of Santiago), there is no business class in domestic flights, and none of the airlines is a low-cost carrier.

Estimation of the perceived value of transit time for containerized cargoes

- Transportation Research Part A: Policy and Practice---2015---Shuaian Wang,Xiaobo Qu,Ying Yang

This paper proposes a novel method for estimating the perceived value of transit time of containers by shipping lines. The key idea is that a shipping line's published schedule is the optimal decision that minimizes the sum

of fuel cost and time-associated costs of the containers adopted by the shipping line. Using the proposed method, we find that the adopted values of transit time for nine trans-Pacific services operated by Orient Overseas Container Line and five trans-Pacific services operated by Maersk Line are between US\$5/TEU/day and US\$30/TEU/day. We further demonstrate how the adopted value can be used for designing the optimal transit times between ports, analyzing the viability of slow-steaming, checking whether ships should speed up to catch up to connecting ships on other services, and helping to predict the market share of less polluting fuels in view of rules on air emission.

Empirical estimation of price and income elasticities of air cargo demand: The case of Hong Kong

- Transportation Research Part A: Policy and Practice---2015---Winnie Wai Ling Lo,Yulai Wan,Anming Zhang

This paper estimates the price and income elasticities of air cargo demand and examines how they may change after the 2008 financial crisis. Using a set of time series data, we simultaneously estimate the aggregated demand and supply functions of air cargo at Hong Kong International Airport (HKIA). We find that during the entire sampling period of 2001–2013, the price elasticity for air cargo transport demand at HKIA ranges from -0.74 to -0.29 , suggesting that air cargo demand in Hong Kong reacts negatively to price (as expected) but does not appear to be very sensitive to price. The income elasticity ranges from 0.29 to 1.47 and appears sensitive to seasonality adjustment approaches. However, in terms of the speed of changes, air cargo demand changes much faster than overall economy, indicating the presence of a pro-cyclical pattern of air cargo traffic with respect to the overall economy. Our analysis shows that air cargo demand becomes more sensitive to changes in both price and income after 2008.

Group attitude and hybrid sanctions:

Micro-econometric evidence from traffic law

- Transportation Research Part A: Policy and Practice---2015---Marcello Basili,Filippo Belloc,Antonio Nicita

In many legal domains hybrid sanctions – i.e. the joint use of both monetary and non-monetary sanctions – are usually applied. We suggest that one possible rationale behind this form of sanction is targeting group-specific deterrence. For some groups of agents, hybrid sanctions act indeed as a self-selection mechanism such that deterrence is obtained only after a critical threshold of infractions is reached. We apply our model to traffic law infractions and further test it, performing a micro-econometric analysis on a unique dataset of a representative sample of 50,000 Italian drivers, over six years (2003–2009), after the introduction of a penalty points system. Our findings empirically confirm our theoretical predictions. When repeated infractions are at stake, well-designed hybrid sanctions, such as the penalty point system designed for traffic law enforcement, may indeed increase overall deterrence. Our results shed new light on the role of the combined monetary and non-monetary sanctions to perform general and specific deterrence.

Relevance of the Northern Sea Route (NSR) for bulk shipping

- Transportation Research Part A: Policy and Practice---2015---Cariou Pierre,Faury Olivier

Some scholars consider that today's market conditions are in favor of the Northern Sea Route (NSR) rather than the Suez Canal Route (SCR). However, the number of bulk carriers using the NSR remains extremely limited, despite higher fuel prices since 2009 and subsequent significant fuel savings. In 2013, there were 53 transits via the Arctic, out of which 27 by oil tankers and 6 by bulk carriers. In this article we show that this result might be attributable to a factor, which is not considered in most studies: the spot freight rate to fuel ratio which governs ship owners' decisions regarding the sailing speed. Due to a low ratio since

2011, the speed of vessels on the SCR is at its lowest level, and potential NSR fuel savings are too limited to provide a viable alternative. We further argue that, contrary to most studies, internalizing NSR environmental benefits marginally improves the attractiveness of the NSR.

Port-city exhaust emission model: An application to cruise and ferry operations in Las Palmas Port

- Transportation Research Part A: Policy and Practice---2015---Miluše Tichavska, Beatriz Tovar

Exhaust emissions cause air pollution and climate change. The exhausts of shipboard fuel combustion are equally damaging particularly, so close to the environmentally sensitive mainland and island coasts, as well as at ports due to their urbanized character. This paper estimates, for the first time, exhaust pollutants related to cruise and ferry operations in Las Palmas Port and, in an island context. Emission assessment is based on a full bottom-up model and messages transmitted by the Automatic Identification System during 2011. Results are described as a breakdown of NO_x, SO_x, PM_{2.5}, CO and CO₂, according to ship classes, operative type and time, providing valuable information to environmental policy makers in port-city areas and islands under similar conditions. It is generally concluded that vessel traffic and passenger shipping in particular are a source of air pollution in Las Palmas Port. Emission maps confirm location of hot spots in quays assigned for cruise and ferry operations. Policy recommendations encourage regular monitoring of exhaust emissions and market-based incentives supported by details on polluting and operative profiles. On the other hand, feasibility studies are suggested for automated mooring, LNG bunkering facilities and also shore-side energy services, prioritizing berthing of shipping sectors (or sub-sectors) with the highest share of exhaust emissions once their local effects have been confirmed by a dispersion, exposure and impact assessment.

Lane-harmonised passenger car equivalents for heterogeneous expressway traffic

- Transportation Research Part A: Policy and Practice---2015---Jian Sheng Yeung, Yiik Diew Wong, Julius Raditya Secadiningrat

In order to account for variations in traffic composition during traffic analysis, passenger car equivalent (PCE) factors are used to convert flow rates of various vehicle classes into flow rates in terms of passenger car units (PCUs). Earlier studies have developed various methods to estimate PCE values but only a few of them are based on uninterrupted traffic flow, particularly for flow regimes with heterogeneous traffic where differential (lower) speed limits are imposed on commercial vehicles. This paper proposes a lane-harmonisation approach, which leverages on the high variation in traffic composition across the lanes, to estimate PCE factors for urban expressways. Multiple linear regression is used and the PCE factors obtained for motorcycles, light goods vehicles, and heavy goods vehicles are 0.65, 1.53, and 2.75, respectively. The estimated capacity flow rate after the application of the obtained PCE factors is around 2200 PCUs per hour per lane.

Spontaneous emergence versus technology management in sustainable mobility transitions: Electric bicycles in China

- Transportation Research Part A: Policy and Practice---2015---Peter Wells, Xiao Lin

This paper describes and seeks to understand the scale of the electric bicycle (electric two-wheeler) market in China, and to begin to explain its emergence with a view to outlining the prospects for learning from this case for applications in other countries around the world. Drawing on secondary data from Chinese government sources, electric bicycle industry websites, Chinese media sites and other sources, this exploratory paper positions the development of the electric bicycle market as occurring largely in the absence of positive policy intervention – in stark contrast to the nurturing afforded the electric car sector world-wide. The paper

develops a multi-scalar perspective of transitions theory in an institutional setting, with examples drawn from Beijing and Fuzhou, to explain the processes of change outside of the traditional reference context of technology policy and management. It is concluded that transitions theory has a greater flexibility and adaptability as an explanatory framework than previously shown, but empirically the electric two-wheeler is a weakly-embedded alternative to mainstream auto-mobility.

The reciprocal relationship between policy debate and media coverage: The case of road pricing policy in the Netherlands

- Transportation Research Part A: Policy and Practice---2015---Özgül Ardic, Jan Anne Anema, Bert van Wee

This study examined the changes in the media coverage of two road pricing schemes proposed in the Netherlands in the period 1998–2010, as well as the link between the media coverage and the policy debate. Both pricing proposals were debated for several years and neither was introduced. Our findings show that space allocation for type of overall tone (e.g. negative or positive towards a pricing proposal) and the range of issues and policy actors in the media coverage were very different for the two proposals, and for each proposal fluctuated greatly over time. Our analysis suggests that such a variation in the media coverage was a reflection of changes in the content of the policy debate (e.g. caused by the specific design features of pricing proposal under discussion, the different policy actors engaged in the debate and their messages about the proposal). This indicates that policymakers can influence the media coverage of road pricing policies to some extent by managing the policy debate. Our findings also show not only that changes in the content of the policy debate were reflected in the media coverage, but also that the media coverage influenced the policy debate: the statements or actions of policy actors received media coverage, which then in turn stimulated the policy debate. However, the influence of media on the policy debate was rather indirect, in

that policy actors mostly reacted to the messages from other policy actors reported in the media and to a lesser extent to the media coverage itself.

Activity–travel behaviour of non-workers from Bangalore City in India

- Transportation Research Part A: Policy and Practice---2015---M. Manoj, Ashish Verma

This paper presents exploratory and statistical analyses of the activity–travel behaviour of non-workers in Bangalore city in India. The study summarises the socio-demographic characteristics as well as the activity–travel behaviour of non-workers using a primary activity–travel survey data collected by the authors. Where possible, the research also compares the analysis findings with the case studies on activity–travel behaviour of non-workers, carried out in developed and developing countries. This gives an opportunity to understand the differences/similarities in the activity–travel behaviour of non-workers across diverse socio-cultural settings. The preliminary exploratory analysis shed light on the differences in activity participation, trip chaining, time-of-day preference for trip departure, and mode use behaviour of non-workers in Bangalore city. Statistical models were developed for investigating the effects of individual and household socio-demographics, land use parameters, and travel context attributes on activity participation, trip chaining, time-of-day choice, and mode choice decisions of non-workers. A few important results of the analysis are the influence of viewing television at home on out-of-home activity participation and trip-chaining behaviour, and the impact of in-home maintenance activity duration on time-of-day choice. Further, based on the findings of the initial analyses, an attempt has been made in this study to develop an integrated model that links time allocation, time-of-day choice, and trip chaining behaviour of non-workers. The study also discusses the implications of the research findings for transportation planning and policy for Bangalore city.

Assessing the impact of the National Cycle Network and physical activity lifestyle on cycling behaviour in England

- Transportation Research Part A: Policy and Practice---2015---Paul Downward,Simona Rasciute

This paper examines the association between access to National Cycle Network (NCN) routes in England and an individual's cycling behaviour whilst accounting for their broader physical activity lifestyle and controlling for their socio-economic circumstances. It identifies a positive association between access to these routes and the total minutes of any form of cycling, and the number of days that cycling takes place primarily for recreational purposes. The broader physical activity of individuals also has a positive association with cycling. Walking appears most likely to be complementary to non-recreational cycling, whilst participation in sport with all forms of cycling, but not with longer duration utilitarian trips. The research also indicates that access to NCN routes has the potential to increase such cycling further, with the exception of longer utilitarian trips, as does a more physically active lifestyle, particularly walking. The main policy implications of the research are to recognise that cycling is intrinsically linked to other physical activity, notably, walking, but that the NCN routes measured in this study primarily support longer duration recreational activity, which is also affected by sporting activity. This suggests that one avenue for achieving the health benefits of cycling may be through promoting NCN routes to harness a more generally active lifestyle and particularly in leisure, whilst sustainability may be further promoted through being linked more to other active travel such as walking. There is therefore a need to exploit the potential of such NCN route provision as part of this promotion.

Methodological challenges in modelling the choice of mode for a new travel alternative using binary stated choice data – The case of high speed rail in Norway

- Transportation Research Part A: Policy and Practice---2015---Stefan Flügel,Askill Halse,Juan de Dios Ortúzar,Luis I. Rizzi

Binary stated choices between traveller's current travel mode and a not-yet-existing mode might be used to build a forecasting model with all (current and future) travel alternatives. One challenge with this approach is the identification of the most appropriate inter-alternative error structure of the forecasting model.

Factors driving public support for road congestion reduction policies: Congestion charging, free public transport and more roads in Stockholm, Helsinki and Lyon

- Transportation Research Part A: Policy and Practice---2015---Maria Börjesson,Carl J. Hamilton,Per Näsman,Claire Papaix

Based on an across-the-board survey conducted among residents of Stockholm, Helsinki and Lyon, we explore the opinions on three policy measures to combat road congestion: congestion charging, free public transport and building more roads. The support for the two latter policies is substantially higher than the support for congestion charging, which is only supported by a majority in Stockholm. Self-interest is important for the formation of the opinion to all three policies. However, fundamental values and general political views, indicated by four attitudinal factors, are even more important in forming opinions towards the three transport policies. Of all attitudinal factors, the one indicating environmental concern most influences the support for all policies. Equity concerns, however, increase the support for free public transport and opposition to taxation increases the support for building more roads.

Quantifying the effects of driver non-compliance and communication system failure in the performance of real-time bus control strategies

- Transportation Research Part A: Policy and Practice---2015---William Phillips,Andrés del Rio,Juan Carlos Muñoz,Felipe Delgado,Ricardo Giesen

Control strategies that prevent bus bunching allow for improvement to the level of service offered by a transit corridor as well as reducing travel time and its variability, thus providing higher reliability to the user. Several optimization models based on the use of real-time information have been shown to achieve this, through the planning of holding of the buses at bus stops. In the majority of the cases the benefits of these models have been estimated assuming ideal operational conditions while only few of them have been tested in real conditions. However, neither the simulation experiment, nor the real implementations have quantified the effects of real-life phenomena that harm the performance of the system, preventing it from achieving the full potential of these control schemes.

Investigating the subjective and objective factors influencing teenagers' school travel mode choice – An integrated choice and latent variable model

- Transportation Research Part A: Policy and Practice---2015---Maria Kamargianni,Subodh Dubey,Amalia Polydoropoulou,Chandra Bhat

In this paper, we apply Bhat and Dubey's (2014) new probit-kernel based Integrated Choice and Latent Variable (ICLV) model formulation to analyze children's travel mode choice to school. The new approach offered significant advantages, as it allowed us to incorporate three latent variables with a large data sample and with 10 ordinal indicators of the latent variables, and still estimate the model without any convergence problems. The data used in the empirical analysis originates from a survey undertaken in Cyprus in 2012. The results underscore the importance of incorporating subjective attitudinal variables in school mode choice modeling.

The results also emphasize the need to improve bus and walking safety, and communicate such improvements to the public, especially to girls and women and high income households. The model application also provides important information regarding the value of investing in bicycling and walking infrastructure.

Do partners influence each other's travel patterns? A new approach to study the role of social norms

- Transportation Research Part A: Policy and Practice---2015---Maarten Kroesen

To better understand the role of social norms in relation to people's travel behavior this study addresses the question whether and to what extent partners in two-partner households influence each other's travel patterns. For example, is the male household head more likely to start using the bicycle if the female household head also uses the bicycle (and vice versa)? While this is a straightforward question, it has, to the best of the author's knowledge, not been explored in previous research. Using data from 958 couples from the German Mobility panel, the bidirectional effects between the travel patterns of male and female household heads are explored. To this end, the relatively new method of latent class transition analysis is used. The results show that, over time, travel pattern membership of the male household head influences travel pattern membership of the female household head and vice versa. Given that the effects are controlled for a range of individual and shared household characteristics, these results suggest that social norms at the household level play an important role. The paper concludes with an outlook on how the developed framework can be extended in the future.

Modeling travel behavior by the structural relationships between lifestyle, built environment and non-working trips

- Transportation Research Part A: Policy and Practice---2015---Roya Etminani-Ghasrodashti,Mahyar Ardeshiri

In the context of sustainable urban transport in developing countries, individuals' travel behavior faces multiple factors which influence their mobility patterns. Recognizing these factors could be a favorable method to organize more regular and sustainable trip patterns. This study aims to identify the less well-known lifestyle along with more popular built environment as the main factors which shape travel behaviors. Employing data from 900 respondents of 22 urban areas in city of Shiraz, Iran, this paper explores travel behaviors as non-working trip frequencies by different modes. Results of structural equation model indicate a strong significant effect of individual's lifestyle patterns on their non-working trips. However, built environment impact on travel behavior is small compared to lifestyle. Besides, other variables such as travel attitudes and socio-economic factors stay crucial in the mode choice selection. These findings indicate the necessity of regarding lifestyle orientations in travel studies as well as objective factors such as land use attributes.

Should we all just stay home? Travel, out-of-home activities, and life satisfaction

- Transportation Research Part A: Policy and Practice---2015---Eric A. Morris

How and why travel contributes to our life satisfaction is of considerable import for transportation policy and planning. This paper empirically examines this relationship using data from the American Time Use Survey. It finds that, controlling for relevant demographic, geographic, and temporal covariates, travel time per day is significantly and positively associated with life satisfaction. This relationship is attenuated, but still significant, when the amount of time spent participating in out-of-home activities is controlled for. Time spent bicycling is strongly associated with higher life satisfaction, though it attains significance only in some models; time spent walking is also quite positive, though it is not significant. However, both walking and bicycling are positively and significantly associated with life satisfaction when time spent on purely recreational walking and bicycling is included. Life satisfaction is positively and significantly associated

with time spent traveling for the purposes of eating and drinking, religious activities, volunteering, and playing and watching sports. Travel time exhibits a strong positive relationship with life satisfaction in smaller towns and cities, but in large cities the association weakens, and for very large cities travel time may actually not be associated with life satisfaction at all. This may be due to the costs of traffic congestion, which disproportionately exists in large cities. In all, while the associations between travel and life satisfaction are clear, the causal story is complex, with the positive relationships potentially being explained by (1) travel allowing us to access destinations that make us happy, (2) the act of travel itself being fulfilling, and/or (3) intrinsically happier people being more likely to travel. In all likelihood, all three factors are at play.

The politics of collective public participation in transportation decision-making

- Transportation Research Part A: Policy and Practice---2015---Carolyn McAndrews, Justine Marcus

Citizen involvement in transportation planning is typically modeled on a liberal democracy in which individuals express their preferences about a project. In this paper we present an analysis based on interviews with stakeholders whose involvement was grounded in a complementary model of public participation, one in which an organized community used collective action (instead of only individual expression), and worked both within and outside of the formal public involvement process to influence the design of an arterial highway in their neighborhood. This case reflects a commonplace context for public participation: residents opposing a highway expansion and the negative effects of heavy traffic in neighborhoods. The problem presented in this case is that the process for citizen involvement was not designed to fully utilize the community's collective capacity. Three aspects of collective action—representation, the ability to shape a policy agenda, and methods of engagement—were contested in the public participation process. We argue that these conflicts around collective action in the public

participation process exposed its “one-way communication,” and enabled a different kind of political process in which neighbors’ organizing was powerful and influenced decisions.

An investigation on the performances of mode shift models in transit ridership forecasting

- Transportation Research Part A: Policy and Practice---2015---Ahmed Osman Idris,Khandker M. Nurul Habib,Amer Shalaby

This paper aims at investigating the over-prediction of public transit ridership by traditional mode choice models estimated using revealed preference data. Five different types of models are estimated and analysed, namely a traditional Revealed Preference (RP) data-based mode choice model, a hybrid mode choice model with a latent variable, a Stated Preference (SP) data-based mode switching model, a joint RP/SP mode switching model, and a hybrid mode switching model with a latent variable. A comparison of the RP data-based mode choice model with the mode choice models including a latent variable showed that the inclusion of behavioural factors (especially habit formation) significantly improved the models. The SP data-based mode switching models elucidated the reasons why traditional models tend to over-predict transit ridership by revealing the role played by different transit level-of-service attributes and their relative importance to mode switching decisions. The results showed that traditional attributes (e.g. travel cost and time) are of lower importance to mode switching behaviour than behavioural factors (e.g. habit formation towards car driving) and other transit service design attributes (e.g. crowding level, number of transfers, and schedule delays). The findings of this study provide general guidelines for developing a variety of transit ridership forecasting models depending on the availability of data and the experience of the planner.

Characteristics of European inland ports: A statistical analysis of inland waterway port development in Dutch municipalities

- Transportation Research Part A: Policy and Practice---2015---Bart Wiegman,Patrick Witte,Tejo Spit

Most scientific attention in port studies centers on deep-sea ports, in particular container ports. In our paper, in contrast, we focus our attention on the characteristics of inland waterway ports in a European context. This is an overlooked part in the scientific literature on inland port development, which is up to now mainly concerned with US-based understandings of inland ports. We try to broaden the application of the inland port concept by explaining the development of inland ports in terms of inland waterway bounded cargo throughput. Based on a large-scale quantitative dataset of inland port development in Dutch municipalities we perform various statistical analyses to arrive at a more detailed understanding of the question: What are the characteristics of European inland waterway ports and what transport and economic factors influence cargo throughput on the municipal level? The results in particular highlight the importance of the presence of a container terminal, the diversity in types of goods which are being handled by the inland port and the accessibility of the inland port relative to the regional motorway network as important factors in explaining the size and growth of inland ports. Interestingly, the popular claim in policy of ‘investments in inland port development leading to employment growth’ cannot be confirmed.

Spatio-temporal analysis of car distance, greenhouse gases and the effect of built environment: A latent class regression analysis

- Transportation Research Part A: Policy and Practice---2015---Seyed Amir H. Zahabi,Luis Miranda-Moreno,Zachary Patterson,Philippe Barla

This work examines the temporal-spatial variations of daily automobile distance traveled and greenhouse gas

emissions (GHGs) and their association with built environment attributes and household socio-demographics. A GHGs household inventory is determined using link-level average speeds for a large and representative sample of households in three origin–destination surveys (1998, 2003 and 2008) in Montreal, Canada. For the emission inventories, different sources of data are combined including link-level average speeds in the network, vehicle occupancy levels and fuel consumption characteristics of the vehicle fleet. Urban form indicators over time such as population density, land use mix and transit accessibility are generated for each household in each of the three waves. A latent class (LC) regression modeling framework is then implemented to investigate the association of built environment and socio-demographics with GHGs and automobile distance traveled. Among other results, it is found that population density, transit accessibility and land-use mix have small but statistically significant negative impact on GHGs and car usage. Despite that this is in accordance with past studies, the estimated elasticities are greater than those reported in the literature for North American cities. Moreover, different household subpopulations are identified in which the effect of built environment varies significantly. Also, a reduction of the average GHGs at the household level is observed over time. According to our estimates, households produced 15% and 10% more GHGs in 1998 and 2003 respectively, compared to 2008. This reduction can be associated to the improvement of the fuel economy of vehicle fleet and the decrease of motor-vehicle usage – e.g., a decrease of 4% is observed for fuel efficiency rates and 12% for distance according to the raw average estimates from 1998 with respect to 2008. A strong link is also observed between socio-demographics and the two travel outcomes. While number of workers is positively associated with car distance and GHGs, low and medium income households pollute less than high-income households.

Collision course? The North Airfield Safety Study at Los Angeles International Airport (LAX)

- Transportation Research Part A: Policy and Practice---2015---Arnold Barnett,Michael Ball,George Donohue,Mark Hansen,Amedeo Odoni,Antonio Trani

The LAX North Airfield Safety Study was undertaken by an Academic Panel consisting of the present authors, and was based in large part on a simulation that was conducted at FutureFlight Central at NASA Ames Research Center. The primary aim of the study was “to estimate as specifically as possible the level of future safety associated with several geometrical configurations of the LAX North Airfield.” This paper describes the study, and how it combined information from human-in-the-loop simulations at NASA with historical data from LAX and other US airports about runway incursions and collisions. The analysis indicated that, even under its existing physical layout, LAX North would experience very low risk of runway collisions at traffic levels projected for 2020. That risk could be reduced by about half if the North Airfield runways were reconfigured, and some reconfigurations would also add appreciably to the operational efficiency of the airport. But because the “baseline” level of risk is so low, the Study concluded that “it would be difficult to construct a compelling case on safety grounds alone for reconfiguring the North Airfield.”

Modeling the impacts of alternative emission trading schemes on international shipping

- Transportation Research Part A: Policy and Practice---2015---Kun Wang,Xiaowen Fu,Meifeng Luo

Various market-based measures have been proposed to reduce CO₂ emissions from international shipping. One promising mechanism under consideration is the Emission Trading Scheme (ETS). This study analyzes and benchmarks the economic implications of two alternative ETS mechanisms, namely, an open ETS compared to a Maritime only ETS (METS). The analytical solutions and model calibration results allow us to quantify

the impacts of alternative ETS schemes on the container shipping sector and the dry bulk shipping sector. It is found that an ETS, whether open or maritime only, will decrease shipping speed, carrier outputs and fuel consumption for both the container and dry bulk sectors, even in the presence of a “wind-fall” profit to shipping companies. Under an open ETS, the dry bulk sector will suffer from a higher proportional reduction in output than the container sector, and will thus sell more emission permits or purchase fewer permits. Under an METS, container carriers will buy emission permits from the dry bulk side. In addition, under an METS the degree of competition within one sector will have spill-over effects on the other sector. Specifically, when the sector that sells (buys) permits is more collusive (competitive), the equilibrium permit price will rise. This study provides a framework for identifying the moderating effects of market structure and competition between firms on emission reduction schemes, and emphasizes the importance of understanding the differential impacts of ETS schemes on individual sectors within an industry when considering alternative policies.

Cost-efficiency benchmarking of European air navigation service providers

- Transportation Research Part A: Policy and Practice---2015---Volodymyr Bilotkach, Simone Gitto, Radosav Jovanović, Juergen Mueller, Eric Pels

This study uses EUROCONTROL data on operating performance of the national air navigation service providers over the 2002–2011 time period to document in detail the efficiency changes across providers and time using data envelopment analysis. Our results suggest that overall providers’ productivity improved over the time period covered by the data, driven by improvements in technical rather than allocative efficiency. However, some trend reversals in the post-2008 crisis period are also observed.

A hierarchical customer satisfaction framework for evaluating rail transit systems of Istanbul

- Transportation Research Part A: Policy and Practice---2015---Nezir Aydin, Erkan Celik, Alev Taskin Gumus

This paper provides a hierarchical customer satisfaction framework to measure rail transit lines’ performances in Istanbul. The problems related to rail transit line systems are addressed via customer satisfaction surveys. Then, a framework is proposed combining statistical analysis, fuzzy analytic hierarchy process, trapezoidal fuzzy sets and Choquet integral to evaluate customer satisfaction levels. Next, the criteria need to be improved are determined and specific recommendations to enhance the operation for specific lines are suggested. The proposed framework provides directions for the future investments and it also can be used at a more macroscopic level to determine the operational deficiencies. Furthermore, it can be generalized and applied to complex decision making problems that include uncertain and subjective data or vague information.

Deep subterranean railway system: Acceptability assessment of the public discourse in the Seoul Metropolitan Area of South Korea

- Transportation Research Part A: Policy and Practice---2015---Younshik Chung, Hyun Kim

The objective of this study is to analyze the public acceptability of deep subterranean railway systems, which will be constructed in the space 40m below ground level and will be operated at twice the speed of the existing subway system. Although such railway systems have been feasible in terms of construction technologies and economics, public acceptability must be considered for the successful introduction of such a new public infrastructure. Therefore, to perform the analysis of public acceptability, a telephone-based survey was conducted for residents in the vicinity of the planned the deep subterranean railway systems. As a result, about 70% of the respondents answered that they took a neutral or opposing attitude to introducing the deep subterranean railway systems. Awareness of the deep

subterranean railway systems has a positive impact on its acceptability. In addition, the acceptability is found to show a negative relationship with environment and inconvenience factors. Based on the analysis results, an affective approach through soft measures such as awareness campaigns and advertisements is recommended to effectively address and mitigate the concerns and issues raised by the public.

Modelling market diffusion of electric vehicles with real world driving data – German market and policy options

- Transportation Research Part A: Policy and Practice---2015---Till Gnann,Patrick Plötz,André Kühn,Martin Wietschel

Plug-in electric vehicles (PEVs) have the potential to reduce green house gas emissions from the transport sector. However, the limited electric range of PEVs could impede their market introduction. Still some potential users are willing to pay more for PEVs. The combined effect of these and other influencing factors as well as the resulting future market evolution are unclear. Here, we study the market evolution of PEVs in Germany until 2020. Our results reveal a great deal of uncertainty in the market evolution of PEVs due to external conditions and the users' willingness to pay. We find the future share of PEVs in German passenger car stock to range from 0.4% to almost 3% by 2020. Energy prices have a large impact on PEV market evolution as a 25% increase in fuel prices would double the number of PEVs in stock by 2020 compared to a reference scenario. We find a special depreciation allowance for commercial vehicles and a subsidy of 1000Euro as the most effective and efficient monetary policy options. The high uncertainty of the market evolution implies that policies to foster market diffusion of PEVs should be dynamically adaptable to react to changing framework conditions.

Who cycles more? Determining cycling frequency through a segmentation approach in Montreal, Canada

- Transportation Research Part A: Policy and Practice---2015---Gabriel Damant-Sirois,Ahmed M. El-Geneidy

The decision to cycle frequently in an urban setting is a complex process and is affected by a variety of factors. This study analyzed the various factors influencing cycling frequency among 1707 cyclists from Montreal, Canada using an ordinal logistic regression. A segmentation of cyclists is used in a series of ordinal logistic models to better understand the different impacts of variables on the frequency of cycling among each group of cyclists for commute and for utilitarian purposes. Our models show a variation in the impacts of each dependent variable on frequency of cycling across the various segments of cyclists. Mainly making cyclists feel safe not only on bicycle specific infrastructure but also on regular streets, emphasizing the low cost, convenience and improving the opinion on cycling in the population are effective interventions to increase bicycle usage. Also, it was shown that women were less likely to cycle to work than men, but more likely to cycle for other utilitarian trips, pointing at the presence of specific barriers to commuting for woman. Although the findings from this study are specific to Montreal, they can be of interest to transportation planners and engineers working toward increasing cycling frequency in other regions.

The use of self-monitoring solutions amongst cyclists: An online survey and empirical study

- Transportation Research Part A: Policy and Practice---2015---Lukasz Piwek,Adam Joinson,James Morvan

Self-monitoring has been shown to be one of the most efficient behaviour change techniques to promote physical activity. However, there has been no research on the exact nature and impact of using various self-monitoring solutions (e.g. cycle computer, cadence monitor, smartphone' physical activity apps) amongst

cyclists. Initially, an online survey was conducted with 227 adults who did or did not use self-monitoring solutions with their cycling. We found that the most important features for cyclists who use self-monitoring are: time it takes to travel, cycling speed, and distance covered. In contrast, cyclists who do not use self-monitoring perceived features related to location (e.g. directions with maps) as the most important ones. In a subsequent study we included self-monitoring solutions as a part of mixed-design, small-scale, longitudinal intervention aimed at changing transportation patterns. We found that self-monitoring is mainly suitable for performance oriented cyclists rather than recreational cyclists. We discuss the implications of those results for designing interventions to promote cycling.

Six years of CO2-based tax incentives for new passenger cars in The Netherlands: Impacts on purchasing behavior trends and CO2 effectiveness

- Transportation Research Part A: Policy and Practice---2015---Robert Kok

There is growing evidence that consumers respond more effectively to upfront price signals, such as vehicle purchase taxes and feebate policies, and to tax incentives that are more salient than others, such as company car taxes graded by CO2 emissions. This paper examines tax changes in The Netherlands, which are among the most stringent and most salient in Europe, and assesses the ex-post purchasing impacts and CO2 effectiveness of six years of CO2-based tax incentives for low-carbon cars in The Netherlands. Dutch tax incentives resulted in 13g/km, or 11% lower average CO2 emissions in 2013. The Netherlands has moved from the 12th position before the tax changes in 2007 to become Europe's number one in terms of the lowest average new car CO2 emissions and highest share of electric vehicles in 2013. Tax incentives for new cars sold between 2008 and 2013 have resulted in 4.6 million tons of potential lifetime CO2 abatement at the cost of a drop in tax revenues of 30–50%. However, when corrected for the Dutch policy-induced increasing real-world fuel-economy shortfall and leakage of

carbon reduction potential through vehicle export of low-carbon cars, only 3.5 million tons or 75% of the CO2 reduction remains. CO2-based tax incentives for company cars seem to have contributed the most to the observed turnaround in purchasing behavior towards lower CO2-emitting passenger cars.

Heavy-duty trucking and the energy efficiency paradox: Evidence from focus groups and interviews

- Transportation Research Part A: Policy and Practice---2015---Heather Klemick,Elizabeth Koppits,Ann Wolverson,Keith Sargent

Theory suggests that profit maximizing firms have an incentive to incorporate cost-effective technologies into their products. However, simple net present value calculations comparing upfront costs of fuel-saving technologies to future savings suggest this is not always the case. This puzzle is commonly referred to as the “energy efficiency paradox.” A growing number of empirical studies examine why households may under-invest in energy efficiency. Fewer studies examine similar undervaluation by businesses. We explore investment decisions within the heavy-duty trucking sector for fuel-saving technologies via focus groups and interviews to gain insight into what factors might explain apparent underinvestment in fuel-saving technologies. We find some evidence that market failures related to lack of information about technology performance and network externalities contribute to slow adoption of some technologies. However, information about new technologies for tractors seems to generate limited spillovers. There is also some evidence of split incentives between owners and drivers, though companies have invested in a variety of technologies and approaches in an attempt to address these effects. Other factors important in trucking investment decisions that are not classic market failures include tradeoffs between fuel economy and other valued truck attributes, as well as uncertainty and risk associated with new technologies if decision-makers are loss averse.

Preparing a nation for autonomous vehicles: opportunities, barriers and policy recommendations

- Transportation Research Part A: Policy and Practice---2015---Daniel J. Fagnant,Kara Kockelman

Autonomous vehicles (AVs) represent a potentially disruptive yet beneficial change to our transportation system. This new technology has the potential to impact vehicle safety, congestion, and travel behavior. All told, major social AV impacts in the form of crash savings, travel time reduction, fuel efficiency and parking benefits are estimated to approach \$2000 to per year per AV, and may eventually approach nearly \$4000 when comprehensive crash costs are accounted for. Yet barriers to implementation and mass-market penetration remain. Initial costs will likely be unaffordable. Licensing and testing standards in the U.S. are being developed at the state level, rather than nationally, which may lead to inconsistencies across states. Liability details remain undefined, security concerns linger, and without new privacy standards, a default lack of privacy for personal travel may become the norm. The impacts and interactions with other components of the transportation system, as well as implementation details, remain uncertain. To address these concerns, the federal government should expand research in these areas and create a nationally recognized licensing framework for AVs, determining appropriate standards for liability, security, and data privacy.

The distribution of crowding costs in public transport: New evidence from Paris

- Transportation Research Part A: Policy and Practice---2015---Luke Haywood,Martin Koning

Whilst congestion in automobile traffic increases trip durations, this is often not the case in rail-based public transport where congestion rather leads to in-vehicle crowding, often neglected in empirical studies. Using original survey data from Paris, this article assesses the distribution of comfort costs of congestion in public transport. Estimating willingness to pay for less

crowded trips at different levels of in-vehicle passenger density we cannot reject a simple linear relationship between crowding costs and density. We apply our results to the cost-benefit analysis of a recent Parisian public transport project.

The economic regulation of railway networks: A worldwide survey

- Transportation Research Part A: Policy and Practice---2015---Antonio Laurino,Francesco Ramella,Paolo Beria

The rapid expansion of car use in the second half of the 20th century together with growing inefficiencies in the publicly run railways, led to traffic decline and financial difficulties for many railway companies. In order to face this situation, various structural reforms have been introduced which have increased the level of private sector involvement, strengthening the need of sound economic regulation. Starting from a desk survey, the paper reviews the resulting railways models for 20 countries. The main characteristics of each regulatory system have been collected and analyzed in order to provide an ex-ante overview of the current practices, both in quantitative and qualitative terms. Results show how public subjects still play a dominant role as infrastructure managers and frequently also as service providers in vertically integrated structures. Limited cases of privatization occurred. Our survey evidence how each country has developed its own framework according to its transport system, political context, economic situation, business and regulatory environment. Further researches are needed to study the ex-post performance of the industry providing empirical evidences of the impacts of the reforms.

Impact evaluation of a mass transit fare change on demand and revenue utilizing smart card data

- Transportation Research Part A: Policy and Practice---2015---Zi-jia Wang,Xiao-hong Li,Feng Chen

Transit fares are an effective tool for demand management. Transit agencies can raise revenue or relieve

overcrowding via fare increases, but they are always confronted with the possibility of heavy ridership losses. Therefore, the outcome of fare changes should be evaluated before implementation. In this work, a methodology was formulated based on elasticity and exhaustive transit card data, and a network approach was proposed to assess the influence of distance-based fare increases on ridership and revenue. The approach was applied to a fare change plan for Beijing Metro. The price elasticities of demand for Beijing Metro at various fare levels and trip distances were tabulated from a stated preference survey. Trip data recorded by an automatic fare collection system was used alongside the topology of the Beijing Metro system to calculate the shortest path lengths between all station pairs, the origin–destination matrix, and trip lengths. Finally, three fare increase alternatives (high, medium, and low) were evaluated in terms of their impact on ridership and revenue. The results demonstrated that smart card data have great potential with regard to fare change evaluation. According to smart card data for a large transit network, the statistical frequency of trip lengths is more highly concentrated than that of the shortest path length. Moreover, the majority of the total trips have a length of around 15km, and these are the most sensitive to fare increases. Specific attention should be paid to this characteristic when developing fare change plans to manage demand or raise revenue.

Estimating cycleway capacity and bicycle equivalent unit for electric bicycles

- Transportation Research Part A: Policy and Practice---2015---Sheng Jin,Xiaobo Qu,Dan Zhou,Cheng Xu,Dongfang Ma,Dianhai Wang

With the rapid increase of electric bicycles (E-bikes) in China, the heterogeneous bicycle traffic flow comprising regular bicycles and E-bikes using shared cycleway creates issues in terms of efficiency as well as safety. Capacity and bicycle equivalent units (BEUs) for E-bikes are two most important parameters for the planning, design, operation, and management of bicycle facilities. In this paper, eight traffic flow fundamental

diagrams are developed for one-way cycleway capacity estimation, and a novel BEU estimation model is also proposed. Eleven datasets from different shared cycleway sections with different cycleway widths were collected in Hangzhou, China for estimation and evaluation purposes. The results indicate that, with around 70% share of E-bikes, the mean estimated capacity is 2348bicycle/h/m. The effects on the capacity of the proportions of E-bikes, gender of cyclists, age of cyclists, and cyclists carrying things were also analyzed. The results implied that the estimated capacity is independent of a cyclist's gender and age, but increases with the proportion of E-bikes. According to this study, the mean BEU for the E-bike is 0.66, and the converted capacities of pure regular bicycles and pure E-bikes are 1800 and 2727bicycle/h/m, respectively. These findings can be used to propose practical countermeasures to improve the capacity of heterogeneous bicycle traffic flow on shared cycleway.

Can carsharing meet the mobility needs for the low-income neighborhoods? Lessons from carsharing usage patterns in New York City

- Transportation Research Part A: Policy and Practice---2015---Kyeongsu Kim

For decades, carsharing has become an attentive dialogue among transportation planners and civic groups who have long supported and business owners and government officials who see carsharing as a means to realize their interests i.e., another market for revenue generation and replacement of government own vehicles with carshare units. It has particularly drawn attention in New York City (NYC). As of today, NYC is the largest carsharing market in the United States, accounting for about one third of all North American carsharing members. In addition to market-driven forces, the City government has pronounced pro-carsharing policies. Yet carsharing is still considered as an exclusive program to middle-income, white, and young populations. The purpose of this study is to see if carsharing can help meet the mobility demand for urban residents, especially in the marginalized neighborhoods. By investigating a leading carsharing pro-

gram – Zipcar’ s vehicle utilization pattern in NYC, I attempt to disentangle how neighborhoods with different socio-demographics are associated with carsharing usage. The study result revealed that there is high demand for midsize (standard) vehicles on weekdays and weeknights. In addition, carsharing usage was highly correlated with the number of total vehicles, not the number of Zipcar parking lots, if the cars are accessible within walking distances. More importantly, carsharing in low-income neighborhoods did not differ from the typical carsharing locations. What matters is the affordability. Hence, there is no reason not to consider new services or expanding existing service boundaries to the outer boroughs in the future.

Innovation strategy in new transportation systems: The case of Crossrail

- Transportation Research Part A: Policy and Practice---2015---Mark Dodgson,David Gann,Sam MacAulay,Andrew Davies

This article examines how innovation can be strategically incorporated into transportation systems. Large transportation systems generally have a poor record in systematically integrating innovation in their development, construction and operation. Our research setting is Crossrail, a major new railway traversing London, where the creation and implementation of an innovation strategy formalized and systemized its approach to innovation. Based on in-depth, semi-structured interviews with project leaders and participant observation, the paper critically analyses the formulation, implementation and performance of Crossrail’ s innovation strategy. Crossrail’ s management explicitly uses an ‘open innovation’ strategy that incentivizes partners, contractors, and clients to innovate in the project. Its strategy guides decisions and priorities on innovation and the types and levels of innovation that best match project aims. The paper holds lessons for those developing, operating and studying large transportation systems both now and into the future.

Sustainable urban transit network design

- Transportation Research Part A: Policy and Practice---2015---Moschoula Pternea,Konstantinos Kepaptsoglou,Matthew G. Karlaftis

Sustainability is a requirement for modern public transportation networks, as these are expected to play a critical role in environment-friendly transportation systems. This paper focuses on developing an efficient model for solving a sustainable oriented variant of the Transit Route Network Design Problem. The model incorporates sustainable design objectives, considers emission-free (electric) vehicles and introduces a direct route design approach with route structure and directness control. An application in a real world case, highlights the performance and benefits of the proposed model.

Does crowding affect the path choice of metro passengers?

- Transportation Research Part A: Policy and Practice---2015---Kyung Min Kim,Sung-Pil Hong,Suk-Joon Ko,Dowon Kim

This paper investigates crowding effect on the path choice of metro passengers. We show people reroute not only to avoid the delay from crowding but also to evade crowding itself. More specifically, a logit model fits best when it uses the transit delay from crowding as well as the passenger load of a connection in addition to the conventional explanatory variables. Also, we demonstrate that crowding decreases the overall welfare of metro passengers. The model is tested on the real path choice data acquired by the recent algorithm by Hong et al. (2015) known to detect the real path choice from Smart Card data in more than 90% of the cases.

The impact of extreme weather conditions on long distance travel behaviour

- Transportation Research Part A: Policy and Practice---2015---Alberto Zanni,Tim J. Ryley

This paper examines traveller attitudes and responses towards disruption from weather and natural events. An internet-based travel behaviour survey was conducted with more than 2000 respondents in London and Glasgow. Of these respondents, 740 reported information on over 1000 long distance trips affected by extreme weather and natural events over the previous three years. Results show respondents are generally cautious towards travelling during extreme weather events. For a slight majority in the case of air and public transport, and a greater one in the case of car, travellers did not considerably alter their travel plan following the disruption. This was explained not only by less disruptive weather conditions (with heavy snow and volcanic ash being the most disruptive) and impact, but also by the relative importance of their trips. Differences between transport modes were not substantial. Business trips sometimes appeared to give travellers more flexibility, some other times not. Origin and destination did have an impact on reaction, as well as the presence of children whilst travelling. Mixed results were obtained about socio-economic and attitudinal variables. Age in particular did not appear to have a significant effect. Whilst most respondents did acknowledge no external influence in their decision, results showed an important contribution of transport organisation staff, as well as home and mobile internet technology. A limited but still considerable number of respondents indicated their closest friends/relatives as the main influence of their decisions. The results will help planners deploy strategies to mitigate the negative effects of weather related disruptions.

Check-in allocation improvements through the use of a simulation–optimization approach

- Transportation Research Part A: Policy and Practice---2015---Miguel Mujica Mota

The aeronautical industry is still under expansion in spite of the problems it is facing due to the increase in oil prices, limited capacity, and novel regulations. The expansion trends translate into problems at different locations within an airport system and are more evident when the resources to cope with the demand are

limited or are reaching to their limits. In the check-in areas they are appreciated as excessive waiting times which in turn are appreciated by the customers as bad service levels. The article presents a novel methodology that combines an evolutionary algorithm and simulation in order to give the best results taking into account not only the mandatory hard and soft rules determined by the internal policies of an airport terminal but also the quality indicators which are very difficult to include using an abstract representation. The evolutionary algorithm is developed to satisfy the different mandatory restrictions for the allocation problem such as minimum and maximum number of check-in desks per flight, load balance in the check-in islands, opening times of check-in desks and other restrictions imposed by the level of service agreement. Once the solutions are obtained, a second evaluation is performed using a simulation model of the terminal that takes into account the stochastic aspects of the problem such as arriving profiles of the passengers, opening times physical configurations of the facility among other with the objective to determine which allocation is the most efficient in real situations in order to maintain the quality indicators at the desired level.

Analysis on line capacity usage for China high speed railway with optimization approach

- Transportation Research Part A: Policy and Practice---2015---Jiamin Zhang

The purpose for the analysis of capacity usage is to utilize the rail infrastructure in a more efficient and practical way. The practical and theoretical challenge of the rail capacity is its dynamics and uncertainty, which are common in China and elsewhere. Based on the capacity balance, a train service-demand intention set (TSDIS) at High-Speed Rail (HSR) line ($t@l$ -TSDIS) is defined, which takes the number of trains, the average speed, the heterogeneity and the stability as the core elements for the capacity usage. For dynamics and uncertainty, we update the norm for capacity measure as the time needed to fulfill the task list $t@l$ -TSDIS. Then we develop the objectives and constraints for the Mathematical Program for Line Capacity (MPLC), which aims at

minimization of heterogeneity and running time as well as maximization of reliability. For solving MPLC, the Pareto Archived Evolutionary Strategy (PAES) and fuzzy logic penalty function are introduced. Furthermore we propose a rolling optimization tactic oriented by the practical problem, which combines the improved Pareto Archived Evolutionary Strategy (iPAES) with an interactive technique. In a case study, we apply the proposed ideas and methodology to Beijing-Shanghai HSR (BS-HSR) line much closer to the railway practice. By using the computer language C# to compile the Console program, Pareto optimized results for MPLC are achieved, including the standard and practical values for the heterogeneity indices, reliability indices and running time indices. We also discuss the sensitivity of the heterogeneity index. This research demonstrates that it is useful to analyze the line capacity usage for China HSR with the proposed optimization approach.

The myth of traffic-responsive signal control: Why common sense does not always make sense

- Transportation Research Part A: Policy and Practice---2015---Ruth Evers,Stef Proost

Intuitively, one is inclined to think that traffic-responsive signal control is the most efficient control policy. In this paper, however, we show that for an intersection of two routes connecting one origin-destination pair where only one route is subject to congestion, anticipatory signal control performs better than traffic-responsive signal control. Furthermore, the unfolded logic behind this result suggests that the superiority of anticipatory signal control also extends to other networks.

Commuting-related fringe benefits in the Netherlands: Interrelationships and company, employee and location characteristics

- Transportation Research Part A: Policy and Practice---2015---Linda Nijland,Martin Dijst

Mobility management measures taken by firms could potentially result in more sustainable transport choices and hence reduce traffic congestion and emissions.

Fringe benefits offered to employees are a means to implement those measures. This paper explores the most common commuting-related fringe benefits currently provided by employers in the Netherlands, namely telework, flextime and allowance types like public transport passes, bicycle contribution, company cars and general financial compensation. By using the Dutch National Time Use Survey (TBO) 2005/2006, interrelationships among fringe benefits and correlations between company, employee, and (home and work) location characteristics and those employee benefits could be investigated. Logistic regressions and Tobit models are used for several estimations indicating the provision and the use of fringe benefits. The results show that relationships among fringe benefits exist, mainly between telework and flextime, but also between those flexible work arrangements and some types of commuting allowance. Furthermore, numerous job, person and geographical variables affect the probability of receiving and using the fringe benefits. For example, in the non-profit and the public sector sustainable commuting benefits are more often provided, the use of fringe benefits is strongly influenced by household composition and several allowance types show a significant correlation with the number of cars in the household. Moreover, firm location, in particular firm density, is highly related to mobility management measures taken by firms.

The impact of Low Emission Zones on particulate matter concentration and public health

- Transportation Research Part A: Policy and Practice---2015---Christiane Malina,Frauke Schefler

A common policy for reducing particulate matter concentrations in the European Union is the introduction of Low Emission Zones (LEZs), which may only be entered by vehicles meeting predefined emission standards. This paper examines the effectiveness of LEZs for reducing PM10 levels in urban areas in Germany and quantifies the associated health impacts from reduced air pollution within the zones. We employ a

fixed effects panel data model for daily observations of PM10 concentrations from 2000 to 2009 and control, *inter alia*, for local meteorological conditions and traffic volume. We apply the regression outputs to a concentration response function derived from the epidemiological literature to calculate associated health impacts of the introduction of LEZs in 25 German cities with 3.96 million inhabitants. Associated uncertainties are accounted for in Monte-Carlo simulations. It is found that the introduction of LEZs has significantly reduced inner city PM10 levels. We estimate the total mean health impact from reduced air pollution in 2010 due to the introduction of stage 1 zones to be 760 million EUR in the 25 LEZ cities in the sample, whereas total mean health benefits are 2.4 billion EUR for the more stringent stage 2 zones when applied in the same cities.

Perceived accessibility, mobility, and connectivity of public transportation systems

- Transportation Research Part A: Policy and Practice---2015---Yung-Hsiang Cheng,Ssu-Yun Chen

Although public transportation is considered effective at reducing the external cost of driving private vehicles, many urbanites do not use public transportation. This study develops measures employing accessibility, mobility, and seamless connectivity for an entire public transportation service chain as indicators for evaluating public transport services, prioritizes underperforming scenarios from the perspective of urban travelers, and derives various market segmentation strategies that consider different socio-demographic characteristics. A conceptual model is set up herein to assess these latent constructs that describe unobservable and immeasurable characteristics. As a Likert ordinal scale can generate misleading statistical inferences, the Rasch model is used to eliminate bias generated by an ordinal scale when measuring these three latent constructs separately. The Rasch model compares person parameters with item parameters, which are then subjected to logarithmic transformation along a logit scale so as to recognize specific difficulties of service scenarios

that cannot be easily eliminated by certain urban travelers. The multidimensional Rasch model also measures the perceptions of urban travelers in terms of the interactions between accessibility, mobility, and seamless connectivity of this public transportation system. While comparing urban travelers of two large cities in Taiwan, Taipei and Kaohsiung, the empirical results demonstrate that perceived accessibility, mobility, and seamless connectivity differ based on travelers' age, frequency of weekly sports activities, and environmental awareness. This paper also advances appropriate improvement strategies and provides policy suggestions for urban planners, public transportation service operation agencies, and policy makers when they seek to create user-friendly public transportation services. The proposed approach can be generalized in other cities by considering their local context uniqueness and further evaluating their public transport services.

Car restraint policies and mileage in Singapore

- Transportation Research Part A: Policy and Practice---2015---Singfat Chu

Negative externalities often surface after policies are implemented. This paper analyses how two "hard" Travel Demand Management (TDM) policies implemented in Singapore to target vehicle ownership and road usage may contribute to a negative externality namely excessive mileage accumulation. This has implications on resource depletion such as petrol wastage, higher CO2 emission and losses in time and productivity. Vehicle ownership in Singapore is managed firstly via the requirement to bid for a Certificate of Entitlement (COE) which entitles the usage of local roads and secondly via the payment of an Additional Registration Fee (ARF) which is refundable between 75% and 50% to incentivise the de-registration of a vehicle before it is 10years old. Such deregistered vehicles may also be eligible for a COE refund between 0% and 80% depending on age. The COE and ARF costs are significant as they typically account for more than half the purchase price of a vehicle. Furthermore, road usage is subject to Electronic Road Pricing (ERP) fees on busy segments. A sample of over 8700 used cars is analysed

to infer the effects of the non-refundable (or “sunk”) and the “variable” portions of the combined cost of COE and ARF as well as the number of ERP gantries on mileage over and above traditional factors such as petrol price and engine size. The findings suggest tweaks to the TDM policies to reduce mileage and its negative implications.

Time use in travel surveys and time use surveys

– Two sides of the same coin?

- Transportation Research Part A: Policy and Practice---2015---Regine Gerike,Tina Gehlert,Friedrich Leisch

An in-depth understanding of travel behaviour determinants, including the relationship to non-travel activities, is the foundation for modelling and policy making. National Travel Surveys (NTS) and time use surveys (TUS) are two major data sources for travel behaviour and activity participation. The aim of this paper is to systematically compare both survey types regarding travel activities and non-travel activities. The analyses are based on the German National Travel Survey and the German National Time Use Survey from 2002.

Transportation habits: Evidence from time diary data

- Transportation Research Part A: Policy and Practice---2015---Joeri Minnen,Ignace Gloorieux,Theun Pieter van Tienoven

The interdisciplinary Time Use Observatory workshops learned that transportation research and social sciences strive for the same multi-day time-diary data in order to make inferences about human habitual (travel) behavior. It also is learned that when it comes to the mathematics and analytics involved both disciplines are miles apart, though both with founded reasons to do so. In brief, transportation research relies on modeling to make predictions whereas social sciences apply statistics to their data to draw conclusions. In line with the interdisciplinary philosophy of the Time Use Observatory workshops, this contribution aims to communicate 30 years of experience in analyzing time-diary

data. To do so, it demonstrates the latter by calculating transportation habits and aims to illustrate that multi-day time-diary data might have some additional benefits for computing temporal regularities. It shows that including a flexible notion of both regular tempo (or recurrence) of activities (e.g. every day) and regular timing of activities (e.g. always at 6am) produces different results for different kind of transportation purposes. It also shows that these calculations using multi-day time-diary data result in an indicator at the individual level that can be analyzed in terms of socio-demographic and socio-economic characteristics. This work concludes that partitioning temporal regularities in regular reoccurrence and regular timing is a crucial element of (transportation) habits.

Understanding time use: Daily or weekly data?

- Transportation Research Part A: Policy and Practice---2015---Sergio Jara-Díaz,Jorge Rosales-Salas

The appropriate duration of time diaries as a source of time use data is analyzed in a structured way. Nine detailed European surveys based on seven-days diaries are used in order to study different dimensions of data quality, duration and variability of activities, and modeling capabilities. Pseudo diaries of 1, 2 (one week, one weekend) and 3 (one week, both weekend) days are constructed to further analyze these issues, selecting the seven-days diaries data as a benchmark. Comparative results show that two and three-days weighted surveys seem to be an adequate surrogate for the information obtained in weekly surveys that capture a basic work–leisure cycle.

Making time count: Traveler activity engagement on urban transit

- Transportation Research Part A: Policy and Practice---2015---Charlotte Frei,Hani S. Mahmassani,Andreas Frei

In practice, travel time is assigned a cost and treated as a disutility to be minimized. There is a growing body of research supporting the hypothesis that travel

time has some value of its own, and the proliferation of information and communication technology (ICT) may be contributing to that value. Travelers' attitudes are confounded with their mode choice, and as telecommunications mediate travel behavior, analysts must recognize the interaction between time use and customer satisfaction for appropriate travel demand management. To that end, this paper presents results from jointly estimated models of travelers' latent satisfaction and on-board activity engagement using Chicago transit rider data gathered in April 2010. The simple questionnaire and small sample corroborate the findings of past research indicating travel attitudes and activity engagement have potential to influence travelers' value of time, and many transit riders consider transit a better use of time and/or money than driving. The findings affirm the need for a more holistic understanding of value of time for travel demand management and infrastructure valuation. As time use has an influence on users' valuation of the transit mode, offering opportunities to conduct certain leisure activities could improve the perceived value of travel time.

An empirical investigation into the time-use and activity patterns of dual-earner couples with and without young children

- Transportation Research Part A: Policy and Practice---2015---Christina Bernardo,Rajesh Paleti,Megan Hoklas,Chandra Bhat

This paper examines the time-use patterns of adults in dual-earner households with and without children as a function of several individual and household socio-demographics and employment characteristics. A disaggregate activity purpose classification including both in-home and out-of-home activity pursuits is used because of the travel demand relevance of out-of-home pursuits, as well as to examine both mobility-related and general time-use related social exclusion and time poverty issues. The study uses the Nested Multiple Discrete Continuous Extreme Value (MDCNEV) model, which recognizes that time-decisions entail the choice of participating in one or more activity purposes along

with the amount of time to invest in each chosen activity purpose, and allows generic correlation structures to account for common unobserved factors that might impact the choice of multiple alternatives. The 2010 American Time Use Survey (ATUS) data is used for the empirical analysis. A major finding of the study is that the presence of a child in dual-earner households not only leads to a reduction in in-home non-work activity participation (excluding child care activities) but also a substantially larger decrease in out-of-home non-work activity participation (excluding child care and shopping activities), suggesting a higher level of mobility-related social exclusion relative to overall time-use social exclusion. To summarize, the results in the paper underscore the importance of considering household structure in activity-based travel demand models, as well as re-designing work policies in the United States to facilitate a reduction in work-family conflict in dual-earner families.

Towards a microeconomic framework for modelling the joint choice of activity–travel behaviour and ICT use

- Transportation Research Part A: Policy and Practice---2015---Jacek Pawlak,John W. Polak,Aruna Sivakumar

The rapid development of information and communication technologies (ICT) has been argued to affect time use patterns in a variety of ways, with consequent impacts on travel behaviour. While there exists a significant body of empirical studies documenting these effects, theoretical developments have lagged this empirical work and in particular, microeconomic time allocation models have not to date been fully extended to accommodate the implications of an increasingly digitised society. To address this gap, we present a modelling framework, grounded in time allocation theories and the goods–leisure framework, for joint modelling of the choice of mode of activity (physical versus teleactivity), travel mode and route, and ICT bundle. By providing the expression for a conditional indirect utility function, we use hypothetical scenarios to demonstrate how our framework can conceptualise various

activity–travel decision situations. In our scenarios we assume a variety of situations such as the implications of severe weather, the introduction of autonomous vehicles, and the interaction between multiple decision makers. Moreover, our approach lays the microeconomic foundations for deriving subjective values of ICT qualities such as broadband speed or connection reliability. Finally, we also demonstrate the means by which our framework could be linked to various data collection protocols (stated preference exercises, diaries of social interactions, laboratory experiments) and modelling approaches (discrete choice modelling, hazard-based duration models).

Traffic Monitoring immediately after a major natural disaster as revealed by probe data – A case in Ishinomaki after the Great East Japan Earthquake

- Transportation Research Part A: Policy and Practice---2015---Yusuke Hara,Masao Kuwahara

This study analyzes how people behaved and traffic congestion expanded immediately after the Great East Japan Earthquake on March 11, 2011 using information such as probe vehicle and smartphone GPS data. One of the cities most seriously damaged during the earthquake was Ishinomaki. Understanding human evacuation behavior and observing road network conditions are key for the creation of effective evacuation support plans and operations. In many cases, however, a major natural disaster destroys most infrastructure sensors and detailed dynamic information on people's movements cannot be recorded. Following the Great East Japan Earthquake, vehicle detectors did not work due to the severe tsunami and electric power failure. Therefore, information was only available from individuals' probe vehicles and smartphone GPS data. These probe data, along with disaster measurements such as water immersion levels, revealed the sudden transition of vehicle speed (i.e., it eventually slowed to less than walking speed and a serious gridlock phenomenon in the Ishinomaki central area occurred). These quantitative findings, which could not be identified without probe data, should be utilized during future disaster

mitigation planning.

Assessing the impact of long-term mobility choice motivation and short-term mobility means connotation on the use intention of electric cars in rural areas

- Transportation Research Part A: Policy and Practice---2015---Marc Tünnau

In this study several hypotheses comprising a heuristic framework derived from rational-choice (RC) premises and regarding some potentially influencing variables on future use intention of different vehicle types are tested with a rural area sample. Especially the differentiation between long-term vs. short-term as well as functional/rational vs. extra-functional/emotional motivators is assessed. Results suggest a predominance of functional motivators and rational connotations over extra-functional/emotional ones. The models to check whether short-term or long-term effects dominate did not clearly confirm a predominance of long-term factors as hypothesized. In several regression models a moderating effect of rational short-term connotations on different long-term motivators was found, thus contributing notably to the prediction of future vehicle use-intention. The need for further research and theory-driven modeling is briefly discussed.

Assessment of the effects of highway geometric design features on the frequency of truck involved crashes using bivariate regression

- Transportation Research Part A: Policy and Practice---2015---Chunjiao Dong,Shashi S. Nambisan,Stephen H. Richards,Zhuanglin Ma

Given the enormous losses to society resulting from large truck involved crashes, a comprehensive understanding of the effects of highway geometric design features on the frequency of truck involved crashes is needed. To better predict the occurrence probabilities of large truck involved crashes and gain direction for policies and countermeasures aimed at reducing the crash frequencies, it is essential to examine truck involved crashes categorized by collision vehicle types,

since passenger cars and large trucks differ in dimensions, size, weight, and operating characteristics. A data set that includes a total of 1310 highway segments with 1787 truck involved crashes for a 4-year period, from 2004 to 2007 in Tennessee is employed to examine the effects that geometric design features and other relevant attributes have on the crash frequency. Since truck involved crash counts have many zeros (often 60–90% of all values) with small sample means and two established categories, car-truck and truck-only crashes, are not independent in nature, the zero-inflated negative binomial (ZINB) models are developed under the bivariate regression framework to simultaneously address the above mentioned issues. In addition, the bivariate negative binomial (BNB) and two individual univariate ZINB models are estimated for model validation. Goodness of fit of the investigated models is evaluated using AIC, SBC statistics, the number of identified significant variables, and graphs of observed versus expected crash frequencies. The bivariate ZINB (BZINB) models have been found to have desirable distributional property to describe the relationship between the large truck involved crashes and geometric design features in terms of better goodness of fit, more precise parameter estimates, more identified significant factors, and improved predictive accuracy. The results of BZINB models indicate that the following factors are significantly related to the likelihood of truck involved crash occurrences: large truck annual average daily traffic (AADT), segment length, degree of horizontal curvature, terrain type, land use, median type, lane width, right side shoulder width, lighting condition, rutting depth (RD), and posted speed limits. Apart from that, passenger car AADT, lane number, and indicator for different speed limits are found to have statistical significant effects on the occurrences of car-truck crashes and international roughness index (IRI) is significant for the predictions of truck-only crashes.

Using DEA models to jointly estimate service quality perception and profitability – Evidence from international airports

- Transportation Research Part A: Policy and Practice---2015---Rico Merkert,A. George Assaf

With increasing competition between airports and a growing share of non-aeronautical revenues, particularly at large international hubs, perceived quality and consumer satisfaction have not only become a key focus of management but potentially the most important tool to achieve or maintain a competitive advantage. However, in the long run stakeholders aim for profit maximisation and it has been shown for other parts of the aviation supply chain that quality does significantly impact on profitability. In this paper we aim to investigate whether perceived airport quality has an impact on airport profit margins. We further apply two-stage Data Envelopment Analysis (DEA) models to estimate a single efficiency measure that combines the potentially conflicting indicators of perceived service quality and profitability for the airport context. We also identify determinants of the jointly estimated single quality/profitability measure.

An analysis of the performance of public bus transport in Tunisian cities

- Transportation Research Part A: Policy and Practice---2015---Ahmed Ayadi,Sami Hammami

The purpose of this paper is to assess the efficiency cost of the Tunisian public bus transport system using six stochastic frontier models to see which one would be the most robust. This analysis is based on a sample of 12 Tunisian regional bus transport companies for the period 2000/2010. To achieve this, we chose, as an independent variable, the “variable cost” and, as an independent variable, the output “seats per kilometer”, the prices of the input, labor and energy as well as a control variable represented by the network length. The main results show that the regional bus transport companies are economically inefficient with an almost similar magnitude regardless of the estimated model except for Green’s True model (2002). This inefficiency

is explained by the existence of an outdated regulation characterized by an administered wage policy where financial risk is incurred by the authorities and not by the company.

A hierarchical line planning approach for a large-scale high speed rail network: The China case

- Transportation Research Part A: Policy and Practice---2015---Huiling Fu,Lei Nie,Lingyun Meng,Benjamin R. Sperry,Zhenhuan He

Planning a set of train lines in a large-scale high speed rail (HSR) network is typically influenced by issues of longer travel distance, high transport demand, track capacity constraints, and a non-periodic timetable. In this paper, we describe an integrated hierarchical approach to determine line plans by defining the stations and trains according to two classes. Based on a bi-level programming model, heuristics are developed for two consecutive stages corresponding to each classification. The approach determines day-period based train line frequencies as well as a combination of various stopping patterns for a mix of fast trunk line services between major stations and a variety of slower body lines that offer service to intermediate stations, so as to satisfy the predicted passenger transport demand. Efficiencies of the line plans described herein concern passenger travel times, train capacity occupancy, and the number of transfers. Moreover, our heuristics allow for combining many additional conflicting demand–supply factors to design a line plan with predominantly cost-oriented and/or customer-oriented objectives. A range of scenarios are developed to generate three line plans for a real-world example of the HSR network in China using a decision support system. The performance of potential train schedules is evaluated to further examine the feasibility of the obtained line plans through graphical timetables.

Rethinking bus punctuality by integrating Automatic Vehicle Location data and passenger patterns

- Transportation Research Part A: Policy and Practice---2015---Benedetto Barabino,Massimo Di Francesco,Sara Mozzoni

This paper investigates punctuality at bus stops. Although it is typically evaluated from the point of view of bus operators, it must also account for users, as required in recent service quality norms. Therefore, evaluating punctuality at bus stops is highly important, but may also be a complex task, because data on both bus arrivals (or departures) and users must be taken into account and processed. Data on buses can be collected by Automatic Vehicle Location (AVL) systems, but several challenges must be addressed in order to use them effectively. Passengers data at bus stops cannot be derived from AVL, but they can be used to derive passenger patterns and need to be integrated into processed AVL data. This paper proposes a new punctuality measure defined as the fraction of passengers who will be served within an acceptably short interval after they arrive. A method is proposed to determine this measure: it provides (i) several rules to handle AVL collected data, (ii) a procedure integrating processed AVL data and potential passengers' patterns and (iii) a hierarchical process to perform the punctuality measure on each bus route direction of a transit network, as well as for every bus stop and time period. The paper illustrates the experimentation of this method on more than 4,000,000 data of a real bus operator and represents outcomes by easy-to-read control dashboards.

On the cost of misperceived travel time variability

- Transportation Research Part A: Policy and Practice---2015---Yu Xiao,Daisuke Fukuda

Because individuals may misperceive travel time distributions, using the implied reduced form of the scheduling model might fall short of capturing all costs of travel time variability. We reformulate a general scheduling

model employing rank-dependent utility theory and derive two special cases as econometric specifications to study these uncaptured costs. It is found that reduced-form expected cost functions still have a mean–variance form when misperception is considered, but the value of travel time variability is higher. We estimate these two models with stated-preference data and calculate the empirical cost of misperception. We find that: (i) travelers are mostly pessimistic and thus tend to choose departure times too early to achieve a minimum cost, (ii) scheduling preferences elicited using a stated-choice method can be relatively biased if probability weighting is not considered, and (iii) the extra cost of misperceiving the travel time distribution might be nontrivial when time is valued differently over the time of day and is substantial for some people.

Optimal funding allocation strategies for safety improvements on urban intersections

- Transportation Research Part A: Policy and Practice---2015---Sabyasachee Mishra,Mihalis M. Golias,Sushant Sharma,Stephen D. Boyles

Urban intersections crashes cause significant economic loss. The safety management process undertaken by most states in the United States is referred to as Highway Safety Improvement Program and consists of three standardized steps: (i) identification of critical crash locations, (ii) development of countermeasures, and (iii) resource allocation among identified crash locations. Often these three steps are undertaken independently, with limited detail of each step at the state planning agencies. The literature review underlines the importance of the third step, and the lack of sophisticated tools available to state planning agencies for leveraging information obtained from the first two steps. Further, non-strategic approaches and unavailability of methods for evaluating policies may lead to sub-optimal funding allocation. This paper overcomes these limitations and proposes multiple optimal resource allocation strategies for improvements at urban intersections that maximize safety benefits, under budget and policy constraints. Proposed policy measures based on benefits maximization (economic competitiveness), equitable

allocation (equity), and relaxation of mutually exclusiveness (multiple alternatives at one location) produce significantly different alternative and fund allocation. The proposed models are applied to selected intersections in four counties of southeast Michigan. Results reinforce the applicability of the strategies/policies and tools developed in this paper for safety project funding allocation on critical urban intersections.

The Gothenburg congestion charge. Effects, design and politics

- Transportation Research Part A: Policy and Practice---2015---Maria Börjesson,Ida Kristoffersson

This paper summarizes the traffic effects of the Gothenburg congestion charges introduced in 2013. The system is similar to the system introduced in Stockholm in 2006; both are designed as time-of-day dependent cordon pricing systems. We find that many effects and adaptation strategies are similar to those found in Stockholm, indicating a high transferability between smaller and larger cities with substantial differences in public transport use. However, there are also important differences regarding some of the effects, the accuracy of the model forecasts and public support arising from different topologies, public transport use, congestion levels and main objectives communicated to the public. Finally, the Gothenburg case suggests that whether congestion charges are introduced or not depends on the support among the political parties, and that this is determined primarily by the prevailing institutional setting and power over revenues, and to a lower extent by the public support, and benefits from congestion reduction.

Overview and analysis of Vehicle Automation and Communication Systems from a motorway traffic management perspective

- Transportation Research Part A: Policy and Practice---2015---Christina Diakaki,Markos Papageorgiou,Ioannis Papamichail,Ioannis Nikolos

During the last decade, there has been an enormous

interdisciplinary effort by the automobile industry and numerous research institutions worldwide towards the development, testing and employment of a variety of Vehicle Automation and Communication Systems (VACS) with the main aims to improve road safety and driver convenience. Some VACS, however, have a direct impact on road efficiency as well and could therefore be exploited to relieve road networks from the significant congestion problems and their negative consequences for travel times, safety, fuel consumption, the environment and the quality of life in general. In other words, some of the available VACS could also be used as novel or innovative sensors, actuators and tools towards a new era of traffic management. This paper provides an overview of proposed and available VACS and discusses their perspectives from the motorway traffic management point of view. Classifications of the different systems in this respect are also provided, while SWOT (Strengths–Weaknesses–Opportunities–Threats) analyses are used to identify specific exploitation ways. Current trends and future perspectives of VACS within a motorway traffic management context are finally summarised.

The spatial productivity of transportation infrastructure

- Transportation Research Part A: Policy and Practice---2015---Pelayo Arbués, José Baños, Matías Mayor

Transportation infrastructure services may cause an impact on the economy of the region in which they are located and, additionally, they are likely to have an impact on other regions. This effect has been labeled the spillover effect. In this study, the existence of direct and spillover effects of road, railway, airport and seaport infrastructure projects is tested by estimating a production function. Together with this primary objective, two common concerns in the literature are addressed: the lack of theoretical foundations for spatial econometrics models and the likely endogenous relationship between transport infrastructure and economic development. The estimated production function takes the form of a Spatial Durbin Model and is estimated using

panel data from the 47 peninsular Spanish provinces by alternatively applying a Maximum Likelihood estimator and Instrumental Variables/Generalized Method of Moments estimators. According to the estimates, road transport infrastructure positively affects the output of the region in which the infrastructure is located and its neighboring provinces, while the remaining modes of transportation projects cause no significant impacts on average.

Air pollution dynamics and the need for temporally differentiated road pricing

- Transportation Research Part A: Policy and Practice---2015---Jessica Coria, Jorge Bonilla Londoño, Maria Grundström, Håkan Pleijel

In this paper we investigate the effects of the temporal variation of pollution dispersion, traffic flows and vehicular emissions on pollution concentration and illustrate the need for temporally differentiated road pricing through an application to the case of the congestion charge in Stockholm, Sweden. By accounting explicitly for the role of pollution dispersion on optimal road pricing, we allow for a more comprehensive view of the economy–ecology interactions at stake, showing that price differentiation is an optimal response to the physical environment. Most congestion charges in place incorporate price bands to mitigate congestion. Our analysis indicates that, to ensure compliance with air quality standards, such price variations should also be a response to limited pollution dispersion.

Prioritizing road extension projects with interdependent benefits under time constraint

- Transportation Research Part A: Policy and Practice---2015---Saeed Asadi Bagloee, Mohsen Asadi

Since transportation projects are costly and resources are limited, prioritizing or sequencing the projects is imperative. This study was inspired by a client who asked: “I have tens of approved road extension projects, but my financial resources are limited. I cannot construct all the projects simultaneously, so can you help me

prioritize my projects?” To address this question, the benefits and costs of all the possible scenarios must be known. However, the impacts (or benefit) of road extension projects are highly interdependent, and in sizable cases cannot be specified thoroughly. We demonstrate that the problem is analogous to the Traveling Salesman Problem (TSP). Dynamic change in travel demand during construction is another aspect of the complexity of the problem. The literature is yet to provide efficient methods for large cases. To this end, we developed a heuristic methodology in which the variation of travel demand during the construction period is considered. We introduce a geometrical objective function for which a solution-finding policy based on “gradient maximization” is developed. To address the projects’ interdependency, a special neural network (NN) model was devised. We developed a search engine hybridized of Ant Colony and Genetic Algorithm to seek a solution to the TSP-like problem on the NN based on gradient maximization. The algorithm was calibrated and applied to real data from the city of Winnipeg, Canada, as well as two cases based on Sioux-Falls. The results were reliable and identification of the optimum solution was achievable within acceptable computational time.

A hybrid-choice latent-class model for the analysis of the effects of weather on cycling demand

- Transportation Research Part A: Policy and Practice---2015---Yutaka Motoaki,Ricardo Daziano

In this paper we analyze demand for cycling using a discrete choice model with latent variables and a discrete heterogeneity distribution for the taste parameters. More specifically, we use a hybrid choice model where latent variables not only enter into utility but also inform assignment to latent classes. Using a discrete choice experiment we analyze the effects of weather (temperature, rain, and snow), cycling time, slope, cycling facilities (bike lanes), and traffic on cycling decisions by members of Cornell University (in an area with cold and snowy winters and hilly topog-

raphy). We show that cyclists can be separated into two segments based on a latent factor that summarizes cycling skills and experience. Specifically, cyclists with more skills and experience are less affected by adverse weather conditions. By deriving the median of the ratio of the marginal rate of substitution for the two classes, we show that rain deters cyclists with lower skills from bicycling 2.5 times more strongly than those with better cycling skills. The median effects also show that snow is almost 4 times more deterrent to the class of less experienced cyclists. We also model the effect of external restrictions (accidents, crime, mechanical problems) and physical condition as latent factors affecting cycling choices.

One price for all? Price discrimination and market captivity: Evidence from the Italian city-pair markets

- Transportation Research Part A: Policy and Practice---2015---Angela Bergantino,Claudia Capozza

This paper tests whether, and to what extent, airlines exploit market captivity by using price discrimination strategies. The Italian passenger market is particularly fit for this purpose, given the high differentials in the degree of the inter-modal competition amongst domestic connections. Results show that, *ceteris paribus*, airlines adopt a different pricing behaviour depending on the degree of inter-modal market captivity. First, in highly concentrated markets with respect to air competitors, airlines price higher when the inter-modal competition is limited. This proves that inter-modal market captivity strengthens the effect of market power. Second, the inter-temporal price discrimination leads to a J-shaped distribution of fares over time, which is more pronounced when the inter-modal competition is effective. This suggests that airlines need to adopt a pricing technique that allows for a greater market segmentation in order to compete successfully with high-speed rail transport and to extract a larger part of passengers’ surplus. These results are relevant in terms of transport-investment implications and competition policy. The indirect benefits that investments

in rail infrastructure would yield through downward pressures on competing airline fares should be embedded in any cost-benefit analysis of high-speed networks investments and in any policy evaluation of measures that aim to reduce the territorial gaps in infrastructure endowment and accessibility.

Selection bias in build-operate-transfer transportation project appraisals

- Transportation Research Part A: Policy and Practice---2015---Xiangdong Xu,Anthony Chen,S.C. Wong,Lin Cheng

Recent empirical studies have found widespread inaccuracies in traffic forecasts despite the fact that travel demand forecasting models have been significantly improved over the past few decades. We suspect that an intrinsic selection bias may exist in the competitive project appraisal process, in addition to the many other factors that contribute to inaccurate traffic forecasts. In this paper, we examine the potential for selection bias in the governmental process of Build-Operate-Transfer (BOT) transportation project appraisals. Although the simultaneous consideration of multiple criteria is typically used in practice, traffic flow estimate is usually a key criterion in these appraisals. For the purposes of this paper, we focus on the selection bias associated with the highest flow estimate criterion. We develop two approaches to quantify the level and chance of inaccuracy caused by selection bias: the expected value approach and the probability approach. The expected value approach addresses the question “to what extent is inaccuracy caused by selection bias?”. The probability approach addresses the question “what is the chance of inaccuracy due to selection bias?”. The results of this analysis confirm the existence of selection bias when a government uses the highest traffic forecast estimate as the priority criterion for BOT project selection. In addition, we offer some insights into the relationship between the extent/chance of inaccuracy and other related factors. We do not argue that selection bias is the only reason for inaccurate traffic forecasts in BOT projects; however, it does appear that it could be an intrinsic factor

worthy of further attention and investigation.

Modelling mode choice for freight transport using advanced choice experiments

- Transportation Research Part A: Policy and Practice---2015---Ana Isabel Arencibia,María Feo-Valero,Leandro García-Menéndez,Concepción Román

In this paper we use advanced choice modelling techniques to analyse demand for freight transport in a context of modal choice. To this end, a stated preference (SP) survey was conducted in order to estimate freight shipper preferences for the main attributes that define the service offered by the different transport modes. From a methodological point of view, we focus on two critical issues in the construction of efficient choice experiments. Firstly, in obtaining good quality prior information about the parameters; and secondly, in the improved quality of the experimental data by tailoring a specific efficient design for every respondent in the sample.

Integrating transport and land-use planning? How steering cultures in local authorities affect implementation of integrated public transport and land-use planning

- Transportation Research Part A: Policy and Practice---2015---Robert Hrelja

Previous research has shown integrated planning to be important for achieving aims concerning more environmentally friendly transport operations, but less good at explaining prerequisites of implementation. This paper analyses how management and working practises in local authorities, here understood as steering cultures, affect implementation of integrated land-use and public transport planning approaches. The analysis builds on case studies of planning in two Swedish municipalities. These have developed two antithetical steering cultures, namely one that can be described as deliberative and one that can be described as sectorised. The paper describes the advantages and disadvantages of

these steering cultures. The findings show the deliberative model to facilitate integration through advanced mechanisms of consensus and co-ordination between policy-makers and officials. The sectorised model has no such mechanisms, but this need not result in poor prospects of integrated planning. It is important for integrated planning approaches, whatever the steering culture, to be in line with the institutionalised norms and objectives by which planning practices are governed. Integration therefore needs a normative component, so as to ensure implementation. The important normative component in this context can be construed as discourses and rationales concerning transport and the urban development of which public transport forms part.

Truck versus pipeline transportation cost analysis of wastewater sludge

- Transportation Research Part A: Policy and Practice---2015---Mohammad Marufuzzaman,Sandra D. Ekşioğlu,Rafael Hernandez

Domestic and industrial sludge generated at wastewater treatment facilities is considered a potential biomass source for producing biodiesel. However, transportation of large amounts of sludge from wastewater treatment facilities to a biorefinery is expensive. The objective of this paper is to identify the proper transportation mode to use as a function of the volume shipped and transportation distances. Currently, sludge is mainly shipped by truck and pipeline. We estimated that the fixed and variable cost components of pipeline transportation for a volume such as 480m³/day and a distance of 100miles are \$0.116/m³ and \$0.089/m³/mile, respectively. We estimated the biomass (sludge) transportation cost per gallon of biodiesel, and observed the changes in these costs as a function of distance traveled and volume shipped. The outcomes of this study have the potential to help biofuel plants make better biomass transportation decisions, and consequently reduce the price of biodiesel significantly.

Knowledge of the concept Light Rail Transit: Exploring its relevance and identification of the determinants of various knowledge levels

- Transportation Research Part A: Policy and Practice---2015---Lieve Creemers,Hans Tormans,Tom Bellemans,Davy Janssens,Geert Wets,Mario Cools

This paper explores the knowledge of the concept ‘Light Rail Transit’ (LRT) in the context of implementing a Light Rail system in a (sub)-urban region. To this end, three models are estimated: a first model to explore the role of knowledge on modal choice, a second one to identify the determinants of the level of knowledge and a third model to identify the determinants of a cognitive mismatch between actual (real) knowledge and perceived knowledge. The first model (a negative binomial regression model) underlines the significant relation between knowledge of the concept LRT and modal choice. Given the lack of knowledge of the concept ‘Light Rail Transit’ revealed by the descriptive results, it is of crucial importance to raise the level of knowledge. Knowledge acquisition can be based on transit experiences and information provision. To explore how information campaigns should be constructed and which target groups should be approached, the factors influencing travelers’ knowledge and the determinants of a cognitive mismatch are identified by a Multinomial Logit Model (MNL-model) and a binary logit model. The results show that various socioeconomic variables as well as socio-psychological variables are significantly influencing actual knowledge and significantly influencing a cognitive mismatch. Among these variables, employment, gender, perception of ticket price of Public Transit (PT) and expectations with regard to seat availability in the LRT-vehicle are the most influential ones.

Distinguishing the land use effects of road pricing based on the urban form attributes

- Transportation Research Part A: Policy and Practice---2015---Shaopeng Zhong,Shusheng Wang,Yao Jiang,Bo Yu,Wenhao Zhang

This paper studies the effects of road pricing on land use under different development scenarios (business as usual scenario and transit oriented development scenario) by a quantitative method, which combines the integrated land use and transport interaction model (TRANUS model) with the scenario-planning techniques. Moreover, in order to further analyze the differences of the land use effects of road pricing on traffic analysis zones (TAZs) with different urban form attributes, a quantitative classification method combining factor analysis and cluster analysis is then used to quantitatively classify TAZs. The results demonstrate that the effects of road pricing on the land use of a specific region depend on the urban form attributes of the region. The higher the densities of employments and population, and better street design (high densities of street and intersections) and public transportation condition, the less the region is negatively affected by road pricing, and vice versa. More importantly, rail transit can alleviate the negative impact of road pricing on commercial development and population concentration of the region. Therefore, before introducing a road pricing policy, it is necessary to develop public transport system, especially rail transit.

Winter problems on mountain passes – Implications for cost-benefit analysis

- Transportation Research Part A: Policy and Practice---2015---Kjersti Granås Bardal, Terje Andreas Mathisen

Cost-benefit analysis is a tool in government decision-making for determining the consequences of alternative uses of society's scarce resources. Such a systematic process of comparing benefits and costs was adopted in early years for transportation projects and it has been the subject of much refining over the years. There are still some flaws, however, in the application of the method. In this article we have studied the impact of weather conditions on traffic speed on low traffic roads often exposed to adverse weather. This is an issue not currently considered in the cost-benefit analysis of road projects. By using two analytical approaches—structural equation modelling and classification and

regression tree analysis—the impact of the weather indicators temperature, wind speed, and precipitation on traffic speed has been quantified. The data relates to three winter months on the European Route 6 road over the mountain pass Saltfjellet in Norway. Increase in wind speed, increase in precipitation and temperatures around freezing point all caused significant decrease in traffic speed in the case studied. If actions were taken to reduce the impact of adverse weather on traffic (e.g. by building a tunnel through the mountain) this study indicates that the road users would gain a total benefit of approximately 2,348,000NOK (282,000EUR) each winter at Saltfjellet if all the weather related benefits were included. We argue that this is a significant number that is highly relevant to include in CBAs. This applies both to the CBAs of new transportation projects as well as when resources are allocated for operation, maintenance, and monitoring of the existing transport systems. Including the weather related benefits would improve the application of CBA as a decision-making tool for policy makers.

Transport infrastructure and long-run economic growth in OECD countries

- Transportation Research Part A: Policy and Practice---2015---Minoo Farhadi

This paper provides an empirical evaluation of the growth impact of public infrastructure in a panel of 18 OECD countries during 1870–2009. This study goes beyond the traditional analysis of growth accounting models by exploring the indirect effect of stock of core infrastructure on output growth through its impact on productivity. Constructing a long-run historical dataset on infrastructural capital formation spanning from 1870, estimated results show that growth in both labour productivity and total factor productivity are positively, but not substantially, influenced by growth in the stock of infrastructure. Furthermore, applying the system GMM technique (Generalised Method of Moments) reveals that although rate of returns to investment in infrastructure exceed the private rate in OECD countries, it is not as high as positive externalities associated with investment in equipment and

structure investment.

New insights on random regret minimization models

- Transportation Research Part A: Policy and Practice---2015---Sander van Cranenburgh,Cristian Guevara,Caspar Chorus

This paper develops new methodological insights on Random Regret Minimization (RRM) models. It starts by showing that the classical RRM model is not scale-invariant, and that – as a result – the degree of regret minimization behavior imposed by the classical RRM model depends crucially on the sizes of the estimated taste parameters in combination with the distribution of attribute-values in the data. Motivated by this insight, this paper makes three methodological contributions: (1) it clarifies how the estimated taste parameters and the decision rule are related to one another; (2) it introduces the notion of “profundity of regret”, and presents a formal measure of this concept; and (3) it proposes two new family members of random regret minimization models: the μ RRM model, and the Pure-RRM model. These new methodological insights are illustrated by re-analyzing 10 datasets which have been used to compare linear-additive RUM and classical RRM models in recently published papers. Our re-analyses reveal that the degree of regret minimizing behavior imposed by the classical RRM model is generally very limited. This insight explains the small differences in model fit that have previously been reported in the literature between the classical RRM model and the linear-additive RUM model. Furthermore, we find that on 4 out of 10 datasets the μ RRM model improves model fit very substantially as compared to the RUM and the classical RRM model.

Modeling the commute mode share of transit using continuous accessibility to jobs

- Transportation Research Part A: Policy and Practice---2015---Andrew Owen,David Levinson

This paper presents the results of an accessibility-based model of aggregate commute mode share, focusing on

the share of transit relative to auto. It demonstrates the use of continuous accessibility – calculated continuously in time, rather than at a single of a few departure times – for the evaluation of transit systems. These accessibility calculations are accomplished using only publicly-available data sources. A binomial logic model is estimated which predicts the likelihood that a commuter will choose transit rather than auto for a commute trip based on aggregate characteristics of the surrounding area. Variables in this model include demographic factors as well as detailed accessibility calculations for both transit and auto. The model achieves a ρ^2 value of 0.597, and analysis of the results suggests that continuous accessibility of transit systems may be a valuable tool for use in modeling and forecasting.

Rethinking the links between social exclusion and transport disadvantage through the lens of social capital

- Transportation Research Part A: Policy and Practice---2015---Tim Schwanen,Karen Lucas,Nihan Akyelken,Diego Cisternas Solsona,Juan-Antonio Carrasco,Tijs Neutens

This paper provides a critical review of the progress in understanding the linkages between transport disadvantage and social exclusion. It follows earlier work in proposing social capital as a concept that mediates those linkages but argues that transport researchers must not confine themselves to conceptualisations of social capital as predominantly benign and capable of reducing transport disadvantage and social exclusion. A range of hypothetical pathways is discussed, highlighting the Janus-faced character of social capital as a medium for both the effectuation of progressive social change and the perpetuation and creation of social inequalities. An analysis is provided of the extent to which the recent transport-related literature supports or rejects the hypothesised pathways, and key avenues for future research are identified.

How will we fund our roads? A case of decreasing revenue from electric vehicles

- Transportation Research Part A: Policy and Practice---2015---Alan Jenn, Inês Lima Azevedo, Paul Fischbeck

Annual expenditures for transportation infrastructure have recently surpassed the funding available through tax and fee collection. One large source of revenue generation for transportation infrastructure is use fees that are charged through taxes on gasoline both on a federal and state level. A massive adoption of electric vehicles (EVs) in the United States would result in significantly lower gasoline consumption and thus reduce the revenue collected to maintain the U.S. transportation infrastructure. We investigate how different vehicles will change the annual fee collected on a marginal basis. In addition, we assess the effects of adoption of alternative vehicles on revenues using several projections of alternative vehicles adoption, both on a state-by-state basis and at the national level. We find that baseline midsize and compact vehicles such as the Toyota Camry and Honda Civic generate approximately \$2500–\$4000 in tax revenue over their lifetime. Under the current funding structure, battery-electric vehicles (BEVs) such as the Nissan Leaf generate substantially less at \$400–\$1300, while plug-in hybrid electric vehicles (PHEVs) such as the Chevrolet Volt generate \$1500–\$2700. Even in states with high lifetime fees due to fuel taxes, such as California, revenue generation can be upwards of 50% lower than in states with high registration fees such as Colorado. Total annual revenue generation decreases by about \$200 million by 2025 as a result of EV adoption in our base case, but in projections with larger adoption of alternative vehicles could lead to revenue generation reductions as large as \$900 million by 2025. Potential schemes that charge user fees on alternative fuel vehicles to overcome the decrease in revenue include a flat annual registration fee at 0.6% of the vehicle's manufacturer suggested retail price (MSRP) or 2¢ per mile fee.

Effects of built environment on walking at the neighbourhood scale. A new role for street networks by modelling their configurational accessibility?

- Transportation Research Part A: Policy and Practice---2015---Patxi J. Lamíquiz, Jorge López-Domínguez

The hypothesis of this paper is that some features of the built environment, particularly those concerned with the accessibility of the street network, could be associated with the proportion of pedestrians on all trips (modal split) found in different parts of a city. Quantitative analysis (bi-variate correlation and a multiple regression model) was used to establish the association between variables. The study area covered a substantial part of the metropolitan area in Madrid, Spain. Results showed a consistent influence of five particular indexes in the multi-variate model. Not surprisingly for this kind of research, four of them described density and mix of land uses. But perhaps more interestingly, the first one was a measure of the accessibility of the public space network, a less prominent variable in literature to date. This variable is called herein configurational accessibility, calculated using Space Syntax, an urban morphology theory. The relevance of configurational accessibility is probably related to its surprising ability to synthesize global and perceived properties of street networks at the same time. The findings introduce the idea that the configuration of the urban grid can influence the proportion of pedestrians (as a part of total trips in any transport mode) who choose to walk on single-journey trips. The discussion links with the current debate about walkability indexes and the need of empirical support for the chosen variables and also with transport planning. Because the relevance of the street network's role is not so easy to grasp, inputs from configurational theory and the pedestrian potential underlying this fact are also discussed at the end of the paper.

Feasible provision of targeted traveler information in public transportation: Segmentation based on functional limitations

- Transportation Research Part A: Policy and Practice---2015---Nina Waara,Karin Brundell-Freij,Ralf Risser,Agneta Ståhl

This paper presents findings on the need for traveler information among people with functional limitation(s), and how the need varies between groups with different functional limitation(s). Chi-Squared Automatic Identification Detector (CHAID) was used to identify groups (segments) in order to understand how functional limitations contribute to the need for traveler information. The key findings suggest that people with functional limitations have a greater need for traveler information concerning different aspects of travel beyond traveler information that relates to their functional limitation(s); this greater need also relates to groups of people with covert functional limitations to which little consideration is usually given. Further, it is feasible to consider the need of traveler information generated by functional limitation(s) in providing traveler information in public transportation, and people with combinations of functional limitations that include loss of lower extremity skills and prevalence of poor balance are particularly in need of relevant traveler information.

Benchmarking road safety performance by grouping local territories: A study in the Netherlands

- Transportation Research Part A: Policy and Practice---2015---L.T. Aarts,S. Houwing

The method of benchmarking provides an opportunity to learn from better performing territories to improve the effectiveness and efficiency of activities in a particular field of interest. Such a field of interest could be road safety. Road safety benchmarking can include several indicators, ranging from performance indicated by crash statistics, to indicators that also account for consequences in costs or the underlying state of the road safety system and relevant organisation and processes

at actor level. The structure and culture of a territory is identified as a basic context of road safety performance. This is regarded as important information to use in grouping of territories to get more homogenous or equal and comparable conditions to learn from ‘the best in class’ .

The influences of past and present residential locations on vehicle ownership decisions

- Transportation Research Part A: Policy and Practice---2015---Gregory S. Macfarlane,Laurie A. Garrow,Patricia Mokhtarian

This study explores the relationship between historical exposure to the built environment and current vehicle ownership patterns. The influence of past exposure to the built environment on current vehicle ownership decisions may be causal, but there are alternative explanations. Households may primarily select to live in neighborhoods that facilitate their vehicle ownership preferences, or they may retain preferences that they have developed in the past, irrespective of their current situations. This study seeks to control for these alternative explanations by including the built environment attributes of households’ past residences as an influence on vehicle ownership choices. We use a dataset from a credit reporting firm that contains up to nine previous residential ZIP codes for households currently living in the 13-county Atlanta, Georgia, metropolitan area. Results show that past location is significant, but of marginal influence relative to the attributes of the current location. From a practical perspective, our results suggest that models that include current but not past neighborhood attributes (also controlling for standard socioeconomic variables) can forecast vehicle ownership decisions reasonably well. However, models that include both current and past neighborhood attributes can provide a more nuanced understanding of the built environment’ s potentially causal influences on vehicle ownership decisions. This better understanding may provide more realistic forecasts of responses to densification or other travel demand management strategies.

Vehicle insurance and the risk of road traffic accidents

- Transportation Research Part A: Policy and Practice---2015---Yung-Ching Hsu,Yung-Ming Shiu,Pai-Lung Chou,Yen-Ming J. Chen

Given the upward trend in incidences of road traffic accidents (RTAs) over recent years, in order to mitigate the financial losses arising from such accidents, governments around the world nowadays generally encourage, or even require, drivers to purchase appropriate vehicle insurance. The primary aim of this study is to examine whether RTAs are directly related to the purchase of vehicle insurance, with our examination of data on vehicle damage insurance policyholders revealing that those drivers who purchase more insurance coverage have a higher probability of being involved in accidents, as a result of which, they will tend to submit more claims. This indicates that insurance coverage might contain information which can be used to assess the probability risk levels of RTAs. We also find that drivers with less safety awareness will tend to purchase more coverage, and that those who purchase more coverage will, in turn, tend to have more accidents and submit more claims. Our findings, which provide a number of road traffic policy implications, would appear to justify the use of the bonus-malus system.

Paying for harbor maintenance in the US: Options for moving past the Harbor Maintenance Tax

- Transportation Research Part A: Policy and Practice---2015---Christopher McIntosh,Neil Wilmot,R.K. Skalborg

The Harbor Maintenance Tax is a fundamentally flawed maintenance funding mechanism for the critical US port system. Three alternatives were analyzed. User fee rates were estimated for either a national or regional tonnage based fee. Our results indicate that maintenance cost recovering regional fees could vary widely from about 10cents per tonne to nearly 80cents per tonne. A national rate would be about 30cents per tonne. The large regional differences and affects

on bulk shippers are likely to make implementing and maintaining cost recovering tonnage based fees infeasible. Two other mechanisms are considered. One possibility is to abolish the HMT without a replacement mechanism. The obvious strength of this approach is its simplicity, the weaknesses is that it is not budget neutral. Another possibility is to increase the federal diesel tax rate. One strength of the approach is the reasonable rate increase required to recover port maintenance costs (estimated between 0.278 and 0.315cents per liter). An additional strength is that relatively inefficient fuel users will either make the largest share of the additional payments or the freight will shift modes to one that is more efficient. One weakness is that the rate has been unchanged since 1997, this points to the political difficulty involved in passing such a rate increase.

Passengers' valuations of train seating layout, position and occupancy

- Transportation Research Part A: Policy and Practice---2015---Mark Wardman,Paul Murphy

The layout of seating within train carriages, of which there are numerous possibilities, and also the occupancy of that seating can be expected to impact on passengers' experiences of a train journey. However, there is very little evidence on how rail passengers value different seating experiences. On the back of exploratory research, and including attitudinal evidence, this paper provides significant and original insights into rail passengers' preferences in this area. The primary evidence base is a Stated Preference experiment, complemented by a novel Revealed Preference exercise that uses CCTV footage to observe where rail passengers prefer to sit.

Urban freight, parking and pricing policies: An evaluation from a transport providers' perspective

- Transportation Research Part A: Policy and Practice---2015---Edoardo Marcucci,Valerio Gatta,Luisa Scaccia

This paper investigates transport providers' preferences for alternative loading bays and pricing policies. It estimates the importance of loading bays, the probability of finding them free and offers strategically relevant information to policy makers. The results underline the relevance of both preference heterogeneity and non-linear attribute effects. Three classes of agents are detected with substantially different preferences also characterized by non-linear sensitivity to attribute level variations. The specific freight sector, frequency of accesses and number of employees are all relevant covariates explaining different preferences for alternative transport providers' categories. The implications of the results obtained are illustrated by simulating alternative policy scenarios. In conclusion, the paper underlines the need for rigorous policy analysis if the correct policy outcomes are to be estimated with an adequate level of accuracy.

Transitioning to energy efficient vehicles: An analysis of the potential rebound effects and subsequent impact upon emissions

- Transportation Research Part A: Policy and Practice---2015---Jake Whitehead,Joel P. Franklin,Simon Washington

Given the shift toward energy efficient vehicles (EEVs) in recent years, it is important that the effects of this transition are properly examined. This paper investigates some of these effects by analyzing annual kilometers traveled (AKT) of private vehicle owners in Stockholm in 2008. The difference in emissions associated with EEV adoption is estimated, along with the effect of a congestion-pricing exemption for EEVs on vehicle usage. Propensity score matching is used to compare AKT rates of different vehicle owner groups based on the treatments of: EEV ownership and commuting across the cordon, controlling for confounding factors such as demographics. Through this procedure, rebound effects are identified, with some EEV owners found to have driven up to 12.2% further than non-EEV owners. Although some of these differences could be attributed to the congestion-pricing exemption, the results were not statistically significant. Overall, tak-

ing into account lifecycle emissions of each fuel type, average EEV emissions were 50.5% less than average non-EEV emissions, with this reduction in emissions offset by 2.0% due to rebound effects. Although it is important for policy-makers to consider the potential for unexpected negative effects in similar transitions, the overall benefit of greatly reduced emissions appears to outweigh any rebound effects present in this case study.

Urban parking policy in Europe: A conceptualization of past and possible future trends

- Transportation Research Part A: Policy and Practice---2015---Giuliano Mingardo,Bert van Wee,Tom Rye

In the last two decades parking has increasingly gained importance in urban planning. Despite the growing number of papers published in recent years, an overall conceptualization of parking policy is still missing. Previous attempts (Shoup, 2005; Litman, 2006; Barter, 2010) focus mainly on the North American planning experience. We try to bridge this gap analysing the evolution of parking policy in Europe. In this paper we first present the key aspects of parking policy, and describe their generic evolution. Next we suggest a novel approach for parking policy making. We conclude by discussing some of the major challenges policy makers will face in the near future regarding parking in urban areas.

Evolution over time of heavy vehicle volume in toll roads: A dynamic panel data to identify key explanatory variables in Spain

- Transportation Research Part A: Policy and Practice---2015---Juan Gomez,José Manuel Vassallo

Improving the knowledge of demand evolution over time is a key aspect in the evaluation of transport policies and in forecasting future investment needs. It becomes even more critical for the case of toll roads, which in recent decades has become an increasingly

common device to fund road projects. However, literature regarding demand elasticity estimates in toll roads is sparse and leaves some important aspects to be analyzed in greater detail. In particular, previous research on traffic analysis does not often disaggregate heavy vehicle demand from the total volume, so that the specific behavioral patterns of this traffic segment are not taken into account. Furthermore, GDP is the main socioeconomic variable most commonly chosen to explain road freight traffic growth over time. This paper seeks to determine the variables that better explain the evolution of heavy vehicle demand in toll roads over time. To that end, we present a dynamic panel data methodology aimed at identifying the key socioeconomic variables that explain the behavior of road freight traffic throughout the years. The results show that, despite the usual practice, GDP may not constitute a suitable explanatory variable for heavy vehicle demand. Rather, considering only the GDP of those sectors with a high impact on transport demand, such as construction or industry, leads to more consistent results. The methodology is applied to Spanish toll roads for the 1990–2011 period. This is an interesting case in the international context, as road freight demand has experienced an even greater reduction in Spain than elsewhere, since the beginning of the economic crisis in 2008.

Travel mental budgeting under road toll: An investigation based on user equilibrium

- Transportation Research Part A: Policy and Practice---2015---Yue Bao,Ziyou Gao,Meng Xu,Huijun Sun,Hai Yang

With the approach of introducing the conceptions of mental account and mental budgeting into the process of travelers' route choice, we try to identify why the usages of tolled roads are often overestimated. Assuming that every traveler sets a mental account for his/her travel to keep track of their expense and keep out-of-pocket spending under control, it addresses these questions such that "How much money can I spend on the travel?" and "What if I spend too much?" . Route tolls that exceed the budget are much

more unacceptable compared to those within budget due to the non-fungibility of money between different accounts. A simple network with two nodes and two routes is analyzed firstly, the analytical solutions are obtained and the optimal road tolls supporting the user equilibrium as a system optimum are also derived. The proposed model is then extended to a generalized network. The multiclass user equilibrium conditions with travel mental budgeting are formulated into an equivalent variational inequality (VI) problem and an equivalent minimization problem. Through analyses with numerical examples, it is found that the main reason that the usages of high tolled roads are often overestimated is due to the fact that travelers with low and moderate out-of-pocket travel budget perceive a much higher travel cost than their actual cost on the high tolled roads.

The underground economy: Tracking the higher-order economic impacts of the São Paulo Subway System

- Transportation Research Part A: Policy and Practice---2015---Eduardo Haddad,Geoffrey Hewings,Alexandre Porsse,Eveline S. Van Leeuwen,Renato S. Vieira

Over one million workers commute daily to São Paulo City center, using different modes of transportation. The São Paulo subway network reaches 74.2km of length and is involved in around 20% of the commuting trips by public transportation, enhancing mobility and productivity of workers. This paper uses an integrated framework to assess the higher-order economic impacts of the existing underground metro infrastructure. We consider links between mobility, accessibility and labor productivity in the context of a detailed metropolitan system embedded in the national economy. Simulation results from a spatial computable general equilibrium model integrated to a transportation model suggest positive economic impacts that go beyond the city limits. While 32% of the impacts accrue to the city of São Paulo, the remaining 68% benefit other municipalities in the metropolitan area (11%), in the State of São Paulo (12.0%) and in the rest of the country (45%).

The endogeneity of OECD gasoline taxes: Evidence from pair-wise, heterogeneous panel long-run causality tests

- Transportation Research Part A: Policy and Practice---2015---Brantley Liddle,Sidney Lung

Despite the current interest in using fuel taxes as an instrument for climate policy, there has been little study of current automotive fuel tax regimes. We expand on two earlier cross-sectional studies on why fuel taxes differ across countries by using OECD panel data and employing heterogeneous panel cointegration and long-run panel Granger-causality techniques. We confirm some of those earlier studies' conclusions. Further, we find that governments that rely on consumption-based taxes for revenues will have higher gasoline tax rates (than governments that rely on income and wealth/property-based taxes). But more significantly, we determine that higher gasoline demand among consumers "causes" democratic governments to set lower gasoline taxes—a finding with important implications for today's climate/energy policy debate.

Analysis of yellow-light running at signalized intersections using high-resolution traffic data

- Transportation Research Part A: Policy and Practice---2015---Guangquan Lu,Yunpeng Wang,Xinkai Wu,Henry X. Liu

Many accidents occurring at signalized intersections are closely related to drivers' decisions of running through intersections during yellow light, i.e., yellow-light running (YLR). Therefore it is important to understand the relationships between YLR and the factors which contribute to drivers' decision of YLR. This requires collecting a large amount of YLR cases. However, existing data collection method, which mainly relies on video cameras, has difficulties to collect a large amount of YLR data. In this research, we propose a method to study drivers' YLR behaviors using high-resolution event-based data from signal control systems. We used 8months' high-resolution data collected by two stop-bar detectors at a signalized intersection located in Minnesota and identified over 30,000 YLR cases. To

identify the possible reasons for drivers' decision of YLR, this research further categorized the YLR cases into four types: "in should-go zone", "in should-stop zone", "in dilemma zone", and "in optional zone" according to the driver's location when signal turns to yellow. Statistical analysis indicates that the mean values of approaching speed and acceleration rate are significantly different for different types of YLR. We also show that there were about 10% of YLR drivers who cannot run through intersection before traffic light turns to red. Furthermore, based on a strong correlation between hourly traffic volume and number of YLR events, this research developed a regression model that can be used to predict the number of YLR events based on hourly flow rate. This research also showed that snowing weather conditions cause more YLR events.

Investigating airline customers' premium coach seat purchases and implications for optimal pricing strategies

- Transportation Research Part A: Policy and Practice---2015---Stacey Mumbower,Laurie A. Garrow,Jeffrey P. Newman

We investigate factors that influence airline customers' purchases of premium coach seats using a database of online prices and seat map displays collected from JetBlue's website. Results show that multiple factors influence purchasing behavior; these factors include the amount of the seat fee, how far in advance the ticket is purchased, the number of passengers traveling together, and load factors (as revealed through seat map displays). We find that customers are between 2 and 3.3 times more likely to purchase premium coach seats (with extra legroom and early boarding privileges) when there are no regular coach window or aisle seats that can be reserved for free. In addition, we find that customers who purchase tickets closer to the departure date are less price-sensitive and are willing to pay higher seat fees. We use these model results to show that JetBlue's seat fees are currently underpriced in many markets; an optimal static fee would increase revenues by 8% whereas optimal time-dependent fees would increase revenues by 10.2%.

In addition, if JetBlue were to leave their seat fees unchanged and instead reserve certain rows of seats for premier customers, they could potentially increase revenues by 12.8%.

Challenges raised by freight for the operations planning of a shared-use rail network. A French perspective

- Transportation Research Part A: Policy and Practice---2015---Camille Morvant

Operating rail infrastructures that are shared among different uses is complex. In Western Europe, the predominance of passenger traffic over freight has traditionally led to thorough scheduling of capacity use, with an increasing tendency to anticipate through the design of regular-interval timetables. The paper discusses the specific challenges posed by fitting freight into the timetabling process for a mixed-use rail network, based on current French experience. The analysis is carried out from the perspective of the infrastructure manager. It is mainly supported by the results of a series of about 30 interviews, carried out in 2012 and 2013 with the parties involved in the timetabling process. The paper provides a comprehensive understanding of the process in terms of organization, rules and practices, with an emphasis on the characteristics of freight traffic compared with passenger traffic. The author highlights three key management issues for the French infrastructure manager when dealing with freight: (1) the uncertainty surrounding the mid-long term development of the rail freight market at the national level; (2) the heterogeneity resulting from the diversity of commodities, convoys and profiles and behaviors of the capacity applicants; (3) the volatility of some freight traffic resulting in a great amount of activity in the later stages of the timetabling process. If uncertainty about the future appears to be a highly sensitive issue in the French context, heterogeneity and volatility of freight traffic can be perceived as management challenges that may be experienced, to a greater or lesser degree, on other rail networks.

On including travel time reliability of road traffic in appraisal

- Transportation Research Part A: Policy and Practice---2015---Gerard C. de Jong, Michiel Bliemer

In many countries, decision-making on proposals for national or regional infrastructure projects in passenger and freight transport includes carrying out a cost-benefit analysis for these projects. Reductions in travel times are usually a key benefit. However, if a project also reduces the variability of travel time, travellers, freight operators and shippers will enjoy additional benefits, the ‘reliability benefits’. Until now, these benefits are usually not included in the cost-benefit analysis. To include reliability of travel or transport time in the cost-benefit analysis of infrastructure projects not only monetary values of reliability, but also reliability forecasting models are needed. As a result of an extensive feasibility study carried out for the German Federal Ministry of Transport, Building and Urban Development this paper aims to provide a literature overview and outcomes of an expert panel on how best to calculate and monetise reliability benefits, synthesised into recommendations for implementing travel time reliability into existing transport models in the short, medium, and long term. The paper focuses on road transport, which has also been the topic for most of the available literature on modelling and valuing transport time reliability.

Will subsidies drive electric vehicle adoption? Measuring consumer preferences in the U.S. and China

- Transportation Research Part A: Policy and Practice---2015---John Paul Helveston, Yimin Liu, Elea McDonnell Feit, Erica Fuchs, Erica Klampfl, Jeremy J. Michalek

We model consumer preferences for conventional, hybrid electric, plug-in hybrid electric (PHEV), and battery electric (BEV) vehicle technologies in China and the U.S. using data from choice-based conjoint surveys fielded in 2012–2013 in both countries. We find

that with the combined bundle of attributes offered by vehicles available today, gasoline vehicles continue in both countries to be most attractive to consumers, and American respondents have significantly lower relative willingness-to-pay for BEV technology than Chinese respondents. While U.S. and Chinese subsidies are similar, favoring vehicles with larger battery packs, differences in consumer preferences lead to different outcomes. Our results suggest that with or without each country's 2012–2013 subsidies, Chinese consumers are willing to adopt today's BEVs and mid-range PHEVs at similar rates relative to their respective gasoline counterparts, whereas American consumers prefer low-range PHEVs despite subsidies. This implies potential for earlier BEV adoption in China, given adequate supply. While there are clear national security benefits for adoption of BEVs in China, the local and global social impact is unclear: With higher electricity generation emissions in China, a transition to BEVs may reduce oil consumption at the expense of increased air pollution and/or greenhouse gas emissions. On the other hand, demand from China could increase global incentives for electric vehicle technology development with the potential to reduce emissions in countries where electricity generation is associated with lower emissions.

Evaluation of pedestrian crosswalk level of service (LOS) in perspective of type of land-use

- Transportation Research Part A: Policy and Practice---2015---B Raghuram Kadali,P. Vedagiri

In India pedestrians usually cross the road at mid-block crosswalks due to ease of access to their destination or the development of adjacent land use types such as shopping, business areas, school and residential areas. The behaviour of pedestrian will change with respect to different land use type and this change in behaviour of pedestrian further reflects change in perceived level of service (LOS). So, it is important to evaluate the quality of service of such crossing facilities with respect to different land-use type under mixed traffic conditions. In this framework, pedestrian perceived LOS were collected with respect to differ-

ent land-use type such as shopping, residential and business areas. The ordered probit (OP) model was developed by using NLOGIT software package, with number of vehicles encountered, road crossing difficulty as well as safety considered as primary factors along with pedestrian individual factors (gender and age), land-use type and roadway geometry. From the model results, it has been concluded that perceived safety, crossing difficulty, land-use condition, number of vehicles encountered, median width and number of lanes have significant effect on pedestrian perceived LOS at unprotected (un-signalized) mid-block crosswalks in mixed traffic scenario. The inferences of these results highlights the importance of land use planning in designing a new set of pedestrian access facilities for unprotected mid-block crosswalks under mixed traffic conditions. Also the study results would be useful for evaluating pedestrian accessibility taking into account different land-use type and planning required degree of segregation with vehicular movement at unprotected mid-block crosswalk locations.

A new composite decision support framework for strategic and sustainable transport appraisals

- Transportation Research Part A: Policy and Practice---2015---Michael Bruhn Barfod, Kim Bang Salling

This paper concerns the development of a new decision support framework for the appraisal of transport infrastructure projects. In such appraisals there will often be a need for including both conventional transport impacts as well as criteria of a more strategic and/or sustainable character. The proposed framework is based on the use of cost-benefit analysis featuring feasibility risk assessment in combination with multi-criteria decision analysis and is supported by the concept of decision conferencing. The framework is applied for a transport related case study dealing with the complex decision problem of determining the most attractive alternative for a new fixed link between Denmark and Sweden – the so-called HH-connection. Applying the framework to the case study made it possible to address the decision problem from an economic,

a strategic, and a sustainable point of view simultaneously. The outcome of the case study demonstrates the decision making framework as a valuable decision support system (DSS), and it is concluded that appraisals of transport projects can be effectively supported by the use of the DSS. Finally, perspectives of the future modelling work are given.

Imperfect reversibility of air transport demand: Effects of air fare, fuel prices and price transmission

- Transportation Research Part A: Policy and Practice---2015---Zia Wadud

There are recent evidence that air transport demand may not have a perfectly reversible relationship with income and jet fuel prices, as is assumed in most demand models. However, it is not known if the imperfectly reversible effects of jet fuel price are a result of asymmetries in the supply side, i.e., asymmetries in cost pass through from fuel prices to air fare, or of demand side behavioral asymmetries whereby people value gains and losses differently. This paper uses US time series data and decomposes air fare and fuel price into three component series to develop an econometric model of air transport demand that is capable of capturing the potential imperfectly reversible relationships and test for the presence or absence of reversibility. We find that air transport demand shows asymmetry with respect to air fare, indicating potential imperfect reversibility in consumer behavior. We also find evidence of asymmetry and hysteresis in cost pass-through from jet fuel prices to air fare, showing rapid increases in airfare when fuel prices increases but a slower response in the opposite direction.

Identifying preferences for public transport investments under a constrained budget

- Transportation Research Part A: Policy and Practice---2015---David Hensher, Chinh Ho, Corinne Mulley

As urban areas face increasing demands for new transport infrastructure to promote a sustainable future

with an increasing reality of constrained government budgets, the debate on whether we should focus on rail or bus-based investments continues unabated in many jurisdictions. Associated with the debate is an emotional (or ideological) bias by communities in favour of one mode, especially rail, which carries much sway at the political level as if there is no budget constraint. This paper presents a stated choice experiment to investigate this context as two unlabelled options described by 20 potential drivers of community preferences for improved public transport, where each choice scenario is conditioned on an estimated construction cost and a total annual transport infrastructure budget for the relevant geographical jurisdiction. This is followed by a labelling of each alternative to reveal whether the option is bus rapid transit (BRT) or light rail (LRT) and to establish whether this additional information influences preference revision. Data is collected in all eight capital cities of Australia in mid 2014. Mixed logit models with heteroscedastic conditioning in terms of the cost of the project infrastructure and whether the alternative is labelled BRT or LRT, provide new evidence on the nature and extent of community modal bias in a budget-constrained choice setting. The conclusions are twofold. On the one hand, if a fully compensatory choice rule is assumed (as is common in all previous modal comparison studies), LRT is predominantly preferred over BRT despite budgetary constraints, similarities in quality of service attributes and the opportunity to choose a greater network coverage for a given construction cost. However, when we allow for attribute non-attendance (a semi-compensatory choice rule), the modal bias is no longer a significant driver of preferences.

Relationship between logistics infrastructure and trade: Evidence from Spanish regional exports

- Transportation Research Part A: Policy and Practice---2015---Sami Bensassi, Laura Márquez-Ramos, Inmaculada Martínez-Zarzoso, Celestino Suárez-Burguet

Geographical factors and transport infrastructure are two of the key determinants that influence interna-

tional competitiveness. In this sense, the quality of such infrastructure and how widespread it is, the distribution and capacity of logistics facilities in a country, as well as the number of private operators and their degree of specialisation, all play an increasingly important role in the design of business strategies aimed at increasing a country's share of the international market. Until recently, however, availability and access to logistics services have been considered secondary factors when defining business competitiveness. This paper estimates an augmented gravity model of trade that specifically includes logistics and transport infrastructure indicators as explanatory variables. The model is estimated by using bilateral exports from 19 Spanish regions to 64 destinations (45 countries and 19 Spanish regions) with data for the period 2003–2007. The findings show that logistics is indeed important for the analysis of trade flows in goods and they highlight the importance of logistics measures at the regional level. In particular, the number, size and quality of logistics facilities positively influence export flows.

Street characteristics to encourage children to walk

- Transportation Research Part A: Policy and Practice---2015---Jack L. Nasar,Christopher Holoman,Dina Abdulkarim

An experiment tested whether physical disorder affected low to moderate income African-American children's choice of street to walk on and their parents' choice of a street for them to walk on. The experiment used an innovative desktop simulation in which 32 fourth and fifth grade African-American children and 30 parents viewed and explored pairs of virtual walk-through streets manipulated on disorder (across three contexts and two other street and sidewalk characteristics) and picked from each pair the one to walk on (child) or for the child to walk on (parent). Each participant was asked to report the reasons for the choices. The analysis revealed that children and their parents were more likely to walk (or have the child walk) on streets lower in disorder. Reported reasons for choices confirmed the importance of physical disorder

in affecting walking choices. Low-cost improvements in order may make streets more desirable for recreational walking.

Effects of providing total cost of ownership information on consumers' intent to purchase a hybrid or plug-in electric vehicle

- Transportation Research Part A: Policy and Practice---2015---Jerome Dumortier,Saba Siddiki,Sanya Carley,Joshua Cisney,Rachel M. Krause,Bradley W. Lane,John A. Rupp,John D. Graham

Energy-saving technologies have a difficult time being widely accepted in the marketplace when they have a high initial purchase price and deferred financial benefits. Consumers might not realize that, in the long-run, the financial benefits from reduced energy consumption offset much or all of the initial price premium. One strategy to address consumer misconception of this advantage is to supply information on the “total cost of ownership”, a metric which accounts for the purchase price, the cost of the fuel, and other costs over the ownership period. In this article, we investigate how providing information on five-year fuel cost savings and total cost of ownership affects the stated preferences of consumers to purchase a gasoline, conventional hybrid, plug-in hybrid, or battery electric vehicle. Through an online survey with an embedded experimental design using distinct labels, we find that respondent rankings of vehicles are unaffected by information on five-year fuel cost savings. However, adding information about total cost of ownership increases the probability that small/mid-sized car consumers express a preference to acquire a conventional hybrid, plug-in hybrid, or a battery-electric vehicle. No such effect is found for consumers of small sport utility vehicles. Our results are consistent with other findings in the behavioral economics literature and suggest that further evaluation of the effects of providing consumers with information on the total cost of vehicle ownership is warranted.

Modelling the resilience, friability and costs of an air transport network affected by a large-scale disruptive event

- Transportation Research Part A: Policy and Practice---2015---Milan Janić

This paper deals with developing a methodology for estimating the resilience, friability, and costs of an air transport network affected by a large-scale disruptive event. The network consists of airports and airspace/air routes between them where airlines operate their flights. Resilience is considered as the ability of the network to neutralize the impacts of disruptive event(s). Friability implies reducing the network's existing resilience due to removing particular nodes/airports and/or links/air routes, and consequently cancelling the affected airline flights. The costs imply additional expenses imposed on airports, airlines, and air passengers as the potentially most affected actors/stakeholders due to mitigating actions such as delaying, cancelling and rerouting particular affected flights. These actions aim at maintaining both the network's resilience and safety at the acceptable level under given conditions.

Factors influencing bike share membership: An analysis of Melbourne and Brisbane

- Transportation Research Part A: Policy and Practice---2015---Elliot Fishman, Simon Washington, Narelle Haworth, Angela Watson

The number of bike share programs has increased rapidly in recent years and there are currently over 700 programs in operation globally. Australia's two bike share programs have been in operation since 2010 and have significantly lower usage rates compared to Europe, North America and China. This study sets out to understand and quantify the factors influencing bike share membership in Australia's two bike share programs located in Melbourne and Brisbane. An online survey was administered to members of both programs as well as a group with no known association with bike share. A logistic regression model revealed several significant predictors of membership including

reactions to mandatory helmet legislation, riding activity over the previous month, and the degree to which convenience motivated private bike riding. In addition, respondents aged 18–34 and having docking station within 250m of their workplace were found to be statistically significant predictors of bike share membership. Finally, those with relatively high incomes increased the odds of membership. These results provide insight as to the relative influence of various factors impacting on bike share membership in Australia. The findings may assist bike share operators to maximize membership potential and help achieve the primary goal of bike share – to increase the sustainability of the transport system.

Investigating the nature and impact of reporting bias in road crash data

- Transportation Research Part A: Policy and Practice---2015---Kibrom Abay

This paper investigates the nature, and impact of the reporting bias associated with the police-reported crash data on inferences made using this data. In doing so, we merge a detailed emergency room data and police-reported crash data for a specific region in Denmark. To disentangle potentially common observable and unobservable factors that affect drivers' injury severity risk and their crash reporting behavior, we formulate a bivariate ordered-response probit model of injury severity risk and crash reporting propensity. To empirically identify the reporting bias in this joint model, we exploit an exogenous police reform that particularly affects some specific municipalities of the region under consideration. The empirical analysis reveals substantial reporting bias in the commonly used police-reported road crash data. This non-random sample selection associated with the police-reported crash data leads to biased estimates on the effect of some of the explanatory variables in injury severity analysis. For instance, estimates based on the police-reported crash data substantially underestimate the effectiveness of seat belt use in reducing drivers' injury severity risk.

Do people drive safer when accidents are more expensive: Testing for moral hazard in experience rating schemes

- Transportation Research Part A: Policy and Practice---2015---Tomislav Vukina,Danijel Nestic

Using individual policies and claims data from the Croatian mandatory motor insurance we test the theoretical proposition that under moral hazard, experience rated pricing scheme should generate the negative state dependence in claims, i.e. that drivers should drive more safely after they had an accident. The empirical challenge in these tests is to disentangle the state dependence from unobserved heterogeneity. We propose a simple approach based on the explicit reliance on the cost of future accidents function which is used to filter out the pure incentives effect, whereas the bonus-malus scale is used to control for pure heterogeneity. Our results confirm the existence of negative dependence in claims indicating the presence of significant moral hazard effect. Increasing a 3-year cost of having an accident by approximately US\$20 decreases the probability of having an accident by 6.5%.

Modelling users' behaviour in inter-urban carsharing program: A stated preference approach

- Transportation Research Part A: Policy and Practice---2015---Stefano de Luca,Roberta Di Pace

In this paper, the effects of a inter-urban carsharing program on users' mode choice behaviour were investigated and modelled through specification, calibration and validation of different modelling approaches founded on the behavioural paradigm of the random utility theory. To this end, switching models conditional on the usually chosen transport mode, unconditional switching models and holding models were investigated and compared. The aim was threefold: (i) to analyse the feasibility of a inter-urban carsharing program; (ii) to investigate the main determinants of the choice behaviour; (iii) to compare different approaches (switching vs. holding; conditional vs. unconditional);

(iv) to investigate different modelling solutions within the random utility framework (homoscedastic, heteroscedastic and cross-correlated closed-form solutions). The set of models was calibrated on a stated preferences survey carried out on users commuting within the metropolitan area of Salerno, in particular with regard to the home-to-work trips from/to Salerno (the capital city of the Salerno province) to/from the three main municipalities belonging to the metropolitan area of Salerno. All of the involved municipalities significantly interact each other, the average trip length is about 30km a day and all are served by public transport. The proposed carsharing program was a one-way service, working alongside public transport, with the possibility of sharing the same car among different users, with free parking slots and free access to the existent restricted traffic areas. Results indicated that the inter-urban carsharing service may be a substitute of the car transport mode, but also it could be a complementary alternative to the transit system in those time periods in which the service is not guaranteed or efficient. Estimation results highlighted that the conditional switching approach is the most effective one, whereas travel monetary cost, access time to carsharing parking slots, gender, age, trip frequency, car availability and the type of trip (home-based) were the most significant attributes. Elasticity results showed that access time to the parking slots predominantly influences choice probability for bus and carpool users; change in carsharing travel costs mainly affects carpool users; change in travel costs of the usually chosen transport mode mainly affects car and carpool users.

How to mix per-flight and per-passenger based airport charges

- Transportation Research Part A: Policy and Practice---2015---Achim I. Czerny,Anming Zhang

This paper investigates the questions of why carriers advocate for higher per-passenger airport charges and lower per-flight charges, and whether and when this proposal is welfare-enhancing. Specifically, the paper compares the optimal mix of per-flight and per-passenger based airport charges from both a monopoly

carriers' and the social viewpoints conditional on airport cost recovery. It focuses on the trade-off between price and frequency (i.e., schedule delays) when time valuations are uniform, or differ, between business and leisure passengers. We identify an easy test for the evaluation of the mix of per-passenger and per-flight based airport charges by policy makers, which is simply to check whether the carrier's preferred per-flight charge is zero. Our analysis suggests that there is no need for immediate regulatory corrections of the current trend towards the strong use of per-passenger based airport charges.

Is car drivers' response to congestion charging schemes based on the correct perception of price signals?

- Transportation Research Part A: Policy and Practice---2015---Heike Link

This paper deals with the question of whether the capability of car drivers to estimate the cost of a new hypothetical, highly differentiated congestion charge influences their decision to change travel behaviour. The analysis makes use of an integrated choice and latent variable model (ICLV) which merges classic choice models with the structural equation approach (SEM) for latent variables. This hybrid model improves the explanatory power considerably compared with a conventional discrete choice model. The results suggest that charge complexity decreases the resistance in considering behavioural changes. Car drivers tend to avoid a travel option where the price is not known beforehand, a phenomenon known as ambiguity avoidance.

The effect of institutional factors on public-private partnership success in ports

- Transportation Research Part A: Policy and Practice---2015---Photis M. Panayides,Francesco Parola,Jasmine Siu Lee Lam

Port public-private partnerships (PPPs) are considered to be an important emerging mechanism for port development and improvement in port performance

especially for developing countries. This paper empirically investigates the effect of institutional factors in the success of port's PPPs; the latter defined as the attractiveness of the PPP project for private bidders and the market competitiveness of the facility. The empirical investigation of a large sample of ports finds that 'regulatory quality', 'market openness', 'ease to start a business' and 'enforcing contracts' are important institutional determinants of port PPP success and may ultimately contribute to port development and economic growth. The results are consistent with and add to the theoretical literature whereas practical implications for port authorities, managers and investors are discussed.

Can ports increase traffic while reducing inputs? Technical efficiency of Spanish Port Authorities using a directional distance function approach

- Transportation Research Part A: Policy and Practice---2015---Beatriz Tovar,Alan Wall

The focus of this paper is on the productive efficiency of ports. We estimate a directional technology distance function using parametric techniques to analyze the production technology and technical efficiency of a set of Spanish Port Authorities observed over the period 1993-2012. Technical inefficiency is conceived as the ability of ports to simultaneously expand a given output and contract variable inputs while maintaining quasi-fixed inputs and other outputs constant. Thus, for containerized cargo we address the following question: Given the amount of quasi-fixed inputs used by the firm and given the volume of the other outputs (liquids, solids, non-containerized cargo and passenger traffic), could ports increase their containerized merchandise while simultaneously reducing their variable inputs? Similar questions are asked for solid bulk and non-containerized general cargo. Our results show evidence of technical inefficiency among the ports in our sample. In particular, if the ports operated efficiently, we find that containerized cargo could be expanded by an average of over 6.4%, with an equivalent reduction in variable inputs. Solid bulk cargo and general non-containerized cargo could be increased by 4.1% and

6.1% respectively, with corresponding reductions in variable inputs. An implication of our results is that there is ample scope for specialization on the part of ports with no increase in infrastructure costs. Given that large investments in infrastructure have been made in Spanish port over the last decade, this opens the possibility of moving towards a management model based on taking advantage of existing capacity rather than new investments.

The joint estimation of respondent-reported certainty and acceptability with choice

- Transportation Research Part A: Policy and Practice---2015---John Rose,Matthew J. Beck,David Hensher

In the stated choice literature, increasing attention has been paid to methods that seek to close the gap between the choices from these experiments and the choices experienced in the real world. Attempts to produce model estimates that are truer to real market behaviours are especially important for transportation, where many important policy decisions rely on such experiments. A recent approach that has emerged makes use of a certainty index whereby respondents report how certain they are about each choice they make. Additional literature also posits that when making decisions, people first identify an acceptable set of alternatives (alternative acceptability) such that a consideration set is formed and it is from this reduced set that the ultimate choice is made. This paper presents two models that jointly estimate choice and choice certainty and choice and alternative acceptability. This joint estimation allows the modeller to overcome potential endogeneity that may exist between these responses. In comparing choices of differing certainty, surprisingly little difference in marginal sensitivities are found. This is not the case in the alternative acceptability models however. An important finding of this research is that what could be interpreted as preference heterogeneity may in fact be more closely linked to scale. The ramifications of these results on future research are discussed.

Road pricing for congestion and accident externalities for mixed traffic of motorcycles and automobiles

- Transportation Research Part A: Policy and Practice---2015---Jyh-Fa Tsai,Chih-Peng Chu,Shou-Ren Hu

Motorcycles play an important role in sharing the trip demand with automobiles for commuting, especially in many cities in Asia. However, the accident cost of a trip by motorcycle is higher than that of an automobile. This study analyzes the road pricing for the congestion and accident externalities of mixed traffic of automobiles and motorcycles. A model for equilibrium trips with no taxation and that for optimal trips with taxation are explored. The model is then applied to the Tucheng City–Banciao City–Taipei central business district corridor in Taipei metropolitan area. The findings in this case study show that the tax for accident externality is larger than that for congestion externality.

Increased energy efficiency in short sea shipping through decreased time in port

- Transportation Research Part A: Policy and Practice---2015---Hannes Johnson,Linda Styhre

According to a range of assessments, there exists a large cost-effective potential to increase energy efficiency in shipping through reduced speed at sea enabled by shorter time in port. This means that the energy needed can be reduced whilst maintaining the same transport service. However, the fact that a large cost-effective potential has been identified that is not being harnessed by decision-makers in practice suggests that there is more to this potential to understand. In this paper, the possibilities for increasing energy efficiency by reducing waiting time in port are explored and problematised through a case study of a short sea bulk shipping company transporting dry bulk goods mainly in the North and Baltic seas. Operational data from two ships in the company's fleet for one year showed that the ships spent more than 40% of their time in ports and that half of the time in port was not

productive. The two most important reasons for the large share of unproductive time were that ports were closed on nights and weekends and that ships arrived too early before the stevedores were ready to load or unload the cargo. Reducing all of the unproductive time may be difficult, but the results also show that even a conservative estimate of one to four hours of reduced time per port call would lead to a reduction in energy use of 2–8%. From in-depth interviews with employees of the shipping company, ports and ship agencies, a complex picture is painted when attempting to understand how this potential arises. Aspects such as a lack of effective ship-shore-port communication, little time for ship operators, an absence of means for accurately predicting energy use of voyages as a function of speed, perceived risk of arriving too late, and relationships with third-party technical management may all play a role.

Explore the relationship between online shopping and shopping trips: An analysis with the 2009 NHTS data

- Transportation Research Part A: Policy and Practice---2014---Yiwei Zhou,Wang, Xiaokun (Cara)

The rapid growth of ecommerce brings great changes to the transportation system. However, most existing studies focus on the impact of ecommerce on freight system. Its impact on personal trips is relatively less studied. It is reasonable to argue that online shopping reduces the need of shopping trips by making goods accessible via door-to-door deliveries. On the other hand, online shopping may also create more shopping trips as online shoppers travel to stores to experience, compare or pick up the goods. Understanding the connections between online shopping and shopping trips is critical for transportation planners to prepare for changes that information technology will continue to bring to this nation in the future. Using the 2009 National Household Travel Survey (NHTS) data and a structural equation model (SEM), this paper disentangles the bidirectional connections between online shopping and shopping trips. Results show that online shopping

encourages shopping trips while shopping trips tend to suppress the online shopping propensity. Besides, both online shopping and shopping trips are influenced by exogenous factors such as shoppers' demographic features, regional specific factors and household attributes. A closer examination at the state level further confirms model validity while disclosing spatial variation in their relationship.

Exploratory analysis of public perceptions of innovative financing for infrastructure systems in the U.S

- Transportation Research Part A: Policy and Practice---2014---Ali Mostafavi,Dulcy Abraham,Antonio Vives

While traditional financing approaches such as federal and state grants funded by taxation are insufficient to address the existing need, innovative financing such as novel public private partnership models, credit enhancement tools, and new bonding instruments has emerged to expand the fiscal space of public agencies for infrastructure development. Formulating innovative financing approaches is one of the challenges faced by policymakers to address the ever growing need for restoring the failing civil infrastructure in the U.S. Public support/opposition is one of the major drivers/disruptors of innovative financing. Assessment of public perceptions is a major component towards gaining public support and developing sustainable infrastructure financing policies. The objective of this study is to investigate the determinants of public perceptions of innovative financing. Data obtained from public survey of 616 individuals from 50 states in the U.S. is analyzed to investigate the effects of: (a) economic factors, (b) infrastructure conditions, and (c) personal characteristics of the public on the knowledge, awareness, perceptions, and attitudes of the public towards innovative financing. The findings reveal that the likelihood of public support of innovative financing is insensitive to economic conditions and is affected by the factors related to infrastructure condition such as the level of need for infrastructure renewal, the ability to protect the public against natural disasters, and the

history of using innovative financing for infrastructure renewal. The findings also show that 57% of the sample population in the U.S. were not knowledgeable about different methods for financing infrastructure projects and 77% of the sample population in the U.S. were not aware of the activities of public organizations for finding innovative financing solutions for infrastructure projects. Based on the findings, two main strategies have been proposed for infrastructure agencies to enhance their efforts towards gaining public acceptance of innovative financing: (i) enhance strategies to facilitate learning for the public about innovative financing in infrastructure projects and (ii) improve marketing and citizen involvement strategies to get the public to buy-in to innovative financing methods. The findings can enhance the current efforts of public agencies related to educating the public and citizen involvement strategies by incorporating public preferences in policy development to enhance the likelihood of public support of innovative financing methods. Potential improvements can be made in changing the key messages in educating the public, using more effective strategies for communicating complicated financing concepts, and highlighting the success stories and benefits of innovative financing in other states and countries.

The impact of a congestion pricing exemption on the demand for new energy efficient vehicles in Stockholm

- Transportation Research Part A: Policy and Practice---2014---Jake Whitehead,Joel P. Franklin,Simon Washington

As governments seek to transition to more efficient vehicle fleets, one strategy has been to incentivize ‘green’ vehicle choice by exempting some of these vehicles from road user charges. As an example, to stimulate sales of energy efficient vehicles (EEVs) in Sweden, some of these automobiles were exempted from Stockholm’s congestion tax. In this paper the effect this policy had on the demand for new, privately-owned, exempt EEVs is assessed by first estimating a model of vehicle choice and then by applying this model to simulate vehicle alternative market shares under different policy

scenarios. The database used to calibrate the model includes owner-specific demographics merged with vehicle registry data for all new private vehicles registered in Stockholm County during 2008. Characteristics of individuals with a higher propensity to purchase an exempt EEV were identified. The most significant factors included intra-cordon residency (positive), distance from home to the CBD (negative), and commuting across the cordon (positive). By calculating vehicle shares from the vehicle choice model and then comparing these estimates to a simulated scenario where the congestion tax exemption was inactive, the exemption was estimated to have substantially increased the share of newly purchased, private, exempt EEVs in Stockholm by 1.8% ($\pm 0.3\%$; 95% C.I.) to a total share of 18.8%. This amounts to an estimated 10.7% increase in private, exempt EEV purchases during 2008, i.e., 519 privately owned, exempt EEVs.

Modelling parking choices considering user heterogeneity

- Transportation Research Part A: Policy and Practice---2014---A. Ibeas,dell’ Olio, L.,M. Bordagaray,J. de D. Ortúzar

We examine car driver’s behaviour when choosing a parking place; the alternatives available are free on-street parking, paid on-street parking and parking in an underground multi-storey car park. A mixed logit model, allowing for correlation between random taste parameters and estimated using stated choice data, is used to infer values of time, both when looking for a parking space and for accessing the final destination. Apart from the cost of parking, we found that vehicle age was a key variable when choosing where to park in Spain. We also found that the perception of the parking charge was fairly heterogeneous, depending both on the drivers’ income levels and whether or not they were local residents. Our results can be generalised for personalised policy making related with parking demand management.

Quality of institutions and private participation in transport infrastructure investment: Evidence from developing countries

- Transportation Research Part A: Policy and Practice---2014---Marco Percoco

In recent decades, owing to a series of public debt crises and constraints on government expenditure, infrastructure investment has dropped significantly in both developed and developing countries. To counter-balance this trend, Public–Private Partnerships (PPPs) schemes have been increasingly adopted. In this paper, we explore the determinants of the degree of private participation in transport infrastructure projects in a large sample of developing countries. By using a large sample of transport projects included in the World Bank Private Participation in Infrastructure Projects database, we document that greater participation by private parties in PPP contracts is associated with better institutions in terms of lower corruption, civil freedom, and a better regulatory framework.

Public participation and written submissions: A transport infrastructure planning case study

- Transportation Research Part A: Policy and Practice---2014---Hans Antonson

Written submissions or comments as a response on an EIS (Environmental Impact Statement) rank as one of the most common forms of public participation. Within public participation research there appears to be an international dearth of knowledge concerning such written submissions. The possible impact of such responses on an EIS is – with few exceptions – seldom put in focus. The aim in the present brief communication is to study one aspect of public participation within transport infrastructure planning, namely the role of written submissions sent to the applicant by individuals, Non-governmental organisations, companies and authorities. By comparing 34 written submissions with road planning documents (including EIS) the impact of the public views has been analysed in a south Swedish case study. At a time when the new Environmental Code only had been in force for less than one year,

it does not appear as if the Road Administration’ s regional office accepted most of the written submissions just to show that the new regulation concerning participation had a direct impact on the planning. Sweden’ s long tradition of public access to official documents may explain why written submissions as one aspect of public participation worked well in the E18 highway planning process, because civil servants have long been taught to promptly furnish information and guidance, as well as to giving advice and other assistance to individuals in matters concerning an authority’ s activity. This study shows, then, that – if properly managed by the developer’ s street-level staff – the use of written submissions may improve the EIS from a stakeholder perspective and also make the stakeholders feel they are being taken seriously.

Synopsis of bicycle demand in the City of Toronto: Investigating the effects of perception, consciousness and comfortability on the purpose of biking and bike ownership

- Transportation Research Part A: Policy and Practice---2014---Khandker Nurul Habib,Jenessa Mann,Mohamed Mahmoud,Adam Weiss

This paper provides an empirical basis for the evaluation of policies and programs that can increase the usage of bikes for different purposes as well as bike ownership. It uses an integrated econometric model of latent variable connecting multiple discrete choices. Empirical models are estimated by using a bicycle demand survey conducted in the City of Toronto in 2009. Empirical investigations reveal that latent perceptions of ‘bikeability’ and ‘safety consciousness’ directly influence the choice of biking. It is also found that the choice of the level of bike ownership (number of bikes) is directly influenced by latent ‘comfortability of biking’ . The number of bikes owned moreover has a strong influence on the choices of biking for different purposes. It is clear that bike users in the City of Toronto are highly safety conscious. Increasing on-street and separate bike lanes proved to have the maximum effects on attracting more people to biking by increasing the perception of bikeability in the city, comfortability of

biking in the city and increasing bike users' sense of safety. In terms of individuals' characteristics, older males are found to be the most conformable and younger females are the least comfortable group of cyclists in Toronto.

Forecasting demand for high speed rail

- Transportation Research Part A: Policy and Practice---2014---Maria Börjesson

It is sometimes argued that standard state-of-practice logit-based models cannot forecast the demand for substantially reduced travel times, for instance due to High Speed Rail (HSR). The present paper investigates this issue by reviewing the literature on travel time elasticities for long distance rail travel and comparing these with elasticities observed when new HSR lines have opened. This paper also validates the Swedish long distance model, Sampers, and its forecast demand for a proposed new HSR, using aggregate data revealing how the air-rail modal split varies with the difference in generalized travel time between rail and air. The Sampers long distance model is also compared to a newly developed model applying Box-Cox transformations. The paper contributes to the empirical literature on long distance travel, long distance elasticities and HSR passenger demand forecasts. Results indicate that the Sampers model is indeed able to predict the demand for HSR reasonably well. The new non-linear model has even better model fit and also slightly higher elasticities.

Simultaneous modeling of individuals' duration and expenditure decisions in out-of-home leisure activities

- Transportation Research Part A: Policy and Practice---2014---Gamze Dane, Theo A. Arntze, Harry J.P. Timmermans, Dick Ettema

In this paper, we propose an activity model under time and budget constraints to simultaneously predict the allocation of time and money to out-of-home leisure activities. The proposed framework considers the activity episode level, given that the activity is

scheduled. Thus, the model considers the decision of the quantities for duration and expenditure spent during the activity. We use a flexible utility function and show how the simultaneous equations can be estimated by using structural equations model (SEM) estimation techniques to handle the endogeneity problem of time and expenditure. The estimation results are based on a large national leisure diary data set collected in 2008 in the Netherlands, which provides detailed information about time and money spent as well as timing and location attributes of the activities. The analysis reveals that socio-demographics, travel party, timing and location variables influence the duration and expenditure of activity episodes. It shows that various socio-demographic groups display different preferences in terms of the time and money spent on activities. The results also indicate substitution relationships between spending more time and money for various activity categories. Thus it is concluded that the analysis provides useful results for a better understanding of combined time and money allocation decisions for leisure activities.

Competition and public service obligations in European aviation markets

- Transportation Research Part A: Policy and Practice---2014---Joan Calzada, Xavier Fageda

This paper analyzes the effect of universal service policies on the airline markets of five European Union countries (France, Germany, Italy, Spain and the United Kingdom) in the period 2002–2010. Results show that airfare discount schemes for island residents raise demand and positively affect competition and the number of flights at the route level. These effects are evident in France and Italy, but are particularly marked in Spain. By contrast, public service obligations (PSOs) reduce competition on the protected routes, while their effect on the number of flights differs depending on national regulations. In Spain, routes protected with PSOs have greater flight frequencies than those on unprotected routes of similar characteristics, but in France, Italy and the UK the opposite result is found. The empirical model also finds that on routes with low-cost airlines

market concentration is smaller and there is a larger number of flights. This result is relevant for the design of universal service policy, since in recent years low-cost airlines have entered a number of thin routes and have increased access to air transportation.

Understanding public response to a congestion charge: A random-effects ordered logit approach

- Transportation Research Part A: Policy and Practice---2014---Zuduo Zheng,Zhiyuan Liu,Chuanli Liu,Nirajan Shiwakoti

Public acceptance is consistently listed as having an enormous impact on the implementation and success of a congestion charge scheme. This paper investigates public acceptance of such a scheme in Australia. Surveys were conducted in Brisbane and Melbourne, the two fastest growing Australian cities. Using an ordered logit modeling approach, the survey data including stated preferences were analyzed to pinpoint the important factors influencing people's attitudes to a congestion charge and, in turn, to their transport mode choices. To accommodate the nature of, and to account for the resulting heterogeneity of the panel data, random effects were considered in the models. As expected, this study found that the amount of the congestion charge and the financial benefits of implementing it have a significant influence on respondents' support for the charge and on the likelihood of their taking a bus to city areas. However, respondents' current primary transport mode for travelling to the city areas has a more pronounced impact. Meanwhile, respondents' perceptions of the congestion charge's role in protecting the environment by reducing vehicle emissions, and of the extent to which the charge would mean that they travelled less frequently to the city for shopping or entertainment, also have a significant impact on their level of support for its implementation. We also found and explained notable differences across two cities. Finally, findings from this study have been fully discussed in relation to the literature.

An ex-post CBA for the Stockholm Metro

- Transportation Research Part A: Policy and Practice---2014---Maria Börjesson,R. Daniel Jons-son,Mattias Lundberg

This paper performs an ex-post cost-benefit analysis (CBA) of the Metro system in Stockholm built in the 1950s. We find that the Metro was socially beneficial and that the largest benefit of the Metro is its capacity, making it possible for many people to travel to and from the city center. We also assess the significance of the wider economic impacts due to labor market distortions and the land-use effects in the case of the Stockholm Metro. The wider economic impacts increase the consumer surplus with 48%, and the yearly income in the county with 1.5%. A land-use model is used to simulate how the land-use has been influenced by the Metro over the years 1956–2006. This simulation indicates that the historical centralized planning of housing along transit corridors has developed the region into a more dispersed region than if the market forces had ruled. The simulation also suggests that the land-use impact from the investment itself is small, but that the land-use impact from the planning accompanying the decision to build the Metro has been substantial.

Agent-based modelling for assessing hybrid and electric cars deployment policies in Luxembourg and Lorraine

- Transportation Research Part A: Policy and Practice---2014---Florent Querini,Enrico Benetto

Electric mobility is often presented as a way to tackle the environmental issues associated with individual mobility, provided that electric vehicles are adopted by drivers on a mass scale. In this paper, we propose an agent-based model (ABM) aiming at modelling the deployment of these vehicles. ABM is particularly indicated when modelling complex systems whose final results are the combination of the interactions between individuals and their environment and when the agents have partial information to take their decisions. We selected Luxembourg and its French neighbouring region,

Lorraine, as the case study for our model, to test Luxembourg's ambitious objective of deploying 40,000 electric vehicles by the year 2020. Model results show that the number of battery powered electric vehicles in Luxembourg (including vehicles from Lorraine's commuters crossing the border every day) could be between 2000 and 21,000. A high number of commercial vehicles in Luxembourg, as well as an unlikely deployment in the neighbouring Belgium and Germany would therefore be required to meet the deployment objective. However, the deployment of plug-in hybrid vehicles could reach 60,000 cars by the end of 2020. To achieve this number, the deployment of charging points seems to be the more effective policy, along with actions aiming at increasing public awareness and acceptance of electric vehicles. The interest in using the ABM also lies in the identification of the main individuals' characteristics affecting the deployment of electric vehicles (household size, commuting distances, etc.), which further support the setting of public policies.

Do modes of transportation and GPS affect cognitive maps of Londoners?

- Transportation Research Part A: Policy and Practice---2014---Negin Minaei

Legibility has long been recognized as an important factor in creating a good image of a city in individuals' minds. This image is perceived to assist people in understanding the city, finding their way, and recalling the city. The quality of the image affects individuals' abilities in way-finding. This is especially important for cosmopolitan and global cities such as London in order to preserve resources and time, manage travel costs, limit pollution (air or noise) and enhance these cities as places to live, work and visit. This research examines the cognitive maps of London drawn by a sample of its residents to discover how different modes of transportation and GPS usage could affect individuals' urban images. Such research is useful for town planners, local government departments, and urban and transport planners because of the way it considers the legibility of London as and provides a tool to study individuals' urban images. 101 participants

were recruited with at least a two-year residency from both genders (38.6% females and 61.4% males) with the average age of 33.88 and S.D.=10.63. The results suggest car use has a positive correlation with seeing London in city scale and GPS usage has a negative correlation. Whilst recent studies have shown that there are differences between active travel modes (e.g., walking, bicycle riding or driving a car) and passive modes (e.g., as a passenger taking a bus, train or taxi), this study indicates that GPS usage also influences cognitive maps, with a negative correlation found between GPS usage and drawing maps on a city scale. Other significant associations were found for the car drivers with a positive relation with the number of roads mentioned on the maps, seeing London in city scale and having a two-dimensional façade image of the city in mind.

The generators of paratransit trips by persons with disabilities

- Transportation Research Part A: Policy and Practice---2014---Devajyoti Deka, Eric J. Gonzales

Identifying the generators of paratransit trips by persons with disabilities is important to comprehend the current demand patterns and forecast future demand. Only a handful of studies have been conducted so far to identify the generators of paratransit trips and most focused on the home end of the trips. Given some of the inconsistencies in past studies and the scarcity of studies on the generators of trips away from home, this study attempts to identify the generators of paratransit trips beginning and ending at clients' homes and away from home. It uses an extremely large dataset consisting of 1.91 million trips made by NJ TRANSIT's Access Link clients, socioeconomic data from the American Community Survey, employment data from the Longitudinal Employer-Household Dynamics, and establishment data from Dun and Bradstreet. The analytical methods include an ordinary least squares model (OLS) and several spatial generalized linear mixed models (GLMM) to identify the characteristics of census block groups associated with Access Link trip generation at home and away from home, Geographic

Information System (GIS) analysis to identify the types of establishments located in the immediate vicinity of drop-offs, and a multinomial logit model (MNL) to examine the relationship between the characteristics of the establishments in the vicinity of drop-offs and the characteristics of the dropped-off clients. Together, the various analyses provide useful insights about para-transit trip generators at the macro and micro levels. Some implications of the findings are discussed.

Consumers' willingness to pay for alternative fuel vehicles: A comparative discrete choice analysis between the US and Japan

- Transportation Research Part A: Policy and Practice---2014---Makoto Tanaka,Takanori Ida,Kayo Murakami, Lee Friedman

This paper conducts a comparative discrete choice analysis to estimate consumers' willingness to pay (WTP) for electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) on the basis of the same stated preference survey carried out in the US and Japan in 2012. We also carry out a comparative analysis across four US states. We find that on average US consumers are more sensitive to fuel cost reductions and alternative fuel station availability than are Japanese consumers. With regard to the comparative analysis across the four US states, consumers' WTP for a fuel cost reduction in California is considerably greater than in the other three states. We use the estimates obtained in the discrete choice analysis to examine the EV/PHEV market shares under several scenarios. In a base case scenario with relatively realistic attribute levels, conventional gasoline vehicles still dominate both in the US and Japan. However, in an innovation scenario with a significant purchase price reduction, we observe a high penetration of alternative fuel vehicles both in the US and Japan. We illustrate the potential use of a discrete choice analysis for forward-looking policy analysis, with the future opportunity to compare its predictions against actual revealed choices. In this case, increased purchase price subsidies are likely to have a significant impact on the market shares of alternative fuel vehicles.

Walking short distances. The socioeconomic drivers for the use of proximity in everyday mobility in Barcelona

- Transportation Research Part A: Policy and Practice---2014---Oriol Marquet,Carme Miralles-Guasch

Many studies have found that cities, with residents that are co-located with jobs and services in compact and diverse urban environments, generate positive outputs for a number of areas of social policy, with issues ranging from environmental to social and including public health. This evidence supports promoting rich and thriving neighbourhoods in order to encourage short distance mobility. In this context, we use a wide travel survey (EMQ06), undertaken in Spain, to measure short-distance travelling within Barcelona and to assess how distinct social groups make use of the local scale for their everyday mobility. The effects of socioeconomics and access to transport are discussed, prior to applying a Chi-squared Automatic Interaction Detection (CHAID) method, in order to explore heterogeneity among the different social groups, in terms of local travelling. We found that nearly a quarter of all daily mobility in Barcelona is performed with a local trip, and that short trips are more frequently undertaken for personal purposes. Also, age, gender and access to private transport appear as significant factors. Overall, our results suggest that a proximity scale is being used by those groups with greater time-space constraints, such as working women or low income people without access to private vehicles, opening important implications on transport policy regarding the design of proximity-prone environments.

The optimal dual-pricing policy of mall parking service

- Transportation Research Part A: Policy and Practice---2014---Ching-Ter Chang,Cheng-Kung Chung, Jiuh-Biing Sheu,Zheng-Yun Zhuang,Huang-Mu Chen

In studies of parking policy, the role of parking pricing has been addressed. Most researches have focused on

the determination of a proper price for city parking spaces that are open to the public and it is now evident that price is used by authorities as a tool to manage transport demand. However, studies of parking pricing that pertain to privately-owned parking resources are few and in particular, the problem of setting a proper price for physical market parking has rarely been studied, such as a mall's 'dual-pricing portfolio' decision for the simultaneous determination of a parking fee and the consumer spending required for free parking (i.e., the 'threshold'). This is a common problem for most malls, but the different agents involved (e.g., the visitors, the mall, the marketplace and the parking lot departments) usually have diverse goals, so the decision must take account of a multiplicity of criteria and subtle relationships. In order to systematically support this type of inter-departmental decision process, a decision model that includes an analytical decision-aid process and the relevant programming models is established. A numerical example verifies the proposed model by taking the data for a mall in Taiwan and the implications, in terms of management, are given. This systematic computational model can be generalized to any type of commercial market that requires a (new) parking pricing policy.

The Downs–Thomson Paradox with responsive transit service

- Transportation Research Part A: Policy and Practice---2014---Fangni Zhang,Hai Yang,Wei Liu

Downs (1962) and Thomson (1977) suggested that highway capacity expansion may produce counterproductive effects on the two-mode (auto and transit) transport system (Downs–Thomson Paradox). This paper investigates the occurrence of this paradox when transit authority can have different economic objectives (profit-maximizing or breakeven) and operating schemes (frequency, fare, or both frequency and fare). For various combinations of economic objectives and operating schemes, the interaction between highway expansion and transit service is explored, as well as its impact on travelers' mode choices and travel utilities. Further, for each combination, the conditions for occur-

rence of the Downs–Thomson Paradox are established. We show that the paradox never occurs when transit authority is profit-maximizing, but it is inevitable when the transit authority is running to maximize travelers' utility while maintaining breakeven. This is because the former transit authority tends to enhance transit service (e.g., raise frequency or reduce fare) when facing an expanded highway; and on the contrary, the latter tends to compromise transit service (e.g., reduce frequency or raise fare). Both analytical and numerical examples are provided to verify the theoretical results.

Shifting from car to active transport: A systematic review of the effectiveness of interventions

- Transportation Research Part A: Policy and Practice---2014---C.E. Scheepers,G.C.W. Wendel-Vos,J.M. den Broeder,E.E.M.M. van Kempen,P.J.V. van Wesemael,A.J. Schuit

A promising way to stimulate physical activity is to promote the choice for active modes of transport (walking and cycling). Over the past years, several interventions and policies have been implemented to stimulate this mode shift. However, information concerning the effectiveness of these interventions and policies is still limited. The aim of the present study was to systematically review the effectiveness of interventions designed to stimulate a shift from car use to cycling or walking and to obtain insight into the intervention tools that have been used to promote and/or implement these interventions.

Heterogeneity among motorists in traffic-congested areas in southern California

- Transportation Research Part A: Policy and Practice---2014---J.F. Jennifer Lee,Peter K. Kwok,Jeffrey Williams

Estimation of congestion costs, presumed to be one of the largest external costs of automobile travel, is typically based on a single value of time delay for motorists in metropolitan areas. However, the estimation may be wrong if the profiles of motorists are

different at different times of day. This study uses a survival model to examine the demographic and socioeconomic profiles of motorists at different times of day at congested locations in southern California, by using on-road remote-sensing measurements and license plates images obtained in 2007 and 2008 by the California South Coast Air Quality Management District (SCAQMD). More than 80,000 vehicles were observed from fifteen selected study sites over fifteen days. Their plates, through anonymized registration records, revealed addresses at the census block group level, which have homogenous profiles by construction. Motorists' profiles at different times of day display large variation, however, according to extended Cox model with a non-parametric baseline hazard, which is used to accommodate both the time-invariant and time-varying effects of the covariates. This study thus proposes a new approach to examine heterogeneity among motorists.

On the value of highway travel time information systems

- Transportation Research Part A: Policy and Practice---2014---Francesc Soriguera

After the widespread deployment of Advanced Traveler Information Systems, there exists an increasing concern about their profitability. The costs of such systems are clear, but the quantification of the benefits still generates debate. This paper analyzes the value of highway travel time information systems. This is achieved by modeling the departure time selection and route choice with and without the guidance of an information system. The behavioral model supporting these choices is grounded on the expected utility theory, where drivers try to maximize the expected value of their perceived utility. The value of information is derived from the reduction of the unreliability costs as a consequence of the wiser decisions made with information. This includes the reduction of travel times, scheduling costs and stress. This modeling approach allows assessing the effects of the precision of the information system in the value of the information.

Study on some bus transport networks in China with considering spatial characteristics

- Transportation Research Part A: Policy and Practice---2014---Xu-Hua Yang,Guang Chen,Sheng-Yong Chen,Wan-Liang Wang,Lei Wang

Many real-world networks are embedded in spaces. Recent studies have found that spatial characteristics are closely related to network features. Bus transport networks (BTNs) are typical spatially embedded networks, but their spatial characteristics are commonly disregarded in previous researches. In this paper, we propose a new spatial representation model for BTNs with information on the geographical location of bus stations and routes, for which we named as the ES model. The new model aids in the study of real-world BTNs. By performing a statistical study with the new representation model on three typical BTNs in China, namely the Beijing, Shanghai and Hangzhou BTNs, we identify some network features that are consistent with those revealed by previous studies, as well as some new features such as high clustering of short-distance station pairs (SSPs) and small average number of bus routes in a path. The result shows that the existence of SSPs can significantly influence the characteristics of BTNs. Besides, with the help of the ES model, we designed a new transfer algorithm for BTNs.

Improving conditions for potential New Zealand cyclists: An application of conjoint analysis

- Transportation Research Part A: Policy and Practice---2014---Ben Wooliscroft,Alexandra Ganglmair-Wooliscroft

The New Zealand Government, along with many around the world, has made a commitment to reducing green house gases with its endorsement of the Kyoto Agreement. The Government has also declared war on obesity and is actively encouraging New Zealanders to exercise more. One of the easiest ways to work towards both outcomes is through encouraging people to cycle as a form of transport instead of using their car. With a nationwide survey and conjoint analysis this

research investigates the motivations and barriers to using a bicycle for commuting. The perceived attitude of drivers to cyclists is identified as the major factor restricting the adoption of the bicycle for commuting.

Understanding the development of business travel policies: Reducing business travel, motivations and barriers

- Transportation Research Part A: Policy and Practice---2014---Helen Roby

Business travel accounted in the UK in 2010 for 3% of trips and 10% of the UK's domestic distance travelled (Department for Transport, 2011, p. 4). However, it is an under researched area, even though in major cities, where transport networks are most congested, it forms a higher proportion of trips. The paper presents the findings of a study of changing business travel practices and policies affecting the briefcase traveller. The findings are drawn from semi-structured interviews with key actors in stakeholder and private sector organisations based predominately in London and a survey of 150 business travellers. The study was designed to understand the motivations and attitudes towards reducing business travel and the compromises that needed to be made to balance reducing carbon emissions and cost, whilst maintaining or improving productivity and meeting the requirements of the business.

The effect of attitudes toward cars and public transportation on behavioral intention in commuting mode choice—A comparison across six Asian countries

- Transportation Research Part A: Policy and Practice---2014---Hong Tan Van, Kasem Choocharukul, Satoshi Fujii

This study investigated the contribution of psychological factors in explaining the choice of transportation mode in six Asian countries. Data were collected from 1118 respondents in Japan, Thailand, China, Vietnam, Indonesia, and the Philippines. The dependent variable was the intention to use one of three modes for work travel after getting a job: car, public transit, or other

modes. The explanatory variables were three attitude factors taken from a previous study, including: 1/symbolic affective, reflecting affective motives of travel mode use; 2/instrumental, referring to functional attributes of travel modes; and 3/social orderliness which represents for environmental friendliness, safety, altruism, quietness et cetera. Several logit model estimates were made using the samples from the six countries separately and together. We obtained three main findings. First, attitude variables about the car were all significant determinants for the entire sample from Asian countries. Second, the social orderliness aspect of public transit was a common concern of respondents from developing countries in selecting this mode for work trips. Third, in countries in which the intent to use a car was not very high, attitude factors about the car were found to be significant determinants of the behavioral intention to commute by car but were less significant in countries in which the desire to use a car was high.

The role of household members in transporting adults with disabilities in the United States

- Transportation Research Part A: Policy and Practice---2014---Devajyoti Deka

Because of certain requirements under US federal law, many studies have been published in recent years on the role of fixed-route transit and paratransit in meeting the travel needs of persons with disabilities. Although persons with disabilities are several times more likely to take rides from household members than to take public transit, little research has been conducted to explore the circumstances under which such rides are given or taken. To address this gap in literature, this study examines the role of household members in transporting persons with disabilities in contemporary America. It explores how the circumstances for the ride takers may change in the future, identifies future challenges in providing mobility to persons with disabilities, and examines ways to meet those challenges. Using nationwide data from the 2009 National Household Travel Survey, the study compares the rides taken by persons with disabilities from household members with

trips made by other travel modes, the persons who take rides with those who do not take rides, and the drivers who provide rides with those who do not provide rides. Probit models are used for the comparisons. Implications of the findings are discussed in light of potential demographic changes in the future, especially the growth of single-person households and the consequent loss of household support for transportation. Due to similarities in circumstances in other developed countries, an international context to the study is also provided.

Identification of freeway crash-prone traffic conditions for traffic flow at different levels of service

- Transportation Research Part A: Policy and Practice---2014---Chengcheng Xu,Pan Liu,Wei Wang,Zhibin Li

The primary objective of this study was to evaluate the risks of crashes associated with the freeway traffic flow operating at various levels of service (LOS) and to identify crash-prone traffic conditions for each LOS. The results showed that the traffic flow operating at LOS E had the highest crash potential, followed by LOS F and D. The traffic flow operating at LOS B and A had the lowest crash potential. For LOS A and B, the vehicle platoon and abrupt change in vehicle speeds were major contributing factors to crash occurrences. For LOS C, crash risks were correlated with lane-change maneuvers, speed variation, and small headways in traffic. For LOS D, crash risks increased with an increase in the temporal change in traffic flow variables and the frequency of lane-change maneuvers. For LOS E, crash risks were mainly affected by high traffic volumes and oscillating traffic conditions. For LOS F, crash risks increased with an increase in the standard deviation of flow rate and the frequency of lane-change maneuvers. The findings suggested that the mechanism of crashes were quite different across various LOS. A Bayesian random-parameters logistic regression model was developed to identify crash-prone traffic conditions for various LOS. The proposed model significantly improved the prediction performance as compared to

the conventional logistic regression model.

Expanding scope of hybrid choice models allowing for mixture of social influences and latent attitudes: Application to intended purchase of electric cars

- Transportation Research Part A: Policy and Practice---2014---Jinhee Kim,Soora Rasouli,Harry Timmermans

Recently, policy makers' expectations about the role of electric cars in reducing emissions have risen substantially. In parallel, academic research on purchase intentions has dramatically increased. Originally, most studies have focused on utility attributes and price. More recently, several hybrid choice models have been estimated to include the impact of attitudes on choice probabilities. In addition, a few studies have caught the attention to social influence. In contributing to this line of research, this paper reports the results of an expanded hybrid choice, which simultaneously estimated all these different effects in a single integrated model of purchase intention. Results indicate that the model performs well. Costs considerations contribute most to the utility of electric cars. Social influence is less important, but there is also evidence that people tend to take it into consideration when there are positive public opinions about electric cars and the market share becomes almost half of friends of their social network. The intention to purchase an electric car is also influenced by attitudes about environmental concerns and technology acceptance.

The Tohoku disasters: Chief lessons concerning the post disaster humanitarian logistics response and policy implications

- Transportation Research Part A: Policy and Practice---2014---José Holguín-Veras,Eiichi Taniguchi,Miguel Jaller,Felipe Aros-Vera,Frederico Ferreira,Russell G. Thompson

This paper describes the findings of the research conducted by the authors on the humanitarian logistic

efforts after the cascading disasters that impacted the Tohoku region after the Great East Japan Earthquake of March 11th, 2011. Using a combination of in depth interviews with participants in the relief efforts and meta analyses of news accounts, the authors identified lessons learned by the participants, and the corresponding policy implications and suggestions for improvement of future response efforts.

Evaluating bus transit performance of Chinese cities: Developing an overall bus comfort model

- Transportation Research Part A: Policy and Practice---2014---Kai Zhang,Kan Zhou,Fangzhou Zhang

In order to improve the level of bus service, a field study was undertaken to develop a combined bus comfort model. This paper provides a comprehensive review of the different ways to predict the bus comfort, in addition to the variable experimental techniques used. It was found some environment parameters like noise, vibration, thermal comfort and the acceleration would affect the passengers' experience. In this model, both the measurement of objective physical parameters and subjective questionnaire survey were conducted to gather the practical environment data, as well as to distribute questionnaires on board city buses during the same trips. By comparing the subjective views of bus passengers to objective physical parameters, a combined bus comfort model was established. This model helps to calculate the concrete value of passengers' perceived bus comfort. An effective approach integrated the comfort model, measuring instrument and the driver monitor could greatly improve the bus service quality.

Spoke airports, intentional and unintentional ground travel, and the air travel decision-making process

- Transportation Research Part A: Policy and Practice---2014---Julie Cidell

For air travelers originating from the spokes of the US hub-and-spoke air network, price, flight frequency,

and aircraft type are all known factors in their travel decision-making process. Less well known, however, is the extent to which different elements of ground travel enter into these travelers' air journeys. Based on 51 interviews at four universities at spokes surrounding O'Hare International Airport, this article describes how considerations such as vehicle availability, individual driving ability, localized weather, and unanticipated ground travel are fundamentally part of the air travel decision-making process for spoke travelers.

Effect of slot trading on route-level competition: Evidence from experience in the UK

- Transportation Research Part A: Policy and Practice---2014---Hideki Fukui

This paper examines the effect of airport slot trading on route-level competition using data on slot trades in the UK. The estimation results suggest that the slot trades among partner carriers contributed to slightly increased competition measured in terms of the number of competitors per route, whereas the slot trades between rival carriers had a negative effect on the number of competitors at the route level. The results suggest that carriers seem to have used the slots obtained from their rivals not to compete with each other but to strengthen their dominance on their existing routes. This behavior is considered to be derived from the bilateral nature of slot trading, which facilitates mutual forbearance among competitors. To cope with the potential anticompetitive effect of mutual forbearance, it would be worthwhile to explore slot-trading schemes that make it harder for carriers to take advantage of multimarket contact as well as alternative methods of primary slot allocation.

Estimating economic and resilience consequences of potential navigation infrastructure failures: A case study of the Monongahela River

- Transportation Research Part A: Policy and Practice---2014---Gwen Shepherd DiPietro,H. Scott Matthews,Chris T. Hendrickson

The paper examines the potential effects of failure of heavily used, outdated locks and dams on the Monongahela River in southwestern Pennsylvania. Catastrophic failure would result in lengthy outage of barge traffic. The displaced volume of coal shipments from mines to power plants is estimated using Energy Information Administration survey data. The resilience of the impacted facilities, the viability of their shipping alternatives, and their ability to re-organize into new markets is assessed. Lost revenues are estimated for facilities that close due to an inability to adapt, as well as the replacement cost of towboats and barges trapped by a catastrophic and sudden failure. The aggregate costs to these facilities as a result of a year-long closure are estimated at \$0.56-1.7 billion.

Lights, camera, legal action! The effectiveness of red light cameras on collisions in Los Angeles

- Transportation Research Part A: Policy and Practice---2014---Timothy Wong

This study estimates the effect of red light cameras (henceforth cameras) on collisions under the Los Angeles Automated Photo Enforcement Program that ran from 2006 to 2011. To control for selection bias and unobservables, a data set is constructed such that intersections with cameras are compared to control groups of nearby intersections without cameras, matched on observable characteristics. To capture potential spillover effects of cameras, control groups at various distances from the intersections with cameras are considered. A Poisson panel data model with random coefficients is applied to these data and estimated using Bayesian methods. The program suffered from weaknesses in enforcement. The city's courts did not uphold citations and this dampened the effect cameras had on drivers. These problems are accounted for in modeling. Controlling for these concerns, results indicate that the cameras decreased red light running related collisions, but increased right-angle and injury collisions, as well as collisions overall.

Charges on transport – To what extent are they passed on to users?

- Transportation Research Part A: Policy and Practice---2014---Finn Jørgensen, Georgina Santos

The paper first briefly reviews the extent to which profit maximising transport firms with identical cost functions and producing identical transport services pass-on output taxes to transport users under perfect competition, under different forms of imperfect competition and when they act as monopolists. Then the analysis is extended to derive the pass-on rates and activity reductions caused by an output tax when firms care both about profit and consumer surplus, produce symmetrically differentiated services and compete simultaneously in quantities and fare and when they collude. The pass-on rates and activity reductions are highest under collusion and lowest under Cournot competition when they produce complementary services. When they produce substitute services, the result is ambiguous and the competitive situation that yields highest pass-on depends on the firms' objective functions and how fiercely they compete. Two important counterintuitive results are that the more intensely the firms compete and the more weight they put on consumer surplus, the higher the pass-on rates are.

Technology adoption of electric bicycles: A survey among early adopters

- Transportation Research Part A: Policy and Practice---2014---Angelika Wolf, Sebastian Seebauer

Electric bicycles (e-bikes) may reduce energy use, air pollution and noise for private transportation through a modal shift from fossil-fuel powered vehicles to e-bikes on short distance trips. However, designing effective promotion campaigns for the adoption of e-bikes requires detailed knowledge on user characteristics and motivations. In order to explain e-bike use on work, shopping and leisure trips, the present study combines concepts from technology adoption with factors derived from research on mobility behaviour. The study employs structural equation modeling to survey data

from 1398 Austrian early adopters who purchased an e-bike between 2009 and 2011.

Path flow estimator for planning applications in small communities

- Transportation Research Part A: Policy and Practice---2014---Seungkyu Ryu,Anthony Chen,H. Michael Zhang,Will Recker

This paper presents an alternative planning framework to model and forecast network traffic for planning applications in small communities, where limited resources debilitate the development and applications of the conventional four-step travel demand forecasting model. The core idea is to use the Path Flow Estimator (PFE) to estimate current and forecast future traffic demand while taking into account of various field and planning data as modeling constraints. Specifically, two versions of PFE are developed: a base year PFE for estimating the current network traffic conditions using field data and planning data, if available, and a future year PFE for predicting future network traffic conditions using forecast planning data and the estimated base year origin–destination trip table as constraints. In the absence of travel survey data, the proposed method uses similar data (traffic counts and land use data) as a four-step model for model development and calibration. Since the Institute of Transportation Engineers (ITE) trip generation rates and Highway Capacity Manual (HCM) are both utilized in the modeling process, the analysis scope and results are consistent with those of common traffic impact studies and other short-range, localized transportation improvement programs. Solution algorithms are also developed to solve the two PFE models and integrated into a GIS-based software called Visual PFE. For proof of concept, two case studies in northern California are performed to demonstrate how the tool can be used in practice. The first case study is a small community of St. Helena, where the city's planning department has neither an existing travel demand model nor the budget for developing a full four-step model. The second case study is in the city of Eureka, where there is a four-step model developed for the Humboldt County that can be used

for comparison. The results show that the proposed approach is applicable for small communities with limited resources.

Urban form, commuting patterns and CO2 emissions: What differences between the municipality's residents and its jobs?

- Transportation Research Part A: Policy and Practice---2014---Anne Aguiléra,Marion Voisin

This article investigates the links between urban form and commuting patterns, and the CO2 emissions associated with them, in the municipalities that comprise the New Town of Marne-la-Vallée (NTMV) located in the Paris Region. The paper distinguishes between the commutes performed by residents and those generated by the jobs located in a municipality. The contribution of the paper is twofold. Firstly, it shows that the CO2 emissions of commutes differ greatly depending on whether one considers residents or jobs: hence focusing on the travel behaviour of residents can lead to significant errors in the assessment of the CO2 emissions generated by a municipality, and therefore its environmental sustainability. Secondly, the paper explores the relationship between commuting trips and several indicators of urban form: density, compactness, jobs-to-residents ratio, accessibility to public transport and distance from Paris. We highlight that high jobs-to-residents ratios tend to increase the proportion of jobs held by residents. Density and compactness are associated with more sustainable travel behaviour among residents, but not non-residents. Finally, the shape of the public transport system, which mainly connects the municipalities of the NTMV with Paris, tends to decrease the proportion of jobs held by residents, especially in the municipalities that are close to Paris, and does not allow non-residents, most of whom do not travel from Paris, to use public transport.

Networking innovation in the European car industry: Does the Open Innovation model fit?

- Transportation Research Part A: Policy and Practice---2014---Mariana Dodourova,Keith Bevis

The demands of transportation have driven the automobile industry into an innovation race. Uncertain technological trends, long development cycles, highly capital-intensive product development, saturated markets, and environmental and safety regulations have subjected the sector to major transformations. The technological and organisational innovations related to these transformations necessitate research that can enhance our understanding of the characteristics of the new systems. The study investigates the applicability of the Open Innovation concept to a mature capital-intensive asset-based industry - the European automobile industry, which is preparing for a radical technological discontinuity. Purposely selected knowledgeable respondents were interviewed across seven European countries. The findings contribute to the understanding of the OI concept by identifying key obstacles to the wider adoption of the OI model in the European car industry, and signalling the importance of intermediaries and large incumbents for driving network development and OI practices as well as the need of new competencies to be developed by all players.

Joint impacts of Bus Rapid Transit and urban form on vehicle ownership: New evidence from a quasi-longitudinal analysis in Bogotá, Colombia

- Transportation Research Part A: Policy and Practice---2014---Tabitha S. Combs, Daniel A. Rodríguez

Bus Rapid Transit (BRT) has become popular as a means to provide non-automobile-based mobility and alleviate the impacts of rising traffic congestion in cities around the world. However, there is little empirical evidence supporting BRT's potential to meet these objectives. This research improves our knowledge of BRT's potential as an alternative to vehicle ownership at the household level and provides new evidence of the role of urban form in supporting transit investment. We use a difference-in-differences research design to examine the change in vehicle ownership from before to after implementation of Bogotá's TransMilenio BRT system. Our results indicate access to TransMilenio's main trunk system is significantly and

negatively associated with vehicle ownership for higher wealth households. Among lower wealth households, access to the trunk system and the complementary feeder system (designed to bring passengers from peripheral neighborhoods into the main trunk system) are both associated with an unexpected increase in the odds of vehicle ownership; however, that increase appears to be reversed in neighborhoods where the built environment supports transit and non-motorized travel. This research contributes a methodology for joint analysis of urban form and transit availability on vehicle ownership, and demonstrates that urban form and transit access can have a synergistic effect. Neglecting this synergy would be a missed opportunity to further leverage the benefits of BRT investments. Our findings also suggest that, in the case of Bogotá, the vehicle ownership impacts of BRT investment may not accrue to lower income households unless that investment is coordinated with policies to promote supportive urban form.

Time to burn: Flight delay, terminal efficiency, and fuel consumption in the National Airspace System

- Transportation Research Part A: Policy and Practice---2014---Megan S. Ryerson, Mark Hansen, James Bonn

Improved Air Traffic Management (ATM) leading to reduced en route and gate delay, greater predictability in flight planning, and reduced terminal inefficiencies has a role to play in reducing aviation fuel consumption. Air navigation service providers are working to quantify this role to help prioritize and justify ATM modernization efforts. In the following study we analyze actual flight-level fuel consumption data reported by a major U.S. based airline to study the possible fuel savings from ATM improvements that allow flights to better adhere to their planned trajectories both en route and in the terminal area. To do so we isolate the contribution of airborne delay, departure delay, excess planned flight time, and terminal area inefficiencies on fuel consumption using econometric techniques. The model results indicate that, for two commonly operated

aircraft types, the system-wide averages of flight fuel consumption attributed to ATM delay and terminal inefficiencies are 1.0–1.5% and 1.5–4.5%, respectively. We quantify the fuel impact of predicted delay to be 10–20% that of unanticipated delay, reinforcing the role of flight plan predictability in reducing fuel consumption. We rank terminal areas by quantifying a Terminal Inefficiency metric based on the variation in terminal area fuel consumed across flights. Our results help prioritize ATM modernization investments by quantifying the trade-offs in planned and unplanned delays and identifying terminal areas with high potential for improvement.

Consumer attitudes about electric cars: Pricing analysis and policy implications

- Transportation Research Part A: Policy and Practice---2014---Paul D. Larson, Jairo Viáfara, Robert V. Parsons, Arne Elias

As electric vehicles (EVs) become more readily available, sales will depend on consumers' interest and understanding. A survey of consumer attitudes on electric cars was conducted in Manitoba from late 2011 to early 2012. It utilizes two price assessment methods. The van Westendorp price sensitivity method (PSM) shows the acceptable price range for EVs to be \$22,000–27,500. This range closely matches average price range for sales of conventional cars during the same period. The willingness-to-pay method reveals consumers are unwilling to pay large premiums for EVs, even when given information on future fuel savings. A consumer group with experience or exposure to EVs is somewhat different. Nearly 25% of these people are willing to pay a premium of up to \$10,000. Different interpretations can be drawn from these responses, calling for further research. An apparent policy opportunity involves consumer education to enhance knowledge and facilitate EV purchase decisions. Survey results also support the hypothesis that EV rollout has focused too much on technology, and not enough on consumers.

An integrated model for discrete and continuous decisions with application to vehicle ownership, type and usage choices

- Transportation Research Part A: Policy and Practice---2014---Yangwen Liu, Jean-Michel Tremblay, Cinzia Cirillo

This paper proposes an integrated econometric framework for discrete and continuous choice dimensions. The model system is applied to the problem of household vehicle ownership, type and usage. A multinomial probit is used to estimate household vehicle ownership, a multinomial logit is used to estimate the vehicle type (class and vintage) choices, and a regression is used to estimate the vehicle usage decisions. Correlation between the discrete (number of vehicles) and the continuous (total annual miles traveled) parts is captured with a full variance–covariance matrix of the unobserved factors. The model system is estimated using Simulated Log-Likelihood methods on data extracted from the 2009 US National Household Travel Survey and a secondary dataset on vehicle characteristics. Model estimates are applied to evaluate changes in vehicle holding and miles driven, in response to the evolution of social societies, living environment and transportation policies.

A land use and transportation integration method for land use allocation and transportation strategies in China

- Transportation Research Part A: Policy and Practice---2014---Hailong Su, Jia Hao Wu, Yinghui Tan, Yuanqiu Bao, Bing Song, Xinghua He

In this paper, we will first review literature of the land use and transportation interaction and then develop a new land use allocation methodology called Three Stages-Two-Feedback Method (Integration Method) for both land use allocation and the transportation policy options with a practical implementation. Then we apply this method in an urban general planning project in China with more than 1.2 million populations. In this project, we evaluated three land use allocation strategies and three transportation policy

options using two application tools (with and without feedbacks) using this method implemented in a land use planning system UPlan and a transportation planning system Emme. The results show that the use of the feedback method (Application Two) results in a vehicle distance reduction and the increase in the service coverage area of transit bus stops at the same time. Due to the use of transportation accessibility and the congestion measures with a MSA implementation, the accessibility measure shows a convergent process over iterations. This nice feature can be used for alternative comparisons. Future research subjects are also discussed.

Organizational effects of experience from accidents. Learning in the aftermath of the Tretten and Åsta train accidents

- Transportation Research Part A: Policy and Practice---2014---Geir Sverre Braut,Øivind Solberg,Ove Njå

This article explores possible signs on learning in organizations following two major railway accidents in Norway, the Tretten accident in 1975 and the Åsta accident in 2000. These are the most serious railway accidents to have occurred in the past decades and both involved collisions on a single track system. The two events have been analyzed and compared in order to investigate possible learning effects and possible differences in learning given the 25-year span between them. The study is based on the analysis of selected documents related to the accidents in general and the narrative components in the documentation related to learning in particular.

A stochastic optimization approach for the selection of reflective cracking mitigation techniques

- Transportation Research Part A: Policy and Practice---2014---Mehdi Noori,Omer Tatari,BooHyun Nam,Behnam Golestani,James Greene

In Hot Mix Asphalt (HMA) overlays, the existing

cracks in the underlying pavements can propagate upward to the new added overlay and may cause Reflective Cracks (RC). These cracks allow water infiltration to the underlying layers and causes further moisture damage as well as weakening the unbound layers. Over the years, several methods have been developed for mitigating the RCs. This study aims to investigate the current reflective cracking mitigation methods and develop a methodology for the selection of appropriate mitigation technique. The developed model is then applied to a case study in the state of Florida.

Impact of weather on urban transit ridership

- Transportation Research Part A: Policy and Practice---2014---Abhishek Singhal,Camille Kamga,Anil Yazici

Utilizing daily ridership data, literature has shown that adverse weather conditions have a negative impact on transit ridership and in turn, result in revenue loss for the transit agencies. This paper extends this discussion by using more detailed hourly ridership data to model the weather effects. For this purpose, the daily and hourly subway ridership from New York City Transit for the years 2010–2011 is utilized. The paper compares the weather impacts on ridership based on day of week and time of day combinations and further demonstrates that the weather's impact on transit ridership varies based on the time period and location. The separation of ridership models based on time of day provides a deeper understanding of the relationship between trip purpose and weather for transit riders. The paper investigates the role of station characteristics such as weather protection, accessibility, proximity and the connecting bus services by developing models based on station types. The findings indicate substantial differences in the extent to which the daily and hourly models and the individual weather elements are able to explain the ridership variability and travel behavior of transit riders. By utilizing the time of day and station based models, the paper demonstrates the potential sources of weather impact on transit infrastructure, transit service and trip characteristics. The results suggest the development of specific policy measures

which can help the transit agencies to mitigate the ridership differences due to adverse weather conditions.

Spatial analysis of the competitiveness of the high-speed train and air transport: The role of access to terminals in the Madrid–Barcelona corridor

- Transportation Research Part A: Policy and Practice---2014---Juan Carlos Martín, Concepción Román, Juan Carlos García-Palomares, Javier Gutiérrez

This paper analyzes the effect of access and egress time to transport terminals over the spatial competitiveness of the high-speed train (HST) in the Madrid–Barcelona (Spain) corridor, one of the densest airline domestic markets in the world. Applying spatial data from 2010 provided by a geographical information system (GIS) to a mode choice model estimated with sample travelers in this corridor, the present study examines whether and how the level-of-service of transport terminals spatially affects the competitiveness or modal distribution of HST and air transport in the provinces of Madrid and Barcelona; and, in particular, the degree of competitiveness that can be accrued by the access time provided by private car and transit in different market segments, especially mandatory and leisure trips. In a number of urban zones near train stations and airports, terminal accessibility clearly favors one transport mode in comparison to the other. Improving terminal accessibility via private car or public transit not only affects the relative access to terminals, but also represents a key strategy for readjusting the market shares of the competing modes in the corridor.

An experiment evaluating the impacts of real-time transit information on bus riders in Tampa, Florida

- Transportation Research Part A: Policy and Practice---2014---Candace Brakewood, Sean Barbeau, Kari Watkins

Public transit agencies often struggle with service reliability issues; when a bus does not arrive on time,

passengers become frustrated and may be less likely to choose transit for future trips. To address reliability issues, transit authorities have begun to provide real-time information (RTI) to riders via mobile and web-enabled devices. The objective of this research is to quantify the benefits of RTI provided to bus riders. The method used is a behavioral experiment with a before–after control group design in which RTI is only provided to the experimental group. Web-based surveys are used to measure behavior, feeling, and satisfaction changes of bus riders in Tampa, Florida over a study period of approximately three months.

Cluster analysis of the competitiveness of container ports in Brazil

- Transportation Research Part A: Policy and Practice---2014---Alexandra Maria Rios Cabral, Francisco Ramos

The container cargo proportion of total maritime transport increased from 3% in 1980 to 16% in 2011. The largest Brazilian port, the port of Santos, is the 42nd largest container port in the world. However, Santos' performance indicators are much lower than those of the world's largest ports, so comparisons with them are difficult. This article focuses on the Brazilian container terminals that handled containers in 2009 and compares port competitiveness. This study classified seventeen Brazilian container terminals into three distinct groups based on the following competitiveness criteria: number of containers handled, berth length, number of berths, terminal tariffs (in US\$), berth depth, rate of medium consignment (in containers/ship), medium board (containers/hour), average waiting time for mooring (in hours/ship), and average waiting time for load or unload cargo (in hours/ship). This classification used a hierarchical cluster analysis. The classification shows that the terminal of Tecon in the port of Santos has the best performance of all, while small terminals (<150,000 container units) are the worst performing terminals in Brazil.

Environmental invitingness for transport-related cycling in middle-aged adults: A proof of concept study using photographs

- Transportation Research Part A: Policy and Practice---2014---Veerle Van Holle,Jelle Van Cauwenberg,Benedicte Deforche,Liesbet Goubert,Lea Maes,Jack Nasar,Nico Van de Weghe,Jo Salmon,Ilse De Bourdeaudhuij

Current evidence on associations between modifiable environmental characteristics and transport-related cycling remains inconsistent. Most studies on these associations used questionnaires to determine environmental perceptions, but such tools may be subject to bias due to unreliable recall. Moreover, questionnaires only measure separate environmental characteristics, while real environments are a combination of different characteristics. To overcome these limitations, the present proof of concept study used panoramic photographs of cycling environments to capture direct responses to the physical environment. We examined which depicted environmental characteristics were associated to environments' invitingness for transportation cycling. Furthermore, interactions with gender and participants' cycling behavior were examined.

Models of bus boarding and alighting dynamics

- Transportation Research Part A: Policy and Practice---2014---Lijun Sun,Alejandro Tirachini,Kay W. Axhausen,Alexander Erath,Der-Horng Lee

Understanding the dynamics of boarding/alighting activities and its impact on bus dwell times is crucial to improving bus service levels. However, research is limited as conventional data collection methods are both time and labour intensive. In this paper, we present the first use of smart card data to study passenger boarding/alighting behaviour and its impact on bus dwell time. Given the nature of these data, we focus on passenger activity time and do not account for the time necessary to open and close doors. We study single decker, double decker and articulated buses and

identify the specific effects of floor/entrance type, number of activities and occupancy on both boarding and alighting dynamics. A linear relationship between average boarding and alighting times and their respective standard deviations is also found, whereas the variability of boarding and alighting time decreases with the number of passengers boarding and alighting. After observing the cumulative boarding/alighting processes under different occupancy conditions, we propose a new model to estimate passenger activity time, by introducing critical occupancy – a parameter incorporating the friction between boarding/alighting and on-board passengers. We conduct regression analyses with the proposed and another popular model for simultaneous boarding/alighting processes, finding that the critical occupancy plays a significant role in determining the regime of boarding and alighting processes and the overall activity time. Our results provide potential implications for practice and policy, such as identifying optimal vehicle type for a particular route and modelling transit service reliability.

Does European high-speed rail affect the current level of air services? An EU-wide analysis

- Transportation Research Part A: Policy and Practice---2014---Frédéric Dobruszkes,Catherine Dehon,Moshe Givoni

This paper analyses whether the current provision of air services in Europe is impacted by high-speed rail (HSR). An ex-post analysis is carried out considering 161 routes EU-wide using transnational data. We use censored regressions with special attention paid to the presence of outliers in the sample and to the potential problem of non-normality of error terms. It is found that shorter HSR travel times involve less air services, with similar impact on both airline seats and flights. This impact quickly drops between 2.0- and 2.5-h HSR travel time. The impact of HSR frequencies is much more limited. Hubbing strategies led by the airlines have the opposite effect from HSR, as hubs involve more air services. Airline/HSR integration at the airport and cities being served by both central and peripheral stations have no significant impact. Metropolitan and

national spatial patterns may help to better understand intermodal effects.

Over-reporting vs. overreacting: Commuters' perceptions of travel times

- Transportation Research Part A: Policy and Practice---2014---Stefanie Peer,Jasper Knockaert,Paul Koster,Erik Verhoef

In a large-scale, real-life peak avoidance experiment, we asked participants to provide estimates of their average in-vehicle travel time during their morning commute. After comparing the reported travel times with the actual corresponding travel times, we found that the average travel times were overstated by a factor of 1.5. We showed that driver- and link-specific characteristics partially explained these exaggerations. Using the stated and revealed preference data, we investigated whether the driver-specific reporting errors were consistent with the drivers' scheduling behaviors in reality and in hypothetical choice experiments. In both cases, we found no robust evidence that drivers behave as if they misperceive travel times to a similar extent as those they misreported, thereby implying that the reported travel times did not represent the actual or perceived travel times in a truthful manner. The results of this study suggest that caution should be recommended when reported travel time data are used in an uncritical manner during transport research and when determining policy.

Dynamic diurnal social taxonomy of urban environments using data from a geocoded time use activity-travel diary and point-based business establishment inventory

- Transportation Research Part A: Policy and Practice---2014---Seo Youn Yoon,Srinath K. Ravulaparthi,Konstadinos G. Goulias

In this paper, we explore the diurnal dynamics of joint activity participation in a small city in Pennsylvania, USA, using behavioral data and an inventory of business establishments. We account for the variation caused by the collective impact of social, temporal

and spatial choices of individuals to produce predicted space-time visualizations of activity participation. The focus is on how social contexts of an activity impact the temporal and spatial decisions regarding the activity locations and how this impact varies depending on activity types. A comparison across activity types and social interaction types is made among spatial patterns during a day. The CentreSIM dataset, which is a household-based activity diary survey collected in Centre County (Pennsylvania, USA) in 2003, provides very detailed social interaction information enabling the analysis of social, spatial and temporal aspects of activity participation. In this paper we use this information to develop a spatio-temporal interpolation method and demonstration based on kriging. In this way, we extract the dynamic social taxonomy of places from the behavioral information in the dataset and suggest how urban and transportation models can be informed from the dynamics of places by observing “what is taking place” (activities being pursued in the context of this paper) combined with “what exists” (business establishments) or “what is available” (businesses that are open). The method here can also be used to improve the design of urban environments (e.g., filling gaps in desired activity locations), manage specific places (e.g., extending the opening and closing times of businesses), study transportation policies that are sensitive to time of day (e.g., pricing of parking to discourage crowding and traffic congestion), and modeling of spatio-temporal decisions of social activities in travel demand models (e.g., to guide the development of model specification and representation of the space in which behavioral models are applied).

Social networks and joint/solo activity-travel behavior

- Transportation Research Part A: Policy and Practice---2014---Tao Lin,Donggen Wang

The social dimension of activity-travel behavior has recently received much research attention. This paper aims to make a contribution to this growing literature by investigating individuals' engagements in joint activities and activity companion choices. Using

activity–travel diary data collected in Hong Kong in 2010, this study examines the impact of social network attributes on the decisions between solo and joint activities, and for joint activities, the choices of companions. Chi-square difference tests are used to assess the importance of social network variables in explaining joint activity behavior. We find that the inclusion of social network attributes significantly improves the goodness-of-fit of the model with only socioeconomic variables. Specifically, individuals receiving emotional support and social companionship from family members/relatives are found to more likely undertake joint activities with their family members/relatives; the size of personal social networks is found to be a significant determinant of companion choices for joint activities; and activity companions are found to be significant determinants of travel companions. The findings of this study improve the understanding about activity–travel, especially joint activity–travel decisions.

An exploration of the importance of social influence in the decision to start bicycling in England

- Transportation Research Part A: Policy and Practice---2014---Henrietta Sherwin,Kiron Chatterjee,Juliet Jain

The purpose of this paper is to gain a better understanding, through qualitative exploration, of the ways in which social influence affects the decision to start bicycling in England. ‘Social influence’ is defined as the process by which an individual’s thoughts and actions are changed by the thoughts and action of others. Its role was investigated at three levels: the immediate family, household members and significant others (direct social influence); the extended family, friends, peers and colleagues (less direct social influence); and the wider cultural context (indirect social influence). Interviews with 61 individuals living in 12 towns and cities across England were analysed. Half of the interviewees were new regular bicyclists and the other half did not bicycle at all, or only occasionally. Social influence was found to be the dominant factor for a minority of the cases where participants started

bicycling regularly. It played a role alongside other factors in other cases. It could take the form of direct influence from family, friends and peers or indirect influence from the social and cultural context. The analysis illustrates the difficulty of capturing social influence which is often hidden and emerges incidentally in the course of the interviews and interacts with other contributing factors. The role of social influence found in this research challenges the rational approach to explaining travel decision making that has traditionally dominated transport studies. The paper suggests that social processes could be harnessed to improve the efficacy of bicycling promotion programs.

Exploring the role of social capital influence variables on travel behaviour

- Transportation Research Part A: Policy and Practice---2014---Floridea Di Ciommo,Julio Comendador,María Eugenia López-Lambas,Elisabetta Cherchi,Juan de Dios Ortúzar

This paper explores the potential role of individual trip characteristics and social capital network variables in the choice of transport mode. A sample of around 100 individuals living or working in one suburb of Madrid (i.e. Las Rosas district of Madrid) participated in a smartphone short panel survey, entering travel data for an entire working week. A Mixed Logit model was estimated with this data to analyze shifts to metro as a consequence of the opening of two new stations in the area. Apart from classical explanatory variables, such as travel time and cost, gender, license and car ownership, the model incorporated two “social capital network” variables: participation in voluntary activities and receiving help for various tasks (i.e. child care, housekeeping, etc.). Both variables improved the capacity of the model to explain transport mode shifts. Further, our results confirm that the shift towards metro was higher in the case of people “helped” and lower for those participating in some voluntary activities.

Activity fragmentation, ICT and travel: An exploratory Path Analysis of spatiotemporal interrelationships

- Transportation Research Part A: Policy and Practice---2014---Eran Ben-Elia,Bayarma Alexander,Christa Hubers,Dick Ettema

This paper focuses on the interrelationships between ICT, activity fragmentation and travel behaviour. The concept of fragmentation relates to how activities are spatiotemporally reorganized, by subdividing activities into smaller components that are then performed at different times and/or locations, in connection with ICT use. The association between ICT, activity fragmentation and travel relationships remains uncharted. Based on a two-day Dutch communication-activity-travel diary different associations between ICT use, paid work spatiotemporal fragmentation indicators and frequency of travel are specified and tested with Path Analysis Modelling accounting for sociodemographic and land use factors. The results demonstrate that the interrelationships between fragmentation, ICT and travel are quite complex. ICT and fragmentation apparently have a reciprocal relationship with mobile ICT use influencing the degree of spatial fragmentation whereas the usages of sedentary ICT are influenced by the degree of temporal fragmentation. Person-ICT attributes and ICT use mediate the participation in non-work activities, and can replace work and non-work travel. Fragmentation reduces work trips but at the same time restricts non-work personal travel possibilities and can reallocate time for leisure activity and travel.

Joint link-based credit charging and road capacity improvement in continuous network design problem

- Transportation Research Part A: Policy and Practice---2014---Guangmin Wang,Ziyou Gao,Meng Xu,Huijun Sun

In this paper, we will discuss the urban road network improvement problem from both supply and demand sides, and propose a bilevel programming model considering joint optimal link-based tradable credit charging

scheme and road capacity improvement. The upper level decision-maker tries to minimize the total system travel time under a budget constraint by optimizing both link-based credit charging and road capacity improvement, whilst at the lower level considering the users' route choice behavior through the generalized travel time including the travel time and the converted time from the value of credit charging for using the link. Therefore, this proposed model integrates the improvement of the urban road network according to improving the road capacity with the given budget constraint and decreasing the travel demand with the tradable credit scheme. After presenting a relaxation algorithm, the numerical experiments on the nine node network are illustrated. Analysis shows that the proposed model is efficient in mitigating traffic congestion according to the less total system travel time than the other ways compared in this paper. The tradable credit scheme offers the better combination of cost-effectiveness, administrative flexibility and distributional fairness comparing with congestion pricing. Moreover, this tradable credit scheme is revenue neutral.

Does the income elasticity of road traffic depend on the source of income?

- Transportation Research Part A: Policy and Practice---2014---Scott Le Vine,Chen, Bingqing (Emily),John Polak

An extensive body of literature addresses the income elasticity of road traffic, in which income is typically treated as a homogenous quantity. Here we report evidence of heterogeneity in cross-sectional estimates of the elasticity of vehicle-kilometres of travel (VKT) with respect to income, when household income is disaggregated on the basis of income source.

Estimating fuel demand elasticities to evaluate CO2 emissions: Panel data evidence for the Lisbon Metropolitan Area

- Transportation Research Part A: Policy and Practice---2014---Patricia Melo,Ahmad Razi Ramli

This paper estimates fuel demand models for the Lisbon Metropolitan Area (AML) and uses the demand elasticities obtained to predict future levels of road transport CO₂ greenhouse gas emissions. Data for the municipalities constituting the AML and the period 1993–2010 are analysed using static and dynamic panel data models to measure the relative importance of fuel price, income, vehicle stock, the price of public transport, and the availability of urban and suburban rail networks on fuel demand. To the best of our knowledge, this is the first study in the Portuguese context to produce fuel demand elasticities for a specific metropolitan area, as opposed to the estimation of country-level aggregate elasticities. Our findings indicate that the elasticity of fuel demand with respect to fuel price ranges between 0.48 and 0.72 in the short run and between 1.19 and 1.82 in the long run. Income elasticities are found to range between 0.51 and 0.54 in the short run and between 1.26 and 1.37 in the long run. The elasticity of fuel demand with respect to vehicle stock (keeping population constant) is 0.57 in the short run and 1.43 in the long run. There is only weak evidence of a reduction in fuel demand as a result of a decrease in the price of public transport, and no effect of greater availability of rail networks. Based on the elasticities estimated, we predict road transport CO₂ emissions for the AML according to different macroeconomic scenarios. The results indicate that the emissions target is only achieved in the scenario of poor economic performance. In the presence of medium and strong economic growth, fuel prices would need to increase by about 7% and 11% per year respectively in order to meet the emissions target.

Motivating small-displacement car purchasing in China

- Transportation Research Part A: Policy and Practice---2014---Ying Qu,Yakun Liu,Qinghua Zhu,Yue Liu

Due to the rapid development of the automobile industry and the ever-increasing quantities of produced and sold automobiles in China, many problems such as fuel scarcity and air pollution have emerged. To

alleviate such problems, one solution is to promote households to purchase small-displacement (engine) cars (SDCs). Based on the theory of planned behavior, we develop a theoretical framework to examine how influencing factors such as environmental attitude, subjective norm, self-image and environmental knowledge motivate SDC purchasing behavior through SDC purchasing intention in China. We further extend the research framework to examine whether the factor of economic incentives moderates the relationships between SDC purchasing intention and behaviors. Using an empirical study with 232 usable questionnaire responses, we observe that SDC purchasing intention partly mediates the relationship between three of four influencing factors (environmental attitude, self-image, environmental knowledge) and SDC purchasing behavior. Statistical results also show that the factor of economic incentives moderates the relationship between SDC purchasing intention and behavior. Our results indicate that three of four influencing factors can yield SDC purchasing behavior, especially when SDC purchasing intention exists. Economic incentives such as financial support from the government could promote SDC purchasing intention to transform into purchasing behavior.

Reduction of capacity and projected costs associated with seat belt installation on school buses

- Transportation Research Part A: Policy and Practice---2014---Saravanan Gurupackiam,Daniel S. Turner,Jay K. Lindly,Steven Jones,Elsa Tedla

This study examines the potential effects the installation of seat belts on school buses would have on the fleet capacity in Alabama and the resulting cost implications. The study also documents the myriad research studies and professional opinions offered on the potential safety effects of equipping school buses with safety restraints/seat belts. Four seat configurations for the school buses were analyzed. The first configuration represents the most common current bus seating configuration without seat belts, 3 seats on each side of the aisle and 12 rows (3/3-12). The physical space required

for seat belt hardware may result in a loss of a row of seats and may reduce the number of students seated per row. Thus, three more configurations were studied: loss of a row of seats (3/3-11), loss of one seat per row (3/2-12), and loss of both a row of seats and a seat per row (3/2-11). The capacity for each configuration for each bus using current pupil loads was determined. The costs associated with installation of seat belts, and purchase and operation of new buses were obtained. Should school bus seat belts become mandatory in Alabama, the results obtained in this study can be used by any school system to determine the optimum configuration for their pupils, which will identify the number of additional buses that must be purchased by the school system. This study found that many of the buses that would become overloaded due to seat belt installation and the resultant loss of seating will be carrying only a few excess pupils. Transportation supervisors may be able to handle such overloads by transferring these pupils to other buses or by adjusting their bus routes to minimize purchase of new buses. Additional suggestions for handling bus overloads were offered in the body of this report.

A dynamic pricing strategy for high occupancy toll lanes

- Transportation Research Part A: Policy and Practice---2014---Kitae Jang,Koohong Chung,Hwasoo Yeo

High Occupancy Toll (HOT) lanes are emerging as a solution to the underutilization of High Occupancy Vehicle (HOV) lanes and also a means to generate revenue for the State Departments of Transportation. This paper proposes a method to determine the toll price dynamically in response to the changes in traffic condition, and describes the procedures for estimating the essential parameters. Such parameters include expected delays, available capacity for toll-paying vehicles and distribution of travelers' value of time (VOT). The objective function of the proposed pricing strategy can be flexibly modified to minimize delay, maximize revenue or combinations of specified levels of delay and revenue. Real-world data from a 14-mile

of freeway segment in the San Francisco Bay Area are used to demonstrate the applicability and feasibility of the proposed method, and findings and implications from this case study are discussed.

The role of attitude structures, direct experience and reframing for the success of congestion pricing

- Transportation Research Part A: Policy and Practice---2014---Jonas Eliasson

Congestion pricing was introduced in Stockholm in 2006, first as a trial followed by a referendum, and permanently from 2007. Public attitudes to the charges became more negative during the period from the decision to the start of the system. Once the trial started, public attitudes became dramatically more positive over the following years, going from 2/3 against the charges to more than 2/3 in favor of the charges. Self-reported changes in behavior and attitudes considerably underestimate actual changes: about 3/4 of the decrease in car trips and more than half of the change in attitudes seem to have gone unnoticed by respondents, ex post. Self-interest and belief in the charges' effectiveness strongly affect attitudes at any given point in time, but can only explain a minor part of the change in attitudes. I suggest that the debate and the shift in attitudes can be understood as a public and political reframing of the congestion charges over time.

Who will buy electric vehicles? Identifying early adopters in Germany

- Transportation Research Part A: Policy and Practice---2014---Patrick Plötz,Uta Schneider,Joachim Globisch,Elisabeth Dütschke

Electric vehicles (EVs) have noteworthy potential to reduce global and local emissions and are expected to become a relevant future market for vehicle sales. Both policy makers and car manufacturers have an interest to understand the first large EV user group, frequently referred to as 'early adopters'. However, there are only a few empirical results available for this important group. In this paper, we analyse and discuss several

empirical data sets from Germany, characterising this user group from both a user and a product perspective, i.e. who is willing to buy an EV and who should buy one. Our results show that the most likely group of private EV buyers in Germany are middle-aged men with technical professions living in rural or suburban multi-person households. They own a large share of vehicles in general, are more likely to profit from the economical benefits of these vehicles due to their annual vehicle kilometres travelled and the share of inner-city driving. They state a higher willingness to buy electric vehicles than other potential adopter groups and their higher socio-economic status allows them to purchase EVs. In contrast to this, inhabitants of major cities are less likely to buy EVs since they form a small group of car owners in general, their mileage is too low for EVs to pay off economically and they state lower interest and lower willingness to pay for EVs than other groups. Our results indicate that transport policy promoting EVs should focus on middle-aged men with families from rural and sub-urban cities as first private EV buyers.

Using repeated cross-sectional travel surveys to enhance forecasting robustness: Accounting for changing mode preferences

- Transportation Research Part A: Policy and Practice---2014---Khandker M. Nurul Habib, Joffre Swait, Sarah Salem

Transportation system capacity and performance, urban form and socio-demographics define the influences and constraints conditioning the preferences of urban residents for different transport modes. Changes in characteristics of urban areas are likely to lead to changes in preferences for alternative modes of transport over time; as a consequence, statistical models to forecast mode choice need to be sensitive to both purposeful changes to urban systems as well as exogenous shocks. We make use of the 1996, 2001 and 2006 household surveys conducted in the Greater Toronto and Hamilton Area to study mode preference evolution and model forecasting performance. These repeated cross-sectional household surveys provide an

opportunity to investigate aggregate structural changes in commuting mode preferences over time, in a manner sensitive to changes in the urban area. We focus on commuting mode choices because these trips are prime determinants of peak period congestion and peak spreading. We then address how to combine the three cross-sections econometrically in a robust way that allows for use of a single mode choice model across the entire period. Using independent data from 2012, we are able to compare the individual year and combined models in terms of forecasting performance to demonstrate the combined model's more robust forecasting performance into the future.

The impact of transportation demand management policies on commuting to college facilities: A case study at the University of Trieste, Italy

- Transportation Research Part A: Policy and Practice---2014---Lucia Rotaris, Romeo Danielis

Universities, like other types of public and private institutions, when located in a city, have both positive and negative impacts on the area where they are situated. On the one hand, they contribute to the prestige of the area; on the other hand, they are large generators/attractors of traffic. The ability to successfully balance the pros and cons of the urban location of these large traffic-generating institutions is crucial for their success and for the livability of the city. In this paper this issue has been analyzed selecting as a representative case the University of Trieste.

Generalized transport costs and index numbers: A geographical analysis of economic and infrastructure fundamentals

- Transportation Research Part A: Policy and Practice---2014---José Zofío, Ana Condeço-Melhorado, Andrés Maroto-Sánchez, Javier Gutiérrez

We rely on the economic theory approach to index numbers to improve the existing definitions and decompositions of variations in generalized transport costs

(GTCs). As a value index, we decompose GTCs into price and quantity indices associated to economic—market—costs and infrastructure variables—distance and time within a network. The methodology allows the accurate identification of the sources of GTCs decline. We illustrate it for the case of road freight transportation in Spain between 1980 and 2007 and at a highly detailed geographical level. Average GTCs weighted by trade flows have decreased by 16.3%, with infrastructure driving that reduction. We find large territorial disparities in GTCs, but also significant geographical clusters where the market and network indices show spatial association.

The pros and cons of Intelligent Speed Adaptation as a restrictive measure for serious speed offenders

- Transportation Research Part A: Policy and Practice---2014---J.W.G.M. van der Pas,J. Kessels,S.H. Vlassenroot,B. van Wee

In 2011 in the Netherlands a field operational test was performed to investigate the possibility of using restrictive Intelligent Speed Adaptation (ISA) as a penalty system for serious speed offenders. This paper presents the overall results of the research focusing on the pros and cons of the use of ISA as a restrictive measure for serious speed offenders, and on the preconditions for deployment. The results showed that the ISA systems tested have a huge effect on driver behavior and have the potential to improve road safety by reducing the level of speeding, mean speed, as well as the standard deviation of speed. However, there are also cons: the behavioral change in driving behavior was only temporary. In addition the tested technology proved too easy to override, raised issues of equity, and a substantial back office is required when implementing the system for serious speed offenders.

Use of combinatorial auctions in the railway industry: Can the “invisible hand” draw the railway timetable?

- Transportation Research Part A: Policy and Practice---2014---Patricia Perennes

Rail capacity is currently administratively allocated in Europe, whereas the economic literature has often contemplated the opportunity of introducing market mechanisms, auctions in particular, into this industry. This article tries to fill the gap between practice and theory. It first describes the properties of rail capacity (rigidity and non-homogeneity) and shows that because of its very nature, this capacity must be allocated through combinatorial auctions. As identified by the economic literature, using combinatorial auctions introduces a lot of complexity (winner determination and information burden) into the allocation process. To deal with this complexity, some form of centralized planning is necessary to design the right market mechanisms and to allocate capacity. This could have strong consequences on the current deregulation process.

The impact of road pricing on housing prices: Preliminary evidence from Milan

- Transportation Research Part A: Policy and Practice---2014---Marco Percoco

Road pricing is increasingly used as an economic tool to decrease the burden of transport externalities. Following the examples of several cities worldwide, on 2nd January, 2008, the city of Milan introduced a charge for accessing the city centre with the aim of curbing air pollution and congestion. The aim of this paper is to evaluate empirically the effect of such a charge on the housing market. By applying a difference-in-differences methodology, I find empirical support for a decrease in housing prices in the coverage area.

Measuring factors influencing valuation of nonmotorized improvement measures

- Transportation Research Part A: Policy and Practice---2014---Tomás Ruiz,José C. Bernabé

This paper presents the application of a new methodology for data collection based on multiple survey methods to study how drivers and transit users value non-motorized improvements. This multi-method survey consisted on a combination of user' s willingness to

change, stated tolerance and contingent valuation experiments.

The influence of firm age on the relationships of airline performance, economic situation and internal operation

- Transportation Research Part A: Policy and Practice---2014---Noor Azina Ismail,Hashem Salarzadeh Jenatabadi

The ways in which airline performance depends on the economic situation and internal operation are well established in the literature. One of the contextual factors that may change the nature of these relationships is firm age. As such, the aim of this study is to investigate the moderating influence of firm age on airline performance outcomes. Thirty airline companies from the Asia Pacific region were selected, and relevant data from 2006 to 2011 were collected. It can be deduced that company experience or firm age can help in taking control of the relationship between the constructs; thus, this measurement acts as a moderator in the research model.

Improving transportation service quality based on information fusion

- Transportation Research Part A: Policy and Practice---2014---James J.H. Liou,Chao-Che Hsu,Yun-Shen Chen

How to improve transportation service quality and thus attract more passengers to use public transportation systems is an important concern for city governments around the world. In this study, we propose a novel information fusion model that addresses the dependent relationships among the various criteria for a method of non-additive weighted gap analysis aimed at evaluating and improving the service quality of transport systems. The hybrid model remedies prior shortcomings and should be more applicable to real-world situations. The proposed model is applied to a real case study of Taipei city bus companies to demonstrate its usefulness. The resulting analysis and the managerial applications for

improving the bus service quality are also discussed with regards to the current policies of Taipei city.

Effects of switching costs on customer attitude loyalty to an airport in a multi-airport region

- Transportation Research Part A: Policy and Practice---2014---Erik Nasset,Øyvind Helgesen

The purpose is to analyze impacts of switching costs on customer attitude loyalty to an airport operator in a Norwegian multi-airport region. A sample of 167 respondents is analyzed by a structural equations modelling approach. Irrespective of customers' perceptions of switching costs, service quality seems to be the most important customer loyalty driver. For low switching costs customers flight offers are also an important loyalty driver. For high switching costs customers facilities are important. An anticipated reduction in switching costs due to improvements in the regions' infrastructure thus implies that more attention should be paid to an upgrading of the flight offers in order to create more airport loyalty in future. This may also have some interesting policy implications, which is briefly discussed in the paper.

An advanced traveler general information system for Fresno, California

- Transportation Research Part A: Policy and Practice---2014---Omid M. Rouhani,H. Oliver Gao

This study estimates the effects of an advanced traveler general information system (ATGIS), which includes fuel consumption and health-related emissions cost information on transportation network users' travel choice behavior for recurrent congestion conditions. The effects are estimated using four different formulations based on four different behavioral assumptions. Incorporating stochastic features in link cost estimation rather than in route choice, we provide a novel modeling approach that enables us to use transportation planning models of major metropolitan areas without a need for major computationally-expensive changes in the existing models. We examined the effects of an ATGIS on the Fresno, CA, road network and found

several interesting results. First, the ATGIS impact is closely related to pre-system (prior to the implementation of an ATGIS) perceived fuel and emissions costs. Total travel time in the city can be reduced by 17% (no pre-system perceived costs) to 1% (accurate pre-system perceived costs), and even increased by 1% (higher-than-actual pre-system perceived costs). Second, the addition of emissions costs, although negligible relative to fuel and time costs, can effectively reduce total system-wide travel time by up to 1% and fuel consumption by up to 0.6% during peak hours. Third, the ATGIS can reduce annual social costs by as much as \$1053 million (high gas price, no pre-system perception) to \$48 million (medium gas price, accurate pre-system perception), which are comparable to social cost savings by a congestion pricing (CP) scheme in the study area.

Prioritizing bicycle paths in Belo Horizonte City, Brazil: Analysis based on user preferences and willingness considering individual heterogeneity

- Transportation Research Part A: Policy and Practice---2014---Dapeng Zhang, David José Ahouagi Vaz Magalhães, Wang, Xiaokun (Cara)

Using bicycles as a commuting mode has proven to be beneficial to both urban traffic conditions and travelers' health. In order to efficiently design facilities and policies that will stimulate bicycle use, it is necessary to first understand people's attitudes towards bicycle use, and the factors that may influence their preferences. Such an understanding will enable reliable predictions of bicycle use willingness level, based on which cycling facility construction can be reasonably prioritized.

Will a driving restriction policy reduce car trips? —The case study of Beijing, China

- Transportation Research Part A: Policy and Practice---2014---Lanlan Wang, Jintao Xu, Ping Qin

A driving restriction policy, as one of the control-and-command rationing measures, is a politically acceptable

policy tool to address traffic congestion and air pollution in some countries and cities in the world. Beijing is the first city in China to implement this policy. A one-day-a-week driving restriction scheme was expected to take 20% of cars off the road every week day. Using household survey and travel diary data, we analyze the short-term effect of this driving restriction policy on individual travel mode choice. The data also allow us to identify which demographic groups are more likely to break the restriction rule. The estimates reveal that the restriction policy in Beijing does not have significant influence on individuals' decisions to drive, as compared with the policy's influence on public transit. The rule-breaking behavior is constant and pervasive. We found that 47.8% of the regulated car owners didn't follow the restriction rules, and drove "illegally" to their destination places. On average, car owners who traveled during peak hours and/or for work trips, and whose destinations were farther away from the city center or subway stations, were more likely to break the driving restriction rules. Therefore, Beijing is probably in need of more comprehensive and palatable policy instruments (e.g., a combination of congestion tolls, parking fees, fuel taxes, and high-speed transit facilities) to effectively alleviate traffic congestion and air pollution.

Assessing social equity in distance based transit fares using a model of travel behavior

- Transportation Research Part A: Policy and Practice---2014---Steven Farber, Keith Bartholomew, Xiao Li, Antonio Páez, Khandker Nurul Habib

The goal of this study is to develop and apply a new method for assessing social equity impacts of distance-based public transit fares. Shifting to a distance-based fare structure can disproportionately favor or penalize different subgroups of a population based on variations in settlement patterns, travel needs, and most importantly, transit use. According to federal law, such disparities must be evaluated by the transit agency, but the area-based techniques identified by the Federal Transit Authority for assessing discrimination fail

to account for disparities in distances travelled by transit users. This means that transit agencies currently lack guidelines for assessing the social equity impacts of replacing flat fare with distance-based fare structures. Our solution is to incorporate a joint ordinal/continuous model of trip generation and distance travelled into a GIS Decision Support System. The system enables a transit planner to visualize and compare distance travelled and transit-cost maps for different population profiles and fare structures. We apply the method to a case study in the Wasatch Front, Utah, where the Utah Transit Authority is exploring a switch to a distance-based fare structure. The analysis reveals that overall distance-based fares benefit low-income, elderly, and non-white populations. However, the effect is geographically uneven, and may be negative for members of these groups living on the urban fringe.

Hybrid cars and HOV lanes

- Transportation Research Part A: Policy and Practice---2014---Sharon Shewmake,Lovell Jarvis

The 2005 California Clean Air Access Sticker program offered stickers to owners of hybrid cars allowing unrestricted access to High Occupancy Vehicle lanes. The program was conceived as a zero-cost mechanism to encourage purchase of hybrid cars and to reduce air pollution. Information from sales of used hybrids allows us to estimate sticker market value. We then derive the value of excess HOV space the hybrids occupied, which is considerably greater than the air pollution benefits achieved. A more effective policy would sell space to drivers of any vehicle and use the revenue to stimulate hybrid demand, preferably via direct subsidy.

Can value capture work in a car dependent city? Willingness to pay for transit access in Perth, Western Australia

- Transportation Research Part A: Policy and Practice---2014---James McIntosh,Roman Trubka,Peter Newman

This paper investigates the impact of transit on urban land markets in the highly car dependent corridors

of Perth with a focus on where new fast rail transit services have recently been built. It determines people's willingness to pay for transit access within different pedestrian catchments for each of the corridors based on hedonic price modelling using land value data on over 460,000 households. The case study uses cross sectional and panel data hedonic price modelling methodology for the calculation of willingness to pay for transit. It finds that land market increases of up to 40% can be achieved, and is particularly relevant to car dependent cities looking to capture the financial and economic value created to build transit extensions or entirely new systems, thus making a strong case for value capture funding of transit projects into car dependent suburbs and the potential for density increases near stations.

Demandeur pays: The EU and funding improvements in South Asian ship recycling practices

- Transportation Research Part A: Policy and Practice---2014---Emmanuel Yujuico

Questionable practices for dismantling end-of-life ships or 'ship recycling' on South Asian countries' shores have elicited unease given their dominance of this unevenly regulated global industry. International efforts to establish enforceable regulations have met with limited success so far, and yet this limited success may be further eroded as different interests promote their own preferred arrangements—or ignore them altogether. This paper focuses on narrowing differences between the European Union and South Asian ship recycling nations over regulating this trade by sequentially detailing its economic rationales, environmental regimes and relevant sustainability principles. These tasks performed, I deductively build a case for an aid-based, 'demandeur pays' approach to meaningfully address this impasse after considering other options to fund improved ship recycling practices in South Asia.

Do parking standards matter? Evaluating the London parking reform with a matched-pair approach

- Transportation Research Part A: Policy and Practice---2014---Fei Li,Zhan Guo

Minimum parking standards, which require developers to build a certain amount of off-street parking spaces, are increasingly criticized for leading to excess parking supply and automobile travel in recent years. However, due to the difficulty in identifying the policy effect, few empirical studies have directly and accurately estimated the effects of parking standards on parking supply. The present study examines a parking reform in London, UK, where minimum parking standards for residential developments were replaced with maximum standards in the early 2000s. Using planning application records, we match neighboring pre-reform and post-reform developments to estimate the effect of the parking standard switch and further identify the “binding” and “capping” effects of minimum and maximum parking standards. It is found that the parking reform in London has led to a reduction of approximately 0.76 parking spaces per unit in residential development applications, or 49% of the pre-reform level. Minimum parking standards seem to have a larger impact than maximum ones on parking supply that fell more upon inner city developments, while maximum parking standards have more influenced suburban neighborhoods. Market forces have played a major role in the decline of parking supply. The findings provide strong evidence for the market distortion effect of minimum parking standards.

Exploring key determinants of travel satisfaction for multi-modal trips by different traveler groups

- Transportation Research Part A: Policy and Practice---2014---Yusak O. Susilo,Oded Cats

Using a primary dataset from an experimental survey in eight European cities, this study identified the key determinants of satisfaction with individual trip stages as well as overall journey experience for different

travel modes and traveler groups. Multivariate statistical analyses were used to examine the relationships between overall satisfaction and travel experience variables, trip complexity, subjective well-being indices, travel-related attitudes as well as individual- and trip-specific attributes. The results indicate that for certain traveler groups, such as women, young and low-income or unemployed travelers, there are distinctive determinants of satisfaction with trip stages for various travel modes. The results also indicate that satisfaction with the primary trip stage is strongly linked to overall trip satisfaction, while satisfaction levels with access and egress trip stages are strongly related to satisfaction with the primary trip stage. Past experience, traveler expectations and attitudes, and the emotional state of travelers are also significant explanatory variables for travel satisfaction. The results indicate that when an individual consciously chooses a particular travel mode, they will report a higher level of satisfaction with that chosen mode. Notwithstanding, while past experience highly influences an individual's current travel satisfaction, the more they travel with the current mode, the less satisfied they are with their choice. The results of this study highlight the importance of gaining a better understanding of the interaction between instrumental variables and non-instrumental variables at different trip stages and the influence on user preferences, satisfaction and decision-making processes.

An integrated analysis of workers' physically active activity and active travel choice behavior

- Transportation Research Part A: Policy and Practice---2014---Ipek N. Sener,Phillip R. Reeder

Using Texas add-on sample data from the 2009 National Household Travel Survey, this study examines adult workers' daily active choice decisions in the context of physical activity and attendant health benefits. The study looked at workers' two choice behaviors: active activity and active travel. The first choice behavior, active activity, is developed as an ordered-response model based on the number of physically active recreational activities pursued during the workday. The second choice behavior, active travel, is developed as a

binary-response model that examines workers' active travel choices—whether or not the worker used any active mode of travel during the same workday. The study improves the understanding and knowledge of observed factors influencing workers' physically active activity-travel behavior. The study also provides several observations regarding the role (and constraints) of employment in individuals' active choices. Using a flexible copula modeling methodology, we explore the true correlation (or dependence) between the two behavior choices that could occur due to the presence of unobserved factors, suggesting a simultaneously low or simultaneously high propensity for being physically active across workers. The study findings suggest that transportation and public health policy makers can mutually benefit from encouraging workers to be physically active (from an activity and/or travel perspective). Overall, the study draws attention to the integrated nature of the public health and transportation fields, thereby providing a distinct view of active/inactive choice behavior. To our knowledge, this is the first study exploring a rich variety of components for workers' active activity-travel behavior through a robust copula approach.

Age related annual crash incidence rate ratios in professional drivers of heavy goods vehicles

- Transportation Research Part A: Policy and Practice---2014---Maya Guest,May M. Boggess,Janine M. Duke

Evidence concerning crash risk for older heavy vehicle drivers is sparse, making it difficult to assess if it is prudent to encourage older drivers to remain in the workforce in a climate of labour shortages. The objective of this study was to estimate annual crash rate ratios of older male heavy vehicle drivers relative to their middle aged peers.

Commuters' mode choice as a coordination problem: A framed field experiment on traffic policy in Hyderabad, India

- Transportation Research Part A: Policy and Practice---2014---Bhuvanachithra Chi-

dambaram,Marco A. Janssen,Jens Rommel,Dimitrios Zikos

All major Indian cities face a severe transport crisis, with the number of cars on the road increasing every day. Policy makers are trying to keep pace with this growth by supplying more roads, largely neglecting demand-side policy measures. We have developed an economic experiment to investigate behavioral responses of citizens to such measures. Drawing on a sample of 204 white-collar commuters from Hyderabad, India, we model mode choice as a coordination problem and analyze how bus subsidies, increased parking costs, and public information on preferential car use can affect mode choice. We find that pecuniary treatments are effective for shifting behavior towards socially more desirable outcomes and increasing total benefits. Mode choice is relatively unaffected by socio-economic variables like gender, education or income but is significantly affected by actual traffic behavior. We discuss limitations of the applied sampling, conclude with a critical evaluation of the strengths and weaknesses of economic experiments in transportation research, and offer an outlook on how further experimentation could enrich the policy debate.

A demand trend change early warning forecast model for the city of São Paulo multi-airport system

- Transportation Research Part A: Policy and Practice---2014---Rodrigo Arnaldo Scarpel

The need of accurate forecasts of air passenger numbers to assist managerial decision making for both short and long terms is well recognized and a central problem on both short and long term forecasting is how to handle future trend. The aim of this paper is to develop a demand trend change early warning forecast model (EWFm) for the city of São Paulo multi-airport system (SPMARs). For SPMARs the EWFm is based on the combination of leading indicators and alarms against possible occurrence of changes on trend component of the monthly number of domestic air passengers. A topdown induction procedure is employed to identify

leading indicators to provide an interpretable prediction procedure to support the development of scenarios for future demand trend. Results show that changes on such demand trend are mostly associated to changes on the economic activity and six different scenarios were built combining the identified leading indicators. The EWFM was employed to assist managerial decision making for both short and long terms in order to evaluate different alternatives to prevent congestion delay occurrences and to support infrastructure planning.

The influence of the road network on private productivity measures using Data Envelopment Analysis: A case study from Spain

- Transportation Research Part A: Policy and Practice---2014---Inmaculada Álvarez,Reyes Blázquez

We evaluate the economic effects of investment in the road network on private regional activity. We employ provincial Spanish panel data from 1980 to 2007 to perform non-parametric frontier techniques based on Data Envelopment Analysis and to obtain the Malmquist productivity indexes, thus enabling us to examine the evaluation of the productivity growth via technological changes or efficiency gains. Additionally, we analyze the role of transport infrastructure on the evolution of Total Factor Productivity and its components through econometric techniques. Our results show important spillover effects. Moreover, our findings have significant implications for policy makers if we take into account the fact that the use of the road network in economic activity or in commercial relations greatly influences productivity growth.

Ports and regional development: A spatial analysis on a panel of European regions

- Transportation Research Part A: Policy and Practice---2014---Anna Bottasso,Maurizio Conti,Claudio Ferrari,Alessio Tei

This paper analyses the impact of port activities on local development for a sample of 621 TL-3 regions located in thirteen European countries and observed over

the period 1998–2009. Using a spatial panel econometric framework which controls for spatial fixed effects, the paper provides an estimate of both the direct and indirect (i.e. spillover) effects associated to port activities. Results suggest that ports might have non-negligible effects on local GDP: interestingly, an important share of the effects takes place outside the region where the port is located.

Modeling the behavioral determinants of travel behavior: An application of latent transition analysis

- Transportation Research Part A: Policy and Practice---2014---Maarten Kroesen

This paper applies the relatively new method of latent class transition analysis to explore the notion that qualitative differences in travel behavior patterns are substantively meaningful and therefore relevant from explanatory point of view. For example, because the bicycle may function as an important access and egress mode, a car user who also (occasionally) uses the bicycle may be more likely to switch to a public transit profile than someone who only uses the car. Data from the Dutch mobility panel are used to inductively reveal travel behavior patterns and model transitions in these patterns over time. Additionally, the effects of seven exogenous variables, including two important life events (i.e. moving house and changing jobs), on cluster membership and the transition probabilities are assessed. The results show that multiple-mode users compared to single-mode users are more likely to switch from one behavioral profile to another. In addition, age, the residential environment, moving house and changing jobs have strong influences on the transition probabilities between the revealed behavioral patterns over time.

Do reforms reduce the magnitudes of cost overruns in road projects? Statistical evidence from Norway

- Transportation Research Part A: Policy and Practice---2014---James Odeck

Although governments often respond to the prevalent cost overruns of transportation projects by reforming the agencies charged with overseeing the construction of projects, the transportation research literature has not provided statistical evidence as to whether such reforms assist in reducing cost overruns. This paper provides such evidence using the Norwegian road sector as a case study. The agency in question was reformed twice, from a monopolistic to a semi-monopolistic organization, and finally, to a fully competitive organization in which road construction was divided out into a separate company and privatized. In this work, we use statistical inferences to explore the related issues. The data set is composed of 1045 projects evenly distributed across the three organizational forms. The results demonstrate that the impact of the reforms has not been equal. The most important impact occurred in the final reform of full competition in which both the cost overruns and delays in construction among larger projects were greatly reduced. The second reform appears to have had a contrasting impact. For transportation research in general, we call for additional studies that will reveal the extent to which efforts carried out by governments (such as reforms) improve the efficiency of these sectors.

Multi-criteria impacts assessment for ranking highway projects in Northwest Spain

- Transportation Research Part A: Policy and Practice---2014---Soledad Nogués, Esther González-González

This paper presents a multi-criteria model to rank highway projects by predicting their combined potential impact on regional population, economy, environment, territory and mobility. A detailed study of initial conditions enable the selection of functional units of study and the identification of homogenous units within the region, playing a relevant role into the process. Ranking is based on the achievement of both efficiency and cohesion objectives at a regional level. The model is tested by analyzing the Spanish Transport Infrastructure Master Plan (PEIT) for the non-central area of Northwest Spain. Application of impact assessment

shows that the construction of infrastructures has selective effects in the area according to the homogenous groups. Potential development was boosted in one of the zone groups, whereas in others, at best, there was a reduction in their regressive tendency. Finally, the model is a dynamic support tool that could be adapted to several planning policies only when the ranking criterion is well-justified.

The asymmetric effects of income and fuel price on air transport demand

- Transportation Research Part A: Policy and Practice---2014---Zia Wadud

Forecasts of passenger demand are an important parameter for aviation planners. Air transport demand models typically assume a perfectly reversible impact of the demand drivers. However, there are reasons to believe that the impacts of some of the demand drivers such as fuel price or income on air transport demand may not be perfectly reversible. Two types of imperfect reversibility, namely asymmetry and hysteresis, are possible. Asymmetry refers to the differences in the demand impacts of a rising price or income from that of a falling price or income. Hysteresis refers to the dependence of the impacts of changing price or income on previous history, especially on previous maximum price or income. We use US time series data and decompose each of fuel price and income into three component series to develop an econometric model for air transport demand that is capable of capturing the potential imperfectly reversible relationships and test for the presence or absence of reversibility. We find statistical evidence of asymmetry and hysteresis – for both, prices and income – in air transport demand. Implications for policy and practice are then discussed.

Driving to save time or saving time to drive? The enduring appeal of the private car

- Transportation Research Part A: Policy and Practice---2014---Jennifer L. Kent

Use of the private car is often viewed as highly problematic. It is regularly associated with global physical,

social and ecological harms such as climate change and the high incidence of lifestyle diseases, including heart disease. Attempts to address these problems generally include provision for day-to-day physical mobility based on alternatives to the private car. Labelled alternative transport, these modes include public transport, walking and cycling. Yet the private car continues as the preferred way to travel in many cities. A deeper understanding of this preference can reveal under explored sites of resistance to alternative transport modes.

Market power and its determinants in the Chinese airline industry

- Transportation Research Part A: Policy and Practice---2014---Qiong Zhang, Hangjun Yang, Qiang Wang, Anming Zhang

This paper first measures the degree of Chinese airlines' market power by using Lerner index, and then investigates its determinants. Our empirical results show that a certain degree of market power exists in the Chinese airline industry. Of the three dominant carriers, Air China exhibits the strongest market power whereas China Eastern Airlines the weakest, with China Southern Airlines being in the middle. Furthermore, the extent of market power varies significantly among regional markets, with China's northeast region as the strongest, followed by the eastern and western regions, and the central area as the weakest. We also find a hub-premium effect similar to the result found in the US airline market. Our analysis shows that the existence of high-speed rail and low-cost carriers, income level, population size, seasonality, and number of competing airlines are the main determinants of competition in the Chinese airline market.

Analysis of a consumer survey on plug-in hybrid electric vehicles

- Transportation Research Part A: Policy and Practice---2014---Joseph S. Krupa, Donna M. Rizzo, Margaret J. Eppstein, D. Brad Lanute, Diann E. Gaalema, Kiran Lakkaraju, Christina E. Warrender

Plug-in Hybrid Electric Vehicles (PHEVs) show potential to reduce greenhouse gas (GHG) emissions, increase fuel efficiency, and offer driving ranges that are not limited by battery capacity. However, these benefits will not be realized if consumers do not adopt this new technology. Several agent-based models have been developed to model potential market penetration of PHEVs, but gaps in the available data limit the usefulness of these models. To address this, we administered a survey to 1000 stated US residents, using Amazon Mechanical Turk, to better understand factors influencing the potential for PHEV market penetration. Our analysis of the survey results reveals quantitative patterns and correlations that extend the existing literature. For example, respondents who felt most strongly about reducing US transportation energy consumption and cutting greenhouse gas emissions had, respectively, 71 and 44 times greater odds of saying they would consider purchasing a compact PHEV than those who felt least strongly about these issues. However, even the most inclined to consider a compact PHEV were not generally willing to pay more than a few thousand US dollars extra for the sticker price. Consistent with prior research, we found that financial and battery-related concerns remain major obstacles to widespread PHEV market penetration. We discuss how our results help to inform agent-based models of PHEV market penetration, governmental policies, and manufacturer pricing and marketing strategies to promote consumer adoption of PHEVs.

Vehicle type choice under the influence of a tax reform and rising fuel prices

- Transportation Research Part A: Policy and Practice---2014---Stefan Mabit

Differentiated vehicle taxes are considered by many a useful tool for promoting environmentally friendly vehicles. Various structures have been implemented in several countries, e.g. Ireland, France, The Czech Republic, and Denmark. In many countries the tax reforms have been followed by a steep change in new vehicle purchases toward more diesel vehicles and more fuel-efficient vehicles. The paper analyses to what

extent a vehicle tax reform similar to the Danish 2007 reform may explain changes in purchasing behaviour. The paper investigates the effects of a tax reform, fuel price changes, and technological development on vehicle type choice using a mixed logit model. The model allows a simulation of the effect of car price changes that resemble those induced by the tax reform. This effect is compared to the effects of fuel price changes and technology improvements. The simulations show that the effect of the tax reform on fuel efficiency is similar to the effect of rising fuel prices while the effect of technological development is much larger. The conclusion is that while the tax reform appeared in the same year as a large increase in fuel efficiency, it seems likely that it only explains a small part of the shift in fuel efficiency that occurred and that the main driver was the technological development.

A multi-objective analysis of a rural road network problem in the hilly regions of Nepal

- Transportation Research Part A: Policy and Practice---2014---Jagat K. Shrestha,Agostinho Benta,Rui B. Lopes,Nuno Lopes

This paper considers the rural road network upgrading problem, using a multi-objective optimization model, to support decision-makers in the choice of roads to upgrade in the hilly regions of Nepal. The model considers two objectives: minimization of user operation costs and maximization of population covered. The problem was solved for a real-world rural road network in the Gorkha district of Nepal. For this case, all non-dominated solutions were obtained and the ones providing more interesting trade-offs were analysed. The model was found suitable for the case under study, and possibly, easily extendable to rural areas of other developing countries.

Truck parking in urban areas: Application of choice modelling within traffic microsimulation

- Transportation Research Part A: Policy and Practice---2014---Mehdi Nourinejad,Adam Wennerman,Khandker Nurul Habib,Matthew J. Roorda

Urban truck parking policies include time restrictions, pricing policies, space management and enforcement. This paper develops a method for investigating the potential impact of truck parking policy in urban areas. An econometric parking choice model is developed that accounts for parking type and location. A traffic simulation module is developed that incorporates the parking choice model to select suitable parking facilities/locations. The models are demonstrated to evaluate the impact of dedicating on-street parking in a busy street system in the Toronto CBD. The results of the study show lower mean searching time for freight vehicles when some streets are reserved for freight parking, accompanied by higher search and walking times for passenger vehicles.

Border crossing delay prediction using transient multi-server queueing models

- Transportation Research Part A: Policy and Practice---2014---Lei Lin,Qian Wang,Adel W. Sadek

As a result of the continued increase in travel demand coupled with the need for tighter security and inspection procedures after September 11, border crossing delay has recently become a critical issue with tremendous economic and social costs. The current paper develops multi-server queueing models to estimate border crossing delay in support of a predictive traveler information system for the crossings. Two classes of multi-server models are considered: (1) models with exponential inter-arrival times and Erlang service times; and (2) a more generic model with a Batch Markovian Arrival Process (BMAP) and phase types (PH) services. As a case study, the models are developed based on real-time traffic volume and inspection time data collected at one of the major US-Canada border crossings, the Peace Bridge, and their transient solution is obtained using heuristic methods. For validation, the queueing models' estimates are compared to the results from a detailed microscopic traffic simulation model of the Peace Bridge border crossing. The comparison shows that the transient queueing model, along its heuristic solution algorithm, is capable of predict-

ing border crossing delay. Finally, a set of sensitivity analysis tests are conducted, and the developed models are incorporated within an optimization framework to help inform border crossing management strategies.

Joint impact of competition, ownership form and economic regulation on airport performance and pricing

- Transportation Research Part A: Policy and Practice---2014---Nicole Adler,Vanessa Liebert

The combined impact of ownership form, economic regulation and competition on airport performance is analyzed using data envelopment analysis to measure cost efficiency in the first stage and regression analysis to measure the impact of the environment in the second stage. The empirical results of an analysis of European and Australian airports over a 10year timeframe reveal that under relatively non-competitive conditions, public airports operate less cost efficiently than fully private airports. Irrespective of ownership form, regulation is necessary to emulate competitive forces thus pushing airport management towards cost efficiency and reasonable pricing policies. Under potential regional or hub competition, economic regulation inhibits airports of any ownership form from operating and pricing efficiently. Although public and fully private airports operate equally efficiently in a competitive setting, private airports still set higher aeronautical charges. Furthermore, mixed ownership forms with a majority public holding are neither cost efficient nor low price, irrespective of the level of competition.

Electric vehicle parking in European and American context: Economic, energy and environmental analysis

- Transportation Research Part A: Policy and Practice---2014---Marta V. Faria,Patrícia C. Baptista,Tiago L. Farias

The transportation sector faces increasing challenges related to energy consumption and local and global emissions profiles. Thus, alternative vehicle technologies and energy pathways are being considered in order to

overturn this trend and electric mobility is considered one adequate possibility towards a more sustainable transportation sector.

Unraveling the evacuation behavior of the medically fragile population: Findings from hurricane Irene

- Transportation Research Part A: Policy and Practice---2014---ManWo Ng,Joshua Behr,Rafael Diaz

Despite the widely recognized importance of evacuation planning for residents with special needs – in this paper referred to as the medically fragile population – there is virtually no research available to guide such planning, as opposed to the numerous empirical research studies on the evacuation behavior of the general population. In this paper, we provide these long-overdue insights using data from a large-scale phone survey (over 7000 samples) conducted in the aftermath of hurricane Irene in the Hampton Roads region in Virginia. Via aggregate and disaggregate analyses, we start to unravel the behavior of this heavily understudied, and potentially vulnerable population group. Special emphasis will be placed on the differences between the medically fragile and non-medically fragile population. Two alternative definitions for what constitutes medically fragile are examined in this paper. Using the broader definition, it was found that a key difference between these two groups relates to the importance of having a strong network of family members in the area. When considering a more narrow definition, we found that being a single parent household, likelihood of neighborhood flooding and knowing most of the names of one's neighbors have significantly different impacts on the two population groups.

Integrating psychometric indicators in latent class choice models

- Transportation Research Part A: Policy and Practice---2014---Ricardo Hurtubia,My Hang Nguyen,Aur lie Glerum,Michel Bierlaire

Latent class models are a convenient and intuitive way

to introduce taste heterogeneity in discrete choice models by relating attributes of the decision makers with unobserved behavioral classes, hence allowing for a more accurate market segmentation. Estimation and specification of latent class models can be improved with the use of psychometric indicators that measure the effect of unobserved attributes in the individual preferences. This paper proposes a method to introduce these additional indicators in the specification of integrated latent class and discrete choice models, through the definition of measurement equations that relate the indicators to attributes of the decision maker. The method is implemented for two mode-choice case studies and compared with alternative methods to introduce indicators. Results show that the proposed method generates significantly different estimates for the class and choice models and provide additional insight into the behavior of each class.

Where to dispose of urban green waste?

Transportation planning for the maintenance of public green spaces

- Transportation Research Part A: Policy and Practice---2014---Frank Meisel,Nicole Thiele

Urban green spaces provide various social and environmental benefits that strongly improve the quality of life in a city. Municipalities are responsible for maintaining their green spaces in order to preserve these potentials. This paper supports municipalities in planning the transportation and disposal logistics of the green waste that is produced by the maintenance activities. The approach combines ecological issues like the seasonality of green waste generation and different types of biomass with economically driven decision making. We show how to determine cost efficient transportation plans for the disposal logistics and how to capture the seasonality of green waste generation when booking capacities at disposal facilities. It is also shown how a municipality can select the disposal facilities to cooperate with in a competitive environment where facilities offer capacities at differing conditions, as is the case for disposal sites that dump the green waste and for conversion plants that use the biomass for producing

renewable energy. We illustrate the approach using case data of a major city in Germany.

Individual freight effects, capacity utilization, and Amtrak service quality

- Transportation Research Part A: Policy and Practice---2014---Betty Krier,Chia-Mei Liu,Brian McNamara,Jerrold Sharpe

This paper offers a new perspective on the post-deregulation rail industry. We hypothesize that a link exists between individual freight effects and Amtrak service quality. Specifically, we investigate the relationship between freight control of the infrastructure on which Amtrak trains operate and Amtrak train delays. Our sample consists of 1117 directional station-pairs for fiscal years 2002 through 2007 on 28 Amtrak non-Northeast Corridor passenger routes. We found that freight effects have a significant impact on Amtrak train delays after controlling for other important delay determinants such as the capacity utilization rate. The impact is higher on long-distance routes. We also observed significant differences between the effects of different freight railroads. For example, Amtrak operations on infrastructure controlled by several Class I railroads experienced significantly larger delays than baseline operations, while Amtrak train delays on Burlington Northern and Santa Fe's tracks actually fell below baseline levels.

Willingness to pay for public transportation options for improving the quality of life of the rural elderly

- Transportation Research Part A: Policy and Practice---2014---Alicia A. Israel Schwarzlose,James W. Mjelde,Rebekka M. Dudensing,Yanhong Jin,Linda K. Cherrington,Junyi Chen

Transportation for the rural elderly is an increasing concern as baby boomers age and young people continue to exit rural communities. When the elderly are no longer able to drive, they rely on alternative forms

of transportation, including public transportation systems. Currently, such systems are usually not good substitutes for driving a private car, especially in rural areas. Because expanded rural transportation systems would likely be funded by taxpayers, an understanding of their preferences and willingness to pay (WTP) for non-medical transportation options is essential. To help understand WTP and preferences, a choice experiment survey was administered to taxpayers in three counties (Atascosa, Polk, and Parker) in Texas. Results indicate taxpayers' value transportation services for the elderly and are willing to support them. They value more flexible options over base levels of the attributes presented, but they may not always prefer the most flexible options. Respondents' WTP for the same transportation attribute was similar across counties, but differences in socio-demographic coefficients suggest that transportation systems may need to be customized to meet local needs. Furthermore, county residents' WTP may not cover the cost of desired improvements to the transportation systems.

Grand challenges for high-speed rail environmental assessment in the United States

- Transportation Research Part A: Policy and Practice---2014---Mikhail V. Chester, Megan S. Ryerson

The comprehensiveness of environmental assessments of future long-distance travel that include high-speed rail (HSR) are constrained by several methodological, institutional, and knowledge gaps that must and can be addressed. These gaps preclude a robust understanding of the changes in environmental, human health, resource, and climate change impacts that result from the implementation of HSR in the United States. The gaps are also inimical to an understanding of how HSR can be positioned for 21st century sustainability goals. Through a synthesis of environmental studies, the gaps are grouped into five overarching grand challenges. They include a spatial incompatibility between HSR and other long-distance modes that is often ignored, an environmental review process that obviates modal alternatives, siloed interest in particular environmental

impacts, a dearth of data on future vehicle and energy sources, and a poor understanding of secondary impacts, particularly in land use. Recommendations are developed for institutional investment in multimodal research, knowledge and method building around several topics. Ultimately, the environmental assessment of HSR should be integrated in assessments that seek to understand the complementary and competitive configurations of transportation services, as well as future accessibility.

Multivariate exposure modeling of accident risk: Insights from Pay-as-you-drive insurance data

- Transportation Research Part A: Policy and Practice---2014---Johannes Paefgen, Thorsten Staake, Elgar Fleisch

The increasing adoption of in-vehicle data recorders (IVDR) for commercial purposes such as Pay-as-you-drive (PAYD) insurance is generating new opportunities for transportation researchers. An important yet currently underrepresented theme of IVDR-based studies is the relationship between the risk of accident involvement and exposure variables that differentiate various driving conditions. Using an extensive commercial data set, we develop a methodology for the extraction of exposure metrics from location trajectories and estimate a range of multivariate logistic regression models in a case-control study design. We achieve high model fit (Nagelkerke's R^2 0.646, Hosmer-Lemeshow significance 0.848) and gain insights into the non-linear relationship between mileage and accident risk. We validate our results with official accident statistics and outline further research opportunities. We hope this work provides a blueprint supporting a standardized conceptualization of exposure to accident risk in the transportation research community that improves the comparability of future studies on the subject.

The hedonic value of railways terminals. A quantitative analysis of the impact of stations quality on travellers behaviour

- Transportation Research Part A: Policy and Practice---2014---Ennio Cascetta, Armando

Transit services quality has long been recognized as an important factor in influencing travelers behaviour and terminals quality is certainly part of it. As a matter of fact a number of transit promotion policies explicitly based on qualitative factors and specifically high architectural standards are being adopted in designing new railways stations and several examples of remarkable architecture applied to railways stations can be found all round the world. In spite of this, the literature in transportation modelling has not yet analyzed the impact of the hedonic quality on travelers' behaviour quantifying whether and by how much it increases their propensity to use rail services.

Assessing the cost and CO₂e impacts of rerouting UK import containers

- Transportation Research Part A: Policy and Practice---2014---Vasco Sanchez Rodrigues,Anthony Beresford,Stephen Pettit,Syamantak Bhattacharya,Irina Harris

Among the most important trade-related issues currently confronting the UK are the environmental implications of very large volumes of containerised freight being handled at a small number of ports while there appears to be significant potential for using other ports and water-rail intermodal connections. Six UK ports are selected for the analysis: Hull/Immingham, Liverpool, Felixstowe, Southampton, Dover and Bristol. Through an origin-destination analysis, the cost and CO₂e impacts of UK port trade patterns are compared using the actual situation against three proposed Scenarios: (1) the re-direction of containers by a combined expansion of Hull and Immingham; Liverpool; and Bristol, (2) moving containers by rail facilitated via expanded capacity at Southampton, and (3) moving containers by rail through expanded capacity at Felixstowe. The research found that transporting containers from Felixstowe and Southampton to the northern regions by rail has the lowest CO₂e impact, and is the most feasible option, although constraints exist in terms of infrastructure provision, water depth and rail network capacity.

Innovative alternatives take action – Investigating determinants of alternative fuel vehicle adoption

- Transportation Research Part A: Policy and Practice---2014---Martin Petschnig,Sven Heidenreich,Patrick Spieth

Alternative fuel vehicles (AFVs) as environmentally friendly alternatives to conventional internal combustion engines have gained increasing attention in general public. While empirical studies have begun to explore product-specific factors that drive consumer adoption of AFVs, an integrative framework of a comprehensive set of AFV adoption factors and its theoretical foundation as well as empirical validation is still missing. By drawing on theory of innovation adoption and theory of reasoned action we show that consumers' perceptions of AFV attributes lead to a general attitude formation towards AFV. In conjunction with consumers' subjective and personal norm, this in turn determines AFV adoption behavior. Concerning AFV attributes, compatibility, design, and relative advantage of AFVs exhibit the strongest influence on consumers' attitude formation toward AFV. We derive implications for future research and policy makers. The latter include suggestions on how to develop and communicate AFV in order to stimulate AFV adoption.

Anticipatory modulation of air navigation charges to balance the use of airspace network capacities

- Transportation Research Part A: Policy and Practice---2014---Radosav Jovanović,Vojin Tošić,Mirjana Čangalović,Milan Stanojević

Excess of air traffic demand over available capacity in certain segments of the European airspace network typically results in substantial delays imposed on airspace users, despite a possible parallel existence of underutilised adjacent network segments. Recent EU legislation lays down a performance scheme for air navigation services (ANS) and network functions, in an attempt to improve overall efficiency of the ANS, across the areas of safety, environment, capacity and cost-efficiency.

It sets a framework for a possible introduction of incentive schemes which would drive the behaviour of involved stakeholders towards meeting the established performance objectives. In such a context, this paper examines an economic concept to incentivise a more efficient use of available network capacities. We put forward a method and develop a model for an anticipatory, time-dependent modulation of ANS charges, aiming to alleviate the demand-capacity imbalance on an airspace network, at minimal cost to airspace users. The proposed method is conceptualised as a bi-level optimisation problem, reconciling the perspectives of network manager and individual network users. The results of a medium-scale real-life case study indicate that an imposition of a revenue-neutral matrix of tolls and rebates on a congested airspace network may yield a fairly equitable route assignment, which seems capacity-wise more efficient than current administrative demand management practices.

Analysis of mode choice variables in short-distance intermodal freight transport using an agent-based model

- Transportation Research Part A: Policy and Practice---2014---Vasco Reis

Medium to long-distance intermodal transport has been strongly promoted by the European Commission and national governments as a solution for ensuring the sustainability of the freight transport sector. However, so far, intermodal transport has revealed limited capacity for competing against road transport. New solutions aimed at expanding the limits of its competitiveness are needed. Some successful cases of short-distance intermodal transport reveal untapped market opportunities.

Stated choices and benefit estimates in the context of traffic calming schemes: Utility maximization, regret minimization, or both?

- Transportation Research Part A: Policy and Practice---2014---Marco Boeri,Riccardo Scarpa,Caspar Chorus

This paper proposes a discrete mixture model which assigns individuals, up to a probability, to either a class of random utility (RU) maximizers or a class of random regret (RR) minimizers, on the basis of their sequence of observed choices. Our proposed model advances the state of the art of RU–RR mixture models by (i) adding and simultaneously estimating a membership model which predicts the probability of belonging to a RU or RR class; (ii) adding a layer of random taste heterogeneity within each behavioural class; and (iii) deriving a welfare measure associated with the RU–RR mixture model and consistent with referendum-voting, which is the adequate mechanism of provision for such local public goods. The context of our empirical application is a stated choice experiment concerning traffic calming schemes. We find that the random parameter RU–RR mixture model not only outperforms its fixed coefficient counterpart in terms of fit—as expected—but also in terms of plausibility of membership determinants of behavioural class. In line with psychological theories of regret, we find that, compared to respondents who are familiar with the choice context (i.e. the traffic calming scheme), unfamiliar respondents are more likely to be regret minimizers than utility maximizers.

The suitability of hedonic models for cost-benefit analysis: Evidence from commuting flows

- Transportation Research Part A: Policy and Practice---2014---Arnstein Gjestland,David Philip McArthur,Liv Osland,Inge Thorsen

We compare two estimates of benefits arising from the construction of new bridges in south-west Norway. One estimate comes from a hedonic property value model. Rather than follow an approach which is strictly theoretically correct, we adopt Rosen’ s simple first-stage approach. To investigate and validate whether this simplified approach gives a reasonable estimate, we compare it to an estimate derived from a travel demand model. We find that a variant of an ex post hedonic house price model gives very similar estimates to the estimates from the travel demand model. This supports a hypothesis that the simplistic hedonic approach is reasonable.

Traffic consolidation in East Asian container ports: A network flow analysis

- Transportation Research Part A: Policy and Practice---2014---Yuhong Wang, Kevin Cullinane

The proliferation of hub-and-spoke operations in maritime container transportation has resulted in the widespread consolidation of traffic flows. Utilising liner shipping network configurations, this paper assesses the impact of freight traffic consolidation in the container port industry by exploring the spatial pattern of traffic flow movements and identifying the variety of roles that container ports play within this context. On the basis of the network concept, the spatial inequality of freight traffic consolidation is determined by the density and direction of all meaningful connections (i.e. significant flows) identified by applying Multiple Linkage Analysis (MLA) to an initial traffic flow matrix.

Hypothetical bias in Stated Choice Experiments: Is it a problem? And if so, how do we deal with it?

- Transportation Research Part A: Policy and Practice---2014---Simon Fifer, John Rose, Stephen Greaves

The extent to which Stated Choice (SC) experiments suffer from hypothetical bias continues to be a controversial topic in the literature. This research provides further evidence in this debate by examining the existence of hypothetical bias in a transport-related SC experiment. Data for this research were sourced from a University of Sydney study exploring the effect of exposure-based charging on motorist behaviour. The sample included 148 Sydney motorists who were recruited to take part in the 10-week GPS driving field study (Revealed Preference/RP data). In addition, participants were also required to complete an SC survey which was designed to mimic the RP decision context in order to capture what participants indicated they would do as opposed to what participants actually did in reaction to the charging regime.

A volatile relationship: The effect of changing gasoline prices on public support for mass transit

- Transportation Research Part A: Policy and Practice---2014---Michael J. Smart

The determinants of public opinion toward public transit is a little-researched topic, though a better understanding of what makes consumers willing to support transit may reveal which attributes of transit consumers value most. One determinant of people's willingness to support investments in mass transit may be the price of fuel for transit's principal competition, the private automobile. In this paper, I examine the relationship between the cost of gasoline and stated willingness to invest public money in mass transit improvements. I hypothesize that fuel price volatility—in addition to price itself—is a determinant of support for more mass transit funding, controlling for other factors. As the price of gasoline becomes more uncertain, the public should, all else equal, support investment in mass transportation, a form of transportation that may provide some measure of protection from the price of fuel. Results suggest a strong effect of price volatility on consumers' willingness to support transit expenditures.

Factors affecting public transportation, car, and motorcycle usage

- Transportation Research Part A: Policy and Practice---2014---Rong-Chang Jou, Tzu-Ying Chen

This study established a hypothesis model based on the seemingly unrelated regression equations (SURE) model to investigate the relationship between public transportation, car, and motorcycle use in various townships in Taiwan and to analyse important factors that affect the usage of these modes. The SURE model was adopted because of the lack of a significant correlation between the dependent variables. The pairwise covariance analysis for any two of the three transportation modes revealed that the transportation modes could substitute for one another. Factors related to modal and demographic characteristics had different

impacts on the usage of the three modes. The calculation of elasticity using different population densities and public transportation usage showed that when the ‘number of city bus routes’ was increased by 50% in areas with high population density and high public transportation usage, car usage decreased by 1.4%, which corresponds to 300,000 vehicles, and total CO2 emissions reduced by 0.0204%. When the ‘total length of city bus routes’ was increased by 50%, the number of motorcycles used decreased by 83 million, and total CO2 emissions reduced by 1.119%, which corresponds to 1.4 million tonnes of CO2 emission. These findings suggest that these different factors had varying impacts on car and motorcycle usage in different areas. We therefore recommended that future transportation policies consider the varying transportation usage trends in different areas.

A choice experiment on alternative fuel vehicle preferences of private car owners in the Netherlands

- Transportation Research Part A: Policy and Practice---2014---Anco Hoen,Mark Koetse

This paper presents results of an online stated choice experiment on preferences of Dutch private car owners for alternative fuel vehicles (AFVs) and their characteristics. Results show that negative preferences for alternative fuel vehicles are large, especially for the electric and fuel cell car, mostly as a result of their limited driving range and considerable refueling times. Preference for AFVs increases considerably with improvements on driving range, refueling time and fuel availability. Negative AFV preferences remain, however, also with substantial improvements in AFV characteristics; the remaining willingness to accept is on average € 10,000–€ 20,000 per AFV. Results from a mixed logit model show that consumer preferences for AFVs and AFV characteristics are heterogeneous to a large extent, in particular for the electric car, additional detour time and fuel time for the electric and fuel cell car. An interaction model reveals that annual mileage is by far the most important factor that determines heterogeneity in preferences for the electric and fuel

cell car. When annual mileage increases, the preference for electric and fuel cell cars decreases substantially, whilst the willingness to pay for driving range increases substantially. Other variables such as using the car for holidays abroad and the daily commute also appear to be relevant for car choice.

Re-cycling a city – Examining the growth of cycling in Dublin

- Transportation Research Part A: Policy and Practice---2014---Brian Caulfield

In the past few decades much research has been conducted on the increasing numbers of commuters taking up cycling to work. This modal shift has been encouraged by pro-cycling policies to increase the attractiveness of cycling and the construction of new cycling infrastructure. In Dublin, several policies have been applied such as a bike rental scheme, bicycle-purchasing schemes, reducing speed limits and the construction of segregated cycle lanes to promote cycling. This paper seeks to examine what, if any, impact these policies have had on cycling rates in Dublin. This paper compares census data from 2006 and 2011 to determine how cycling rates have changed and if the demographics of cyclists have changed in the city. The results presented in the paper show that cycling rates have increased in Dublin and that a greater percentage of females, those in higher age and socio-economic groups are cycling to work on a regular basis. The analysis presented in this paper identifies groups of individuals that have recently shifted to cycling to work, by identifying who these people are, policymakers can tailor strategies to target these groups to encourage others in these groups to take up cycling.

What type of road pricing scheme might appeal to politicians? Viewpoints on the challenge in gaining the citizen and public servant vote by staging reform

- Transportation Research Part A: Policy and Practice---2014---David Hensher,Michiel Bliemer

The greatest hurdle facing road pricing reform is political commitment. With rare exception, efforts to introduce significant reform in road pricing, aimed at raising sufficient revenue to ensure that road investment and ongoing maintenance is secured, without an additional impost to users above current outlays, while at the same time reducing traffic congestion, has fallen largely on politically non-supportive ears. The big challenge is to convince politicians (and their advisers) that it is possible to reform road pricing so that users are made better off (at least the great majority) in terms of time spent travelling and monies outlaid, and that government secures growing levels of revenue, but with at least some funds being used to improve public transport and the existing road network. This paper identifies the major issues that make much of the academic research into road pricing somewhat limited in terms of achieving real change. Staging reform is an appealing way forward, but ensuring the order and timing of events to secure progress is the big challenge. We offer some suggestions, including some ideas on new language designed to increase the level of buy in, and recognise that progress through action will require compromises in respect of an ‘ideal’ economically efficient pricing reform agenda.

Knowing their place on the roads: What would equality mean for walking and cycling?

- Transportation Research Part A: Policy and Practice---2014---Caroline Mullen,Miles Tight,Anthony Whiteing,Ann Jopson

Trials and dangers faced by pedestrians and cyclists have not only created an impression of undesirable conditions, but have promoted arguments of injustice and inequality. High rates of death and injury coupled with reporting of poor infrastructure and fear of the behaviour of other road users point to a plausible *prima facie* concern that pedestrians and cyclists suffer inequalities. Yet this appearance masks uncertainty about what factors are relevant in judging inequality and how these should be treated against potentially competing claims. This article develops a framework assessing conditions for walking and cycling accord-

ing to a theoretical conception of political and social equality, and so providing a basis on which to make arguments for change in transport policy, planning and law. In developing the framework we examine the relevance to equality of a range of factors, including measurement of road casualties, questions of responsibility to increase walking and cycling as means of contributing to pollution and carbon reduction, matters of fault and responsibility for road safety, and the economic impacts of improving conditions for walking and cycling.

Why do passengers choose a specific car of a metro train during the morning peak hours?

- Transportation Research Part A: Policy and Practice---2014---Hyunmi Kim,Sohee Kwon,Seung Kook Wu,Keemin Sohn

Crowding on metro trains is an important measure of passenger satisfaction and also provides a criterion for determining service frequency and the number of cars necessary for a train set. Particularly in metropolitan areas during morning peak hours, many studies have revealed a considerable difference in the crowding of specific cars on a single train. To accommodate the impact of this phenomenon in calculating metro capacity, a loading diversity factor has been adopted in many transportation studies. However, the underlying causes behind the uneven nature of carriage loading have rarely been examined in a systematic manner. In particular, there has been no trial to explain the nature of choice within a framework for individual passengers. Under the assumption that the uneven selection might stem from each passenger’s intrinsic preference for a specific car, the present study established a nested logit model to investigate the potential factors affecting the choice of a specific car on a train. Passengers were interviewed as they boarded from the platforms of line 7 of the Seoul Metro during the morning peak hours. Results show that the motivation to minimize the walking distance at destination stations turned out to be the most decisive in determining a passenger’s choice for a specific car of a train.

A process for designing policy packaging: Ideals and realities

- Transportation Research Part A: Policy and Practice---2014---Andreas Justen,Nils Fearnley,Moshe Givoni,James Macmillen

The article introduces a design process for policy packaging, combining a heuristic approach with a real world example of European policymaking. The policy packaging process is divided into six stages, starting with (1) the definition of goals and objectives, (2) the creation of an inventory of measures, (3) the formulation and assessment of the initial package, (4) the modification of the initial package through adding, adjusting or removing measures, (5) package implementation, and finally (6) the monitoring and evaluation of the package. The process stands as a generic, comprehensive framework developed as a means of guiding policy formulation and increasing the likelihood of efficient, effective and acceptable policy interventions. The approach is compared to practice, examining whether it can support policy formulation in relation to the EU 2011 White Paper on transport. It shows that several principles of the design process are already reflected by the White Paper, with some important differences also observed. While objectives, targets, and an inventory of measures are part of the White Paper, policies recommended for implementation are treated separately as discrete interventions. The White Paper hence lacks examples or recommendations as to how various measures might be combined in order to achieve the policy objectives. Based on a policy example from the White Paper, it is attempted to apply the heuristic framework and offer recommendations on how to best construct a policy package.

Assessment of policies and detection of unintended effects: Guiding principles for the consideration of methods and tools in policy-packaging

- Transportation Research Part A: Policy and Practice---2014---Andreas Justen,Jens Schippl,Barbara Lenz,Torsten Fleischer

Single policies or entire policy packages are often assessed using different methods aiming at a quantification of effects as well as the detection of undesired outcomes. The knowledge of potential impacts is essential to take informed policy actions. Hence, there is a constant need for efficient assessment approaches to support policy decision-making. A broad range of such assessment methods is used in policymaking. Some of them are using quantitative data; others are characterized by qualitative information, observations or opinions. Practical experiences with transport policy prove that these methods all have their pros and cons, but none of them are able to detect the full range of effects. This leads to important questions this article deals with, such as what are the strengths and limitations of the different tools and methods for assessing impacts, and how should different approaches be integrated into the policymaking processes?

Risk and irreversibility of transport interventions

- Transportation Research Part A: Policy and Practice---2014---Farideh Ramjerdi,Nils Fearnley

Infrastructure decisions and transport policies are often based on the notion that all decisions are made at one single point in time, based on full information and an accurate evaluation of the benefits and costs of different alternatives. The reality is very much different, especially in the transport sector, due to the complex and dynamic nature of the transport system and the interplay between the many sub-systems that comprise it. Inherent in such complexities are elements of uncertainty, risk, irreversibility, path dependency and lock-in effects.

Strategies to manage barriers in policy formation and implementation of road pricing packages

- Transportation Research Part A: Policy and Practice---2014---Claus Hede-gaard Sørensen,Karolina Isaksson,James Macmillen,Jonas kerman,Florian Kressler

In the transport policy domain, as in other highly-contested spheres of public policy, it is commonplace

for certain policy measures to emerge as promising only to then remain unimplemented. Road pricing is one example of a theoretically well-developed transport policy measure that has proven notoriously difficult to decide and implement. There are however lessons to learn from practice on how to manage barriers to policy formation and implementation also within this field. Drawing on the congestion charging schemes implemented in London in 2003 and Stockholm in 2006, and the Swiss Heavy Vehicle Fee scheme implemented in 2001, this paper identifies a selection of strategies which appear to have supported the policymakers' capacity to implement effective road pricing schemes. Together, these three examples offer a sound empirical basis from which to infer a set of strategies for the formulation and implementation of politically-contentious road pricing packages—addressing issues of measure combination, flexibility, legitimacy, communication, timing and organisational dynamics. While acknowledging the primacy of broader external and contextual issues, the conclusion is that taking inspiration from the strategies identified in this paper may increase the likelihood of successful policy package processes.

A virtual environment for the formulation of policy packages

- Transportation Research Part A: Policy and Practice---2014---Araz Taeihagh,René Bañares-Alcántara,Moshe Givoni

The interdependence and complexity of socio-technical systems and availability of a wide variety of policy measures to address policy problems make the process of policy formulation difficult. In order to formulate sustainable and efficient transport policies, development of new tools and techniques is necessary. One of the approaches gaining ground is policy packaging, which shifts focus from implementation of individual policy measures to implementation of combinations of measures with the aim of increasing efficiency and effectiveness of policy interventions by increasing synergies and reducing potential contradictions among policy measures. In this paper, we describe the development of a virtual environment for the exploration and analysis

of different configurations of policy measures in order to build policy packages. By developing systematic approaches it is possible to examine more alternatives at a greater depth, decrease the time required for the overall analysis, provide real-time assessment and feedback on the effect of changes in the configurations, and ultimately form more effective policies. The results from this research demonstrate the usefulness of computational approaches in addressing the complexity inherent in the formulation of policy packages. This new approach has been applied to the formulation of policies to advance sustainable transportation.

Influence of weather conditions on transit ridership: A statistical study using data from Smartcards

- Transportation Research Part A: Policy and Practice---2014---P. Arana,S. Cabezudo,M. Peñalba

This paper analyses the influence of meteorological conditions on the number of public bus trips made for leisure, shopping and personal business in Gipuzkoa, Spain. The ridership transit data employed were obtained from the data generated by a CAD/AVL system (Computer-aided dispatch/Automatic Vehicle Location) that simultaneously manages the data coming from all of the bus operators in the region. So, the study analyses the trips actually made by the entire population without resorting to sample data or aggregate behavioural studies, confirming as an added value of smart technologies their potentialities as a source of information. To determine the reasons for travelling, only journeys made on Saturdays and Sundays were studied for all weekends in 2010 and 2011. Multiple linear regression results showed that wind and rain could result in a decrease in the number of trips, while a temperature rise caused an increase in the number of trips, in agreement with the results of previous survey-based studies. Finally, both regular and occasional travellers were found to share this behavioural pattern.

For whom the tunnel be tolled: A four-factor model for explaining willingness-to-pay tolls

- Transportation Research Part A: Policy and Practice---2014---Yusuf, Juita-Elena (Wie),O'Connell, Lenahan,Khairul A. Anuar

This research examines citizen acceptance of tolls and road pricing, and specifically focuses on determinants of the individual's expressed willingness-to-pay tolls to use a tunnel express lane that would be free of traffic delays. We answer the research question "What factors influence citizens' willingness-to-pay tolls" by empirically estimating a four factor model of willingness-to-pay: (a) direct benefit to the respondent; (b) relative cost over time; (c) community concern; and (d) political and environmental liberalism. We use data about citizen perceptions from the Life in Hampton Roads Survey, a survey of residents of Hampton Roads, Virginia. We find that willingness-to-pay is primarily driven and motivated by self-interest, through a balancing of benefit to cost relative to individual income and frequency of use. In addition, concern for the community also contributes to willingness-to-pay tolls. The individual's perception of government's trustworthiness, a reflection of political and environmental beliefs, also influences the extent to which an individual is willing to pay tolls.

A rule-based approach for determining the plausible universe of electric vehicle buyers in the Lisbon Metropolitan Area

- Transportation Research Part A: Policy and Practice---2014---Mafalda Mendes Lopes,Filipe Moura,Luis M. Martinez

The electric vehicle (EV) presents many advantages when compared to the internal combustion engine vehicle (ICEV): lower lifecycle energy consumption, operating costs, air and noise emissions. Conversely, it also has disadvantages: high purchase price, reduced driving range and insufficient charging system (long charging time and low network coverage). Car purchase behaviour is a well-studied process where explanatory models estimate the discrete choice probability of each

alternative of the choice set based on car and consumers (socioeconomic) attributes.

The economics and engineering of bus stops: Spacing, design and congestion

- Transportation Research Part A: Policy and Practice---2014---Alejandro Tirachini

This paper re-considers the problem of choosing the number of bus stops along urban routes, first by estimating the probability of stopping in low demand markets, and second by analysing the interplay between bus stop size, bus running speed, spacing and congestion in high demand markets. A comprehensive review of the theory and practice on the location and spacing of bus stops is presented. Using empirical data from Sydney, Australia, we show that the widely used Poisson model overestimates the probability of stopping in an on-call bus stopping regime, and consequently underestimates the optimal number of bus stops that should be designed. For fixed-stop services, we show that bus running speed, frequency and dwell time are crucial to determining the relationship between bus stop spacing and demand, with bus stop congestion in the form of queuing delays playing a key role. In particular, we find that bus stop spacing should be decreased if demand increases at a constant bus running speed; however, if both bus running speed and the speed of the passenger boarding process increase, then the distance between bus stops should be kept long even at high demand levels, a result that is consistent with the implementation of Bus Rapid Transit (BRT) systems that feature high bus running speeds and long distances between stops relative to conventional bus services.

Visual characteristics of roads: A literature review of people's perception and Norwegian design practice

- Transportation Research Part A: Policy and Practice---2014---Christina Blumentrath,Mari Sundli Tveit

Several projects and measures have been developed to

enhance the design of public roads. Nevertheless, the critics of their design remain numerous. To further the discussion on road aesthetics, this paper makes suggestions for a more consistent terminology and presents a theoretical framework for assessing the visual quality of roads. Based on a literature review, twelve visual characteristics are identified: coherence, imageability, simplicity, visibility, maintenance, naturalness, integration, contrast, variety, aesthetics of flow, legibility and orientation. These characteristics are presented and described and where possible their theoretical and empirical backing is given. Only a few visual characteristics in road design have been subjected to empirical perception studies, so their importance for road users and residents remains unclear.

A new risk quantification approach in port facility security assessment

- Transportation Research Part A: Policy and Practice---2014---Zaili Yang, Adolf K.Y. Ng, Jin Wang

Terrorist attacks in the past decade had raised concern that terrorists capable of the suicide hijackings of airplanes could readily adapt such capabilities to maritime targets like ports. Although a large number of port security control measures have been proposed which have greatly enhanced security performance, the voice of requiring further justification on their effectiveness from various maritime stakeholders remains strong. Indeed, different ports around the world still have very diversified practices and standards regarding “secure” facilities, with a generally accepted assessment methodology found wanting. Despite the existence of previous research works, few have been done to address this issue, which clearly exposes a significant research gap. Understanding such deficiency, this paper introduces a novel fuzzy evidential reasoning approach to facilitate the quantitative analysis of port facility security assessment (PFSA). To achieve it, the major key security performance indicators (KSPIs) used by designated authorities in port facility security plan are identified; the current PFSA practices are reviewed with particular attention to the grades used by port operators when

assessing the KSPIs; and a fuzzy evidential reasoning approach is applied to quantify port facility security risks and to conduct the cost benefit analysis of the associated security control measures.

Relationship between freight accessibility and logistics employment in US counties

- Transportation Research Part A: Policy and Practice---2014---Frank P. van den Heuvel, Liliana Rivera, Karel H. van Donselaar, Ad de Jong, Yossi Sheffi, Peter de Langen, Jan C. Fransoo

This paper analyzes the relationship between freight accessibility and logistics employment in the US. It develops an accessibility measure relevant for logistics companies based on a gravity model. This allows for an analysis of the accessibility of US counties focusing on four different modes of transportation: road, rail, air, and maritime. Using a Partial Least Squares model, these four different freight accessibility measures are combined into two constructs, continental and intercontinental freight accessibility, and related to logistics employment. Results show that highly accessible counties attract more logistics employment than other counties. The analyses show that it is very important to control for the effect of the county population on both freight accessibility and logistics employment. While county population explains the most variation in the logistics employment per county, there is a significant relationship between freight accessibility and logistics employment, when controlling for this effect.

Residential satisfaction close to highways: The impact of accessibility, nuisances and highway adjustment projects

- Transportation Research Part A: Policy and Practice---2014---Marije Hamersma, Taede Tillema, Joseph Sussman, Jos Arts

In this paper we focus on gaining insight into the residential satisfaction of households near highways, based on survey data collected among 1225 respondents in the Netherlands living within 1000m from a highway. Ordinal regression was used to study the impact of highway

externalities on residential satisfaction. Moreover, we gained first insights into the reactions of people on highway adjustment projects, by studying people's expectations towards residential satisfaction as a consequence of the project with use of a multinomial logistic regression analysis.

Associations among household characteristics, vehicle characteristics and emissions failures: An application of targeted marketing data

- Transportation Research Part A: Policy and Practice---2014---Stefan Binder, Gregory S. Macfarlane, Laurie A. Garrow, Michel Bierlaire

Many U.S. cities use vehicle emissions testing programs to improve air quality by identifying gross polluting vehicles and requiring their owners to make emissions-related repairs. All vehicles that meet certain criteria must pass an emissions test as part of the vehicle registration process. States use different criteria to determine which vehicles must be tested; however, the equity impacts associated with various screening criteria are unknown. This is due to difficulties researchers have faced in linking vehicle and household characteristics. We investigate the relative influence of vehicle and household characteristics on emissions failures in Atlanta, Georgia, by linking its emissions testing database to a targeted marketing database; the latter contains information about vehicle owners. We use count and hurdle models to predict vehicle emissions failures. Our model finds a relationship between sociodemographic characteristics and emissions failures after controlling for vehicle characteristics; that is, given two identical vehicles, the one owned by a low-income or minority household is more likely to fail emissions. We use our model to investigate the impacts of different emissions testing policies by income and ethnic groups.

The influence of light rail transit on transit use: An exploration of station area residents along the Hiawatha line in Minneapolis

- Transportation Research Part A: Policy and Practice---2014---Cao, Xinyu (Jason), Jessica Schoner

Rail transit is often implemented in the corridors already with high transit demand. When evaluating its ridership benefits, previous studies often choose the city/county/region as control groups, rather than comparable corridors without rail, and hence overstate its impacts. In this study, we employ propensity score matching to explore the impact of Hiawatha light rail transit (LRT) on transit use. We find that compared to residents in similar urban corridors, the Hiawatha LRT promotes transit use of residents who have lived in the corridor before its opening, and that residents who moved to the corridor after its opening use transit as often as new residents in the comparable urban corridors without LRT. We conclude that besides LRT, land use and transportation policies are necessary for ridership growth.

Experiences from the Swedish Value of Time study

- Transportation Research Part A: Policy and Practice---2014---Maria Börjesson, Jonas Eliasson

We provide a synthesis of results and insights from the Swedish Value of Time study, with focus on what is relevant for transport appraisal and understanding travel behavior. We summarize recent econometric advances, and show how these enable a better understanding and identification of the value of time distribution. The influence of the sign and size of changes is estimated and discussed, including the problems of loss aversion and the value of small time savings. Further, we show how the value of time depends on trip and traveler characteristics, discuss in what dimensions the value of time should be differentiated in appraisal, and provide recommended values for use in applied transport appraisal.

An analysis of the dynamics of activity and travel needs in response to social network evolution and life-cycle events: A structural equation model

- Transportation Research Part A: Policy and Practice---2014---Fariya Sharmeen, Theo Arntze, Harry Timmermans

Several studies in transportation literature have shown that in the short-term social networks play an important role in discretionary activity and travel decisions of an individual. However, social networks may not remain unchanged in the long term, particularly in response to life-cycle events (for instance, an employment transition). A change in the social network in turn may have a repercussion on activity and travel behaviour, indicating that an investigation of the long term dynamics of social networks are relevant for understanding activity scheduling, or rescheduling behaviour. To this end, the paper advances the concept of social network dynamics in dynamic activity travel behaviour modelling. It explores the dynamics of social networks and life-cycle events, and their influence on activity and travel needs. Dynamics are assumed to be triggered by life-cycle events. For the purpose of the study an event-based retrospective survey was conducted in 2011 in the Netherlands. A structural equation model was developed to elicit activity and travel needs and their dependencies on life-cycle and social network dynamics. The estimated model takes history dependence of activity and travel needs into account. Results suggest that activity and travel dynamics are influenced by life-cycle and social network dynamics. Moreover social network and activity travel dynamics were found to be interdependent (i.e. a change in one leads to change in the other). Furthermore, the study results confirm the general assumption that travel needs are for the most part influenced by activity needs. The paper concludes that the theory and modelling framework of travel behaviour dynamics should take the dynamics of personal networks into account.

Policy implementation lessons from six road pricing cases

- Transportation Research Part A: Policy and Practice---2014---Diana Vonk Noordegraaf, Jan Anne Annema, Bert van Wee

The implementation of road pricing has been limited worldwide despite the notion that road pricing is generally considered to be a potentially effective measure to reduce externalities, in particular traffic congestion. By

means of a content analysis of 106 scientific papers, this paper aims to identify and compare the detailed set of implementation factors for the four implemented road pricing cases of Singapore, London, Stockholm and the Norwegian cities, and the two not implemented cases of Hong Kong and Edinburgh. Policy implementation lessons are formulated to aid local and national authorities considering the implementation of road pricing. In contrast to other studies, this paper identifies a broad set of implementation factors for each empirical case (an average of 36). The cases have six generic implementation factors in common, the most prominent being political and public support. However, the generic factors only account for on average 27% of all the implementation factors listed. Consequently, authorities aiming to implement road pricing also need to take many case specific factors into account in the implementation process. Furthermore, the six cases show that policy implementation will only be successful when many factors positively contribute to the process which explains why it is such a precarious endeavour.

Consumer mobility in the Scottish isles: The impact of internet adoption upon retail travel patterns

- Transportation Research Part A: Policy and Practice---2014---Eric Calderwood, Paul Freathy

While there have been numerous studies of on-line shopping behaviour, the impact of internet adoption upon island communities remains largely unexplored. This is despite the identified difficulties that are encountered when attempting to access goods and services in these peripheral economies. Limitations in the transport infrastructure, inconsistent supply and restricted availability have all been acknowledged as issues affecting local retail provision. Island residents have also traditionally been required to travel to the main town or mainland in order to shop for key items. This research study examines the extent to which on-line provision has reconfigured the mobility patterns of residents in the Scottish isles and whether e-commerce has reduced the propensity of individuals to undertake shopping related travel. The findings suggest that e-commerce has

had only a modest impact upon consumer travel patterns and that other situational factors moderate the identified benefits that accrue from purchasing on-line.

Access and the choice of transit technology

- Transportation Research Part A: Policy and Practice---2014---Karthik Sivakumaran,Yuwei Li,Michael Cassidy,Samer Madanat

An urban transit system can be made more cost-efficient by improving the access to it. Efforts in this vein often entail the provision of greater mobility, as when high-speed feeder buses are used to carry commuters to and from trunk-line stations. Other efforts have focused on the creation of more favorable land-use patterns, as occurs when households within a Transit-Oriented Development (TOD) are tightly clustered around trunk stations. The efficacy of these mobility and land-use solutions are separately examined in the present work. To this end, continuum approximation models are used to design idealized transit systems that minimize the generalized costs to both the users and the operators of those systems.

Logistics agglomeration in the US

- Transportation Research Part A: Policy and Practice---2014---Liliana Rivera,Yossi Sheffi,Roy Welsh

Governments around the world are investing significant resources in the development of logistics clusters. This paper develops a methodology for identifying them and applies it to answer several lingering questions in the context of the US. It contributes to a more general debate in the general industrial clusters literature: while many authors see industrial clusters growing, others see them dispersing. To answer this and related questions in the context of logistics clusters the paper first analyzes the prevalence of such clusters using a two-index methodology to identify clusters in the US. Evidence of increasing concentration of the logistics industry in clusters in the US over time is tested and documented. In addition, some evidence that logistics

activities in counties inside clusters show higher growth than counties outside clusters is found.

Classification of taxi khattee (jitney) lines based on topography and line cost indices

- Transportation Research Part A: Policy and Practice---2014---Ali Gholami,Yaser Taghizadeh,Zong Tian

Taxi khattee is a mode of transportation in Iran that is similar to jitney, which is very common in many developing countries. Jitney is obsolete and illegal in many developed countries. Some researchers show jitney is not an economical mode of urban transportation because of many harmful side effects. Even though this mode is not generally economical, there are some situations where it is a good option. Since people's transit habits have been formed along this mean of transportation for many years, the immediate elimination of this mode would not be possible. In this paper a methodology is provided to classify taxi khattee lines in order to substitute uneconomical lines with other modes. The methodology is based on topography and line cost indices. The case study of this research is in region one of Tehran, Iran. Results show taxi khattee is not economical on none of the present lines.

Crowding-in or crowding out: An empirical analysis on the effect of subsidies on individual willingness-to-pay for public transportation

- Transportation Research Part A: Policy and Practice---2014---Florian Drevs,Dieter K. Tscheulin,Jörg Lindenmeier,Simone Renner

Public transportation throughout the world is highly subsidized. User knowledge about public subsidies may affect their willingness to pay for public transport services and alter demand and related passenger fare revenues. This is especially relevant in view of the increasing availability of information about public subsidies. An empirical study reveals a crowding-in effect, on average, on WTP (willingness to pay) as a result of access to information about public subsidies that generates concerns of fairness. Crowding-out effects

also occur, caused by considerations of double financing and free-riding, although they are minor. Study results show that public transportation companies as well as financing institutions should highlight the existence of subsidies to produce crowding-in effects in the WTP for public transportation, to maximize public valuation (WTP) of public transportation. This should increase self-generated revenues of public transportation services.

The optimal shipment size and truck size choice – The allocation of trucks across hauls

- Transportation Research Part A: Policy and Practice---2014---Megersa Abate, Gerard de Jong

There has been a growing interest in understanding how firms allocate their trucks across hauls, and how this allocation changes under various economic environments. This study investigates how variations in route/haul, carrier and vehicle characteristics affect the optimal vehicle size choice and the associated choice of shipment size. We show that the two choices are derived from the same optimization problem. There can be a continuum of shipment sizes, but decision-makers in freight transport have to choose from a limited number of vehicle alternatives. Therefore, we use a discrete-continuous econometric model where shipment size is modeled as a continuous variable, and vehicle size/type choice as a discrete variable. The results indicate that when faced with higher demand, and during longer trips firms are more likely to use heavier vehicles and ship in larger quantities which suggest that firms are realizing economies of scale and economies of distance. The study also discusses the effect of vehicle operating cost on the vehicle selection process and its policy implications.

Charge up then charge out? Drivers' perceptions and experiences of electric vehicles in the UK

- Transportation Research Part A: Policy and Practice---2014---Louise Bunce, Margaret Harris, Mark Burgess

The UK government has made substantial investments in electric transport as a potential means of reducing CO2 emissions (DoECC, 2012). This paper investigates responses to recharging plug-in battery electric vehicles from the perspective of electric vehicle (EV) drivers. Drivers in the UK Ultra Low Carbon Vehicle trial (n=135, 29% female, M=47years) completed questionnaires and were interviewed to assess their attitudes and experiences before they obtained their EV and after driving the EV for 3months. The results demonstrated that drivers were positive about recharging – preferring it to ‘refuelling’ – and they became more relaxed over time about the frequency of recharging. Drivers managed without using a public charging infrastructure although such an infrastructure may be desirable to promote EV use. Finally, there was an interesting difference in drivers’ awareness of the environmental impact of driving and recharging an EV before and after the trial in relation to CO2 emissions and the energy cycle. The results are discussed in relation to the implications for developing the future EV market.

On sources of market power in the airline industry: Panel data evidence from the US airports

- Transportation Research Part A: Policy and Practice---2014---Volodymyr Bilotkach, Paulos Ashebir Lakew

A firm can obtain market power through its dominant position on the product market, or via control of a key resource. In particular, it has been argued that airport dominance is a more important source of market power in the US airline industry than route dominance. We examine this contention by analyzing a seventeen-year panel of airport-level prices in the United States. We demonstrate that even though on average airport-level concentration appears to be the strongest source of market power, concentration on routes originating at an airport is the strongest predictor of price levels for the sub-set of large and medium hub airports. There is little evidence that either airport or route dominance significantly affect prices in the

sub-sample of medium and small hub airports. There is also little evidence that an airport's dominant carrier exerts market power beyond the level predicted by the airport or route dominance. Our results imply that consumer welfare losses due to airline consolidation can be concentrated in smaller communities, and related to changes in airport-level concentration. We provide a simple evaluation of the possible effects of two recent and one projected mergers (Delta-Northwest, United-Continental, and American-US Airways) in light of this finding, and suggest that the former consolidation event can potentially lead to non-trivial consumer welfare losses to travelers in over 30 small communities.

Evaluating air carrier fuel efficiency in the US airline industry

- Transportation Research Part A: Policy and Practice---2014---Bo Zou,Matthew Elke,Mark Hansen,Nabin Kafle

We employ ratio-based, deterministic, and stochastic frontier approaches to investigate fuel efficiency among 15 large jet operators (mainline airlines) in the US. Given the hub-and-spoke routing structure and the consequent affiliation between mainline and regional carriers, we consider not only fuel efficiency of individual mainline airlines, but also the joint efficiency of each mainline and its regional subsidiaries, as well as efficiency in transporting passengers from their origins to destinations. We find that: (1) airline fuel consumption is highly correlated with, and largely explained by, the amount of revenue passenger miles and flight departures it produces; (2) depending on the methodology applied, average airline fuel efficiency for the year 2010 is 9–20% less than that of the most efficient carrier, while the least efficient carriers are 25–42% less efficient than the industry leaders; (3) regional carriers have two opposing effects on fuel efficiency of mainline airlines: higher fuel per revenue passenger mile but improved accessibility provision; (4) the net effect of routing circuitry on fuel efficiency is small; (5) potential cost savings from improved efficiency for mainline airlines can reach the magnitude of billion dollars in 2010.

Urban travel demand model with endogenous congestion

- Transportation Research Part A: Policy and Practice---2014---Marco Batarce,Marc Ivaldi

We formulate and estimate a structural model for travel demand in which users have heterogeneous preferences and make their transport decisions based on network congestion. A key component in the model is the infinite number of users in the network, all of whom have common knowledge about the distribution of preferences in the population. In this setting, the congestion level is endogenously determined in the equilibrium of a game with a continuum of players. For the estimate, we use the first-order conditions of the users' utility maximization problem to derive the likelihood function. For inference, we apply a two-step, semi-parametric method. Using data from Santiago, Chile, we show that the estimated parameters confirm the effect of congestion on individuals' preferences and that demand elasticities obtained by using our framework are consistent with results reported in the literature. We use the model to evaluate the effect on the welfare of increasing the cost of car trips and implementing a second-best fare schedule for bus transit. We also assess the welfare loss caused by congestion in Santiago.

Scenario-based CO2 emissions reduction potential and energy use in Republic of Korea's passenger vehicle fleet

- Transportation Research Part A: Policy and Practice---2014---Ahyun Ko,Cha-Lee Myung,Simssoo Park,Sangil Kwon

This study explores the carbon dioxide (CO2) emissions reduction potential of passenger vehicles in Republic of Korea, by assuming a number of CO2 reduction routes. Historical data pertaining to important factors affecting the CO2 emissions of passenger vehicles, such as the number of registered vehicles, annual mileage, and average CO2 emissions per vehicle, were analyzed to predict the extent by which these factors would change in 2020. The results show that the total CO2 emissions from passenger vehicles in 2015 would be

approximately 37.1Mton, assuming automobile manufacturers will meet the regulations for CO₂ emissions reductions for 2015. The CO₂ emissions reduction route is determined in accordance with a hypothetical regulation for CO₂ emissions reductions in 2020. If the CO₂ emissions rates of new passenger vehicles are reduced by 3–7% per year after complying with the 2015 regulation, then total CO₂ emissions and required energy would be approximately 36.5–38.6Mton and 12.9–13.6Mtoe, respectively. Also, if the current fuel economy competition persists until 2020, the CO₂ emissions reductions will follow the plausible reduction route and consequently reach 35.1Mton CO₂ and 12.4Mtoe energy in 2020. As a result, in order to reduce the total CO₂ emissions of passenger vehicles in 2020 (compared with 2015), the value of regulated CO₂ emissions in 2020 should be set to less than 103g/km per passenger vehicle.

Dynamic simulation modeling and policy analysis of an area-based congestion pricing scheme for a transportation socioeconomic system

- Transportation Research Part A: Policy and Practice---2014---Nasim S. Sabounchi, Konstantinos P. Triantis, Sudipta Sarangi, Shiyong Liu

This paper evaluates the impact of an area-based congestion pricing scheme in terms of its effectiveness on mitigating traffic congestion by using a system dynamics model. Unknown parameter values are calibrated using data available from the area-based pricing scheme implemented in the London metropolitan area. The key features of our model are that individual behavior is affected by the level of congestion, the cost of driving, and the supply/capacity and demand associated with metro transit. Perceptions of users are captured by three separate linguistic variables and fuzzy set theory is used to evaluate the combined effects of individual perceptions on the travel mode selection and the switching behavior between travel modes. As part of our analysis we explore three premises, i.e., that revenues generated from a congestion pricing scheme

can substantially improve alternative transportation modes, that the improvement of these modes can have a positive effect on the mitigation of traffic congestion, and that a congestion pricing scheme cannot effectively resolve congestion problems in short term due to the existence of material and information delays. We assess various policies and determine appropriate values for critical parameters to find the best results in terms of implementing the area-based pricing scheme.

Highway Accident Modeling and Forecasting in Winter

- Transportation Research Part A: Policy and Practice---2014---Akram Khaleghi Ghosheh Balagh, Farnoosh Naderkhani, Viliam Makis

Environmental attributes are critical risk factors that have proven to affect collision rates. Associated driving risks can be reduced by better maintenance of roadway infrastructure, enforcement of speed limits or other traffic laws. Given the preventive nature of these policies and regulations, accurate predictions of environmental attributes are needed. Currently, most of road safety prediction models are based on deterministic weather forecasts which are not able to capture changes in the likelihood of collision occurrence. As a result, probabilistic forecast is required to improve decision making, mainly in winter. In this paper, a stochastic approach to modeling highway collisions in winter time is considered which enables better assessment of driving conditions and a more accurate prediction. A logistic regression model with covariates is applied to crash data where environmental characteristics are modeled as a finite state space homogeneous multivariate discrete time Markov chain. After fitting the model, weather prediction as well as the conditional predictive probability distribution of collision occurrence are obtained. As the application, the ability of the proposed model to predict hourly environmental attributes and collision occurrence is examined using real highway crash data. The performance of the developed stochastic model is compared with several existing models in the literature using actual collision data. The results demonstrate that the proposed stochastic model

outperforms existing models and it accurately predicts collision occurrence in the presence of stochastically changeable winter weather conditions. As a result, the proposed probabilistic forecast model can be used as a valuable tool in a decision support system.

Attitudes towards the role of Cost–Benefit Analysis in the decision-making process for spatial-infrastructure projects: A Dutch case study

- Transportation Research Part A: Policy and Practice---2013---Niek Mouter, Jan Anne Anema, Bert van Wee

This paper provides a systematic overview of the attitudes of key actors in the Dutch Cost–Benefit Analysis (CBA) practice towards the role of CBA in the decision-making process for spatial-infrastructure projects. The main aim of this paper is to scrutinize the extent to which there is agreement among these Dutch actors in regard to the role of the CBA in the decision-making process. A secondary goal is to provide possible explanations for agreements and controversies among key actors in the Dutch CBA practice. In this study two research methods are combined to study the key actors' attitudes. Firstly, 86 key actors (e.g. consultants, scientists, policy makers) were interviewed in-depth. Secondly, 74 of them completed a written questionnaire. The most important conclusion of this paper is that in the Dutch CBA practice there is agreement that CBA must have a role in the appraisal process of spatial-infrastructure projects. However, there is a lot of controversy among economists and spatial planners in the Dutch CBA practice concerning the value that is and should be assigned to CBA in the decision-making process. Economists predominantly believe that not enough value is assigned to the CBA in the decision-making process, whereas spatial planners predominantly think that too much value is assigned to the CBA. Both economists and spatial planners believe that this controversy is problematic as it results in debates about the pros and cons of CBA instead of the pros and cons of the spatial-infrastructure projects. This paper analyzes some solutions for this controversy.

Travelers' preferences in multimodal networks: Design and results of a comprehensive series of choice experiments

- Transportation Research Part A: Policy and Practice---2013---Theo A. Arentze, Eric J.E. Molin

The modeling of individuals' choice behavior in integrated multimodal transport networks requires the estimation of preference parameters related to the trade-off between uni-modal trips and multimodal combinations of private and public modes as well as relevant attributes of access, main and access stages of the trip. The stated choice method is a well-established method to estimate travel choice models empirically. However, including all relevant elements in a single experiment will not only result in choice tasks that are too complex for respondents but will also lead to choice-sets that include options that are not feasible for a given trip distance. To overcome this problem, this paper develops an approach that involves the use of a series of SP experiments to estimate a single comprehensive multimodal travel choice model. In total, four experiments are designed focusing on particular multimodal (including Park-and-Ride options) and public-transport choices for trips of varying distance. A representative national sample (N=2746) of individuals from the Netherlands participated in the experiments through an online questionnaire. The data pooled across experiments are used to estimate the model in a scaled error-component-mixed multinomial logit framework. In this way, valuations of time, costs and service-quality attributes could be estimated on a relatively high level of detail concerning modes and trip stages. Comparisons with previous research indicate that the parameter estimates have reasonable values. The estimation results offer rich information on how travelers tradeoff between travel-time, travel-costs and service-quality attributes in travel choice in multimodal networks.

A modified model to curb fare evasion and enforce compliance: Empirical evidence and implications

- Transportation Research Part A: Policy and Practice---2013---Benedetto Barabino,Sara Salis,Bruno Useli

Fare evasion is a major problem for transit companies due to lost fare revenues and damage to their corporate images. Therefore, the establishment and proper management of ticket inspection teams deployed to tackle fare dodgers is highly important and represents a severe challenge. In this paper, an existent profit maximization model for estimating the optimum level of inspection has been extended, calibrated, and tested in a real case, using data available from an Italian transit operator, resulting from 98 days of checks and 3659 completed on-board interviews. Given the current network-wide inspection level per single verifier, and considering the level of fines currently applied, the optimal value of the total inspection rate is found to amount to 4.5%. The model provides empirical evidence towards understanding the fare evasion problem, besides highlighting the need for collaboration with the managers of the transit company. An overview of the manipulation of some control variables related to risk perception and the main implications of the findings are presented to transport companies using “honour” ticketing systems.

Illuminating the unseen in transit use: A framework for examining the effect of attitudes and perceptions on travel behavior

- Transportation Research Part A: Policy and Practice---2013---Steven Spears,Douglas Houston,Marlon Boarnet

This study develops the Perception-Intention-Adaptation (PIA) framework to examine the role of attitudes, perceptions, and norms in public transportation ridership. The PIA framework is then applied to understand the relative importance of socio-demographic, built environment, transit service, and socio-psychological factors on public transit

use for 279 residents of south Los Angeles, California, a predominately low-income, non-white neighborhood. Confirmatory factor analysis based on 21 survey items resulted in six transit-relevant socio-psychological factors which were used in regression models of two measures of transit use: the probability of using transit at least once in the 7-day observation period, and the mean number of daily transit trips. Our analysis indicates that two PIA constructs, attitudes toward public transportation and concerns about personal safety, significantly improved the model fit and were robust predictors of transit use, independent of built environment factors such as near-residence street network connectivity and transit service level. Results indicate the need for combined policy approaches to increasing transit use that not only enhance transit access, but also target attitudes about transit service and perceptions of crime on transit.

Drivers’ acceptance of delay time at different levels of service at signalised intersections

- Transportation Research Part A: Policy and Practice---2013---Rong-Chang Jou,Yi-Wen Chen

This study investigates the willingness of drivers, primarily motorcycle riders and car drivers, to accept delay time for different levels of service at signalised intersections. Videos of different levels of service were pre-recorded and presented to respondents in a survey. A contingent valuation method was employed to design scenarios corresponding to different levels of service. A spike model was subsequently employed to determine the acceptance of delay time. The results indicated a willingness to accept delay time ranging from 26 to 68s for motorcycle riders and from 34 to 81s for car drivers with different levels of service at signalised intersection. It is worth noting that the delay time is longer than that described in the Taiwan Highway Capacity Manual, thereby indicating that Taiwanese drivers are willing to accept longer delay time for different levels of service at signalised intersections.

Determinants of public support for transport taxes

- Transportation Research Part A: Policy and Practice---2013---Steffen Kallbekken,Jorge García,Kristine Korneliussen

We argue that different transport taxes can be described in terms of common attributes, establishing a basis for a more comprehensive model of public acceptance. The attributes are perceived effectiveness in reducing local air pollution and congestion, distributional effects, and impact on personal finances. We test a model of public acceptance, which emphasises the role of individual perceptions and expectations, across fuel taxes, road pricing and parking fees. Despite substantial variation in individual perceptions, and despite using three rather different taxes, our analysis reveals a high degree of consistency in the influence of specific attributes on public support for taxation.

Weather to travel to the beach

- Transportation Research Part A: Policy and Practice---2013---Muhammad Sabir,Jos van Ommeren,Piet Rietveld

Weather conditions have a strong effect on certain leisure destinations choices causing extreme road and parking congestion. An important question is then to what extent travelers react to these forms of congestion by switching to other travel modes. Using information from a national travel survey from 1996 till 2005, we analyze trips from the home to beach destinations in the Netherlands and examine the influence of weather on the probability of making beach trips by car. We take into account that the distance to the beach affects the decision to travel to the beach as well as the decision to travel by car. Our findings suggest that modal choice of beach travelers is sensitive to weather-induced congestion on roads to the beach. Our results imply that, conditional on making a beach trip, car use decreases by about 15% during higher temperatures inducing a 50% increase in train use. Furthermore, the distance elasticity of demand for beach trips is clearly negative and about -0.40, suggesting that the monetary value

of visiting a beach during the summer is in the order of €10–20. Appropriate pricing of parking near beaches is suggested as a solution to reduce congestion and cruising for parking externalities.

Economy-wide impact analysis of a carbon tax on international container shipping

- Transportation Research Part A: Policy and Practice---2013---Tsung-Chen Lee,Young-Tae Chang,Paul T.W. Lee

International shipping is a vital channel linking the world economy, particularly from the perspective of international commodity trade. The recently proposed carbon regulation in international shipping will not only affect the competitiveness of shipping lines, but will also have implications for the global economy. This paper adopts an energy–environmental version of the Global Trade Analysis Project referred to as GTAP-E to analyze the quantitative effects of a maritime carbon tax on the global economy by placing a special focus on containerizable commodities given their significant role in international trade. The major advantage of the GTAP-E model is that it can capture the effects of asymmetric changes in freight costs on different routes caused by the maritime carbon tax. Based on our numerical results, imposing a maritime carbon tax on international container shipping will not lead to a significant economic impact unless the tax level is high. China will suffer the greatest real GDP loss among all countries. Under a high level of global maritime carbon tax (\$90/tCO₂), the real GDP loss to China will be around 0.02%. The negative economic impacts on the European countries will be greater if a maritime carbon tax is imposed only on the European container exporting/importing routes, compared to the situation where a global maritime carbon tax is imposed on container shipping. Finally, the imposition of a maritime carbon tax will discourage distant container trade on the routes (origin–destination) “China–USA”, “Rest of Asia–USA”, and “South America–China”.

Developing a web-based accessibility calculator prototype for the Greater Montreal Area

- Transportation Research Part A: Policy and Practice---2013---Antonio Páez,Md. Moniruzzaman,Pierre-Leo Bourbonnais,Catherine Morency

A mixture of modes is considered a key element towards sustainable transportation. New technologies that provide information about various modes and environments can help to inform choices regarding travel and accessibility. In this paper we describe the development of a web-based accessibility calculator prototype for the Greater Montreal Area in Canada. The core of this tool is a statistical model of trip length developed using the spatial expansion method. The model is used to obtain estimates of trip length for a desired profile, based on attributes such as age, gender, family structure, and mode of travel, as well as geographical location. These estimates are used to calculate a cumulative opportunities accessibility measure to different types of essential destinations. Travel behavior information is drawn from Montreal's 2008 Household Travel Surveys. Geocoded information about trip origins and destinations is used to calculate trip length. A broad array of covariates related to individual and household attributes, and urban form are used. A geocoded business point database is used for the calculation of cumulative opportunities. To simplify the use of the accessibility calculator, the model is implemented in a user-friendly way using Google Maps API v3 and a convenient interface. Different possible uses of the accessibility calculator are illustrated in the paper. The accessibility calculator can be used by members of the public or planners/policy makers to measure the level of accessibility for a specific address and personal profile by various modes of transportation.

Economic and emissions impacts of renewable fuel goals for aviation in the US

- Transportation Research Part A: Policy and Practice---2013---Niven Winchester,Dominic McConnachie,Christoph Wollersheim,Ian A. Waitz

The US Federal Aviation Administration (FAA) has a goal that one billion gallons of renewable jet fuel is consumed by the US aviation industry each year from 2018. We examine the economic and emissions impacts of this goal using renewable fuel produced from a Hydroprocessed Esters and Fatty Acids (HEFA) process from renewable oils. Our approach employs an economy-wide model of economic activity and energy systems and a detailed partial equilibrium model of the aviation industry. If soybean oil is used as a feedstock, we find that meeting the aviation biofuel goal in 2020 will require an implicit subsidy from airlines to biofuel producers of \$2.69 per gallon of renewable jet fuel. If the aviation goal can be met by fuel from oilseed rotation crops grown on otherwise fallow land, the implicit subsidy is \$0.35 per gallon of renewable jet fuel. As commercial aviation biofuel consumption represents less than 2% of total fuel used by this industry, the goal has a small impact on the average price of jet fuel and carbon dioxide emissions. We also find that, under the pathways we examine, the cost per tonne of CO₂ abated due to aviation biofuels is between \$50 and \$400.

Analyzing scale independence in jobs-housing and commute efficiency metrics

- Transportation Research Part A: Policy and Practice---2013---Michael A. Niedzielski,Mark W. Horner,Ningchuan Xiao

Understanding journey to work travel patterns remains an important concern for planners and policy-makers from the viewpoint of economic, environmental, and social sustainability. Researchers, keen to inform metropolitan scale planning efforts, have devised ways of benchmarking regional commuting and land use phenomena. The foundation for these benchmarks rests on metrics that quantify the home-job proximity in terms of the aggregate arrangement of workers relative to jobs. Emanating from the literature on 'excess commuting' and 'jobs housing balance', these metrics are increasingly moving towards policy applications. Despite major methodological developments over the last decade, a key methodological issue remains unre-

solved. Recently developed metrics under this regional macro-scale framework use zonal-based spatial data (e.g. census tracts or traffic analysis zones (TAZs)) and consequently the values of the metrics may be influenced by the scale (e.g. zone size varies between census blocks versus tracts) and zonal partitioning scheme. Moreover it is not known if values of these metrics vary across scale, and exhibit self-similarity, meaning whether it is possible to infer values from one scale to another. This study examines the relationship between the commuting efficiency framework and spatial scale issues by implementing a suite of commuting metrics in the Boise, Idaho USA metropolitan area. Simulations using geographic information systems (GIS), optimization techniques and fractal analysis show that newer metrics developed post 2002 do not vary with scale, while those devised pre-2002 vary with scale but do so in a predictable way.

The effect of incentives and technology on the adoption of electric motorcycles: A stated choice experiment in Vietnam

- Transportation Research Part A: Policy and Practice---2013---Luke Jones, Christopher R. Cherry, Tuan A. Vu, Quang N. Nguyen

Many Asian cities are experiencing rapid growth in the ownership of personal gasoline-powered motorcycles, a shift away from relatively low-emitting modes of transportation that is contributing to deteriorated air quality. Electric two-wheelers have the potential for significant air pollution reductions as an alternative to gasoline-powered motorcycles; however, they have yet to penetrate many Asian markets. While previous research has examined the adoption of cleaner alternatives to gasoline-powered automobiles (e.g., hybrid electric cars), similar work on motorcycle alternatives is lacking. This study uses a stated preference survey of households in Hanoi, Vietnam to analyze adoption of electric two-wheelers, while focusing on the effects of economic incentives (e.g., differential sales taxes and fuel prices) and technological improvements (e.g., more efficient batteries). A choice model is estimated and market shares are calculated for scenarios involv-

ing different levels of electric two-wheeler technology, gasoline prices, and sales tax rates. Results indicate that technological improvements and economic incentives, particularly sales taxes, have significant effects on adoption.

Marginal costs of freeway traffic congestion with on-road pollution exposure externality

- Transportation Research Part A: Policy and Practice---2013---Alexander Y. Bigazzi, Miguel A. Figliozzi

The health cost of on-road air pollution exposure is a component of traffic marginal costs that has not previously been assessed. The main objective of this paper is to introduce on-road pollution exposure as an externality of traffic, particularly important during traffic congestion when on-road pollution exposure is highest. Marginal private and external cost equations are developed that include on-road pollution exposure in addition to time, fuel, and pollution emissions components. The marginal external cost of on-road exposure includes terms for the marginal vehicle's emissions, the increased emissions from all vehicles caused by additional congestion from the marginal vehicle, and the additional exposure duration for all travelers caused by additional congestion from the marginal vehicle. A sensitivity analysis shows that on-road pollution exposure can be a large portion (18%) of marginal social costs of traffic flow near freeway capacity, ranging from 4% to 38% with different exposure parameters. In an optimal pricing scenario, excluding the on-road exposure externality can lead to 6% residual welfare loss because of sub-optimal tolls. While regional pollution generates greater costs in uncongested conditions, on-road exposure comes to dominate health costs on congested freeways because of increased duration and intensity of exposure. The estimated marginal cost and benefit curves indicate a theoretical preference for price controls to address the externality problem. The inclusion of on-road exposure costs reduces the magnitudes of projects required to cover implementation costs for intelligent transportation system (ITS) improvements; the net benefits of road-pricing ITS sys-

tems are increased more than the net benefits of ITS traffic flow improvements. When considering distinct vehicle classes, inclusion of on-road exposure costs greatly increases heavy-duty vehicle marginal costs because of their higher emissions rates and greater roadway capacity utilization. Lastly, there are large uncertainties associated with the parameters utilized in the estimation of health outcomes that are a function of travel pollution intensity and duration. More research is needed to develop on-road exposure modeling tools that link repeated short-duration exposure and health outcomes.

Public financing of private freight rail infrastructure to reduce highway congestion: A case study of public policy and decision making in the United States

- Transportation Research Part A: Policy and Practice---2013---Gregory Rowangould

As goods movement continues to increase it is expected to outpace infrastructure capacity in the United States. Moving a larger share of goods by rail rather than truck is a potentially cost effective part of a solution. Freight rail not only offers a substitute for truck trips but is a cleaner, more energy efficient, and safer alternative. Recently a number of private freight rail projects have received public funding. The public funds are aimed at increasing freight rail capacity with the goal of diverting some goods currently moved by truck to rail. While the benefits of moving goods by rail are relatively clear, it is unclear if public decision makers can effectively identify strategic rail investments that will achieve their policy goals. This study critically examines the analytical methods, models, and data that are commonly used to support decisions to provide public funds for private freight rail projects. This is accomplished through a case study of California's Trade Corridors Improvement Fund program which provided \$680 million for 11 freight rail projects. The study's contributions include identifying critical analytical flaws and challenges affecting the benefit estimates that public funding decisions rely on. Improvements to current evaluation methods are also identified as are

regulatory reforms and policy interventions that may offer more effective and reliable outcomes.

Driving out of choices: An investigation of transport modality in a university sample

- Transportation Research Part A: Policy and Practice---2013---T.A. Lavery,A. Páez,P.S. Kanaroglou

Transportation systems around the world have been designed in a way that emphasizes the pre-eminence of motorized mobility, in particular the private car. This has led to the emergence of transportation monocultures, defined as systems where the ability of travelers to use various modes is constrained. In order to create transportation polycultures, alternative modes of transportation must be available and users must perceive them as feasible alternatives to the car. This implies changing the modality style (a predisposition towards certain modes) and increasing the modality (number of alternatives available and feasible for use) of travelers. The objective of this paper is to investigate the modality of respondents to a travel survey in McMaster University, Canada. We define modality as the self-reported number of modes that respondents consider available/feasible for their daily commute, including the chosen mode. Analysis is based on the application of an ordered probit model. The results of our study indicate that modality is influenced by a combination of demographic, attitudinal and spatial/land use variables. With respect to mode of travel, active travelers tend to have a higher modality compared to users of motorized modes. Car users who live in more densely built environments are more likely to report higher levels of modality, whereas density reduces the modality of users of local transit. Distance from McMaster reduces the modality of car and local transit users.

Has the Dutch news media acted as a policy actor in the road pricing policy debate?

- Transportation Research Part A: Policy and Practice---2013---Özgül Ardic,Jan Anne Anema,Bert van Wee

The media is seen as an important player in road pricing policy implementation processes. Yet, it is not clear whether the media is actually a policy actor, like politicians or interest groups, which pursues a particular policy positions. This paper empirically examines whether the Dutch news media was objective in its reporting of the Dutch road pricing policy debate (which took place between 1998 and 2010) or whether it acted as a policy actor through biased reporting. We applied Westerstahl's Objectivity Framework to the media coverage by five leading national newspapers. Our main conclusion is that the Dutch news media was not objective and acted as a policy actor in the Dutch road pricing policy debate. Although all the newspapers violated objectivity to the same degree, they clearly adopted different policy positions. One popular newspaper was negative and the other mixed whereas all three quality newspapers were positive with the exception of one which sometimes inclined to a mixed position. All newspapers generally maintained the same position over the relatively long period of the road pricing debate.

Single European Sky and Single European Railway Area: A system level analysis of air and rail transportation

- Transportation Research Part A: Policy and Practice---2013---Paola Pellegrini, Joaquin Rodriguez

Air and rail transportation systems are characterized by important common features: they serve a significant share of passenger traffic in Europe; their functioning relies on the cooperation of many stakeholders operating a fixed timetable, often with competing objectives; and they have been characterized by quite a fragmented development following national borders. For these systems, the European Commission envisages a common future in terms of an increase of efficiency and elimination of national borders. In this paper, we analyze the two systems in the perspective of their common development and we underline the main existing differences linked to the management of the infrastructure. These differences concern the processes implemented

for specifying and allocating capacity, both in strategic planning and in real-time intervention. Our analysis suggests that the air transportation system is moving in the direction indicated by the European Commission, as well as the rail transportation system for what concerns international train paths (typically high-speed trains). However, a substantial separation still exists between conventional rail transportation systems of different countries.

Competition on the tracks – Passengers' response to deregulation of interregional rail services

- Transportation Research Part A: Policy and Practice---2013---Oskar Fröidh, Camilla Byström

On the West Coast Line (WCL) in Sweden, de facto competition in interregional rail travel has been in effect since 2009. While the Öresund trains are subsidized by regional authorities, SJ runs interregional services on a commercial basis in parallel. How do passengers' valuations affect demand?

Proenvironmental travel behavior among office workers: A qualitative study of individual and organizational determinants

- Transportation Research Part A: Policy and Practice---2013---Siu Hing Lo, Gerard J.P. van Breukelen, Gjalt-Jorn Y. Peters, Gerjo Kok

An analysis of individual and organizational determinants of proenvironmental work-related travel behavior, and their interactions, is presented. Interviews and focus groups were conducted with office workers from four organizations in two Dutch provinces. Environmentally-relevant behavior related to commutes and business trips (i.e. travel frequency, travel mode, teleworking, and teleconferencing) was examined. Evidence from interorganizational comparisons suggests that organizational measures did not have uniform effects on employee behavior which was partially due to differences in attitude and personal income. The salience of social norms pertaining to work-related travel behavior also differed between organizations and

organizational subpopulations. Differences in attitudes between employees, however, did correspond to some extent to organizational culture or focus differences at the organizational level. Finally, the results underscore the possibility that similar outcomes at the behavioral level might be the result of different underlying dynamics.

Efficiency of speed limits in cities: A spatial computable general equilibrium assessment

- Transportation Research Part A: Policy and Practice---2013---Eric Nitzsche, Stefan Tscharktschew

Road traffic speed limits are suggested to be associated with, e.g., changes in travel times, vehicle operating costs, accidents, noise and emissions. In this paper we analyze the impacts of speed limit policies, i.e. restricting the maximum permissible road traffic speed, on an urban economy. While most existing studies do only focus on the effects of speed limits on frequency and severity of accidents, we provide a more general assessment of speed limit policies by employing a spatial computable general equilibrium model calibrated to an ‘average’ German metropolitan area. It is shown that besides transport related effects additional economic effects may influence the overall performance of speed limit policies significantly. Driven by spatial economic effects, tightening speed limits on all roads, i.e. setting a general urban speed limit of, e.g. 30km/h, lowers aggregate social welfare, although aggregate environmental and accident costs decline. However, setting speed limits around the city center only and not in suburban areas with access to beltways curtails negative effects on the urban economy and, in the end, may result in overall welfare gains. Therefore, our results suggest that implementing a general speed limit uniformly in the entire urban area, thus paying no attention to the spatial shape of the city and its road network, is likely to be an inadequate measure to enhance social welfare. However, restricting speed limits locally, thus focusing on the design of a ‘slow zone’, is essential and, in the end, is a more promising speed regulation policy having more likely the chance

to enhance social welfare.

The effects of decentralized capacity decisions for congested self-financed roads

- Transportation Research Part A: Policy and Practice---2013---Sofia Grahn-Voorneveld

This paper studies the differences between centralized and decentralized decisions for capacity and road user charges on a congested self-financed road with local, national and international traffic. Road user charges are allowed only to cover the costs for providing the road with a specific capacity, and to cover external costs caused by traffic. The road is either provided by the nation, or else this responsibility is decentralized to the community.

An improved pavement maintenance optimization methodology: Integrating LCA and LCCA

- Transportation Research Part A: Policy and Practice---2013---Bin Yu, Qing Lu, Jian Xu

Environmental damage cost (EDC) is traditionally ignored in the pavement cost evaluation. This study used a combined life cycle assessment–life cycle cost analysis (LCA–LCCA) model to optimize the pavement maintenance plans with the incorporation of EDC. The paper introduced a comprehensive LCA methodology in pavement field, estimated the marginal damage costs of various air pollutants, and developed an algorithm to link LCA model and LCCA model. A case study of three overlay systems, Portland cement concrete (PCC) overlay, hot mix asphalt (HMA) overlay, and crack, seal, and overlay (CSOL), was presented. The findings through the study include: the EDC occupies a significant portion of the overall costs; the developed LCA–LCCA model is effective in reducing both the energy consumption/greenhouse gas emission ranging from 8.2% to 12.3% and the overall costs ranging from 5.9% to 10.2% for the three overlay designs, respectively; it is reasonable to expect smaller environmental burdens and less overall costs for the PCC and CSOL

options as opposed to the HMA option although comparisons of the former two are indeterminate due to the great uncertainties in the usage module.

Time of day pricing and its multi-dimensional impacts: A stated preference analysis

- Transportation Research Part A: Policy and Practice---2013---José Holguín-Veras, Brandon Allen

Time of day pricing uses higher tolls in the peak-hours to induce passenger car traffic to consider a switch to more sustainable alternatives in terms of time of travel, mode, route, and payment method. In designing such programs, special attention must be paid to ensure that the drivers' behavioral responses to pricing are well understood. This is important because, if the analysts do not correctly predict users' reactions, policies and programs may fail to achieve their objectives. Knowledge of users' responses to pricing assists policy makers to design effective pricing programs.

Consumer valuation of changes in driving range: A meta-analysis

- Transportation Research Part A: Policy and Practice---2013---Alexandros Dimitropoulos, Piet Rietveld, Jos van Ommeren

We perform a meta-analysis of studies investigating consumer preferences for electric and other alternative fuel vehicles (AFVs) to provide insights into the way driving range is traded off for capital costs. We find that consumers are willing to pay, on average, between 66 and 75 US\$ for a 1-mile increase in driving range. *Ceteris paribus*, 100-mile-range cars have to be priced about 60% less than their conventional counterparts to become competitive. In line with intuition, but in contrast to most specifications employed in primary studies, we find that consumers' marginal willingness to pay (WTP) decreases at a diminishing rate with increases in driving range. The variation in the WTP and compensating variation estimates among examined studies can be attributed to differences in the levels of driving range considered, in other elements of the

study design and in the country of study. Our findings support stated preference literature's conclusion that short driving range has been a major limitation to the large-scale adoption of battery electric vehicles (BEVs) and other AFVs, and that technological developments permitting longer driving ranges will, to some extent, facilitate their market penetration. We further propose that consumer valuation of driving range should not be examined in isolation from other attributes related to refuelling activities, such as refuelling duration and the coverage of refuelling infrastructure.

Exploring the profession of mobility manager in Belgium and their impact on commuting

- Transportation Research Part A: Policy and Practice---2013---Laurent Van Malderen, Bart Jourquin, Claude Pecheux, Isabelle Thomas, Elien Van De Vijver, Thomas Vanoutrive, Ann Verhet-sel, Frank Witlox

This paper aims to explore the profession of mobility manager and to find out whether they achieve (or not) change in the commuting behaviours of employees. We firstly use data of a Belgian mobility survey that contains information about 4969 workplaces. Then, we use data of a face-to-face survey among 60 mobility managers. The results show that the mobility managers may have an important impact on both the Employer Transport Plan of her/his workplace and the commuting behaviour of employees. We also empirically show that her/his involvement in managing mobility is important. However, the face-to-face survey shows that the profession of mobility manager is still a part time function in Belgium and that they only have an advisory role in the decision taken by their workplaces. Therefore, one can conclude that the role of mobility managers is important, but not as important as other factors such as the support of the executive officers.

Transportation and income inequality in China: 1978–2007

- Transportation Research Part A: Policy and Practice---2013---Yan Li, Maria N. DaCosta

This paper mainly studies how various types of transportation modes are associated with income inequality in China for the years between 1978 and 2007. Gini coefficients are used to measure the income inequality nationwide, and within urban and rural areas of China. Factors other than transportation are also considered in the regression model, including a few demographic variables and major economic indicators. We contribute to the literature by examining the income redistributive effects of transport infrastructure and services, and providing transport planning and policy guidance which may alter the orientation of public policy and help alleviate the growing social and economic imbalance in China.

The impact of airline differentiation on marginal cost pricing at UK airports

- Transportation Research Part A: Policy and Practice---2013---Augusto Voltes-Dorta,Zheng Lei

Airport pricing is a central issue in international transport policies, which tend to support pricing schemes based on marginal operating costs. This paper aims to provide empirical evidence in support of increased differentiation in airport charges on the basis of marginal passenger costs being sensitive to the type of airline, i.e. full-service, low-cost, and charter. To that end, both long- and short-run multi-output cost functions are estimated over an unbalanced pool database of 29 UK airports observed between 1995 and 2009. The passenger output is hedonically-adjusted in order to introduce the desired level of disaggregation while also keeping a parsimonious specification. Results show that low-cost passengers impose significantly lower costs to airport infrastructure than those from either full-service or charter airlines. A full schedule of marginal and average incremental cost estimates for the combined passenger categories is provided for all sample airports. Taking into account the existence of returns to scale and economies of capacity, this provides a useful guide for optimal pricing of aeronautical infrastructure under either single- or dual-till regulations.

Curbside parking time limits

- Transportation Research Part A: Policy and Practice---2013---Richard Arnott,John Rowse

Previous work in the economic theory of parking has treated parkers as homogeneous. In almost all policy contexts, however, heterogeneity among individuals matters not only quantitatively but also qualitatively. For example, providing both tolled and untolled alternatives allows those with high values of time to pay largely with money and those with low values of time to pay only with time. This paper extends the authors' (2009) integrated model of parking and traffic congestion in an isotropic downtown in steady state to treat heterogeneity in the value of time and parking duration. It develops the theory, and then presents an extended numerical example that applies the theory to several policy scenarios. With homogeneous individuals, underpricing curbside parking leads to wasteful cruising for parking. With heterogeneous individuals, however, curbside time limits can be used to ration out those with longer parking durations, so that cruising for parking is eliminated. With curbside parking time limits, underpricing curbside parking downtown may be a sound policy response to the free parking provided by suburban shopping centers.

A novel method to monitor bicycling environments

- Transportation Research Part A: Policy and Practice---2013---Shinhye Joo,Cheol Oh

A bicycle is a promising human-powered and emission-free transportation mode to address growing transportation and environmental problems. Bike-friendly environments should be constructed to innovatively increase the use of bicycles as a significant transportation mode. From this perspective, the scientific and effective monitoring of bicycling environments is of keen interest. An important technical challenge for monitoring is to evaluate the performance of bicycling environments. This study proposes a novel monitoring method that can be used for evaluating bicycle performance in terms of safety and mobility. An instru-

mented probe bicycle (IPB), which is equipped with a set of sensors including a global positioning systems (GPS) receiver, accelerometer, and gyro sensor, was used to develop the proposed monitoring method. The IPB provides useful bicycle maneuvering data for identifying longitudinal, lateral, and vertical maneuverings of the bicycle, which are affected by environmental factors such as heavy vehicle volume, surface conditions, grade, crossings, humps, and curbs. Regarding safety monitoring, an index to predict bicyclist's perceived safety and comfort with the predictors derived from the measurements by the IPB was developed. A questionnaire survey was conducted to obtain actual responses from bicyclists for perceived safety and comfort during the field experiment. In addition, a method to evaluate the bicycle mobility using GPS speed data was devised. Then, a fault tree analysis (FTA) technique, which is a well-known technique for risk analysis, was adopted to integrate safety and mobility monitoring. As a result, the bicycling monitoring index (BMI) was proposed. Data derived from the proposed method is expected to be effectively used for promoting the bicycle use by supporting the development and evaluation of various bicycle-related policies.

Investigating European railway managers' perception of transaction costs at the train operation/infrastructure interface

- Transportation Research Part A: Policy and Practice---2013---Rico Merkert,Chris A. Nash

This paper discusses the effects of institutional organisation on the transactions and interactions between train operators and infrastructure managers in the three most liberalised rail systems in Europe, namely Britain, Germany and Sweden. The heart of the analysis is a major in-depth interview programme with 81 senior rail managers in 2008 followed by a survey of the same managers 4years later (2012/2013). Our results reveal how rail managers perceive their transactions in the real world as opposed to pure transaction cost theory. For both snapshots, co-ordination and contractual aspects particularly related to timetabling and real time operations are seen as more crucial than

the traditional investment hold up or lock in transaction cost economics issues. In all three systems good relationships are indicated as the most important contributor to making the system work. It does appear that having many of these issues resolved internally by members of a single group simplifies the transactions considerably. But there is a cost to this when competition is desirable, as it creates greater uncertainty and fear of discrimination on behalf of those train operators outside the group.

An empirical examination of the growing phenomenon of off-site residential car parking provision: The situation at UK airports

- Transportation Research Part A: Policy and Practice---2013---Lucy Budd,Stephen Ison,Thomas Budd

Parking management is a strategy that has been extensively employed by authorities and organisations world-wide in an attempt to address traffic-related congestion and associated environmental impacts at a variety of sites and scales. At airports, parking control and pricing regimes are used to generate revenue and manage traffic demand. On the supply side, within the last few years a new trend in unregulated off-site, predominately residential, car parking provision around UK airports has emerged and quickly grown in popularity. Through a survey of three UK-based self-styled 'parking marketplace' websites and an in-depth analysis of one, this paper provides an empirical examination of the growing phenomenon of off-site residential car parking provision around the UK's 25 busiest passenger airports and discusses the potential implications of this niche but growing phenomenon. Data is provided on the supply and the demand for these alternative spaces, as well as their physical location, attributes, and pricing regimes. The empirical findings indicate that, while this currently represents a relatively small proportion of overall airport parking supply it is experiencing rapid growth and may become significant in the future. The paper concludes by contending that airport operators and local authorities need to be cognisant of the existence of, and the chal-

allenges and opportunities associated with, alternative parking provision in order to be able to better plan for, and respond to the planning, environmental, and consumer implications it may create.

Setting public service obligations in low-demand air transportation networks: Application to the Azores

- Transportation Research Part A: Policy and Practice---2013---João Pedro Pita,António Pais Antunes,Cynthia Barnhart,António Menezes

The deregulation of air transportation was expected to have negative implications on regions with insufficient passenger demand to generate profits – regions where air transportation often plays a crucial role with respect to the mobility of people and goods, as well as to the development of tourism. Because of this, governments have decided to accompany the deregulation process with the adoption of subsidy schemes aimed at mitigating the anticipated consequences to low-demand regions. The subsidy scheme adopted in the European Union is known as the Public Service Obligations (PSO) system. In this paper, we propose a decision approach to assist governments (aviation authorities) in the setting of PSO standards consistent with the budget available to finance their implementation. The approach is based on an integrated flight scheduling and fleet assignment model to determine the air transportation network that minimizes the total social costs of satisfying a given origin/destination target demand. The usefulness of the approach is illustrated with an application to the network of the Azores, one of the main European networks fully operated according to the PSO system.

Commuter rail accessibility and house values: The case of the Montreal South Shore, Canada, 1992–2009

- Transportation Research Part A: Policy and Practice---2013---Jean Dubé,Marius Thériault,François Des Rosiers

While public transportation (PT) plays a crucial role

in the social and environmental dimensions, its impacts on the location rent remain poorly known. However, there is a strong connection between PT infrastructures and real estate markets since the former may generate externalities that can influence sales prices. This paper aims at estimating the actual effect of implementing a commuter train service between a major city (Montreal, Canada) and its southern periphery occurring in 2000–2003. Using a difference-in-differences (DID) estimator in the hedonic price model for single-family house sales between 1992 and 2009, the paper estimates the direct marginal price impact of a new commuter train service following changes in access to stations. Results suggest that the opening of a new commuter train service on the Montreal South Shore generates a location premium for houses located in the stations' vicinity (as measured through walking distance and car driving time) as opposed to houses that do not experience any improvement in accessibility to the commuter train service, either in space or in time. In addition, the new service raises property tax income for involved municipalities by several million dollars a year through enhanced property values.

Sustainable passenger transport: Back to Brundtland

- Transportation Research Part A: Policy and Practice---2013---Erling Holden,Kristin Linnerud,David Banister

We argue that there is no clear definition of the concept sustainable passenger transport to help guide politicians in solving challenges at the global or regional level. Rather, the use of the concept has to an increasing extent reflected socially desirable attributes of local- and project-level problems, but these ignore the global challenges the concept was meant to solve. Going back to the Brundtland Report, we redefine the concept of 'sustainable passenger transport' and suggest an assessment method based on four equally important, main dimensions: safeguarding long-term ecological sustainability, satisfying basic transport needs, and promoting intra- and intergenerational equity. We also define indicators and threshold values that have to be

met for each of these dimensions and then illustrate how to achieve sustainable passenger transport.

The role of ‘indirect’ greenhouse gas emissions in tourism: Assessing the hidden carbon impacts from a holiday package tour

- Transportation Research Part A: Policy and Practice---2013---Viachaslau Filimonau, Janet Dickinson, Derek Robbins, Maharaj Vijay Reddy

Tourism is a noticeable contributor to global greenhouse gas (GHG) emissions. Existing estimates of tourism’s carbon footprint are however incomplete as they fail to holistically assess the additional, ‘indirect’ carbon requirements. These arise from the non-use phases of a tourism product or service life cycle and can be further magnified by supply chain industries. Under-development of methods for carbon impact assessment in tourism is the primary reason for the omission of ‘indirect’ GHG emissions. This study develops a new approach for comprehensive appraisal of GHG emissions which incorporates and advances the methodological advantages of existing assessment techniques. It tests the applicability of this approach in tourism by conducting a holistic analysis of a standard holiday package to Portugal, based on the British tourism market. The new approach demonstrates the significance of the ‘indirect’ GHG emissions in the total carbon footprint from the holiday package, thus emphasising the necessity for more comprehensive future assessments.

An empirical investigation of the impact of behavioural and psychographic consumer characteristics on car preferences: An integrated model of car type choice

- Transportation Research Part A: Policy and Practice---2013---George Baltas, Charalampos Saridakis

Based on the data collected from a large-scale survey research of 1622 consumers, the present paper develops a disaggregate, compensatory choice model to collectively examine the impact of under-examined factors

on consumer car type choice behaviour. All existing econometric forecasting models of vehicle type choice in the literature have so far considered objective measures as determinants of vehicle type choice. The proposed choice model considers 12 car-type alternatives and is successively extended to allow for choice probability distortions resulting from individual heterogeneity across a set of 30 variables, related to objective, behavioural and psychographic consumer characteristics. The results provide clear evidence that variables such as purpose of car use, prepurchase information source used, consumer’s proneness towards buying an ecological car, consumer’s involvement with cars, and consumer’s attachment to cars, significantly affect car type choice. The results yield important implications for manufacturers, transportation planners and researchers.

Environmental performance and firm strategies in the dutch automotive sector

- Transportation Research Part A: Policy and Practice---2013---A. van der Vooren, F. Alkemade, M.P. Hekkert

This paper explores how automotive firms positioned their portfolio since the introduction of energy labels for cars. Using data on product characteristics of automobiles offered on the Dutch market over the period 2001–2010, we analyse how car manufacturers’ product portfolios have changed. Portfolio changes by the top 15 car manufacturers in the Netherlands are analysed. Though the analysis shows that manufacturers move in a similar direction towards a portfolio with cleaner vehicles, the different manufacturers have chosen very different portfolio management strategies. In particular the manufacturers that followed a portfolio strategy of relatively large propulsion efficiency improvements without large weight changes increased their sales numbers compared to other car manufacturers. Manufacturers lagging behind with CO₂ emission reduction performed weak in terms of sales.

The causal effect of commute time on labor supply: Evidence from a natural experiment involving substitute teachers

- Transportation Research Part A: Policy and Practice---2013---Seth Gershenson

The effect of commute time on labor supply is estimated in a unique labor market in which workers are subject to daily exogenous variation in commute time and are free to make daily labor supply decisions: substitute teaching. Data on both accepted and rejected job offers received by substitute teachers are used to estimate a sequential binary-choice model of job-offer acceptance decisions. The elasticity of the offer-acceptance probability with respect to commute time is found to be about 0.4. The aversion to commuting is about 36% larger on extremely cold mornings, but precipitation has essentially zero impact on commuting preferences. The effect of fuel price is of the expected sign, but imprecisely estimated. Women are particularly averse to commuting on cold mornings and are more sensitive to variation in fuel prices than men, but no statistically significant difference in the overall aversion to commuting is found between men and women.

Drivers' perception of LOSs at signalised intersections

- Transportation Research Part A: Policy and Practice---2013---Rong-Chang Jou, Cheng-Chen Kou, Yi-Wen Chen

This study considers driver perception to assess further the level of service (LOS) at signalised intersections. Motorcycle riders and car drivers are the main focus of this investigation. Videos of different LOSs were pre-recorded and later presented to the respondent in the survey. An ordered probit model was used to estimate the effects of important factors on the driver's perception toward different LOSs at a signalised intersection. The results obtained from the model demonstrate that trip-, socioeconomic-, road-related characteristics (e.g., pavement condition, geometric design, traffic control), and weather conditions are all significant variables influencing the driver's perception towards different

LOSs at a signalised intersection. Our results can provide a reference when planners and other authorities assess the LOSs at signalised intersections.

Do You Mind if I Plug-in My Car? How etiquette shapes PEV drivers' vehicle charging behavior

- Transportation Research Part A: Policy and Practice---2013---Nicolette Caperello, Kenneth S. Kurani, Jennifer Tyree Hageman

Plug-in electric vehicles (PEVs) engage drivers in an essential new behavior—plugging the car into the electrical grid to charge the vehicles' batteries. Broadly, it has been assumed that (1) away-from-home charging is necessary to grow the PEV market and (2) if away-from-home charging infrastructure is in place and PEV drivers know of it, they will perceive opportunities to charge. The experiences of early PEV drivers cause us to rethink at least the second of these assumptions. Drivers report a lack of what they call “etiquette,” i.e., rules to guide their behavior and their expectations of how they and other PEV drivers ought to behave in these new social interactions. PEV drivers want widely shared, understood, and practiced guidelines to feel comfortable and confident in charging their vehicles away from home. This study uses inductive thematic analysis of transcripts of interviews of 28 PEV driving households conducted in San Diego County, California in spring, 2012. Themes about etiquette emerged within two types of away from home charging. First, public chargers (available to any PEV driver) were the sites of situations in which drivers' perceived a lack of rules or conflicts between different systems of rules; both were described as inhibiting use of public chargers. Second, workplace charging (typically available only to employees of the entity where the charger is located) adds an additional layer of rules and possibly resources that may either inhibit or encourage PEV charging by employees. As PEV markets and charger networks grow, charging will be shaped by additional systems of rules and regulations, e.g., those governing financial transactions. Our results suggest that absent efforts to help PEV drivers develop, learn, and practice the new rules, they may create as much uncertainty as

guidance.

Incorporating the influence of latent modal preferences on travel mode choice behavior

- Transportation Research Part A: Policy and Practice---2013---Akshay Vij, André Carrel, Joan L. Walker

Latent modal preferences, or modality styles, are defined as behavioral predispositions characterized by a certain travel mode or set of travel modes that an individual habitually uses. They are reflective of higher-level orientations, or lifestyles, that are hypothesized to influence all dimensions of an individual's travel and activity behavior. The objectives of this paper are to understand and quantify different modality styles, and to show how the modality styles construct can be operationalized within the context of traditional models of travel mode choice. We employ the six-week MOBIDRIVE travel diary and estimate behavioral mixture models in which the modality style provides a behavioral rationale to the way in which unobserved heterogeneity is specified in the travel model. Our analysis consists of two stages: First, we explore the presence and types of modality styles suggested by the data through the means of a descriptive analysis. Next, we develop a model that captures the influence of modality styles on two dimensions of an individual's travel behavior: travel mode choice for work tours and travel mode choice for non-work tours. The modality styles are specified as latent classes; heterogeneity across modality styles include both the modes considered (choice set) and the values of taste parameters. The modality style of an individual then influences all of his/her travel mode choice decisions for work and non-work tours. In addition, error components capture unobserved correlation across travel mode choice decisions made by the same individual. Results indicate the presence of habitual drivers who display a strong bias for using the automobile and multimodal individuals who exhibit variation in their modal preferences. Multimodal behavior is further distinguished by those who appear to be sensitive to travel times and those who appear to be insensitive. Estimation

results further find that modality styles are strongly correlated with more long-term travel decisions and life-cycle characteristics.

How do transport infrastructure and policies affect house prices and rents? Evidence from Athens, Greece

- Transportation Research Part A: Policy and Practice---2013---D. Efthymiou, C. Antoniou

The interaction between land use and transportation infrastructure is a topic that has been extensively researched and continues to be of interest as new underlying economic, infrastructure and environmental conditions emerge. In this research, the direct and indirect effects of transportation infrastructure and policies on house prices and rents are studied. Since real estate transaction data are not available, a web-scraping tool was developed to parse house prices and attributes from publicly available resources. Econometric models of two categories were then estimated: (1) hedonic price models, based on Ordinary Least Squares (OLS) and (2) spatial econometric models, such as the spatial regression model (SAR), spatial error (SEM), Durbin (SDM) and autocorrelation (SAC) model and Geographically Weighted Regression (GWR), which are increasingly used by econometricians in order to capture the effect of the – usually unobserved – spatial factors on house valuation.

Posted speed limit: To include or not to include in operating speed models

- Transportation Research Part A: Policy and Practice---2013---Scott C. Himes, Eric T. Donnell, Richard J. Porter

Models of motorized vehicle operating speeds are used to assess the design consistency of planned or existing highway alignments or to quantify the potential speed outcomes of a design or traffic control decision. These models generally estimate the mean or 85th-percentile speed of free-flow vehicles as a function of the geometric design elements, traffic control, or other features present along the roadway. Models for measures of

speed dispersion (e.g., standard deviation of speed) have been considered in more recent research. There are differing viewpoints concerning the inclusion of the posted speed limit as an independent variable in operating speed models. Some have excluded posted speed limit from operating speed prediction models, indicating that it was highly correlated with the geometric design elements also included as independent variables in the model. The other viewpoint is that the posted speed limit logically influences operating speeds, and should therefore be included in speed prediction models. This paper explores this issue using an econometric modeling approach, considering irrelevant variables, multicollinearity, omitted variable bias, and endogeneity bias. The results suggest that the posted speed limit should be treated as an exogenous variable in models of operating speed, including models of speed magnitude and speed dispersion.

Accuracy of congestion pricing forecasts

- Transportation Research Part A: Policy and Practice---2013---Jonas Eliasson,Maria Börjesson,Dirk van Amelsfort,Karin Brundell-Freij,Leonid Engelson

This paper compares forecast effects of the Stockholm congestion charges with actual outcomes. The most important concerns during the design of the congestion charging scheme were the traffic reduction in bottlenecks, the increase in public transport ridership, the decrease of vehicle kilometres in the city centre, and potential traffic effects on circumferential roads. Comparisons of forecasts and actual outcomes show that the transport model predicted all of these factors well enough to allow planners to draw correct conclusions regarding the design and preparations for the scheme. The one major shortcoming was that the static assignment network model was unable to predict the substantial reductions of queuing times. We conclude that the transport model worked well enough to be useful as decision support, performing considerably better than unaided “experts’ judgments”, but that results must be interpreted taking the model’s limitations into account. The positive experiences

from the Stockholm congestion charges hence seem to be transferable to other cities in the sense that if a charging system is forecast to have beneficial effects on congestion, then this is most likely true.

Accessibility evaluations of feeder transit services

- Transportation Research Part A: Policy and Practice---2013---Shailesh Chandra,Muhammad Ehsanul Bari,Prem Chand Devarasetty,Sharada Vadali

Transit systems play a vital role in the economic development of a region by providing commuters access to industry hubs and centers. The first/last mile transport connectivity to/from a major transit line further extends the opportunities of access to an increased number of industrial hubs and places of interest to an increased number of commuters from a remote community. This paper analyses the accessibility impacts for first/last mile transport connectivity to/from the major transit line using two most common feeder transit services – fixed route transit (FRT) and demand responsive transit (DRT). Analytical results show that for impedance decay factor (β) values equal to 1, the potential accessibility is a monotonically increasing function with respect to number of fixed stops visited by the FRT shuttle and number of passenger demands served by the DRT. The value of β greater than 1 results in maximizing the potential accessibility at an optimal number of fixed stops for FRT and an optimal number of passenger demand being served in a cycle for DRT. However, with a fractional value for β , there is no maximum or minimum potential accessibility that can be obtained either for the FRT or the DRT. Further, we illustrate the effects of impedance decay factor on accessibility using sensitivity analysis for the FRT and using simulations with real feeder like services operating in Denver, Colorado for the DRT. The handy formulas and equations developed in this paper can be extremely useful to transit planners and policy-makers in quickly deciding on an optimal feeder service operating policy for maximizing accessibility to/from a major transit line stop.

Road safety forecasting and ex-ante evaluation of policy in the Netherlands

- Transportation Research Part A: Policy and Practice---2013---Wendy Weijermars,Paul Wese-mann

Road safety forecasting and ex-ante evaluation of road safety policy are useful tools in policy making. This paper illustrates the use of these instruments in policy making in the Netherlands. As part of an interim evaluation of achieving Dutch road safety targets, the numbers of fatalities and serious road injuries were estimated for 2020. From these forecasts, it was concluded that the target for serious road injuries most probably would not be met without additional policy measures. Therefore, the Minister of Infrastructure and the Environment in the Netherlands decided to take additional measures. From an ex-ante evaluation of these measures, it was concluded that also with these additional measures the target for the number of serious road injuries in 2020 will most probably not be met.

Distribution models for start-up lost time and effective departure flow rate

- Transportation Research Part A: Policy and Practice---2013---Jiyuan Tan,Li Li,Zhiheng Li,Yi Zhang

Due to its importance, lots of investigations had been carried out in the last four decades to study the relationship between phase duration and vehicle departure amount. In this paper, we aim to build appropriate distribution models for start-up lost time and effective departure flow rate, by considering their relations with the frequently mentioned departure headway distributions. The motivation behind is that distribution models could provide richer information than the conventional mean value models and thus better serve the need of traffic simulation and signal timing planning. To reach this goal, we first check empirical data collected in Beijing, China. Tests show that the departure headways at each position in a discharging queue are very weakly dependent or almost independent. Based

on this new finding, two distribution models are proposed for start-up lost time and effective flow rate, respectively. We also examine the dependences of departure headways that are generated by three popular traffic simulation software: VISSIM, PARAMICS and TransModeler. Results suggest that in VISSIM, the departure headways at different positions are almost deterministically dependent and may not be in accordance with empirical observations. Finally, we discuss how the dependence of departure headways may influence traffic simulation and signal timing planning.

Commuting trade-offs and distance reduction in two-worker households

- Transportation Research Part A: Policy and Practice---2013---Julien Surprenant-Legault,Zachary Patterson,Ahmed M. El-Geneidy

Two-worker households have received a great deal of attention in the academic literature pertaining to transportation and land use planning. Two-worker households are likely to play an increasingly important role in determining future transportation demand but their expected impact has been subject to debate. This research uses a novel approach to quantify the degree to which partner commute distance affects individual commute distance. It quantifies the degree to which partners adjust their behavior to reduce total commute distance. It also provides empirical evidence that two-worker households do indeed adjust their residence workplace configuration to reduce commute distance. It does so through the use of an adaptation of common approaches to analyzing commute distance (modeling total as well as individual commute distances) with innovative variables inspired by the literature on household location and tenure. Findings from this study reconfirm the empirical research suggesting that members of two-worker households travel the same or less than one-worker households. They also confirm that partner commute distance has a positive impact on individual commute distance, suggesting partner commute distance is complementary. At the same time, it is shown that this does not imply that partner's do not trade-off commute distance, rather two-worker

households apply strategies to decrease their total commuting distance. This research could help policy makers in better understanding the commuting patterns of two-worker households to help in adapting land use and transportation policies that can address the needs of this growing population group.

Does competitive tendering improve customer satisfaction with public transport? A case study for the Netherlands

- Transportation Research Part A: Policy and Practice---2013---Arnoud Mouwen,Piet Rietveld

During 10years experience with competitive tendering of regional and local public transport in the Netherlands, national average trip satisfaction of passengers increased from 6.84 to 7.25 (+0.41). This is a remarkable improvement, but a closer look at the data reveals that also in regions without competitive tendering the improvement in satisfaction was substantial. The difference in the improvement for regions with and without tendering is only +0.06. Tendering led in the majority of concession areas to an improvement of average trip satisfaction, but in some 40% of the cases a deterioration was observed. A change of operator in general has a negative impact on satisfaction. We also find that the effect on satisfaction of early tendering is larger than of later tendering. This may well be the consequence of a shift in emphasis of authorities and operators from quality improvement to efficiency improvements. The model building and analysis is based on the comparison per year-pair of regions tendered versus regions non-tendered (in that specific year-pair). So we compare the effects on satisfaction of tendered regions relative to non-tendered regions.

Insights on disruptions as opportunities for transport policy change

- Transportation Research Part A: Policy and Practice---2013---Greg Marsden,Iain Docherty

Policy change is characterised as being slow and incremental over long time periods. In discussing a radical

shift to a low carbon economy, many researchers identify a need for a more significant and rapid change to transport policy and travel patterns. However, it is not clear what is meant by rapid policy change and what conditions might be needed to support its delivery.

The milk run revisited: A load factor paradox with economic and environmental implications for urban freight transport

- Transportation Research Part A: Policy and Practice---2013---Niklas Arvidsson

Research has shown that time access restrictions in city centers might increase social sustainability aspects such as livability or safety, but might also increase the number of vehicles and the total distance travelled; which have negative environmental impact and can decrease economic sustainability. In this paper we see that this negative effect could also be the result of other access restrictions, like load factor restrictions, and may be related to factors other than the number of vehicles and total distance travelled. Such as if the distribution center is in the outskirts of the city and customers are situated outside the city center. In this study a common urban distribution network scenario is presented – the milk run – where only the load factor is changed. Increasing the load factor is usually regarded as a way of improving efficiency, but we observe that under certain conditions improving the load factor affects economic and environmental sustainability, by increasing total costs and emissions. Following insights from this study, policy makers and companies should be careful when using single key performance indicators in urban freight distribution.

Evaluating the impacts of a new transit system on commuting mode choice using a GEV model estimated to revealed preference data: A case study of the VIVA system in York Region, Ontario

- Transportation Research Part A: Policy and Practice---2013---David Forsey,Khandker Nurul Habib,Eric J. Miller,Amer Shalaby

The Regional Municipality of York, north of the City of

Toronto, introduced a new bus service known as VIVA in 2005. This distinctly branded system operates primarily in two highly-travelled corridors and features high operating speeds, offline fare payment, advanced traveller information systems, and other ITS technologies. Although this new service has been deemed a success by many, it remains to be seen to what degree local work and post-secondary school transit use was affected by its introduction. To evaluate this, home-based work and post-secondary school trip mode choice models are estimated by using the datasets collected after the opening of the service. These models are then used to evaluate the impacts of the system on commuting mode choice preferences by using an additional dataset collected before opening the service. A GEV model is used to capture heterogeneity reflected in the RP datasets. The paper shows how modelling can be used to assess how level of service variables (e.g. travel times) can explain the impacts of new transit service. Empirical models reveal that the introduction of VIVA impacted the mode choice preference structure in the study area for work and post-secondary school trips. Also, it is shown that the improvements in transit service had greater impacts on transit mode share than the impacts of increasing traffic congestion. It is also posited that VIVA attributes such as improved branding, advertising, and communications may have caused this change in preferences.

Modelling departure time choices by a Heteroskedastic Generalized Logit (Het-GenL) model: An investigation on home-based commuting trips in the Greater Toronto and Hamilton Area (GTHA)

- Transportation Research Part A: Policy and Practice---2013---Ana Sasic,Khandker Nurul Habib

The paper presents an econometric model for departure time choice modelling. The proposed model is a discrete choice model with latent choice sets. As per the formulation of the mode, the model falls in the general category of Generalized Extreme Value (GEV) models with choice set formation, which is also

known as a Generalized Logit (GenL) model. However, the proposed modelling framework uses a scale parameterization approach to capture heteroskedasticity in departure time choices. Hence, the model presented in the paper is a Heteroskedastic Generalized Logit (Het-GenL) model in general or specifically a heteroskedastic Paired Combinatorial Logit Model (Het-PCL). Empirical models are developed for the departure time choices for home-based commuting trips in the Greater Toronto and Hamilton Area (GTHA). The datasets from the Transportation Tomorrow Survey, a 5 percent household based trip diary survey conducted in 2006 is used for empirical model estimation. Separate models are estimated for private car and transit users' departure time choices. It becomes evident that transportation level-of-service attributes enter into the systematic utility function as well as the scale parameter function with significant coefficients. The proposed econometric approach captures the normalization effect of different variables in terms of simultaneously influencing systematic utility as well as the scale parameter and thereby correctly explains the elasticity of corresponding variables.

The business relationships between LCCs and airports in Southeast Asia: Influences of power imbalance and mutual dependence

- Transportation Research Part A: Policy and Practice---2013---Eliver Lin,Barry Mak,Kevin Wong

This research examines how LCCs and airports develop their business relationships and the influences of power imbalance and mutual dependence on their interactions, as well as their relationship outcomes. Multiple case studies method was adopted in this research. Four LCC-airport relationships in four extreme scenarios of power imbalance and mutual dependence were studied. The findings suggest that LCC-airport relationships tend to establish with institutional approach when the capacity of the airport is nearly saturated. In contrast, they establish the relationships with negotiation approach when the capacity of the airport is underutilized. The power differences determine the equality

or inequality of exchange of compromise and support between the LCC and the airport; the dependence determines their willingness to compromise, provide support to each other, and also the strength of their attachment; the mutual dependence determines the total strength of the attachment of both parties, hence the solidity of their relationships.

A multi-dimensional framework for evaluating the transit service performance

- Transportation Research Part A: Policy and Practice---2013---Mohammad Nurul Hassan, Yaser E. Hawas, Kamran Ahmed

This paper presents a multi-level framework to measure public transit service performance. This framework uses a combination of subjective and objective measures to assess the service quality. It allows for the opinions of the various stakeholders of public transit services (users, operators, and service providers) to be incorporated in a multi-criteria evaluation process. The framework can evaluate the public transit service performance at different levels of details (system level and route level). It can be used to assess the performance at the route level, which can then be used to provide specific recommendations to enhance the operation for specific routes, and also it can be used at a more macroscopic level to identify the operational deficiencies or areas of improvement at the system level. The route analysis level is based on a multi-criteria evaluation procedure that involves weighted scoring techniques. A case study on a transit system of 12 operating routes in Abu Dhabi city is conducted to illustrate the framework.

Public policy implications of harmonizing engineering technology with socio-economic modeling: Application to transportation infrastructure management

- Transportation Research Part A: Policy and Practice---2013---E. Andrijcic, Y.Y. Haimes, T. Beatley

The persistent infrastructure underinvestment coupled with a significant growth in commercial and non-

commercial transportation demand has rendered the US transportation infrastructure unprepared for current and future demands. A significant improvement in the condition of the US transportation infrastructure must be grounded on a more sustainable and proactive approach to address the existing gap between short-term commitments and long-term needs. This paper demonstrates in quantitative terms the value of long-term investments to overcome the historical impediments to infrastructure rehabilitation, including the need for a proactive political structure that compensates for the apparent lack of public accountability, and for the poor understanding of the socio-economic effects caused by transportation infrastructure failures. Such a process could avoid impending catastrophes. This paper presents a modeling paradigm that accounts for multiple stakeholder perspectives and relates the formulation of public policy to a long-term horizon through the modeling of the transportation infrastructure as a system of systems. The methodology enables involved stakeholders and decision makers to visualize their shared interests and to promote coordinated individual decisions in order to achieve a more acceptable level of the overall system of systems objectives. To illustrate the relevance of the proposed modeling approach, we apply it to a bridge maintenance problem and we discuss the synthesis of existing engineering practice with socio-economic factors that aids in streamlining long-term infrastructure goals with immediate short-term needs. The insights obtained from the proposed system of systems methodological approach point to the need to adopt a more forward-looking and collaborative public policy for infrastructure maintenance.

Do fewer people mean fewer cars? Population decline and car ownership in Germany

- Transportation Research Part A: Policy and Practice---2013---Nolan Ritter, Colin Vance

Drawing on household data from Germany, this study econometrically analyzes the determinants of automobile ownership, focusing specifically on the extent to which decreases in family size translate into changes in the number of cars at the national level. Beyond

modeling several variables over which policy makers have direct leverage, including the proximity of public transit, fuel prices and land use density, the analysis uses the estimated coefficients from a multinomial logit model to simulate car ownership rates under alternative scenarios pertaining to demographic change and other socio-economic variables. Our baseline scenario predicts continued increases in the number of cars despite decreases in population, a trend that is attributed to continued increases in household income.

A novel agent-based transportation model of a university campus with application to quantifying the environmental cost of parking search

- Transportation Research Part A: Policy and Practice---2013---Liya Guo,Shan Huang,Adel W. Sadek

This paper develops a novel agent-based transportation model of a university campus, primarily focusing on vehicle-related travel and the associated parking search process. In developing and validating the model, the study uses a wide range of data sources including: (1) a brief “trip-diary” type survey; (2) 24-h traffic counts at the entry and exit points to the campus; (3) information about the university buildings’ class room capacities and class schedules; (4) parking occupancy surveys; and (5) select intersections’ turn movement counts. The agent-based model is designed to explicitly capture trip chaining behavior, and the often-overlooked phenomenon of drivers searching for an available parking spot. The parking search process is modeled using a sequential game-theoretic, neo-additive capacity model which accounts for drivers optimistic and pessimistic attitudes regarding parking availability in their most desirable lot. The agent-based demand model is then integrated with the Transportation Analysis and Simulation System (TRANSIMS), which serves as the traffic micro-simulation engine, and with the MOVES2010 emissions model. Following the validation of the integrated model, it is used to quantify the environmental cost of the parking search process on campus. The study may be regarded as one of the few studies to integrate an agent- or activity based model

of travel demand, albeit admittedly simplified, with a fine-grained transportation network, a detailed traffic micro-simulation, and a project-level emissions model. Another contribution of the study is in terms of quantifying the environmental cost, in terms of wasted fuel and increased emissions, associated with the parking search process on campus.

Swedish municipalities and public participation in the traffic planning process – Where do we stand?

- Transportation Research Part A: Policy and Practice---2013---Charlotte Wahl

In this paper public participation in Swedish municipal traffic planning is studied with the focus onto what extent and how municipalities and consultants interact with participants in traffic-planning processes. Telephone interviews with planners were performed and planners’ insight and knowledge of participation methods are analysed in order to give an indication of which prerequisites seem to determine potential involvement of users. The results imply that recurring user involvement is rare in the municipalities studied and that the planner’ s attitude towards participation seems to be a determining factor, aside from resources like time and money. There seems to be good general knowledge of user involvement among the interviewed planners, but the level of understanding of methodological issues is considerably higher in municipalities where interaction is a recurring part of the planning. The results in this study imply that it might be relevant to balance which level of involvement is the most desired against what is possible in terms of resources and competence.

How wide should be the adjacent area to an urban motorway to prevent potential health impacts from traffic emissions?

- Transportation Research Part A: Policy and Practice---2013---N. Barros,T. Fontes,M.P. Silva,M.C. Manso

In recent years, several studies show that people who

live, work or attend school near the main roadways have an increased incidence and severity of health problems that may be related with traffic emissions of air pollutants. The concentrations of near-road atmospheric pollutants vary depending on traffic patterns, environmental conditions, topography and the presence of roadside structures. In this study, the vertical and horizontal variation of nitrogen dioxide (NO₂) and benzene (C₆H₆) concentration along a major city ring motorway were analysed. The main goal of this study is to try to establish a distance from this urban motorway considered “safe” concerning the air pollutants human health limit values and to study the influence of the different forcing factors of the near road air pollutants transport and dispersion. Statistic significant differences ($p=0.001$, Kruskal–Wallis test) were observed between sub-domains for NO₂ representing different conditions of traffic emission and pollutants dispersion, but not for C₆H₆ ($p=0.335$). Results also suggest significant lower concentrations recorded at 100m away from roadway than at the roadside for all campaigns ($p<0.016$ (NO₂) and $p<0.036$ (C₆H₆), Mann–Whitney test). In order to have a “safe” life in homes located near motorways, the outdoor concentrations of NO₂ must not exceed 44–60.0 $\mu\text{g m}^{-3}$ and C₆H₆ must not exceed 1.4–3.3 $\mu\text{g m}^{-3}$. However, at 100m away from roadway, 81.8% of NO₂ receptors exceed the annual limit value of human health protection (40 $\mu\text{g m}^{-3}$) and at the roadside this value goes up to 95.5%. These findings suggest that the safe distance to an urban motorway roadside should be more at least 100m. This distance should be further studied before being used as a reference to develop articulated urban mobility and planning policies.

Statistical assessment and analyses of the determinants of transportation sector gasoline demand in Jordan

- Transportation Research Part A: Policy and Practice---2013---Ahmed Al-Ghandoor, Jamal Jaber, Ismael Al-Hinti, Yousef Abdallat

The main objectives of this study are to analyze past gasoline consumption in Jordan’ s transportation sec-

tor and to identify main factors affecting its future demand. The sector is responsible for 39% of the total final energy consumption in Jordan, and is nearly totally dependent on oil consumption. The structure of this sector is analyzed with focus on passenger cars which represent 65% of total vehicles, and are responsible for nearly all of the national gasoline fuel demand. To achieve these objectives, the study develops a multi linear regression model using different independent variables based on 22-year historical data between years 1988 and 2009 refined from scattered data sources. The final model includes only the number of registered vehicles, income level, and gasoline price variables. A number of policy gaps are identified as contributors to the low efficiency composition of the fleet in terms of engine size, composition, availability of public transport, fuel prices, vehicle age, and type of ignition. To illustrate the importance of integrating energy policies within national energy plans, the impact of ending subsidies of gasoline was investigated and found to be significant. Without such policies, gasoline consumptions are predicted to rise by 1.81%/year. However, if such policies are implemented, over the same period, gasoline consumptions are forecasted to ascend at a lower rate of 0.53%/year.

The technical efficiency of US Airlines

- Transportation Research Part A: Policy and Practice---2013---Carlos Barros, Qi Bin Liang, Nicolas Peypoch

This paper applies the B-convex model in order to investigate the technical efficiency of a representative sample of US airlines over the period 1998–2010. The results are mixed and reveal that US airlines’ efficiency can be influenced by the size of the airline, mergers and acquisitions, and by time. Policy implications are derived.

The relationship of area-level sociodemographic characteristics, household composition and individual-level socioeconomic status on walking behavior among adults

- Transportation Research Part A: Policy and Practice---2013---Mary O. Hearst,John R. Sirard,Ann Forsyth,Emily D. Parker,Elizabeth G. Klein,Christine G. Green,Leslie A. Lytle

Understanding the contextual factors associated with why adults walk is important for those interested in increasing walking as a mode of transportation and leisure. This paper investigates the relationships between neighborhood-level sociodemographic context, individual level sociodemographic characteristics and walking for leisure and transport. Data from two community-based studies of adults (n=550) were used to determine the association between the Area Sociodemographic Environment (ASDE), calculated from U.S. Census variables, and individual-level SES as potential correlates of walking behavior. Descriptive statistics, mean comparisons and Pearson's correlations coefficients were used to assess bivariate relationships. Generalized estimating equations were used to model the relationship between ASDE, as quartiles, and walking behavior. Adjusted models suggest adults engage in more minutes of walking for transportation and less walking for leisure in the most disadvantaged compared to the least disadvantaged neighborhoods but adding individual level demographics and SES eliminated the significant results. However, when models were stratified for free or reduced cost lunch, of those with children who qualified for free or reduced lunch, those who lived in the wealthiest neighborhoods engaged in 10.7min less of total walking per day compared to those living in the most challenged neighborhoods ($p<0.001$). Strategies to increase walking for transportation or leisure need to take account of individual level socioeconomic factors in addition to area-level measures.

A meta-analysis of the impact of rail projects on land and property values

- Transportation Research Part A: Policy and Practice---2013---Sara I. Mohammad,Daniel Graham,Patricia Melo,Richard J. Anderson

The literature on land and property values demonstrates a great deal of variability in the estimated change in values arising from rail investments. This paper conducts a meta-analysis on empirical estimates from 23 studies (102 observations) that analysed the impact of rail on land/property value changes. Variation in the estimated impacts is calculated and discussed in relation to key dimensions of study-design characteristics. The results show that a number of factors produce significant variations in the estimates. These include the type of land use, the type of rail service, the rail system life cycle maturity, the distance to stations, the geographical location, accessibility to roads, methodological characteristics, as well as whether the impacted area is land or property. On the other hand, we observe that changes in purchase price and rent values due to rail projects are statistically similar to each other, that there is no evidence of change in values over time nor due to the location of land/property within the city, and that including property characteristics and neighbourhood type in the estimation model do not change values significantly. Publication bias tests are also performed and show that although researchers tend to report both positive and negative results, they tend to be biased towards statistically significant estimates.

Environmental attitudes and emissions charging: An example of policy implications for vehicle choice

- Transportation Research Part A: Policy and Practice---2013---Matthew J. Beck,John Rose,David Hensher

A growing global focus on environmental concerns, in particular the role of carbon emissions in global warming, has created an atmosphere where attitudes towards the environment are a pre-eminent focus. In

particular, the role of the motor vehicle in climate change has become increasingly important. In this paper a stated preference experiment is used to examine the impact of an emissions charge on vehicle choice in the context of such environmental attitudes; which are found to be key in explaining preference variation. The policy implications of this result are discussed, highlighting the usefulness of latent class modelling for policy management.

Influence of travel behavior on global CO2 emissions

- Transportation Research Part A: Policy and Practice---2013---Bastien Girod, Detlef P. van Vuuren, Bert de Vries

Travel demand is rising steeply and its contribution to global CO2 emissions is increasing. Different studies have shown possible mitigation through technological options, but so far few studies have evaluated the implications of changing travel behavior on global travel demand, energy use and CO2 emissions. For this study a newly developed detailed passenger transportation model representing technology characteristics as well as key behavioral variables is used. The model allows the reproduction of observed travel demand (1971–2005) in the different world regions and considers income and time rebound effects. Regarding future travel demand, the model allows for an evaluation of the sensitivity for future trends in travel money and time budgets, luxury level, vehicle load and modal split. The study highlights the high relevance of future development in travel behavior for climate policy. A consistent combination of different behavioral changes towards a more climate friendly travel behavior is modeled to reduce CO2 emissions towards the end of this century by around 50% compared to the baseline.

Does distance matter? Exploring the links among values, motivations, home location, and satisfaction in walking trips

- Transportation Research Part A: Policy and Practice---2013---Kevin Manaugh, Ahmed M. El-Geneidy

This research utilizes a large-scale travel survey that captures two important – but often overlooked – elements: traveler motivations and satisfaction levels. Attitudes towards exercise, social interaction, and the environment are central motivations affecting individual's choice of mode. Trip satisfaction is a complex element that has important ramifications for understanding travel behavior. Using clustering techniques, walkers are stratified into one of six distinct groups based on underlying values and motivations. Among other findings, people who are most concerned with environmental issues and physical activity are walking much longer distances than average and are much more satisfied with their commute. In addition, a new conceptual model of walking behavior is presented that suggests that underlying values lead to home location decisions while simultaneously having a moderating effect on the perception and satisfaction with travel. This research adds to the burgeoning debate surrounding how various aspects of travel can best be measured, conceptualized and modeled for better public policy.

Customer choice patterns in passenger rail competition

- Transportation Research Part A: Policy and Practice---2013---Johannes Paha, Dirk Rompf, Christiane Warnecke

This study explores determinants of customer choice behaviour in passenger rail competition on two cross-border routes, Cologne–Brussels and Cologne–Amsterdam. It fills a gap in the literature on competition in commercial passenger rail by relying on newly collected stated preference data from about 700 on-train interviews. Our multinomial Logit estimations reveal two important effects that are closely connected to (psychological) switching costs. First, the customers on the route Cologne–Amsterdam, for whom competition is a purely hypothetical situation, value a competitive market structure lower than customers on the already competitive route Cologne–Brussels. Second, travellers show a status quo bias with a preference for the service provider on whose trains they were interviewed. This effect goes beyond the im-

pact exercised by explanatory variables capturing the observable differences of the services and customers, including loyalty-enhancing effects like the possession of customer cards. Our results imply that entry into the commercial passenger rail market may be more difficult than often thought. Thus, the study contributes to explaining the low level of competition in these markets in Europe.

Analysis of dynamic behavior and safety of baby carriages in public transportation buses

- Transportation Research Part A: Policy and Practice---2013---Juan Dols,Vicente Pons,Enrique Alcalá,Beatriz Valles,Ángel Martín

Issues concerning the use of baby carriages in public buses are still pendant of international legislation that could contribute to unify provisions around accessibility and safety on this type of transportation. There is actually a lack of knowledge around the dynamic behavior and forces involved in the movement of baby carriages when on board in public transportation services. This paper focuses on an analysis of the forces transmitted to the baby carriages and their behavior during normal operation and critical maneuvers by public buses. The article presents partially the results obtained from a research project conducted by the Institute of Design and Manufacturing (IDF) of the Universitat Politècnica de València (Spain) in cooperation with the Institute for Automobile Research (INSIA) of the Universidad Politécnica de Madrid (Spain). The aim was to establish the technical requirements for accessibility and safety of baby carriages (US) or prams (UK) in public buses that could help national and international community to develop standards and provisions on this type of people mobility.

The divergent role of spatial access: The changing supply and location of service amenities and service travel distance in Sweden

- Transportation Research Part A: Policy and Practice---2013---Katarina Haugen,Bertil Vilhelmsson

This research explores and adds to the literature concerning the relationship between spatial structure and travel behaviour; specifically, the relationship between local and regional accessibility to service amenities and the distance of service-related trips. The analysis is based on a unique combination of national travel survey data for Sweden and official register data with detailed, geo-referenced information about the Swedish population and the location of service amenities in 1995 and 2005/2006. The results show that spatial access to service amenities increased in general over the study period, both locally (i.e., within ranges of 1km and 5km, respectively, of residential areas) and regionally (within 50km). Despite increased spatial accessibility, the observed average travel distance also increased. We find strong and differing associations between spatial access to service amenities and travel distance, depending on level of scale. While the association was negative on the local scale (i.e., a numerically large supply of amenities was related to shorter travel distance), it was the opposite and positive, on the regional scale. In terms of implications for policy, the results imply that land use planning measures to promote local access, and thereby reduce traffic volumes, may per se be insufficient for attaining more sustainable levels of mobility.

Proposed framework for sustainability screening of urban transport projects in developing countries: A case study of Accra, Ghana

- Transportation Research Part A: Policy and Practice---2013---Steven Jones,Moses Tefe,Seth Appiah-Opoku

This paper documents a framework suggested for screening urban transport projects in developing countries to reflect local issues relevant to sustainability. The framework is based on the integration of indigenous and scientific knowledge to reflect the sustainability of candidate projects. This is achieved through a participatory approach to integrate inputs from system users and providers to produce a term defined as the Localized Sustainability Score (LSS). The LSS of the projects are then used to produce a relative ranking

of potential projects, for use as a decision support for project screening and selection. Proof-of-concept development of the proposed LSS framework is presented via a preliminary case study in Accra–Ghana and the results indicate that the framework adequately represented local sustainable transport needs, priorities and perceptions. The LSS determined for some selected projects maintained the original relative rankings that were already derived using conventional methods. The LSS also has the added advantage of evaluating projects of different scales, which were not easy to evaluate together by conventional methods.

Convenience for the car-borne shopper: Are malls and shopping strips driving customers away?

- Transportation Research Part A: Policy and Practice---2013---Vaughan Reimers

Global warming, increasing traffic congestion, diminishing resources and declining health levels have led to the introduction of several policies aimed at deterring car-usage. However many such policies have not only often failed to achieve their objective, they also risk jeopardising the retail sector. To help understand why, this study measures the importance shoppers assign to car convenience, their perceptions of shopping malls and shopping strips (also referred to as Main Street or the High Street) in relation to it, and then compares them in their actual provision of it. To achieve these objectives, the study utilised a consumer household survey and a retail audit. The results of the study indicate that consumers regard car convenience as an important determinant of where they choose to shop, and perceive malls as a superior source of it. Moreover, with the sole exception of being able to park close to desired stores, malls offer car-borne shoppers more convenient access and parking. The findings suggest that any strategy designed to deter car usage should be designed to impact equally on both mall shopping and strip shopping, or risk tipping the balance even further in favour of the mall.

Cost analysis for high-volume and long-haul transportation of densified biomass feedstock

- Transportation Research Part A: Policy and Practice---2013---Daniela Gonzales, Erin M. Searcy, Sandra D. Ekşioğlu

Using densified biomass to produce biofuels has the potential to reduce the cost of delivering biomass to biorefineries. Densified biomass has physical properties similar to grain, and therefore, the transportation system in support of delivering densified biomass to a biorefinery is expected to emulate the current grain transportation system. By analyzing transportation costs for products like grain and woodchips, this paper identifies the main factors that impact the delivery cost of densified biomass and quantifies those factors' impact on transportation costs. This paper provides a transportation-cost analysis which will aid the design and management of biofuel supply chains. This evaluation is very important because the expensive logistics and transportation costs are one of the major barriers slowing development in this industry.

Geographical unit based analysis in the context of transportation safety planning

- Transportation Research Part A: Policy and Practice---2013---Mohamed Abdel-Aty, Jaeyoung Lee, Chowdhury Siddiqui, Keechoo Choi

A wide array of spatial units has been explored in macro-level modeling. With the advancement of Geographic Information System (GIS) analysts are able to analyze crashes for various geographical units. However, a clear guideline on which geographic entity should be chosen is not present. Macro level safety analysis is at the core of transportation safety planning (TSP) which in turn is a key in many aspects of policy and decision making of safety investments. The preference of spatial unit can vary with the dependent variable of the model. Or, for a specific dependent variable, models may be invariant to multiple spatial units by producing a similar goodness-of-fits. In this study three different crash models were investigated for traffic analysis zones (TAZs), block groups (BGs) and census

tracts (CTs) of two counties in Florida. The models were developed for the total crashes, severe crashes and pedestrian crashes in this region. The primary objective of the study was to explore and investigate the effect of zonal variation (scale and zoning) on these specific types of crash models. These models were developed based on various roadway characteristics and census variables (e.g., land use, socio-economic, etc.).

A framework for evaluating the role of electric vehicles in transportation network infrastructure under travel demand variability

- Transportation Research Part A: Policy and Practice---2013---Lauren M. Gardner,Melissa Dull,S. Travis Waller

The introduction of plug-in electric vehicles (PEVs) represents an unprecedented interaction between the road network and electricity grid. By replacing the traditional fuel source, petrol, with electricity, PEVs will increase the demand for electric power in a region and change emission profiles. Overall, the impacts depend on the eventual penetration of PEV ownership, but the true market share of PEVs in the future is highly unclear and radically different scenarios are possible. This added forecasting volatility makes long-term transport models that explicitly consider travel demand uncertainty even more critical. This work utilizes transport modeling tools in order to quantify the relationship between the travel patterns of PEV drivers and PEV energy consumption rates, as well as the corresponding environmental impact (measured by emissions savings relative to traditional internal combustion engine vehicles). Furthermore, this research explicitly addresses the relationship between long term travel demand uncertainty and system level energy consumption variability, an essential issue for regional energy providers and planners. Results and implications are discussed on both a small demonstration network and the Sioux Falls network.

Horizontal transshipment technologies as enablers of combined transport: Impact of transport policies on the modal split

- Transportation Research Part A: Policy and Practice---2013---Eugen Truschkin,Ralf Elbert

The technological solutions for the horizontal transshipment of non-liftable semi-trailers allow the decision makers in the transport market to consider an additional transport alternative to road transportation in the mode choice decision: combined transport. This study explores the modal split between road freight transport and combined transport that is enabled by horizontal transshipment technologies, given a dependence on the changing transport mode characteristics that are caused by direct intervention through transport policies as well as by changing environmental factors such as increasing freight volume or diesel prices. In addition, the impact of the heterogeneous forwarders' business models is considered. To estimate the modal split between the road and the combined transport, we combine a Bass model with a discrete choice model. Based on the data derived from an online questionnaire distributed to German forwarders, the model estimates a maximum 42% market penetration ratio for the combined transport. This ratio is captured with the help of the direct subsidization of rail line hauling, which is consequently the strongest lever for the modal shift. This lever is followed by the introduction of long trains, bringing a maximum market penetration of approximately 35%. We reveal that the policies that directly promote combined transport have a stronger effect on the modal shift than the policies that discriminate against road transport. Furthermore, we find that the leverage of the transport policies for the medium range distances is significantly higher than for the long distances. These results can be used as a decision support by government officials for the configuration of their specific transport policies as well as by logistics service providers to adjust their technology investment decisions based on the anticipated user demand in different situations.

Modelling the spatial interactions between workplace and residential location

- Transportation Research Part A: Policy and Practice---2013---Ángel Ibeas,Ruben Cordera,dell' Olio, Luigi,Pierluigi Coppola

The use of Multinomial Logit (MNL) models specification for the simulation of residential location have been often criticised due to the Independence of Irrelevant Alternatives hypothesis (IIA) which does not allow for the existence of spatial correlation between residential zones. Moreover, it is not clear when and to what extent the influence of the workplace zone and accessibility to employment affect the residential location choices made by households; in other word, whether the residing choice is conditional to the workplace, or vice versa; or if such choices (residence and work place) are joint.

An application of cumulative prospect theory to freeway drivers' route choice behaviours

- Transportation Research Part A: Policy and Practice---2013---Rong-Chang Jou,Ke-Hong Chen

A distinguishing feature of this study is that drivers' attitudes and preference towards risk were considered and their perceptions of gains and losses were modelled using cumulative prospect theory (CPT). The parameters of the value function and the weighting function were estimated to reflect the risk attitudes of freeway drivers in Taiwan. The resulting estimates showed that the behaviour of most Taiwanese freeway drivers can be captured by the features of CPT if real-time traffic information is used.

Accelerating the transformation to a low carbon passenger transport system: The role of car purchase taxes, feebates, road taxes and scrappage incentives in the UK

- Transportation Research Part A: Policy and Practice---2013---Christian Brand,Jillian Anable,Martino Tran

The transition to a low carbon transport world requires a host of demand and supply policies to be developed and deployed. Pricing and taxation of vehicle ownership plays a major role, as it affects purchasing behavior, overall ownership and use of vehicles. There is a lack in robust assessments of the life cycle energy and environmental effects of a number of key car pricing and taxation instruments, including graded purchase taxes, vehicle excise duties and vehicle scrappage incentives. This paper aims to fill this gap by exploring which type of vehicle taxation accelerates fuel, technology and purchasing behavioral transitions the fastest with (i) most tailpipe and life cycle greenhouse gas emissions savings, (ii) potential revenue neutrality for the Treasury and (iii) no adverse effects on car ownership and use.

Estimation of travel mode choice for domestic tourists to Nha Trang using the multinomial probit model

- Transportation Research Part A: Policy and Practice---2013---Vo Van Can

The purpose of this study is to examine how the characteristics of domestic tourists and attributes of travel modes influence the tourists' modal choice to Nha Trang, Viet Nam by applying the multinomial probit model. The analysis is based on primary data surveyed from tourists visiting Nha Trang in March, 2011. A total of 402 valid samples were used from 554 initial samples. The study provides several important findings concerning tourists' modal choice. Travel time per kilometer, per-kilometer travel cost to income ratio, mode quality variables, and income are key elements in explaining the tourists' modal choice decision. In addition, tourists with a lower income tend to be more sensitive to change in per-kilometer cost. Furthermore, the high-income tourists are much more likely to choose plane or train rather than coach. Understanding the tourists' modal choice behavior may help tourism transport companies to develop appropriate marketing strategies.

The effects of airline and high speed train integration

- Transportation Research Part A: Policy and Practice---2013---M. Pilar Socorro,María Vicens

With a theoretical model we analyze the social and environmental effects of airline and HST integration in two different scenarios: airports with capacity constraints and airports with low airline competition. The merits of this theoretical model are twofold. First, the model allows us to support and qualify some of the empirical predictions made by the literature that studies airline and railway integration. Second, the model can provide some insights to policy makers in order to evaluate the possible effects of airline and HST integration in alternative hypothetical situations. We use the Madrid–Malaga route (Spain) to highlight the potentials of the model to evaluate the benefits of airline and HST integration.

The dynamic nearest neighbor policy for the multi-vehicle pick-up and delivery problem

- Transportation Research Part A: Policy and Practice---2013---Patricia Kristine Sheridan,Erich Gluck,Qi Guan,Thomas Pickles,Balıoğlu,Barış,Beno Benhabib

In this paper, a dynamic nearest neighbor (DNN) policy is proposed for operating a fleet of vehicles to serve customers, who place calls in a Euclidean service area according to a Poisson process. Each vehicle serves one customer at a time, who has a distinct origin and destination independently and uniformly distributed within the service area. The new DNN policy is a refined version of the nearest neighbor (NN) policy that is well known to perform sub-optimally when the frequency of customer requests is high. The DNN policy maintains geographically closest customer-to-vehicle assignments, due to its ability to divert/re-assign vehicles that may be already en-route to pick up other customers, when another vehicle becomes available or a new customer call arrives. Two other pertinent issues addressed include: the pro-active deployment of the vehicles by anticipating in which regions of the service area future

calls are more likely to arise; and, imposition of limits to avoid prohibitively long customer wait times. The paper also presents accurate approximations for all the policies compared. Extensive simulations, some of which are included herein, clearly show the DNN policy to be tangibly superior to the first-come-first-served (FCFS) and NN policies.

Choosing conflict on the road to sustainable mobility: A risky strategy for breaking path dependency in urban policy making

- Transportation Research Part A: Policy and Practice---2013---Robert Hrelja,Karolina Isaksson,Tim Richardson

Previous studies have identified implementation problems connected to sustainable mobility. These difficulties raise the question of which strategies can be successfully pursued to break path dependencies in urban policy making. This article is focused on corporate mobility management as one specific example of sustainable mobility initiatives, and analyses the formation and implementation of a travel policy for employees at the city administration of Örebro, Sweden. The analysis reveals how controversies can evolve into major implementation barriers for sustainable mobility initiatives. The analysis centres on the playing out of power relations between politicians and groups of officers in the development of interventions to break path dependencies. The strategy pursued in Örebro turned out to be very challenging within the municipality, since it required significant transformation of the officials' personal travel behaviour, and so led to open conflicts within the city administration. The case demonstrates that radical and confrontational attempts to break path dependencies may result in the same watering down as less controversial, more consensual strategies. When handling controversial sustainable mobility measures there may be more benefit in deliberative strategies of raising awareness, creating new consciousness or institutionalising desired discursive shifts.

Multiple purposes at single destination: A key to a better understanding of the relationship between tour complexity and mode choice

- Transportation Research Part A: Policy and Practice---2013---Chinh Ho,Corinne Mulley

This paper investigates the nature of tours undertaken by public transport and car. Using a new approach to the typology of tours, which takes into account not only the number but also the spatial distribution of activities chained into a tour, the paper sheds light on the reasons why findings in the existing research literature conflict. Descriptive and modelling analyses on a home-based tour dataset created from the Sydney Household Travel Survey are presented to show that tours using car or public transport are different in nature. For public transport, activities chained into a tour have destinations which are typically in close proximity and reachable by walking whereas the car was found to be utilised for travel involving multiple purposes at multiple destinations. The new approach in this paper to the typology of tours takes the destination into account to give clearer and more significant relationships between tour complexity and mode choice, allowing potential policy and planning implications for promoting public transport ridership to be drawn. The results indicate that if there is a spatial dispersion to the activities chained into a tour, this significantly reduces public transport use. Conversely, public transport use increases as the number of activities sharing a destination with others chained into a tour increases. These findings suggest that planning strategies to increase public transport use need to focus on providing multiple purposes at a single destination.

Foreign participation and competition: A way to improve the container port efficiency in China?

- Transportation Research Part A: Policy and Practice---2013---Andrew Chi-lok Yuen,Anming Zhang,Waiman Cheung

This paper investigates how the involvement of foreign and local ownerships, intra- and inter-port competition and hinterland affect the container terminal efficiency

in China and its neighboring countries. The operational efficiency of sample container terminals is estimated by data envelopment analysis, which is followed by regression analysis to examine factors affecting container terminal efficiency. We find that having some Chinese ownership may make a container terminal more efficient, while a container terminal is less efficient with Chinese as the major shareholder. It is also found that intra- and inter-port competition may enhance container terminal efficiency. Finally, the efficiency growth of terminals is examined, and implications for the regional economic disparity in China are discussed.

Modeling pedestrian queuing using micro-simulation

- Transportation Research Part A: Policy and Practice---2013---Inhi Kim,Ronald Galiza,Luis Ferreira

The system considered is a cinema ticketing booth system. A general simulation algorithm is presented as well as the system's operating characteristics. The results of the experiment were verified by comparing them with video observation data and theoretical values. Finally, with comparative analysis of experiment data, the developed simulation model was able to replicate the situation in which pedestrians find an available booth to occupy while waiting in a queue. The model can facilitate the availability of various pedestrian flows and a range of operating times. With some efforts of computer programming, the situations where multiple booths are available were simulated to identify pedestrian movement. The developed simulation model captures important details, such as travel time, wait time, queue length and the number of waiting pedestrians with the different number of pedestrian flows and booths. The paper presents a means to designing the pedestrian operation and plan on the basis of the estimated number of people.

Ranking the substantive problems in the Dutch Cost-Benefit Analysis practice

- Transportation Research Part A: Policy and Practice---2013---Niek Mouter,Jan Anne An-

This paper investigates the perceptions of key participants in the Dutch Cost–Benefit Analysis (CBA) practice regarding substantive problems when appraising spatial-infrastructure projects with CBA. Two research methods were applied. Firstly, 86 key participants in the Dutch CBA practice were interviewed in-depth in order to obtain an overview and a ranking of perceived substantive problems with CBA in the Netherlands. Secondly, the people interviewed were also asked to fill in a written questionnaire in which they were asked to rank the substantive problems once again, in order to improve the validity of the ranking; 74 of the participants completed this questionnaire. The most important conclusions of this paper are, firstly, that key participants in the Dutch CBA practice consider ‘problems with the estimation of the non-monetized project effects’ as the most important substantive problem cluster and ‘problems with monetizing project effects’ as the second most important substantive problem cluster. Secondly, key participants in the Dutch CBA practice consider the ‘problem analysis’ in a CBA to be a very important substantive problem. Thirdly, there is, in a broad sense, consensus among the different groups in the Dutch CBA practice concerning their perception of the seriousness of problem clusters and the way they rank the problem clusters. Fourthly, a large part of the substantive problems mentioned by the key participants in the Dutch CBA practice are non-specific CBA problems.

Accounting for site-selection bias in before–after studies for continuous distributions: Characteristics and application using speed data

- Transportation Research Part A: Policy and Practice---2013---Pei-Fen Kuo,Dominique Lord

The before–after study is still the most popular method used by traffic engineers and transportation safety analysts for evaluating the effects of an intervention. Compared to the cross-sectional study, the before–after study has lower within-subject variability since it directly accounts for changes that have occurred at the

study sites. However, although this kind of study may offer superior performance, it can still be plagued by important methodological limitations, which could significantly alter the study outcome. They include the regression-to-the-mean (RTM) and site-selection effects. The primary objective of this study consists of presenting a method that can reduce the selection effects when an entry criterion is used in before–after studies for continuous data (e.g. speed, reaction times, etc.), without relying on the use of a control group. The distribution of the data could follow a normal or lognormal distribution. The study objective was accomplished using simulated and observed speed data collected in Florida. The proposed method documented in this paper was compared to the Naïve, Control Group (CG) and the Analysis of Covariance (ANCOVA) methods. The simulation results show that the proposed method provides a more precise estimate than the Naïve method, as expected. In addition, the method performs better than the CG and the ANCOVA methods when similar control group data are not available. The results also show that higher entry criteria, lower between-subject variances, and higher within-subject variances cause higher selection biases. When traffic engineers and urban planners evaluate or compare different strategies, the proposed method can be applied to adjust naïve estimators of treatment effectiveness documented in previous studies without similar control group data.

Transportation serviceability analysis for metropolitan commuting corridors based on modal choice modeling

- Transportation Research Part A: Policy and Practice---2013---Hui Zhao,Xuedong Yan,Ziyu Gao

Major commuting corridors in metropolitan areas generally comprise multiple transportation modes for commuters, such as transit (subways or buses), private vehicles, or park-and-ride combinations. During the morning peak hour, the commuters would choose one of the available transportation modes to travel through the corridors from rural/suburban living areas to urban working areas. This paper introduces a concept of

transportation serviceability to evaluate a transportation mode's service status in a specific link, route, road, or network during a certain period. The serviceability can be measured by the possibility that travelers choose a specific type of transportation service at a certain travel cost. The commuters' modal-choice possibilities are calculated using a stochastic equilibrium model based on general travel cost. The modeling results illustrate how transportation serviceability is influenced by background traffic flow in a corridor, value of comfort for railway mode, and parking fee distribution.

Analysis of dynamic effects on seaports adopting port security policy

- Transportation Research Part A: Policy and Practice---2013---Gi-Tae Yeo, Ji-Yeong Pak, Zaili Yang

Policy variables, such as security levels at seaports, affect port efficiency in a non-linear way while other factors affecting efficiency at ports such as a number of berths, the area of port yard, and the number of port labors have linear structural relation. Ensuring a certain level of regulations can increase port efficiency, while an excess of the level may result in the reverse of these gains. Addressing seaport-related issues is not a simple undertaking because a seaport is regarded as a system-of-system, which is both difficult to understand and to model. Therefore, studies that adequately analyze the overall dynamic of a port complex in terms of security concerns have been seen insufficient, leaving a significant research gap to fill in. To analyze the relationship between seaport security levels and container volumes, this study adopts the method of System Dynamics (SD). Use of the SD can demonstrate the benefits of simulations, such as suggesting the visual causal loops among evaluation factors, representing the several sub-models, and enabling various forms of analysis, such as the base model, optimistic scenario model, and pessimistic scenario model. As a result of simulation, the impacts on handling container cargo volumes in Korea due to the increasing level of security is estimated at 2,770,000TEUs by the year 2015

and 3,050,000TEUs by 2020. Appropriate tailor of the proposed SD based methodology can stimulate security-economic quantitative analysis in a wider range of port context, thus promoting effective implementation of security measures.

Improving the analysis of road pricing acceptability surveys by using hybrid models

- Transportation Research Part A: Policy and Practice---2013---Floridea Di Ciommo, Andrés Monzón, Alvaro Fernandez-Heredia

Several international studies have analyzed the acceptability of road pricing schemes by means of an attitude survey in combination with the results of a stated choice experiment using both a descriptive analysis and a discrete-choice model with binary choice ("accept" or "not accept" the toll). However, the use of hybrid discrete choice models constitutes an innovative alternative for integrating subjective attitudes and perceptions deriving from the survey of attitudes with the more objective variables from the stated choice experiment. This paper analyzes the results of applying these models to measure the acceptability of interurban road pricing among different groups of stakeholders (road freight and passenger operators, highway concessionaires, and associations of private car users) with qualitatively significant opinions on road pricing measures. Our results show that hybrid models are better suited to explaining the acceptability of a road pricing scheme by different groups of stakeholders than a separate analysis of the survey of attitudes and a discrete-choice model applied on a stated choice experiment. A particular finding was that the strong psycho-social latent variable of the perception of fairness explains the rejection or acceptance of a toll scheme by road stakeholders.

Implementation of evidence-based design approaches in transportation decision making

- Transportation Research Part A: Policy and Practice---2013---Emma J. Bones, Elise M. Barrella, Adjo A. Amekudzi

Evidence-based design (EBD) originated in the healthcare industry as a combination of evidence-based medicine and evidence-based practice. EBD is a process for creating or improving healthcare buildings by using rigorous evidence to create benchmarks of current practices, achieve specific goals, and then monitor the success of the design to inform future decision making. EBD studies for the healthcare industry are compiled into an international database to provide design information to all users. This paper reviews applications of EBD in healthcare and other fields, assesses the potential value of applying EBD in the transportation field, and makes recommendations that can help with the adoption of EBD for transportation design and engineering. Emerging areas such as transportation asset management, health impact assessments and green design are particularly appropriate and promising for the development and application of EBD databases. This paper is a useful resource for transportation executives or researchers who are interested in developing evidence-based databases to guide their future decision making to be more strategic to take advantage of proven successful applications. When appropriately applied, EBD has the potential to reduce costs and risks while increasing innovation and encouraging new ideas for transportation and other projects.

Linking modal choice to motility: A comprehensive review

- Transportation Research Part A: Policy and Practice---2013---Astrid De Witte,Joachim Hollevoet,Frédéric Dobruszkes,Michel Hubert,Cathy Macharis

Modal choice is determined by a whole range of factors that are interrelated to a larger or smaller extent. It is often the result of a very compound choice process that can take place consciously or unconsciously and that includes objective as well as subjective determinants. Despite its significance in our daily life, there is no uniform way to define and analyze the concept of modal choice. The aim of this review is to fill this gap by elaborating a common modal choice definition and by providing a comprehensive review on the concept

of modal choice through linking it to Kaufmann's motility concept. By doing so, this review will not only contribute to an improved knowledge on different modal choice determinants and their interdependencies, but can also assist to the understanding and modeling of modal choice decisions. The review can therefore help increasing the effectiveness of policy measures taken by environmental, urban and transport policy makers.

Investigating the nonlinear relationship between transportation system performance and daily activity-travel scheduling behaviour

- Transportation Research Part A: Policy and Practice---2013---Khandker Nurul Habib,Ana Sasic,Claude Weis,Kay Axhausen

The paper presents an econometric investigation of the behavioural relationship between transportation system performance in terms of travel time changes and daily activity-travel scheduling processes. Innovative survey data on the complete daily activity-scheduling adaptation process is used jointly with revealed scheduling information. The survey, conducted in Zurich, Switzerland, collected daily scheduling information together with stated adaptation responses corresponding to four adaptation scenarios. The four scenarios are defined by applying hypothetical increases in travel time of 50%, 100%, and 200% and a 50% decrease in travel time. Stated adaptation responses are collected in the context of 24-h activity scheduling. Data are used to estimate RUM based daily travel activity scheduling models. Models are estimated for one revealed schedule and four stated scheduling datasets. In addition, a joint model is estimated for pooled revealed and stated scheduling data. In the joint model, separate scale/variance parameters are estimated for revealed and stated information. Results clearly identify the nonlinear responses of activity-travel scheduling to the changes in travel time. Asymmetric responses are shown for travel time increases and decreases. People become more conservative with time expenditures when scheduling activities subject to increased travel times. However, beyond a certain limit of travel time

increase, scheduling behaviour becomes more unpredictable. The lessons learned from this investigation have implications in the application of activity-based models for forecasting and policy analyses. Models developed using only a revealed preference dataset should not be used to extrapolate to situations where travel times changes by large margins. The results also prove that significant improvements in capturing behavioural responses in the activity scheduling process are possible by pooling revealed preference and stated preference data sets and jointly modelling with an explicit representation of RP scale/variance differences.

Case analysis of simultaneous concessions of parking meters and underground parking facilities

- Transportation Research Part A: Policy and Practice---2013---Felix Caicedo,Alejandra Diaz

The ongoing discussions of a city, where potential bidders for the concessions of on-street and off-street parking questioned separate bids procedures recalled our attention; in addition, willing to satisfy public demands the municipality planed to keep free spaces in the same area. In this article we assess the impact of joint concessions of parking meters and underground parking facilities, firstly by considering a radial pattern around the location of the underground facility, and secondly by proposing GA which analyzes different patterns. The results corroborate that providing free parking generates excess demand and high cruising for parking. Furthermore, they support joint provision of above ground and underground parking concessions because otherwise there can be too high level of competition in a small area, which may erode potential bidders incentives -specially when local authorities expect that the concession rights be reinvested into social needs.

Assessing the quality of intercity road transportation of passengers: An exploratory study in Brazil

- Transportation Research Part A: Policy and Practice---2013---André Luís Policiani Freitas

In Brazil, buses represent the main mode of public transportation. However, in recent years intercity and interstate bus companies have been facing a growing competition with other forms of transportation such as bus companies competitors, illegal transportation companies, chartered buses, and, more recently, air companies. In this scenario characterized by growing competition, it is essential to evaluate the quality of road transportation of passengers. In order to contribute to the analysis of this issue, this paper presents a methodological approach to assess the quality of intercity road transportation of passengers, according to the customers' perspective. By conducting a case study in a city of almost 500,000 inhabitants from the interior of Rio de Janeiro, an Importance-Satisfaction Analysis (ISA) and an assignment procedure were used in order to obtain: (i) the main factors (criteria) that influence the quality of service intercity road transportation of passengers, (ii) the importance degree of criteria related to road transportation of passengers, (iii) the satisfaction of the users of road transportation under the considered criteria, (iv) the critical criteria/items, and (v) the categories which best represent the quality of service intercity road transportation according to the passengers' perspective. Finally, several possible corrective actions to improve the quality of services considering each critical item/criterion were highlighted and special recommendations were done for the critical process (ticket sales).

Network design approach for hub ports-shipping companies competition and cooperation

- Transportation Research Part A: Policy and Practice---2013---Nasrin Asgari,Reza Zanjirani Farahani,Mark Goh

In the maritime industry, the stakeholders comprising the port authorities, shipping companies, and port operators often compete and collaborate within an ecological system. This paper investigates the competition and cooperation strategies amongst three parties: two major container hub ports and the shipping companies. This research develops a game theoretic network design model which considers three scenarios: (i) perfect com-

petition between the hub ports, (ii) perfect cooperation between the hub ports, and (iii) cooperation between the shipping companies and the hub ports as a whole. The scenarios are tested using empirical data from two leading Asian hub ports: Singapore and Hong Kong. An interval branch and bound is designed to solve the models.

Responses to differentiated road pricing schemes

- Transportation Research Part A: Policy and Practice---2013---Angela Francke,Denise Kaniok

Reducing traffic-related problems is an important issue that requires changes in travel behavior. It is argued that road pricing is an effective tool but that it would be more effective if charges are differentiated. A laboratory experiment employing a heterogeneous sample (n=155) examined effects of differentiated road pricing schemes on understanding and behavioral change intentions. The results show that difficulties are experienced in calculating the charges for road pricing schemes differentiated with respect to both place and time. Suggesting learning effects, if presented with degree of differentiation gradually increasing compared to random orders, the highly differentiated schemes were evaluated faster, as more comprehensible, and perceived difficulty decreased. Elderly were less flexible than young people in indicating how they would respond, women were more flexible than men, and frequent drivers less flexible than non-frequent drivers. A distance-based road pricing scheme with a fixed charge per kilometer was on average ranked highest on preference compared to several other conceivable road pricing alternatives.

Applying valence framing to enhance the effect of information on transport-related carbon dioxide emissions

- Transportation Research Part A: Policy and Practice---2013---Erel Avineri,E. Owen D. Waygood

The provision of information about transport-related

carbon dioxide (CO₂) emissions to the traveler can be seen as an instrument to increase the likelihood of more sustainable choices being made by individuals. However, as transport-related CO₂ emissions are largely seen as a ‘social’ cost rather than a ‘private’ cost to the individual, the behavioral engagement with and response to information on environmental effects of travel choices may be limited. It is argued that framing, studied in a range of contexts, can be used to enhance the evaluation of choice attributes and promote more sustainable choices. An experiment is reported that examines the effect of valence framing of amounts of CO₂ emissions on the perceived differences between alternative amounts. Through the use of positive and negative terms, the information is framed to focus attention either on the potential of a travel mode to provide environmental benefit (positive frame) or on its potential to reduce environmental loss (negative frame). Survey participants’ estimates of CO₂ amounts were compared for positive and negative framing of the same information using an ordered logit model. The findings imply that negative framing is more effective than positive framing in highlighting differences between CO₂ amounts of alternative travel modes and therefore is likely to influence travel-related choices.

The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles

- Transportation Research Part A: Policy and Practice---2013---Geertje Schuitema,Jillian Anable,Stephen Skippon,Neale Kinnear

The aim is to understand how private car drivers’ perception of vehicle attributes may affect their intention to adopt electric vehicles (EVs). Data are obtained from a national online survey of potential EV adopters in the UK. The results indicate that instrumental attributes are important largely because they are associated with other attributes derived from owning and using EVs, including pleasure of driving (hedonic attributes) and identity derived from owning and using EVs (symbolic attributes). People who believe that a pro-environmental self-identity fits with their self-

image are more likely to have positive perceptions of EV attributes. Perceptions of EV attributes are only very weakly associated with car-authority identity.

Attitudes towards road pricing and environmental taxation among US and UK students

- Transportation Research Part A: Policy and Practice---2013---Junghwa Kim, Jan-Dirk Schmöcker, Satoshi Fujii, Robert Noland

This study investigates the determinants of public acceptability of road pricing and environmental taxation policies. The strength and direction of causal paths between psychological determinants and the acceptability of these policies are measured with survey data from students in New Jersey, USA and London. The estimated models show that a number of well-established psychological determinants provide an explanation for the acceptability of both policies and in both locations despite various differences in the policy scenarios. Scenario fairness appears to be the most important direct determinant of acceptability in both countries. We further verify the effect of “specific trust in government” on scenario fairness and other direct determinants that indicate the important role of government performance for achieving acceptability for these measures. Our findings further suggest that awareness of wider environmental issues, such as climate change, can lead to the support of specific sustainable transport policies, such as road pricing, which do not address climate change issues directly.

Intention to act towards a local hydrogen refueling facility: Moral considerations versus self-interest

- Transportation Research Part A: Policy and Practice---2013---N.M.A. Huijts, J.I.M. De Groot, E.J.E. Molin, B. van Wee

Using hydrogen as a fuel in transport may reduce environmental and societal problems resulting from current fossil fuel use, such as climate change and oil dependency. However, this requires both building hydrogen

refueling infrastructure and gaining the acceptance of the citizens living nearby. Knowing what motivates citizens to act in favor of or against hydrogen refueling facilities may help in the development of policies that encourage the use of hydrogen as a fuel. This paper aims to contribute to this by examining whether intention to act in favor of, or against, a local hydrogen refueling facility is more strongly based on moral considerations or on self-interest. To this end, the explanatory value of the Norm Activation Model (NAM) was compared with the explanatory value of the Theory of Planned Behavior (TPB). The analyses were carried out on data collected from a group of Dutch participants who received information about hydrogen as a fuel, hydrogen technology, and the opinion of stakeholders. The group consisted of 800 participants, of which 495 were in favor and 92 against a local hydrogen refueling facility. We found that both NAM and TPB variables significantly explained intention to act for supporters and opponents. The NAM variables explained intention to act more strongly than the TPB variables for both groups. These findings suggest that intention to act both in favor of and against hydrogen refueling facilities was more strongly based on moral considerations than on self-interest. If TPB variables were added to a model that included NAM variables, the explained variance increased for the supporters group, whereas this was not the case for the opponents group. These results indicate that for supporters of hydrogen refueling facilities, self-interest is a secondary goal after moral considerations but that this is not the case for opponents. To validate the findings, the analyses were also carried out on data from a group of participants that did not receive information. This control group consisted of 414 participants, of which 184 were in favor of and 45 against a local hydrogen facility. The same results were found for these supporters and opponents, indicating the robustness of our findings.

Dimensions and determinants of expert and public attitudes to sustainable transport policies and technologies

- Transportation Research Part A: Policy and Practice---2013---Dimitrios Xenias,Lorraine Whitmarsh

This paper investigates (a) attitudes to sustainable transport and how these differ between experts and non-experts, and (b) factors that influence these attitudes and their relevant importance in explaining why such differences occur. Attitudes of experts (N=53) and British public (N=40) were compared using open-ended questionnaires, attitude scales, analytic hierarchy process and preference ranking. Both samples prioritised reduction in transport demand in qualitative measures. In quantitative measures, however, experts preferred techno-economic measures while the public prioritised behaviour change and public transport improvement. Some options for sustainable transport also varied with individuals' values, suggesting that expertise alone does not fully account for variation in attitudes. Different perspectives and values imply a need for a broader definition of expertise in transport policy-making, and that the public may not accept transport policies/technologies designed by experts – underlining the importance of early public engagement.

Influence of values, beliefs, and age on intention to travel by a new railway line under construction in northern Sweden

- Transportation Research Part A: Policy and Practice---2013---A. Nordlund,K. Westin

The aim is to investigate determinants of intentions to use a new railway line under construction in the northern Sweden. To this end a test was made of a two-part hierarchical model of train-use intentions positing influences from general values and beliefs as well as specific beliefs about the new railway line. A questionnaire was sent to a randomly selected sample of 1238 citizens residing in seven municipalities along the new railway line. In order to also investigate potential generation differences participants were sampled in four age

groups, young adults, young middle-aged, middle-aged, and pensioners. The results supported the proposed hierarchical model showing that general values and beliefs influence intentions primarily through the specific beliefs about the railway line. In addition, the results showed that the youngest age group is more open to change and has stronger intentions to use the new railway.

Influences of car type class and carbon dioxide emission levels on purchases of new cars: A retrospective analysis of car purchases in Norway

- Transportation Research Part A: Policy and Practice---2013---Alim Nayum,Christian A. Klöckner,Sunita Prugsamatz

The impact of socio-demographic and psychological factors on purchases of new cars is examined. Data were gathered in an online retrospective survey using a sample of 198 Norwegian households who purchased a new car in December 2010. A latent class analysis was performed to identify car type classes followed by a path analysis to investigate the determinants of the purchased car type class and the influence on the purchased car' s level of carbon dioxide emissions. The results revealed that car type class is the strongest determinant of the car' s level of CO2 emissions. Socio-demographic factors have little impact on choice of car type class when psychological factors are controlled for. Intention to purchase an environmentally friendly car has a direct effect on the car' s CO2 emissions.

Interacting with limited mobility resources: Psychological range levels in electric vehicle use

- Transportation Research Part A: Policy and Practice---2013---Thomas Franke,Josef F. Krems

Limited driving range is an obstacle to adoption of electric vehicles (EVs). We examine from a self-regulation perspective the psychological dynamics underlying individual reference values for three different types of range constructs. In a 6-month field trial 40 EVs were leased to a sample of early adopter customers. In general,

users were satisfied with range and stressful range situations rarely occurred. Results further suggested that users were comfortable with utilizing approximately 75–80% of their available range resources. Several personality traits (e.g., control beliefs, low impulsivity) and system competence variables (e.g., daily practice, subjective competence) were positively related to range level values and thus range utilization. Comfortable range was positively related to range satisfaction. We recommend that psychology-based strategies should be applied to enhance range optimization.

How accurate are drivers' predictions of their own mobility? Accounting for psychological factors in the development of intelligent charging technology for electric vehicles

- Transportation Research Part A: Policy and Practice---2013---Ulf J.J. Hahnel, Sebastian Gözl, Hans Spada

Intelligent load management systems (ILMS) for electric vehicles (EVs) would make it possible to link EV use to renewable energy sources. ILMS require information about the departure time and length of EV drivers' upcoming trips to optimize the charging process depending on the availability of renewable energy in the grid. Inaccurate information may lead to insufficient battery levels or inefficient charging processes. In a field test during two weeks 60 participants predicted the departure time and trip length of their upcoming trips after having arrived at home with their own gasoline-powered cars. Actual mobility behavior was assessed by means of logbooks and GPS tracking devices. The results show that participants are on average able to accurately predict their departure times and trip lengths although for some outliers their prediction errors would potentially have led to insufficient battery levels. The type of trip (work, leisure, shopping) significantly influenced the accuracy of mobility predictions.

Psychometric analysis of the satisfaction with travel scale

- Transportation Research Part A: Policy and Practice---2013---Margareta Friman, Satoshi Fujii, Dick Ettema, Tommy Gärling, Lars E. Olsson

Confirmatory factor analyses are used to examine the psychometric properties of the satisfaction with travel scale (STS), including tests of measurement invariance across urban areas and travel modes (car, public transport and slow modes). The data set consists of questionnaire responses from random samples of residents of Sweden's three largest urban areas. A theoretically supported, one-factor second-order measurement model with three separate constructs received empirical support in analyses of satisfaction with daily travel in general, satisfaction with the commute to work, and satisfaction with the commute from work in the different urban areas and with different travel modes. On the three first-order factors, high loadings were as expected obtained on scales involving cognitive evaluations (e.g. "low vs. high standard") and affective evaluations with respect to positive deactivation (e.g. "relaxed vs. stressed") and positive activation (e.g. "alert vs. tired"). Satisfaction with daily travel in general differed significantly in the largest urban area from the medium-large urban area and the smallest urban area. The results also revealed that commuters travelling by bicycle or on foot are more satisfied with their work commute than people using other travel modes.

Network design model with evacuation constraints

- Transportation Research Part A: Policy and Practice---2013---Yuval Hadas, Amir Laor

In recent years terrorism activities have been increasing in scope worldwide as well as the global warming process has had a direct impact on the weather in various climates, subjecting countries around the world to unusually severe storms. Thus for the policy maker it is not only a matter of network design (roads and

facilities) in terms of costs and level of service for commuting, but also the matter of network design in terms of costs and evacuation time. This paper focuses on the later – the development of a model for the design of an optimal network in terms of minimizing both evacuation time and network constructions costs. However, the optimal model's complexity does not allow solution within a reasonable timeframe. Therefore, a fast heuristic model was developed based on the minimum-cost algorithm, using the unimodular properties of the model for obtaining integral results. The heuristic algorithm was compared to the optimal algorithm (both based on ILOG CPLEX) on various network scenarios and produced on average 10% higher construction costs than the optimal algorithm. On the other hand, the execution time of the heuristic algorithm was significantly faster than the optimal algorithm.

Dynamic formation mechanism of airport competitiveness: The case of China

- Transportation Research Part A: Policy and Practice---2013---Qiang Cui,Hai-bo Kuang,Chun-you Wu,Ye Li

With the rapid development of Chinese economy, the demand of air transportation has increased enormously and airports are facing intensive competition, so the issue of how to enhance airport competitiveness has attracted serious concern of the public. The formation mechanism of airport competitiveness is very complex and the research is insufficient on this topic. In this paper, index system of airport competitiveness is built from four aspects: Regional Development, Production Factors, Demand Conditions and Support Industry. Dynamic formation mechanism of airport competitiveness is studied through Structure Equation Model as well as System Dynamic with the historical data of 25 Chinese airports from 2006 to 2010. Then the influencing mechanism of some important influencing factors is analyzed with the help of Vensim software, which verifies the rationality of the model. The results show that airport investment and city R&D inputs are the two most important influencing factors of airport competitiveness, which could provide guidance for decision

makers on airport competitiveness cultivation.

The cost of general aviation accidents in the United States

- Transportation Research Part A: Policy and Practice---2013---Joseph B. Sobieralski

Very few studies examine the costs associated with general aviation accidents. Given the large number of general aviation operations as well as the large number of fatalities and injuries attributed to general aviation accidents in the United States, understanding the costs to society is of great importance. This study estimates the costs associated with general aviation accidents in the United States. The direct costs are estimated and the indirect costs are estimated via the human capital approach in addition to the willingness-to-pay approach. The average annual accident costs attributed to general aviation are found to be \$1.64billion and \$4.64billion (2011 US\$) utilizing the human capital approach and willingness-to-pay approach, respectively. These values appear to be fairly robust when subjected to a sensitivity analysis.

Governmental regulation impact on producers and consumers: A longitudinal analysis of the European automotive market

- Transportation Research Part A: Policy and Practice---2013---Peter Wells,Adarsh Varma,Dan Newman,Duncan Kay,Gena Gibson,Jamie Beevor,Ian Skinner

This paper analyses the issue of whether governmental regulation results in higher producer costs that are then passed on as higher prices to the consumer, with a longitudinal study of the European automotive market. Using a large data set for the period 1995–2010 the hedonic price analysis study concludes that the claims that regulation would result in higher per unit costs for new cars are not supported, at least as far as the pass-through into retail or list prices are concerned. Consequently, regulators need a better understanding of what the ‘cost of regulation’ claims entail over the longer term – with the implication that additional

costs even where they arise are more easily absorbed than has hitherto been expected.

Measuring the impact of sub-urban transit-oriented developments on single-family home values

- Transportation Research Part A: Policy and Practice---2013---Shishir Mathur,Christopher Ferrell

This paper provides evidence on the impact of a sub-urban transit-oriented development (TOD) on surrounding single-family home prices. Using a dataset that inventories single-family home sale transactions surrounding Ohlone Chenyoweth TOD in San Jose, CA, the paper employs hedonic regression to estimate the effect of the TOD on home prices.

Bicycle commuting market analysis using attitudinal market segmentation approach

- Transportation Research Part A: Policy and Practice---2013---Zhibin Li,Wei Wang,Chen Yang,David R. Ragland

The market segmentation analysis for bicycle commuting can help identify distinct bicycle market segments and develop specific policies or strategies for increasing the bicycle usage in each segment. This study aims to use the approach of attitudinal market segmentation for identifying the potential markets of bicycle commuting. To achieve the research objective, the household survey is conducted to obtain the travelers' attitudes towards their commuting travels. The factor analysis is used to explore the latent attitudes. The structural equation modeling (SEM) simultaneously estimates the correlations between the attitudinal factors. The K-means clustering is conducted to segment the bicycle commuting market into several submarkets. Finally, six segments of bicycle commuting market with distinct attitudes are identified by four dividing factors including the willingness to use bicycle, need for fixed schedule, desire for comfort, and environmental awareness. The attitudinal characteristics, socioeconomic features, and actual bicycle choices in each market

segment are analyzed and compared. The policy implications that best serve the needs of each submarket are discussed to promote the bicycle commuting.

Exploring carsharing usage motives: A hierarchical means-end chain analysis

- Transportation Research Part A: Policy and Practice---2013---Tobias Schaefers

Recently, carsharing has entered a phase of commercial mainstreaming as carsharing providers and urban transportation planners aim at broadening the customer base. In this context, knowledge about the motives of carsharing usage is essential for further growth. Based on a qualitative means-end chain analysis this paper therefore explores usage motives, thus expanding the existing insights from analyses of usage behavior. In a series of laddering interviews with users of a US carsharing service, the underlying hierarchical motive structure is uncovered and four motivational patterns are identified: value-seeking, convenience, lifestyle, and environmental motives. Implications are drawn for applying these insights.

Is the environmental policies procedures a barrier to development of inland navigation and port management? A case of study in Brazil

- Transportation Research Part A: Policy and Practice---2013---Ilza Machado Kaiser,Barbara Stolte Bezerra,Leslie Ivana Serino Castro

The main objective of this article is to discuss the Brazilian environmental legislation and policies towards the development of navigation and port management. The research illustrated some difficulties faced by the country and make suggestions to overcome it. The construction of the environmental legal framework began in the early 1960s and resulted in a very complex system, as a consequence of policies adopted by the country. Nowadays Brazilian environmental policies are developed in democratic and participative way, although with elevated degree of bureaucracy and lack of integration among the several governmental agencies,

which makes the approval of environmental certifications demand several years for new port projects or improvements, which delays the economic development of the country. Efforts have been made to simplify the licensing process. As result of this research two flowchart for environmental licenses of ports installation are shown: The first shows the process until 2009 and the second shows the process nowadays. This become an important issue due the fact that inland navigation is one of the less pollutant modes of transportation, and although, the process of environmental certification was simplified, if compare with 2009, it is still complex and time-consuming, delaying the development of the infrastructure.

Perceived attributes of bus and car mediating satisfaction with the work commute

- Transportation Research Part A: Policy and Practice---2013---Lars Eriksson,Margareta Friman,Tommy Gärling

In an experimental simulation employing 123 undergraduates the effect of different travel modes on satisfaction with travel, mood after the day traveled, and satisfaction with the day as a whole were assessed for the work commute by car or bus. Car was rated higher than bus on satisfaction with travel. This mode difference was accounted for by ratings of the mode-specific attributes fun, lifestyle match, and feeling secure for which car was rated higher than bus. It was also shown that satisfaction with travel partially mediated the effect of travel mode on mood. Satisfaction with the day as a whole was however not influenced by travel mode when controlling for the mood effect of travel.

Network interconnectivity with competition and regulation

- Transportation Research Part A: Policy and Practice---2013---Jolian McHardy,Michael Reynolds,Stephen Trotter

A simple theoretical network model is introduced to investigate the problem of network interconnection. Prices, profits and welfare are compared under welfare

maximisation, network monopoly and a scenario with competition over one part of the network. Given that inducing actual competition may bring disbenefits such as cost duplication and co-ordination costs, we also explore the possibility of a regulator using the threat of entry on a section of the monopoly network in order to bring about the socially preferred level of interconnectivity. We show that there are feasible parameter values for which such a threat is plausible.

Preserving an aging transit fleet: An optimal resource allocation perspective based on service life and constrained budget

- Transportation Research Part A: Policy and Practice---2013---Sabyasachee Mishra,Sushant Sharma,Snehamay Khasnabis,Tom V. Mathew

Local, county and state level transit agencies with large fleets of buses and limited budgets seek a robust fund allocation mechanism to maintain service standards. However, equitable and optimal fund allocation for purchasing, operating and maintaining a transit fleet is a complex process. In this study, we develop an optimization model for allocation of funds among different fleet improvement programs within budget constraints over the planning period. This is achieved by minimizing the net present cost (NPC) of the investment within the constraint of a minimum level of fleet quality expressed as a surrogate of the remaining life of the fleet. Integer programming is used to solve the formulated optimization problem using branch and bound algorithm. The model formulation and application are demonstrated with a real world case study of transit agencies. It is observed that minimizing NPC provides a realistic way to allocate resources between different program options among different transit agencies while maintaining a desired quality level. The proposed model is generalized and can be used as a resource allocation tool for transit fleet management by any transit agency.

A review of models and model usage scenarios for an airport complex system

- Transportation Research Part A: Policy and Practice---2013---Paul Pao-Yen Wu,Kerrie Mengersen

Airports represent the epitome of complex systems with multiple stakeholders, multiple jurisdictions and complex interactions between many actors. The large number of existing models that capture different aspects of the airport are a testament to this. However, these existing models do not consider in a systematic sense modelling requirements nor how stakeholders such as airport operators or airlines would make use of these models. This can detrimentally impact on the verification and validation of models and makes the development of extensible and reusable modelling tools difficult.

Internet disclosure and corporate performance: A case study of the international shipping industry

- Transportation Research Part A: Policy and Practice---2013---Andreas Andrikopoulos,Anna Merika,Anna Triantafyllou,Andreas G. Merikas

Dissemination of information via corporate websites is considered to be desirable, because it constitutes a way round modes of market failure, such as asymmetric information in capital markets and agency problems. This paper explores the relationship between internet disclosure, profitability and financial structure in the shipping sector. Its value added lies in treating the disclosure–profitability relationship as a two-way relationship: while previous research concentrates on profitability as the main driver for greater internet disclosure, we argue that the higher the degree of internet disclosure of financial information, the more likely it is that the firm will experience enhanced profitability. Studying the websites of 171 international listed shipping corporations in 2010 we construct a disclosure index to measure the quantity of disseminated information for each firm in the sample and we explore the cross sectional determinants of disclosure performance.

Measuring corporate performance with profitability, we develop a simultaneous equation model and our GMM results produce evidence of a statistically significant positive relationship between the extent of internet disclosure and corporate performance. Our finding largely explains why shipping firms are keen on making more and more financial information available via the web and has significant policy implications for executives, as it suggests that greater internet disclosure is not a mere effect of sound financial performance, but also, and perhaps more importantly, a requirement for it.

Comprehensive evaluation of energy conservation and emission reduction policies

- Transportation Research Part A: Policy and Practice---2013---Todd Litman

Various transportation policies can help conserve energy and reduce pollution emissions. Some, called cleaner vehicle strategies in this article, reduce emission rates per vehicle-kilometer. Others, called mobility management (also called transportation demand management) strategies, reduce total vehicle travel. There is disagreement concerning which approach is best overall. Some studies conclude that cleaner vehicle strategies are generally most cost effective and beneficial, while others favor mobility management strategies. These different conclusions tend to reflect different analysis scope. Analyses that favor clean vehicle strategies tend to overlook or undervalue some significant impacts including cleaner vehicle rebound effects and mobility management co-benefits. More comprehensive analysis tends to favor mobility management. This article investigates these issues and provides specific recommendations for comprehensive evaluation.

A comprehensive study of life course, cohort, and period effects on changes in travel mode use

- Transportation Research Part A: Policy and Practice---2013---Joachim Scheiner,Christian Holz-Rau

This paper studies changes in people's travel mode use

from one year to the next. It is informed by three distinct discourses: travel behaviour change, the mobility biographies approach, and cohort analysis. The data used is the German Mobility Panel (GMP) 1994–2008 in which households and their members are asked three times in three subsequent years to report the trips they made over a week. The changes reported are regressed to key events over the life course, cohort effects and period effects, while various sociodemographic and spatial attributes are controlled. Due to the non-independent nature of panel observations, a cluster-robust regression approach is used. The findings suggest that behind the aggregate stability in travel mode use over time there is much change ‘under the surface’, induced by life course changes, individual and household sociodemographic, and spatial context. The changes found induced by life course related key events favour the notion of mobility biographies. However, taken over all key events seem to be relatively loosely associated with mode use changes. Nonetheless, various significant effects of baseline variables suggest that mode use may change even in the absence of a key event.

Consistency and fungibility of monetary valuations in transport: An empirical analysis of framing and mental accounting effects

- Transportation Research Part A: Policy and Practice---2012---Stephane Hess, Shepley Orr, Rob Sheldon

Governments around the world use monetised values of transport externalities to undertake project appraisal and cost–benefit analysis. However, because different types of benefits are monetised (e.g., travel time savings, preventing statistical fatalities, reliability, etc.) the question naturally arises as to whether they are consistent. That is, whether a “dollar is a dollar” as welfare economics requires, or whether spending money in one area carries a different disutility from spending money in another area. This would equate to a violation of fungibility, which is the property of a good or a commodity whose individual units are capable of mutual substitution. The view that money is not fungible is explained in behavioural economics

through theories of framing and mental accounting. This paper describes the results of a stated choice experiment designed to test the fungibility and consistency of monetary valuations in transport. From a nationally representative sample, we elicit direct values for the three pairwise trade-offs between travel time, travel cost, and safety. We then show that in the context of our analysis, any trade-offs inferred on the basis of other trade-offs, as is common practice (e.g. inferring a safety vs time trade-off on the basis of monetary valuations for time and safety), produces biased results, suggesting that the assumption of fungibility does not hold. Specifically, we find that time is valued more highly when valued directly by cost than when traded with safety, and the reverse is true for safety.

Modeling isoexposure to transit users for market potential analysis

- Transportation Research Part A: Policy and Practice---2012---Antonio Páez, Martin Trépanier, Catherine Morency

Transit operators face a difficult fiscal environment and an imperative to contribute to urban sustainability. Under these circumstances, operators must find innovative ways to make public transportation attractive to broader segments of the public, while simultaneously trying to raise revenue to reduce reliance on public subsidies. Development of commercial partnerships is seen as a promising way to achieve these goals. Previous research has examined the potential of using geodemographics to assist transit agencies in the task of identifying potential partners for developing mutually beneficial commercial agreements. In this paper we describe an approach to model isoexposure to transit users as a tool to assess market potential. The approach is based on the analysis of walking behavior of transit users, and specifically distance walked at the end of their transit trip. Spatial modeling is used to geographically project estimates of walking distance for a desired demographic profile at a specific transit facility. After expanding the estimates using sample weights, overlays of these estimates can be used to generate variations in exposure to transit travel-

ers at different locations in space. The approach is demonstrated using the case of Metro users in Montreal, Canada. The case study demonstrates the use of isoexposure profiles as a novel approach to generate marketing intelligence. This should be of interest to transit agencies and businesses interested in developing partnerships.

Modeling travel time reliability of freeways using risk assessment techniques

- Transportation Research Part A: Policy and Practice---2012---Huizhao Tu,Hao Li,Hans van Lint,Henk van Zuylen

Travel time reliability is considered to be one of the key indicators for the performance of transport systems and is measured in various ways. This paper synthesizes both reliability concepts: traffic breakdown, the indicator of the instability of travel times, is treated as the risk, whereas travel time variability, the indicator of the uncertainty of travel times, is considered as the consequence of this risk. An analytical formula, using risk assessment technique, explicitly expresses the cost of travel time unreliability as the sum of the products of the consequences (i.e. variability) and the corresponding probabilities of breakdown. It provides a novel measure of travel time reliability and is applicable in network performance evaluations. An empirical example based on a large dataset of freeway traffic flow data from loop detectors shows that the developed travel time reliability measure is both intuitively logical and consistent.

Allocation flexibility and price efficiency within Singapore' s Vehicle Quota System

- Transportation Research Part A: Policy and Practice---2012---Singfat Chu

Permit or license plate quotas are highly effective albeit controversial policy tools for managing growth in the vehicle population and thereby, adverse traffic congestion. A judicious distribution of the scarce permits that targets the dual objectives of price efficiency and social diversity in vehicle ownership can however

mitigate the controversy. This paper scrutinizes the attainment levels of these two objectives within Singapore' s multi-categorical Vehicle Quota System in two time periods (1991–1998 and 2002–2011) which differ in the number of permit allocation categories, the auction format used (sealed versus open bids) and in the frequency of distribution (monthly versus semi-monthly). The lessons derived are contrasted to the other two jurisdictions which have also implemented quotas on their vehicle registrations namely, Shanghai and Beijing.

Giving a direction to port regionalisation

- Transportation Research Part A: Policy and Practice---2012---Jason Monios,Gordon Wilmsmeier

As theoretical approaches to port development have advanced over the years, the role of the inland terminal has attracted increasing focus, particularly under the framework of port regionalisation. This paper will explore port regionalisation in different contexts through a greater focus on the drivers and direction of a number of inland terminal development strategies.

Evaluating the efficiency of the Essential Air Service program in the United States

- Transportation Research Part A: Policy and Practice---2012---Tony Grubestic,Fangwu Wei

Essential Air Service (EAS) is a federally funded program in the United States that provides connecting, commercial air service between rural communities and their nearest large or medium commercial hub airport. During fiscal year 2010, \$170million dollars were spent to provide this service to 107 communities in the US. However, with significant variations in subsidies to each airport (ranging from \$427,757 to \$3,082,403) and marked differences in passengers served, there are serious concerns regarding the overall efficiency of the EAS program. The purpose of this paper is to use data envelopment analysis integrated in a geographic information system for evaluating service efficiencies at the

community level. Policy implications and strategies to improve the EAS program are discussed.

A meta-analysis of DEA and SFA studies of the technical efficiency of seaports: A comparison of fixed and random-effects regression models

- Transportation Research Part A: Policy and Practice---2012---James Odeck,Svein Bråthen

This paper presents a meta-analysis of variations in seaports' Mean Technical Efficiency (MTE) scores based on 40 studies published in refereed academic journals. We link the variation in estimated MTE scores to differences in the following factors: the frontier methodology used, which essentially are the Data Envelopment Analysis (DEA) and the Stochastic Frontier Analysis (SFA); regions where seaports are situated; type of data used; number of observations; and the total number of variables used. Furthermore, we compare fixed-effects against a random-effects regression model where the latter assumes that the individual study specific characteristics matter while the former assumes that there is one general tendency across all studies. We present several findings based on the data: (1) the random-effects model outperforms the fixed effects model in explaining the variations in MTEs, (2) recently published studies have lower MTE scores as compared with earlier published studies, (3) studies that used nonparametric DEA models depict higher MTE scores as compared with those that used SFA models, (4) panel data studies have lower TE scores as compared with cross-sectional data, and (5) studies using European seaport data produce lower MTE scores when compared with the rest of the world. Finally, our results contradict some previous meta-analysis studies of TE scores. We encourage the use of random-effects models in meta-analysis studies because they account for individual study specific effects.

Assessing the long term benefit of banning the use of hand-held wireless devices while driving

- Transportation Research Part A: Policy and Practice---2012---Sheldon H. Jacobson,Douglas M. King,Kevin C. Ryan,Matthew J. Robbins

An increasing number of legislative efforts have been undertaken to prohibit the use of hand-held wireless devices while driving. As of July 2012, ten states and the District of Columbia enforce laws banning the use of hand-held cell phones while driving. Thirty-nine states and the District of Columbia have banned text messaging while driving. Recent studies of driver behavior suggest that hand-held wireless device usage negatively impacts driver performance. However few studies at the aggregate level address the plausible link between the use of hand-held wireless devices while driving, increased risk of automobile accidents, and government legislative efforts to reduce such risk. This paper analyzes data at the aggregate level and builds a regression model to estimate the long term accident rate reduction due to a hand-held ban. This model differs from previous studies, which consider short term accident rate reduction, by considering time trends in the accident rate due to the ban. Additionally, counties considered in this analysis are placed into groups based on driver density, defined by the number of licensed drivers per centerline mile of roadway, and a separate analysis is performed within these groups. This approach allows one to better quantify the effect of hand-held bans in counties of different driver densities. Results from this paper suggest that bans on hand-held wireless device use while driving reduce the rate of personal injury accidents in counties with high levels of driver density, but may increase accident rates in counties with low driver density levels. These results can inform transportation policymakers interested in reducing automobile-accident-risk attributable to the use of hand-held wireless devices while driving.

Attitudes, mode switching behavior, and the built environment: A longitudinal study in the Puget Sound Region

- Transportation Research Part A: Policy and Practice---2012---Tingting Wang,Cynthia Chen

Carpooling in the US has a storied history. After experiencing a peak 20% mode share in 1980, the current share of carpooling for work trips is about 10% and the majority of these carpooling trips are made by

intra-household members. Casting the choice between SOV and carpool as a social dilemma in which SOV is a noncooperative choice and carpool is a cooperative one, we propose to test two hypotheses. First, the switch from SOV to carpool and the reverse choice are attributed to different factors—structural factors, or those factors altering the objective features of a decision scenario such as travel time and travel cost, play a dominant role in the switch from carpool to SOV while psychosocial factors (attitudes and beliefs) play a critical role in the switch from SOV to carpool. Second, the two choices are underlaid by different behavioral mechanisms. In particular, we expect self-justification by carpool-to-SOV switchers—after they switch from carpool to SOV, they adjusted their attitudes toward carpool accordingly to match their behavior. The analysis of the first three waves of the Puget Sound Transportation Panel supports these two hypotheses. Our study results recommend developing programs and policies that aim at influencing people’s subjective assessments of carpooling, in addition to the existing ones that mostly focus on incentivizing carpooling, and differentiating between programs seeking to encourage SOV users to switch to carpool and those aiming to maintain existing carpoolers.

Step-tolling with price-sensitive demand: Why more steps in the toll make the consumer better off

- Transportation Research Part A: Policy and Practice---2012---Vincent van den Berg

Most dynamic models of congestion pricing use fully time-variant tolls. However, in practice, tolls are uniform over the day, or at most have just a few steps. Such uniform and step tolls have received surprisingly little attention from the literature. Moreover, most models that do study them assume that demand is insensitive to the price. This seems an empirically questionable assumption that, as this paper finds, strongly affects the implications of step tolling for the consumer. In the bottleneck model, first-best tolling has no effect on the generalised price, and thus consumer surplus remains the same as without tolling. Conversely, under

price-sensitive demand, step tolling increases the price, making the consumer worse off. The more steps the toll has, the closer it approximates the first-best toll, thereby increasing the welfare gain and making consumers better off. This indicates the importance for real-world tolls to have as many steps as possible: this not only raises welfare, but may also increase the political acceptability of the scheme by making consumers better off.

Comparative performance of alternative humanitarian logistic structures after the Port-au-Prince earthquake: ACEs, PIEs, and CANs

- Transportation Research Part A: Policy and Practice---2012---José Holguín-Veras, Miguel Jaller, Tricia Wachtendorf

The paper analyzes the performance of different post-disaster humanitarian logistic structures that arose in response to the Port-au-Prince earthquake of January 12th, 2010. Based on field work conducted by the authors, the paper defines a typology of structures; assesses their relative performance in terms of delivering relief aid; and identifies the causes that explain the differences between them. Three structures are defined for comparative purposes: Agency Centric Efforts (ACEs), Partially Integrated Efforts (PIEs), and Collaborative Aid Networks (CANs). These structures differ to the extent to which they are integrated with the local social networks during the relief effort. Representative examples were analyzed to illustrate their inherent strengths and weaknesses, and reach conclusions of general applicability. The authors strengthen the analyses with discussions of “comparables,” i.e., other cases not fully discussed in the paper that shed additional light onto the performance of the structures.

An analysis of destination choice for opaque airline products using multidimensional binary logit models

- Transportation Research Part A: Policy and Practice---2012---Misuk Lee, Alexandre Khe-

lifa,Laurie A. Garrow,Michel Bierlaire,David Post

We investigate how customers respond to an opaque airline product offered by a European carrier. In this opaque product design, customers are randomly assigned to travel to one of approximately ten destinations; however, for a fee they may exclude one or more destinations from the choice set (or a particular package design) prior to learning which destination they will travel to. We use a multidimensional binary logit model to predict the probability that one or more alternatives will be chosen by a customer. Results show that customers are more likely to pay to exclude destinations located close to the origin airport and destinations that speak the same language as the origin airport. Length of stay, cost of living at the destination, and measures of destination attractiveness are also found to be significant predictors for some package designs. Based on these findings, we offer general recommendations for how to design opaque packages for airline customers.

Triangulation of two methods measuring the impacts of a free-floating carsharing system in Germany

- Transportation Research Part A: Policy and Practice---2012---Jörg Firnkorn

This article reports on two different methods applied in the same survey (N=1881) to measure the impact of the carsharing system car2go on other transportation modes in Ulm, Germany. The first method calculated how the mobility behavior of respondents would hypothetically be at the present time if car2go was not available. The second method determined the respondents' past mobility behavior before using car2go. Confounding circumstances were corrected in both approaches through different mechanisms. Comparable methods calculating carsharing impacts have only been applied individually in past studies. This is the first study applying two measurement methods within the same survey, which enables a triangulation. As other influencing parameters were equal (e.g. sampling frame,

nonresponse bias, mode of asking, point in time of the survey), the deviating results are assumed to have resulted from the different measurement techniques. The findings indicate a primacy effect (disproportionally high selection of first answer options) having influenced the first measurement and an overestimation of the impact on total kilometers travelled in the second measurement. The comparative findings of this dual-measurement could contribute to research designs of greater precision in future work on carsharing impacts.

Revisiting reference point formation, gains–losses asymmetry and non-linear sensitivities with an emphasis on attribute specific treatment

- Transportation Research Part A: Policy and Practice---2012---Amanda Stathopoulos,Stephane Hess

In contrast with expected utility theory, empirical findings indicate that decision-makers are sensitive to departures from reference points rather than states. Several tests of the reference-dependent preference framework have been carried out in experimental economics, and to a smaller extent in a choice modelling setting, to date. However, these empirical applications have generally focussed on a single behavioural phenomenon using uniform modelling approaches. This paper aims to broaden existing work by presenting a multi-attribute framework, allowing contemporarily for gains–losses asymmetry, non-linearity and testing for several possible reference points. The framework is applied in the context of commuter choices and reveals important gains in model fit and further insights into behaviour compared to standard modelling approaches. Of particular relevance for future research is the functional form of fare sensitivity that varies significantly with the reference point used.

Evaluating bicycle-transit users' perceptions of intermodal inconvenience

- Transportation Research Part A: Policy and Practice---2012---Yung-Hsiang Cheng,Kuo-Chu Liu

Bicycles and transit systems are considered to be the pinnacle of green transportation. The combined use of the two could provide a competitive alternative for an integrated, green, and seamless service, yet relatively few studies have investigated the multimodal integration problems of the entire service chain from the perspective of users. Users' perceived inconvenience during travel can be regarded as a latent construct that describes an unobservable and immeasurable characteristic. Nevertheless, the traditional Likert method in an ordinal scale causes a misleading statistical inference. The Rasch model eliminates such bias generated by an ordinal scale through a logistic linear transformation, and it compares person parameters with item parameters, which are then subjected to a logarithmic transformation along a logit scale to clearly identify which service items' inconvenience cannot be easily overcome by certain users. This empirical study demonstrates that perceived inconveniences differ based on the users' sex, riding frequency, trip purpose, and environmental awareness. The differential item functioning analysis that was adopted in this study can identify the critical factors leading to the differences in perceived inconvenience. Our empirical results suggest that a male cyclist who is a commuter with a high monthly riding frequency and who is environmentally conscious has a better ability than their counterpart to overcome perceived inconveniences during travel using a bicycle-transit service. To effectively mitigate users' perceived inconvenience, the Rasch analytical results suggest that the improvement of the intra-transit system factors in the short term and the improvement of external environmental factors in the long term will be successful. The information herein proves useful for transportation planners and policy makers when considering the special travel needs of certain groups to create a user-friendly bicycle-transit travel environment that promotes its usage.

A hedonic test of the effects of the Alternative Motor Fuels Act

- Transportation Research Part A: Policy and Practice---2012---Yimin Liu,Gloria E. Helfand

Under the Alternative Motor Fuels Act (AMFA), vehicles that run on ethanol, methanol, or natural gas get extra credits in the calculation of Corporate Average Fuel Economy (CAFE). This paper uses hedonic techniques to examine the effect of production of alternative-fuel vehicles (AFVs) on the implicit price of fuel economy. This study finds that, after AFVs came to market, the marginal value of fuel economy from companies producing them decreased. This finding suggests that manufacturers who produced AFVs were willing to offer a lower price for fuel economy, because automakers had an additional way to achieve fuel economy standards beyond improving the fuel efficiency of conventional cars. These findings bolster the argument that a major role of the AMFA credit for AFVs is to allow automakers to increase their production of fuel-inefficient vehicles.

Relationship between service quality and demand for inter-urban buses

- Transportation Research Part A: Policy and Practice---2012---Marta Rojo,Hernán Gonzalo-Orden,dell' Olio, Luigi,Ángel Ibeas

This article proposes a model for analysing the modal choice of travellers making inter-urban journeys. Discrete choice models with systematic and random tastes variation were applied to find the most relevant variables for encouraging the use of public transport by bus rather than private car. This research follows on from the results of previous user satisfaction studies on inter-urban bus services in the province of Burgos (Spain). Willingness to pay is also estimated for time savings or other improvements in the bus service.

Where do cyclists ride? A route choice model developed with revealed preference GPS data

- Transportation Research Part A: Policy and Practice---2012---Joseph Broach,Jennifer Dill,John Gliebe

To better understand bicyclists' preferences for facility types, GPS units were used to observe the behavior of 164 cyclists in Portland, Oregon, USA for several

days each. Trip purpose and several other trip-level variables recorded by the cyclists, and the resulting trips were coded to a highly detailed bicycle network. The authors used the 1449 non-exercise, utilitarian trips to estimate a bicycle route choice model. The model used a choice set generation algorithm based on multiple permutations of path attributes and was formulated to account for overlapping route alternatives. The findings suggest that cyclists are sensitive to the effects of distance, turn frequency, slope, intersection control (e.g. presence or absence of traffic signals), and traffic volumes. In addition, cyclists appear to place relatively high value on off-street bike paths, enhanced neighborhood bikeways with traffic calming features (aka “bicycle boulevards”), and bridge facilities. Bike lanes more or less exactly offset the negative effects of adjacent traffic, but were no more or less attractive than a basic low traffic volume street. Finally, route preferences differ between commute and other utilitarian trips; cyclists were more sensitive to distance and less sensitive to other infrastructure characteristics for commute trips.

Estimating traffic demand risk – A multiscale analysis

- Transportation Research Part A: Policy and Practice---2012---Niclas Krüger

This paper proposes a novel method for estimating the traffic demand risk associated with transportation. Using mathematical properties of wavelets, we develop a statistical measure of traffic demand sensitivity with respect to GDP. This measure can be adapted in a flexible way to capture risk levels relevant for different investment horizons. We demonstrate the timescale decomposition of risk with Swedish traffic demand data for 1950–2005. In general, rail transport shows a stronger co-movement with GDP than road transport. Moreover, we examine the volatility exhibited by traffic demand. Our findings suggest that rail investments are more risky than road investments. Since the findings can be used for optimal investment timing and for choice between public investment alternatives, they are deemed important for public policy in general.

Combining technology development and behaviour change to meet CO2 cumulative emission budgets for road transport: Case studies for the USA and Europe

- Transportation Research Part A: Policy and Practice---2012---Stephen Skippon, Shoba Veer-araghavan, Hongrui Ma, Paul Gadd, Nigel Tait

Global temperature rise over the long term will be proportional to the total amount of CO2 emitted. Any given probability of exceeding a targeted maximum temperature rise implies a maximum limit on the cumulative total of CO2 that can be emitted: a CO2 “budget”. This paper describes an approach to modelling cumulative emissions from light and heavy duty road transport from the present to 2050, focussing on the USA and Europe, and comparing the potential impacts of a range of technological and behaviourally-based abatement measures with such cumulative emissions budgets.

The private and social cost efficiency of port hinterland container distribution through a regional logistics system

- Transportation Research Part A: Policy and Practice---2012---Fedele Iannone

Increasingly, the debate on freight transport and logistics involves the challenge of sustainable development. Key objectives of sustainable or “green” freight logistics systems are the mitigation of negative environmental and human health effects of distribution operations and the realization of a major modal shift in transport preferences, while at the same time achieving internal generalized cost efficiency and quality of services. Pursuing these goals requires the introduction of a range of measures. These measures call for private and public actors to take up various initiatives and adopt policies. Usually, it is more effective to combine different actions into an integrated package of measures than to introduce single instruments in isolation.

Estimating the costs of political populism: Traffic violation pardons in Korea

- Transportation Research Part A: Policy and Practice---2012---Youngsun Kwon,Seung Hun Han,Changi Nam

Since 1995, four presidents have granted six traffic violation pardons in Korea, and 24.6 million individuals have been the beneficiaries of these pardons. The objective of this paper is to explore how costly traffic violation pardons are by finding out the effects of traffic violation pardons on traffic accidents, and then estimating the economic costs caused by traffic violation pardons. Traffic violation pardons have the effect of raising traffic accidents by 4.3% and 3.6% per year and the economic costs of traffic accidents by 4.2% and 3.5% per year for two consecutive years after the pardons are granted.

Ex-post analysis of impacts of the car registration fee in the Czech Republic

- Transportation Research Part A: Policy and Practice---2012---Jarmila Zimmermannova

Currently, the influence of transportation and its impact on environmental indicators throughout the world are increasing; however, governments of particular countries try to implement new economic instruments with the expectations of changing people's behaviour or at least environmental parameters of the motor vehicle fleet. The Government of the Czech Republic introduced a new economic instrument, which came into force on 1 January 2009 and was inspired by similar environmental taxes in Member States of the European Union – the car registration fee, which is based on emission parameters of cars. The main target of this fee has been to change the structure of the passenger car fleet in the Czech Republic, particularly to support new registrations of new passenger cars with better environmental characteristics and to decrease the share of new registrations of used passenger cars. This article focuses on an ex-post analysis of impacts of the car registration fee on the structure of the passenger car fleet

in the Czech Republic and its environmental characteristics in the first 3 years after the legal mandate of the fee. The case study is based on a correlation analysis and an analysis of statistical data from official sources in the Czech Republic. The impacts of the car registration fee on both the structure of the passenger car fleet in the Czech Republic and the environmental characteristics of new registrations are significant. For the first time since 2004, the number of new registrations of new cars was higher in the period 2009–2011 than the number of new registrations of used cars. Moreover, the share of alternative fuel cars in the passenger car market is increasing and the emissions from private car transport are decreasing.

Valuing of attributes influencing the attractiveness of suburban train service in Mumbai city: A stated preference approach

- Transportation Research Part A: Policy and Practice---2012---Debasis Basu,John Douglas Hunt

The paper presents valuing of qualitative and quantitative travel attributes influencing the attractiveness of suburban train service in Mumbai city, India. A stated preference experiment is designed to capture the data of sub-urban train mode choice behavior. The behavioral data are analyzed using different modeling techniques such as multinomial logit (MNL) and mixed logit (ML). In ML model, the random parameters are assumed to follow constrained triangular distribution, where mean equals its spread. The decomposition of preference heterogeneity around the mean estimate of random parameter is also investigated using ML model. The study shows the influence of headway time and train ride time associated with a particular crowding level (expressed in density of standing passengers/m²) in choosing the sub-urban train mode by calculating their willingness-to-pay (WTP) values and highlights the importance of WTP for addressing policy issues in the reduction of in-vehicle crowding level. The present study documents new findings of the effect of crowding level on train ride time in the context of a developing country and suggests some important directions for

future suburban train transport crowding valuation research.

Spatial multi-criteria assessment of potential lead markets for electrified vehicles in Europe

- Transportation Research Part A: Policy and Practice---2012---Alyona Zubaryeva,Christian Thiel,Nicola Zaccarelli,Enrico Barbone,Arnaud Mercier

This study presents a modeling approach that focuses on the identification of potential lead markets for electric-drive vehicles (EDVs) in Europe. It is based on a combination of several selected economic, social, environmental, and transport-related factors. The modeling approach is implemented in a GIS-based multi-criteria decision support process with fuzzy measures, enabling an assessment at different spatial and temporal scales under different EDV market penetration scenarios for Europe. The decision support system embeds a multi-criteria analysis based on selected expert-weighted market penetration drivers. The spatial scale chosen for the application of the decision support process are NUTS2 regions and cities within EU27 member states. Three scenarios are investigated, a business as usual, a moderate change, and an accelerated innovation scenario. Across the scenario horizon, it is shown how lead regions for EDVs will be changing in time between first early-adopter areas towards other long-term potential lead regions, depending on the evolution of the market drivers. The European regions and cities which will have a higher lead market potential score in 2020 and 2030 are identified. Our model solution suggests that with the business-as-usual scenario there will be a few insular lead market areas in 2020 and a relatively limited number of more connected lead regions in 2030. The other two scenarios explored suggest a more positive picture leading for the case of the 2030 accelerated scenario to a wide distribution of EDVs across most of Germany, the Netherlands, France, the UK, Ireland, and Italy. The cities of London, Madrid, Berlin and Rome would show high EDV sales under this scenario.

Effects of different factors on drivers' guidance compliance behaviors under road condition information shown on VMS

- Transportation Research Part A: Policy and Practice---2012---Shiquan Zhong,Lizhen Zhou,Shoufeng Ma,Ning Jia

It is generally accepted that compliance behavior is affected by many factors. The purpose of this study is to investigate the effects of diverse factors on drivers' guidance compliance behaviors under road condition information shown on graphic variable message sign (VMS), and based on this to find out a better information release mode. The involved data were obtained from questionnaire survey, and ordinal regression was used to analyze the casual relation between guidance compliance behavior and its influencing factors. Based on an overall analysis of conditions in driver' s route choice, an accurate method was proposed to calculate the compliance rate. The model testing information indicated that ordinal regression model with complementary log-log being the link function was appropriate to quantify the relation between the compliance rate and the factors. The estimation results showed that age, driving years, average annual mileage, monthly income, driving style, occupation, the degree of trust in VMS, the familiarity with road network and the route choice style were significant determinants of guidance compliance behavior. This paper also compared two different guidance modes which were ordinary guidance mode (M1) and predicted guidance mode (M2) through simulation. The average speed fluctuations and average travel time supported that M2 had better effect in improving traffic flow and balancing traffic load and resource. Some detailed suggestions of releasing guidance information were proposed with the explanation by flow-density curve and variation of traffic flows. These findings are the foundation to design and improve guidance systems by assessing guidance effect and modifying guidance algorithm.

The design of interurban bus networks in city centers

- Transportation Research Part A: Policy and Practice---2012---Mireia Roca-Riu,Miquel Estrada,César Trapote

This paper proposes a bilevel formulation for solving the Bus Network Design Problem (BNDP) of interurban services entering a major city. It is focused in interurban services because it is a growing problem in most of major cities, yet new in the literature. The layout of interurban bus routes and the locations of transfer stations in the main city are the key factors to provide a competitive public transportation service to commuters in a metropolitan area. The number of commuters in huge urban concentrations is growing due to the difficulties of living near the city center. The objective function of the first level is defined with the aim of reducing user and agency costs. In the second level the performance of users is addressed. Furthermore, a local search method based on the Tabu Search algorithm was carried out to guide the exploration in the solution domain. The results obtained in a set of test problems have demonstrated that the restart parameters of the algorithm play a significant role in the efficiency of the algorithm. Finally, implementation in the large network of Barcelona (Spain) reduces the total cost by 5% with regard to the present situation.

Effectiveness of safety-based incentives in Public Private Partnerships: Evidence from the case of Spain

- Transportation Research Part A: Policy and Practice---2012---Thais Rangel,José Manuel Vassallo,Blanca Arenas

Many countries around the world are implementing Public-Private-Partnership (PPP) contracts to manage road infrastructure. In some of these contracts the public sector introduces economic incentives to the private operator to foster the accomplishment of social goals. One of the incentives that have been introduced in some PPP contracts is related to safety in such a way that the better the safety outcome the greater will be

the economic reward to the contractor. The aim of this paper is at identify whether the incentives to improve road safety in highway PPPs are ultimately effective in improving safety ratios. To this end Poisson and negative binomial regression models have been applied using information from highway sections in Spain. The findings indicate that even though road safety is highly influenced by variables that are not much controllable by the contractor such as the Average Annual Daily Traffic and the percentage of heavy vehicles, the implementation of safety incentives in PPPs has a positive influence in the reduction of fatalities, injuries and accidents.

Assessing air quality and health benefits of the Clean Truck Program in the Alameda corridor, CA

- Transportation Research Part A: Policy and Practice---2012---Gunwoo Lee,You, Soyoung (Iris),Stephen G. Ritchie,Jean-Daniel Saphores,R. Jayakrishnan,Oladele Ogunseitan

In this paper, vehicle microscopic simulation and emission models were combined with an air pollutant dispersion model and a health assessment tool to quantify some social costs resulting from urban freight transportation in the Alameda corridor that links the Ports of Los Angeles and Long Beach to downtown Los Angeles. Traffic on two busy freeways, the I-710 and the I-110, and some heavily trafficked arterial roads was analyzed to estimate the health impacts caused by drayage truck emissions of particulate matter (PM) for four different years: 2005, which serves as a baseline for various pollution inventories, as well as 2008, 2010 and 2012. These years correspond to deadlines for the Clean Truck Program (CTP), which was put in place to improve air quality in the Alameda corridor. Results show that the health costs from particulate matter (PM) emitted by drayage trucks exceeded 440million dollars in 2005. However, these costs decreased by 36%, 90%, and 96% after accounting for the requirements of the 2008, 2010, and 2012 CTP deadlines. These results quantify the magnitude of the social costs generated by drayage trucks in the Alameda corridor, suggest that these costs justified replacing drayage trucks operat-

ing there, and indicate that the Clean Truck Program likely exceeded its target.

Redefining activity types: Who participates in which leisure activity?

- Transportation Research Part A: Policy and Practice---2012---Gulsah Akar,Kelly J. Clifton,Sean T. Doherty

This paper analyzes the activity choices of individuals and the links between socio-demographics, daily schedules and activity attributes using a new activity choice framework. Activities are first clustered into groups based on their salient attributes, such as duration, frequency, flexibility, planning times, and number of involved persons, rather than their functional types (work, leisure and household obligations), using a K-means cluster technique. This led to the creation of several new activity groups such as “long, temporally fixed, personally flexible activities” , “short and flexible activities” . These activity groups form the choice set for the mixed logit activity choice modeling structure developed for the leisure activities in the second part of the paper. The model results reveal the significant relationships between socio-demographics, temporal characteristics, and characteristics of the schedules on leisure activity choice. The results demonstrate how changing demographics and other activities in individuals’ schedules may affect the nature of the leisure activities and present the substitution and complimentary effects that these new activity groups have on one another.

Optimal distribution of financial incentives to foster off-hour deliveries in urban areas

- Transportation Research Part A: Policy and Practice---2012---Michael A. Silas,José Holguín-Veras,Sergio Jara-Díaz

The main objective of this paper is to develop mathematical formulations to gain insight into the best way to distribute financial incentives to receivers of urban deliveries to maximize participation in off-hour deliveries. The paper considers two different types of

incentive budgets: exogenous, and endogenous. The exogenous case represents the condition in which an external decision maker determines the incentive budget that is to be distributed among potential participants in off-hour deliveries. In the case of an endogenous incentive budget, the entity distributing the incentives must raise the necessary funds using revenue generation mechanisms such as tolls and fines. The optimal incentives are obtained from the Karush–Kuhn–Tucker conditions of a mathematical program that maximizes the number of truck trips shifted to the off-hours as a function of the incentives. The mathematical models developed in this paper provide guidelines about how to optimally distribute financial incentives to foster off-hour deliveries.

Developing green fleet management strategies: Repair/retrofit/replacement decisions under environmental regulation

- Transportation Research Part A: Policy and Practice---2012---Timon H. Stasko,H. Oliver Gao

The considerable cost of maintaining large fleets has generated interest in cost minimization strategies. With many related decisions, numerous constraints, and significant sources of uncertainty (e.g. vehicle breakdowns), fleet managers face complex dynamic optimization problems. Existing methodologies frequently make simplifying assumptions or fail to converge quickly for large problems. This paper presents an approximate dynamic programming approach for making vehicle purchase, resale, and retrofit decisions in a fleet setting with stochastic vehicle breakdowns. Value iteration is informed by dual variables from linear programs, as well as other bounds on vehicle shadow prices. Sample problems are based on a government fleet seeking to comply with emissions regulation. The model predicts the expected cost of compliance, the rules the fleet manager will use in deciding how to comply, and the regulation’ s impact on the value of vehicles in the fleet. Stricter regulation lowers the value of some vehicle categories while raising the value of others. Such insights can help guide regulators, as well as the fleet managers they oversee. The methodologies

developed could be applied more broadly to general multi-asset replacement problems, many of which have similar structures.

The value of travel time and reliability-evidence from a stated preference survey and actual usage

- Transportation Research Part A: Policy and Practice---2012---Prem Chand Devarasetty,Mark Burris,W. Shaw

This research examined travel behavior of Managed Lane (ML) users to better understand the value travelers place on travel time savings and travel time reliability. We also highlight the importance of survey design techniques. These objectives were accomplished through a stated preference survey of Houston's Katy Freeway travelers. Three stated choice experiment survey design techniques were tested in this study: Bayesian (Db) efficient, random level attribute generation, and an adaptive random approach. Mixed logit models were developed from responses using each of those designs. The value of travel time savings (VTTSs) estimates do vary across the design strategies, with the VTTS estimates based on the Db-efficient design being approximately half the estimates from the other two designs. However, among the three design strategies, the value of travel time reliability (VOR) was only significant in the Db-efficient design.

The influence of individual's risk perception and attitudes on travel behavior

- Transportation Research Part A: Policy and Practice---2012---Wafa Elias,Yoram Shiftan

This study analyzes the effect of individuals' risk perception of being involved in road crashes, awareness of the negative environmental effects of transportation, knowledge of environmental problems, fatalistic beliefs, attitudes toward various public transport (PT) features, and beliefs on their level of intention to shift from car to public transportation and walking. It attempts to examine the potential of transport policies to improve PT systems and the pedestrian road safety

level by bettering traffic arrangements on the intention to shift from car to PT and walking. The study uses an integrated approach consisting of a descriptive analysis; a factor analysis to create attitudinal factors; and an intention model that is developed, based on a stated-preference survey, with attitudinal factors among the explanatory variables, in regard to the use of public transportation for commuting. The approach, set within a theoretical framework that is also developed, is applied to a case study of Arab cities in the Galilee region of northern Israel. The results support the hypothesis that perception of the risk of being involved in road crashes positively affects sustainable travel behavior, as expressed by the level of intention to use public transport; concern for and knowledge of environmental problems, in contrast, exerts no significant effect on the intention to shift to PT. The results showed that people have a higher intention to shift to public transport for work trips than for other purposes. Improving the PT system and the pedestrian road-safety level promote the intention to shift to PT, in particular for commute trips.

Using structural equations modeling to unravel the influence of land use patterns on travel behavior of workers in Montreal

- Transportation Research Part A: Policy and Practice---2012---João de Abreu e Silva,Catherine Morency,Konstadinos G. Goulias

This paper addresses the relations between travel behavior and land use patterns using a Structural Equations Modeling (SEM) framework. The proposed model structure draws on two earlier models developed for Lisbon and Seattle which show significant effects of land use patterns on travel behavior. The travel behavior variables included here are multifaceted including commuting distance, car ownership, the amount of mobility by mode (car, transit and non-motorized modes), both in terms of total kilometers travelled and number of trips. The model also includes a travel scheduling variable, which is the total time spent between the first and last trips to reflect daily constraints in time allocation and travel.

Real-time partway deadheading strategy based on transit service reliability assessment

- Transportation Research Part A: Policy and Practice---2012---Bin Yu,Zhongzhen Yang,Shan Li

This paper presents a partway deadheading strategy for transit operations to improve transit service of the peak directions of transit routes. This strategy consists of two phases: reliability assessment of further transit service and optimization of partway deadheading operation. The reliability assessment of further transit service, which is based on the current and recent service reliability, is used to justify whether or not to implement a partway deadheading operation. The objective of the second phase is to determine the beginning stop for a new service for the deadheaded vehicle by maximizing the benefit of transit system. A heuristic algorithm is also defined and implemented to estimate reliability of further transit service and to optimize partway deadheading operation. Then, the partway deadheading strategy proposed in this paper is tested with the data from a transit route in Dalian city of China. The results show the partway deadheading strategy with the reasonable parameters can improve transit service.

From broken windows to a renovated research agenda: A review of the literature on vandalism and graffiti in the rail industry

- Transportation Research Part A: Policy and Practice---2012---Kirrilly Thompson,Naomi Offler,Lily Hirsch,Danielle Every,Matthew J. Thomas,Drew Dawson

The execution of vandalism and graffiti on rail property has a significant impact on rail authorities, the patronisation of rail services, expenditure, and the timely operation of services. There are also important social costs which stem from passengers feeling unsafe, not to mention the environmental costs of removing graffiti and repairing vandalism. In this review paper, we focus on the social, non-technical determinants of and deterrents to vandalism and graffiti in the rail

industry. First, we consider the definitions of graffiti and vandalism that are often conflated. After providing some clarification on terminology, and proposing a media-centred approach to vandalism and graffiti, we consider various theorisations of the psychosocial determinants of vandalism and graffiti behaviour. We then turn to an empirical discussion of different technical and social, non-technical prevention programmes that have been trialled. With a focus on identifying what works and under what circumstances, we refer to international case studies of successful vandalism reduction initiatives from Europe, the United Kingdom, the United States of America and Australia. Based on a review of literature and practice, we outline a future research agenda to address vandalism and graffiti. We recommend lines of further research covering: theory, empirical data collection and practical initiatives. Specifically, we note the need for a trans-theoretical model of vandalism and graffiti, further ethnographic research and improved evaluation and benchmarking strategies. This is the first review dedicated to the topic of vandalism and graffiti in the rail industry and the first review of non-technical, social deterrents to vandalism and graffiti broadly.

A dynamic cordon pricing scheme combining the Macroscopic Fundamental Diagram and an agent-based traffic model

- Transportation Research Part A: Policy and Practice---2012---Nan Zheng,Rashid A. Waraich,Kay W. Axhausen,Nikolas Geroliminis

Pricing is considered an effective management policy to reduce traffic congestion in transportation networks. In this paper we combine a macroscopic model of traffic congestion in urban networks with an agent-based simulator to study congestion pricing schemes. The macroscopic model, which has been tested with real data in previous studies, represents an accurate and robust approach to model the dynamics of congestion. The agent-based simulator can reproduce the complexity of travel behavior in terms of travelers' choices and heterogeneity. This integrated approach is superior to traditional pricing schemes. On one hand, traffic simu-

lators (including car-following, lane-changing and route choice models) consider travel behavior, i.e. departure time choice, inelastic to the level of congestion. On the other hand, most congestion pricing models utilize supply models insensitive to demand fluctuations and non-stationary conditions. This is not consistent with the physics of traffic and the dynamics of congestion. Furthermore, works that integrate the above features in pricing models are assuming deterministic and homogeneous population characteristics. In this paper, we first demonstrate by case studies in Zurich urban road network, that the output of a agent-based simulator is consistent with the physics of traffic flow dynamics, as defined by a Macroscopic Fundamental Diagram (MFD). We then develop and apply a dynamic cordon-based congestion pricing scheme, in which tolls are controlled by an MFD. And we investigate the effectiveness of the proposed pricing scheme. Results show that by applying such a congestion pricing, (i) the savings of travel time at both aggregated and disaggregated level outweigh the costs of tolling, (ii) the congestion inside the cordon area is eased while no extra congestion is generated in the neighbor area outside the cordon, (iii) tolling has stronger impact on leisure-related activities than on work-related activities, as fewer agents who perform work-related activities changed their time plans. Future work can apply the same methodology to other network-based pricing schemes, such as area-based or distance-traveled-based pricing. Equity issues can be investigated more carefully, if provided with data such as income of agents. Value-of-time-dependent pricing schemes then can also be determined.

Welfare effects of road pricing and traffic information under alternative ownership regimes

- Transportation Research Part A: Policy and Practice---2012---Sergejs Gubins,Erik Verhoef,Thomas Graaff

This paper models strategic interactions between a road supplier, a provider of traffic information, and road users, with stochastic travel times. Using a game-theoretical analysis of suppliers' pricing strategies, we assess the social welfare effects of traffic information

under various ownership regimes. The results show that the distortive welfare effect of monopolistic information pricing appears relatively small. Collusion of the road operator and information provider yields higher social welfare than independent pricing by two firms. The intuition behind this result resembles that behind the welfare effects of double marginalization, but is not exactly the same, as traffic information is not strictly complementary to road use.

Identifying the early adopters of alternative fuel vehicles: A case study of Birmingham, United Kingdom

- Transportation Research Part A: Policy and Practice---2012---Amy R. Campbell,Tim Ryley,Rob Thring

The transport sector has been identified as a significant contributor to greenhouse gas emissions. As part of its emissions reduction strategy, the United Kingdom Government is demonstrating support for new vehicle technologies, paying attention, in particular, to electric vehicles.

Financing congressional earmarks: Implications for transport policy and planning

- Transportation Research Part A: Policy and Practice---2012---Gian-Claudia Sciara

This research documents the primary strategies used by the US Congress to fund transportation earmarks from the early 1990s to the mid-2000s. It draws on careful analysis of funding bills and primary and secondary sources including government reports, industry and policy newsletters, scholarly articles, and publicly available data on earmarks. It is also informed by interviews with transportation stakeholders involved with earmarks at federal, state, and regional levels. By detailing how Congress pays for earmarks, I show that earmarks do more to redistribute than add to existing transportation resources, and that the intricacy of Congressional funding maneuvers can make earmarks' fiscal impacts hard to discern. Several

implications follow for transportation policy and practice. First, critiques that earmarks increase federal transportation spending are misplaced. While such claims make it easy to discredit national investment in transportation, skepticism is in order when earmarks are invoked to throw out the baby with the bathwater. Second, earmarks' true costs are related not to increased deficits but rather to opportunity costs incurred when unplanned earmarks replace other investments, particularly projects identified through regional and state planning or competitive selection by an executive agency. Finally, this work suggests productive directions for future earmark reform, such as limiting earmarks to projects in regional or state plans and making explicit for any earmarks in a bill the funding mechanisms that support them. Such steps could lessen the opportunity costs (and administrative inefficiencies) of earmarks, increase transparency in earmarking, and potentially make the practice less objectionable if used to facilitate passage of the long overdue surface transportation authorization bill.

Examining the scaling effect and overlapping problem in logit-based stochastic user equilibrium models

- Transportation Research Part A: Policy and Practice---2012---Anthony Chen,Surachet Pravinvongvuth,Xiangdong Xu,Seungkyu Ryu,Piya Chootinan

The purpose of this paper is to examine the scaling effect and overlapping problem in a route choice context using the logit-based stochastic user equilibrium (SUE) principle to explicitly account for the congestion effect. Numerical experiments are performed on nine models: the deterministic user equilibrium model, the multinomial logit SUE model with and without scaling, the C-logit SUE model with and without scaling, the path-size logit SUE model with and without scaling, and the paired combinatorial logit SUE model with and without scaling. Sensitivity analysis is conducted to examine the effects of route sets, congestion levels, dispersion intensities, and network asymmetries. A real transportation network in the City of Winnipeg,

Canada is also used to compare the network equilibrium flow allocations of different SUE models. The results of the sensitivity analysis and the Winnipeg network reveal that both scaling effect and overlapping problem can have a significant impact on the network equilibrium flow allocations.

To kill a real option – Incomplete contracts, real options and PPP

- Transportation Research Part A: Policy and Practice---2012---Niclas Krüger

This paper is concerned with the implications of public-private partnership agreements for the execution of expansion options in road infrastructure. More specifically, it analyzes the expansion of an existing two-lane road in Sweden, and examines the real options created by an intermediate type of road with three lanes. Interpreting the results from real option analysis in the light of incomplete contract theory, this paper finds that external congestion costs might necessitate public ownership to ensure a social optimal outcome in public-private partnerships.

Individual characteristics and stated preferences for alternative energy sources and propulsion technologies in vehicles: A discrete choice analysis for Germany

- Transportation Research Part A: Policy and Practice---2012---Andreas Ziegler

With respect to the German goal of a transition to a lead market for electromobility within a short time period, this paper empirically examines the preferences for alternative energy sources or propulsion technologies in vehicles and particularly for electric vehicles. The data stem from a stated preference discrete choice experiment with 598 potential German car buyers. In order to simulate a realistic future purchase situation, seven vehicle types were incorporated in each of the six choice sets, i.e. hybrid, gas, biofuel, hydrogen, and electric vehicles besides common gasoline and diesel vehicles. The econometric analysis with flexible multinomial probit models reveals that potential car buyers

in Germany currently have a low stated preference for electric, hydrogen, and hybrid vehicles. While our paper also discusses the impact of common vehicle attributes such as purchase price or service station availability, it particularly considers the effect of socio-demographic and environmental awareness variables. The estimation results reveal that younger potential car buyers have a higher stated preference for hydrogen and electric vehicles, males have a higher stated choice of hydrogen vehicles, and environmentally aware potential car buyers have a higher stated preference for hydrogen and electric vehicles. These results suggest that common policy instruments such as the promotion of research and development, taxation, or subsidization in the field of electromobility could be supplemented by strategies to increase the social acceptance of alternative vehicle types that are directly oriented to these population groups. Methodologically, our study highlights the importance of the inclusion of taste persistence across the choice sets and a high number of random draws in the Geweke–Hajivassiliou–Keane simulator in the simulated maximum likelihood estimation of the multinomial probit models.

Activity planning processes in the Agent-based Dynamic Activity Planning and Travel Scheduling (ADAPTS) model

- Transportation Research Part A: Policy and Practice---2012---Joshua Auld, Mohammadian, Abolfazl(Kouros)

This paper describes the representation of the activity planning process utilized in a new activity-based microsimulation model called the ADAPTS (Agent-based Dynamic Activity Planning and Travel Scheduling) model, which dynamically simulates activity and travel planning and scheduling. The model utilizes a dynamic activity planning framework within the larger overall microsimulation system, which is a computational process model that attempts to replicate the decisions which comprise time-dependent activity scheduling. The model presents a step forward in which the usual concepts of activity generation and activity scheduling are significantly enhanced by adding an additional

component referred to as activity planning in which the various attributes which describe the activity are determined. The model framework, therefore, separates activity planning from activity generation and treats all three components, generation, planning and scheduling, as separate discrete but dynamic events within the overall microsimulation. The development of the planning order model, which determines when and in what order each activity planning decision is made is the specific focus of this paper. The models comprising the planning order framework are developed using recent survey data from a GPS-based prompted recall survey. The model development, estimation, validation, and its use within the overall ADAPTS system are discussed. A significant finding of the study is the verification of the apparent transferability of the activity planning order model.

Reforming the urban public transport bus system in Malta: Approach and acceptance

- Transportation Research Part A: Policy and Practice---2012---Maria Attard

The islands of Malta have joined the European Union in 2004 and have for the past decade suffered a decline in the patronage of its public transport service. Offered under a monopoly by an Association of individual owner drivers, the public transport service has not changed dramatically since its start in the early 1900s. Instead, an organic growth alongside the main routes linking new areas to the public transport network and a declining level of service pushed even more the local population to switch to private mobility. This has classified the islands amongst the countries in the world with the highest levels of motorisation. In 2008, following a general election and a general strike held by the public transport operators over the Government's intentions to remove monopolies, the new Minister for Transport published his intentions to reform public transport from its roots. This reform included the removal of the monopolies protecting the incumbents as well as developing a new network of services which cater more effectively to the public's travelling demands. This paper deals with the public transport

reform and through direct observation details the processes involved in the regulation of public transport as well as the design of the new public transport network. The paper concludes with the critical factors which led to implementation of the reform and how this is applicable to cities worldwide.

The relationships between e-shopping and store shopping in the shopping process of search goods

- Transportation Research Part A: Policy and Practice---2012---Cao, Xinyu (Jason)

Internet facilitates hybrid shopping processes by enabling consumers to acquire information, experience product, and conduct transaction using different media (e.g., internet, store, and catalog) at different locations at different times. Although several studies have explored how internet transactions and store sales influence each other, few investigated transportation implications of the hybrid shopping process of single products. Using 540 internet users in the Minneapolis-St. Paul metropolitan area, USA, this study decomposed their shopping processes of a group of search goods (books, CDs, VCDs, videotapes, and album) to understand the relationships of e-shopping and store shopping. We found the media for product awareness, information search, and product trial are important predictors of transaction medium; and the awareness medium is the most important. Further, 17% of store buyers used internet for information search and/or product trial, and about 10% of internet buyers made trips to store to acquire information and/or experience product. The findings carry implications for marketing strategies and travel demand analysis.

Logsums for utility-maximizers and regret-minimizers, and their relation with desirability and satisfaction

- Transportation Research Part A: Policy and Practice---2012---Caspar Chorus

This paper studies to what extent the Logsum-measure of user benefits relates to travelers' perceptions of

choice set-desirability and choice-satisfaction. Knowing these relations is important since researchers have recently started to analyze and interpret user benefits in general – and Logsums in specific – in terms of these more behaviorally oriented notions, rather than in terms of expected utility. Participants to a stated route choice experiment were asked to indicate, after each choice made, to what extent they considered the choice set to be desirable, or to what extent they were satisfied with the chosen alternative. These measurements were correlated with Logsums that were computed for each choice situation. In addition, the paper derives a regret-based Logsum (which gives the expected regret of a choice situation) and presents a comparison with its utilitarian counterpart. Also for this regret-based Logsum, correlations with desirability- and satisfaction-ratings are computed. As a general finding, it appears that all computed correlations are rather weak. This suggests that, at least in the context of our data, the utility-based Logsum and its regret-based counterpart appear to have only a fairly weak connection with the behavioral notions of choice set-desirability and choice-satisfaction.

Sustainable commute in a car-dominant city: Factors affecting alternative mode choices among university students

- Transportation Research Part A: Policy and Practice---2012---Jiangping Zhou

This paper studies university students' commute and housing behaviors using samples from Los Angeles, a place notorious for car dependence and dominance. It finds that being embedded in this place does not make university students drive alone more than their peers in other places. Being multimodal and having a discounted transit pass increase the odds of alternative modes while holding a parking permit reduces the odds of these modes. Commute distance is positively related to carpool and telecommuting. Gender, status (undergraduate vs. graduate) and age are significantly correlated to biking, walking or public transit. Students living alone are more likely to commute by driving alone than other students. Having friends and

classmates living nearby increases the odds of taking public transit. Due to data constraints, this study cannot prove whether there is any correlation between information contagion and the effects of living alone and having friends and classmates living nearby on alternative mode choice. But it proposes that the issue be worthwhile of further investigations. Based on the above, the paper recommends a comprehensive travel demand management program, utilization of information contagion effects of students and promotion of multimodal commute to better promote alternative mode of commute among university students.

Towards integrated land use and transportation: A dynamic disequilibrium based microsimulation framework for built space markets

- Transportation Research Part A: Policy and Practice---2012---Bilal Farooq, Eric J. Miller

Investigating the factors and processes that influence the spatiotemporal distribution of built space and population in an urban area, plays an extremely important role in our greater understanding of the urban travel behaviour. Existing location of activity centres, especially home and work, strongly influences the short-term individual-level decisions such as mode of transportation, and long-term household-level decisions such as change in job and residential location. Conditions in the built space market also affect households' and firms' location and relocation decisions, and hence influence the general travel patterns in an urban area. In this context, this paper addresses a very important, but at the same time, not very widely investigated dimension that plays a key role in the evolution of built space and population distribution: Market. A disequilibrium based microsimulation modelling framework is developed for the built space markets. This framework is then used to operationalize the Greater Toronto and Hamilton Area's owner-occupied housing market within Integrated Land Use Transportation and Environment (ILUTE) modelling system. Simulation results captured heterogeneity in the transaction prices, due to type of dwellings and different market conditions, in a very disaggregate fashion. The proposed

methodology is validated by running the simulation from 1986 to 2006 and comparing the results with the historic data.

Home-to-work commuting, urban form and potential energy savings: A local scale approach to regional statistics

- Transportation Research Part A: Policy and Practice---2012---S. Dujardin, F. Pirart, F. Brévers, A.-F. Marique, J. Teller

The link between transport energy consumption and land use patterns has been the focus of a considerable amount of academic works over the past decades. While many empirical researches are backed up with solid statistical techniques, most of them do not fully consider the influence of scale underlying empirical quantitative investigations. Using fine-scale home-to-work commuting data for Wallonia (Belgium), this paper re-evaluates Breheny's (1995) assertion that urban structure should hold the characteristics of major cities if substantial energy savings are to be achieved. A local scale approach highlights efficient settlements in terms of transport energy consumption not only within major towns, but also within remote rural areas. Furthermore, results suggest that influencing the urban form following local energy efficient examples rather than regional ones could also yield significant gains, without an extreme policy stance of re-urbanisation in major cities.

Performance indicators for public transit connectivity in multi-modal transportation networks

- Transportation Research Part A: Policy and Practice---2012---Sabyasachee Mishra, Timothy F. Welch, Manoj K. Jha

Connectivity plays a crucial role as agencies at the federal and state level focus on expanding the public transit system to meet the demands of a multi-modal transportation system. Transit agencies have a need to explore mechanisms to improve connectivity by improving transit service. This requires a systemic

approach to develop measures that can prioritize the allocation of funding to locations that provide greater connectivity, or in some cases direct funding towards underperforming areas. The concept of connectivity is well documented in social network literature and to some extent, transportation engineering literature. However, connectivity measures have limited capability to analyze multi-modal public transportation systems which are much more complex in nature than highway networks.

A dynamic modeling approach to highway sustainability: Strategies to reduce overall impact

- Transportation Research Part A: Policy and Practice---2012---Gokhan Egilmez,Omer Tatari

The need for sustainable development is increasing as the industrial and service activities keep putting such a strain on the natural functions of the Earth, thus the ability of the planet' s to sustain future generations. Since most of the industrial and service activities are provided via transportation, it is one of the most crucial elements of sustainable development. In this paper, US highway system sustainability problem is studied. System dynamics modeling approach is employed due to the causal relationships and feedback loops that are observed in the problem structure. The reference mode is considered as the increasing CO2 emission trend. The objective is to meet the Liberman and Warner Climate Act' s targets by 2050. Three potential strategies for policy making are tested with the developed dynamic simulation: fuel efficiency, public transportation and electric vehicle usage. The results indicate that hybrid implementation of individual policies has a crucial impact on the success of policy making.

A behavioral housing search model: Two-stage hazard-based and multinomial logit approach to choice-set formation and location selection

- Transportation Research Part A: Policy and Practice---2012---Taha Hossein Rashidi,Joshua Auld,Mohammadian, Abolfazl (Kouros)

Residential location search has become an important topic to both practitioners and researchers as more detailed and disaggregate land-use and transportation demand models are developed which require information on individual household location decisions. The housing search process starts with an alternative formation and screening stage. At this level households evaluate all potential alternatives based on their lifestyle, preferences, and utilities to form a manageable choice set with a limited number of plausible alternatives. Then the final residential location is selected among these alternatives. This two-stage decision making process can be used for both aggregate zone-level selection as well as searching disaggregate parcel or building-based housing markets for potential dwellings. In this paper a zonal level household housing search model is developed. Initially, a household specific choice set is drawn from the entire possible alternatives in the area based on the average household work distance to each alternative. Following the choice set formation step, a discrete choice model is utilized for modeling the final residential zone selection of the household. A hazard-based model is used for the choice set formation module while the final choice selection is modeled using a multinomial logit formulation with a deterministic sample correction factor. The approach presented in the paper provides a remedy for the large choice set problem typically faced in housing search models.

Dual influences on vehicle speed in special-use lanes and critique of US regulation

- Transportation Research Part A: Policy and Practice---2012---Kitae Jang,Michael J. Cassidy

We verify that slow speeds in a special-use lane, such as a carpool or bus lane, can be due to both, high demand for that lane and slow speeds in the adjacent regular-use lane. These dual influences are confirmed from months of data collected from all freeway carpool facilities in the San Francisco Bay Area. Additional data indicate that both influences hold: for other types of special-use lanes, including bus lanes; and for other parts of the world.

On the perceived justice of urban road pricing: An empirical study in Lyon

- Transportation Research Part A: Policy and Practice---2012---Stéphanie Souche-Le Corvec, Charles Raux, Yves Croissant

Various methods of restricting automobile traffic, by price (tolls) or by quantity (odd/even license plates or limited days of traffic), are tested in a survey (N = 400) about attitudes toward traffic restrictions in Lyon, France. Ordered probit models with random-effects panel allow us to estimate the survey respondents' perceptions of these methods, as well as the roles of individual socio-demographic characteristics in the formation of these perceptions. Both the restriction of automobile traffic and its regulation by congestion (waiting in line) are widely considered unjust by the respondents, regardless of whether they work and whether they are drivers or non-drivers. Their attitudes towards tolls justified by the pollution caused by automobile traffic are less negative. As regards compensation, in addition to emergency vehicles and those that transport people with limited mobility, respondents believe car-pooling ought to benefit of a toll exemption. The support for a reduced rate for low-income users shows a concern for justice to which it will be necessary to respond. The respondents' socio-professional status, level of education, car use or non-use, and residence inside or outside of the toll zone clearly play a role in their perceptions of these methods of regulation and compensation.

Sensitivity of prices to demand shocks: A natural experiment in the San Francisco Bay Area

- Transportation Research Part A: Policy and Practice---2012---Volodymyr Bilotkach, Yuriy Gorodnichenko, Oleksandr Talavera

We analyze the impact of a freeway interchange collapse in the San Francisco Bay Area on the difference in airfare quotes for travel into the area's main airports. The incident temporarily made Oakland airport a less attractive choice for traveling to San Francisco, so we hypothesize that fares for travel into Oakland will be relatively lower while the freeway interchange

was out of service. We test our contention using a sample of fare quotes collected on-line, and find the expected effect of a magnitude of 6–7%. Our results imply the following important conclusions. First, the demand-side shock was well absorbed by the supply side. Second, adjustment of prices and return to the status quo once the shock vanished was swift.

The effect of the price of gasoline on the urban economy: From route choice to general equilibrium

- Transportation Research Part A: Policy and Practice---2012---Alex Anas, Tomoru Hiramatsu

RELU-TRAN2, a spatial computable general equilibrium (CGE) model of the Chicago MSA is used to understand how gasoline use, car-VMT, on-the-road fuel intensity, trips and location patterns, housing, labor and product markets respond to a gas price increase. We find a long-run elasticity of gasoline demand (with congestion endogenous) of -0.081 , keeping constant car prices and the TFI (technological fuel intensity) of car types but allowing consumers to choose from car types. 43% of this long run elasticity is from switching to transit; 15% from trip, car-type and location choice; 38% from price, wage and rent equilibration, and 4% from building stock changes. 79% of the long run elasticity is from changes in car-VMT (the extensive margin) and 21% from savings in gasoline per mile (the intensive margin); with 83% of this intensive margin from changes in congestion and 17% from the substitution in favor of lower TFI. An exogenous trend-line improvement of the TFI of the car-types available for choice raises the long-run response to a percent increase in the gas price from -0.081 to -0.251 . Thus, only 1/3 of the long-run response to the gas price stems from consumer choices and 2/3 from progress in fuel intensity. From 2000 to 2007, real gas prices rose 53.7%, the average car fuel intensity improved 2.7% and car prices fell 20%. The model predicts that from these changes alone, keeping constant population, income, etc. aggregate gasoline use in this period would have fallen by 5.2%.

Energy policies for passenger motor vehicles

- Transportation Research Part A: Policy and Practice---2012---Kenneth Small

This paper assesses the costs and effectiveness of several energy policies for light-duty motor vehicles in the United States, using a version of the National Energy Modeling System. The policies addressed are higher fuel taxes, tighter vehicle efficiency standards, and financial subsidies and penalties for the purchase of high- and low-efficiency vehicles (feebates). I find that tightening fuel-efficiency standards beyond those currently mandated through 2016, or imposing feebates designed to accomplish similar changes, can achieve by 2030 reductions in energy use by all light-duty passenger vehicles of 7.1–8.4%. A stronger feebate policy has somewhat greater effects, but at a significantly higher unit cost. High fuel taxes, on the order of \$2.00 per gallon (2007\$), have somewhat greater effects, arguably more favorable cost-effectiveness ratios, and produce their effects much more quickly because they affect the usage rate of both new and used vehicles. Policy costs vary greatly with assumptions about the reason for the apparent myopia commonly observed in consumer demand for fuel efficiency, and with the inclusion or exclusion of ancillary costs of congestion, local air pollution, and accidents.

Integrating congestion pricing, transit subsidies and mode choice

- Transportation Research Part A: Policy and Practice---2012---Leonardo J. Basso,Sergio R. Jara-Díaz

We model and analyze optimal (welfare maximizing) prices and design of transport services in a bimodal context. Car congestion and transit design are simultaneously introduced and consumers choose based on the full price they perceive. The optimization variables are the congestion toll, the transit fare (and hence the level of subsidies) and transit frequency. We obtain six main results: (i) the optimal car-transit split is generally different from the total cost minimizing one;

(ii) optimal congestion and transit price are interdependent and have an optimal frequency attached; (iii) the optimal money price difference together with the optimal frequency yield the optimal modal split; (iv) if this modal split is used in traditional stand-alone formulations – where each mode is priced independently–resulting congestion tolls and transit subsidies and fares are consistent with the optimal money price difference; (v) self-financing of the transport sector is feasible; and (vi) investment in car infrastructure induces an increase in generalized cost for all public transport users.

Do parking requirements significantly increase the area dedicated to parking? A test of the effect of parking requirements values in Los Angeles County

- Transportation Research Part A: Policy and Practice---2012---W. Bowman Cutter,Sofia F. Franco

Minimum parking requirements (MPRs) are the norm for urban and suburban development in the United States (Davidson et al., 2002). The justification for MPRs is that overflow parking will occupy nearby street or off-street parking. Shoup (1999a) and Willson (1995) provide cases where there is reason to believe that parking space requirements have forced parcel developers to place more parking than they would in the absence of parking requirements. However, to our knowledge the existing literature does not test the effect of parking minimums on the amount of lot space devoted to parking beyond a few case studies. This paper tests the hypothesis that MPRs bind for most land uses using data on suburban office, commercial, industrial and retail property sales from Los Angeles County using both direct and indirect approaches. Our indirect test of the effects of parking requirements is similar to the one used by Glaeser and Gyourko (2003). A simple theoretical model shows that the marginal value of additional parking to the sale price of a building should be equal to the cost of land plus the cost of parking construction. We estimate the marginal values of parking and lot area with spatial methods using a

large data set from the Los Angeles area non-residential property sales and find that for most of the property types the marginal value of parking is significantly below that of the parcel area. In addition, we directly examine required and supplied parking and find that on average parking supplied is quite close to the required amount.

Voluntary internalization of speeding externalities with vehicle insurance

- Transportation Research Part A: Policy and Practice---2012---Lars Hultkrantz,Jan-Eric Nilsson,Sara Arvidsson

High speed is an important determinant of accidents for speeders as well as for other motorists. This paper develops a framework for analyzing instruments that encourage drivers to internalize the full consequences of their behavior with respect to choice of speed using Pay-As-You-Speed (PAYS) insurance, possibly as an extension of Pay-As-You-Drive (PAYD) insurance. We demonstrate how the combination of a Pigovian taxation scheme and PAYS can be designed in a setting involving two principals (the state and an insurance company) that affect the incentives of commuters to choose between driving and other modes of transport and for those that use the car mode to drive carefully. While the government is assumed to maximize overall social efficiency and therefore wants to implement marginal cost pricing, insurance companies do actuarial pricing, i.e. average cost pricing within risk classes that are homogeneous to the degree that the insurers have information about actual behavior. PAYS insurance improves the insurance industry's possibility to differentiate premiums according to behavior and therefore to target risk classes in a better way than today. Moreover, since our framework is designed to accomplish differentiation by self-selection, compulsory regulation is not necessary, although there may be reason for the government to facilitate the implementation of the new technology.

Price and frequency competition in freight transportation

- Transportation Research Part A: Policy and Practice---2012---Nilopa Shah,Jan Brueckner

This paper develops a simple analytical model of price and frequency competition among freight carriers. In the model, the full price faced by a shipper (a goods producer) includes the actual shipping price plus an inventory holding cost, which is inversely proportional to the frequency of shipments offered by the freight carrier. Taking brand loyalty on the part of shippers into account, competing freight carriers maximize profit by setting prices, frequencies and vehicle carrying capacities. Assuming tractable functional forms, long- and short-run comparative-static results are derived to show how the choice variables are affected by the model's parameters. The paper also provides an efficiency analysis, comparing the equilibrium to the social optimum, and it attempts to explain the phenomenon of excess capacity in the freight industry.

Estimating the marginal cost of railway track renewals using corner solution models

- Transportation Research Part A: Policy and Practice---2012---Mats Andersson,Andrew Smith,Åsa Wikberg,Phill Wheat

Economic theory advocates marginal cost pricing for efficient utilisation of transport infrastructure. A growing body of literature has emerged on the issue of rail marginal infrastructure wear and tear costs, but the majority of the work is focused on costs for infrastructure maintenance. Railway track renewals are a substantial part of an infrastructure manager's budget, but in disaggregated statistical analyses they cause problems for traditional regression models since there is a piling up of values of the dependent variable at zero. Previous econometric work has sought to circumvent the problem by aggregation in some way. In this paper we instead apply corner solution models to disaggregate (track-section) data, including the zero observations. We derive track renewal cost elasticities with respect to traffic volumes and in turn marginal

renewal costs using Swedish railway renewal data over the period 1999–2009. This paper is the first attempt in the literature to apply corner solution models, and in particular the two-part model, to disaggregate renewal cost data in railways. It is also the first paper that we are aware of to report usage elasticities specifically for renewal costs and therefore adds important new evidence to the previous literature where there is a paucity of studies on renewals and considerable uncertainty over the effects of rail traffic on renewal costs. In the Swedish context, we find that the inclusion of marginal track renewal costs in the track access pricing regime, which currently only reflects marginal maintenance costs, would add substantially to the existing track access charge. EU legislation requires that access charges reflect the ‘costs directly incurred as a result of operating the train service’, which should include a marginal renewal cost component. This change would also increase the cost recovery ratio of the Swedish infrastructure manager, thus meeting a policy objective of the national government.

Flight delays, capacity investment and social welfare under air transport supply-demand equilibrium

- Transportation Research Part A: Policy and Practice---2012---Bo Zou,Mark Hansen

This paper analyzes benefits from aviation infrastructure investment under competitive supply-demand equilibrium. The analysis recognizes that, in the air transportation system where economies of density is an inherent characteristic, capacity change would trigger a complicated set of adjustment of and interplay among passenger demand, air fare, flight frequency, aircraft size, and flight delays, leading to an equilibrium shift. An analytical model that incorporates these elements is developed. The results from comparative static analysis show that capacity constraint suppresses demand, reduces flight frequency, and increases passenger generalized cost. Our numerical analysis further reveals that, by switching to larger aircraft size, airlines manage to offset part of the delay effect on unit operating cost, and charge passengers lower fare. With higher

capacity, airlines tend to raise both fare and frequency while decreasing aircraft size. More demand emerges in the market, with reduced generalized cost for each traveler. The marginal benefit brought by capacity expansion diminishes as the capacity-demand imbalance becomes less severe. Existing passengers in the market receive most of the benefit, followed by airlines. The welfare gains from induced demand are much smaller. The equilibrium approach yields more plausible investment benefit estimates than does the conventional method. In particular, when forecasting future demand the equilibrium approach is capable of preventing the occurrence of excessive high delays.

Road network vulnerability analysis of area-covering disruptions: A grid-based approach with case study

- Transportation Research Part A: Policy and Practice---2012---Erik Jenelius,Lars-Göran Mattsson

We present an approach to systematically analysing the vulnerability of road networks under disruptions covering extended areas. Since various kinds of events including floods, heavy snowfall, storms and wildfires can cause such spatially spread degradations, the analysis method is an important complement to the existing studies of single link failures. The methodology involves covering the study area with grids of uniformly shaped and sized cells, where each cell represents the extent of an event disrupting any intersecting links. We apply the approach to the Swedish road network using travel demand and network data from the Swedish national transport modelling system Samper. The study shows that the impacts of area-covering disruptions are largely determined by the level of internal, outbound and inbound travel demand of the affected area itself. This is unlike single link failures, where the link flow and the redundancy in the surrounding network determine the impacts. As a result, the vulnerability to spatially spread events shows a markedly different geographical distribution. These findings, which should be universal for most road networks of similar scale, are important in the planning process of resource allocation

for mitigation and recovery.

Remoteness and accessibility in the vulnerability analysis of regional road networks

- Transportation Research Part A: Policy and Practice---2012---Michael A.P. Taylor,Susilawati,

This paper considers the development of a method for network vulnerability analysis which considers the socio-economic impacts of network degradation and seeks to determine the most critical locations in the network. The method compares the levels of remoteness (or its inverse, accessibility) of localities within the study region, on the basis of the impacts of degradation of the road network on a recognised accessibility/remoteness index that can be applied to each and every location within the region. It thus extends the earlier work on accessibility-based vulnerability analysis which was limited to assessment of impacts on selected nodes in a network. The new method allows study of impacts on both specified locations (which do not have to be represented as network nodes) and the region as a whole. The accessibility/remoteness index is defined so that an accessibility surface can be calculated for the region, and the volume under this surface provides an overall measure of accessibility. Changes in the volume under different network states thus reflect the overall impacts. The method is applied to a rural region in south east Australia.

A method to assess demand growth vulnerability of travel times on road network links

- Transportation Research Part A: Policy and Practice---2012---David Watling,N.C. Balijepalli

Many national governments around the world have turned their recent focus to monitoring the actual reliability of their road networks. In parallel there have been major research efforts aimed at developing modelling approaches for predicting the potential vulnerability of such networks, and in forecasting the future impact of any mitigating actions. In practice—whether monitoring the past or planning for the future—a confounding factor may arise, namely the potential

for systematic growth in demand over a period of years. As this growth occurs the networks will operate in a regime closer to capacity, in which they are more sensitive to any variation in flow or capacity. Such growth will be partially an explanation for trends observed in historic data, and it will have an impact in forecasting too, where we can interpret this as implying that the networks are vulnerable to demand growth. This fact is not reflected in current vulnerability methods which focus almost exclusively on vulnerability to loss in capacity. In the paper, a simple, moment-based method is developed to separate out this effect of demand growth on the distribution of travel times on a network link, the aim being to develop a simple, tractable, analytic method for medium-term planning applications. Thus the impact of demand growth on the mean, variance and skewness in travel times may be isolated. For given critical changes in these summary measures, we are thus able to identify what (location-specific) level of demand growth would cause these critical values to be exceeded, and this level is referred to as Demand Growth Reliability Vulnerability (DGRV). Computing the DGRV index for each link of a network also allows the planner to identify the most vulnerable locations, in terms of their ability to accommodate growth in demand. Numerical examples are used to illustrate the principles and computation of the DGRV measure.

Time-dependent Hyperstar algorithm for robust vehicle navigation

- Transportation Research Part A: Policy and Practice---2012---Michael G.H. Bell,Valentina Trozzi,Solmaz Haji Hosseinloo,Guido Gentile,Achille Fonzone

The vehicle navigation problem studied in Bell (2009) is revisited and a time-dependent reverse Hyperstar algorithm is presented. This minimises the expected time of arrival at the destination, and all intermediate nodes, where expectation is based on a pessimistic (or risk-averse) view of unknown link delays. This may also be regarded as a hyperpath version of the Chabini and Lan (2002) algorithm, which itself is a time-dependent A* algorithm. Links are assigned undelayed travel times

and maximum delays, both of which are potentially functions of the time of arrival at the respective link. Probabilities for link use are sought that minimise the driver's maximum exposure to delay on the approach to each node, leading to the determination of a pessimistic expected time of arrival at the destination and all intermediate nodes. Since the context considered is vehicle navigation, the probability of link use measures link attractiveness, so a link with a zero probability of use is unattractive while a link with a probability of use equal to one will have no attractive alternatives. A solution algorithm is presented and proven to solve the problem provided the node potentials are feasible and a FIFO condition applies to undelayed link travel times. The paper concludes with a numerical example.

A bi-criteria indicator to assess supply chain network performance for critical needs under capacity and demand disruptions

- Transportation Research Part A: Policy and Practice---2012---Patrick Qiang, Anna Nagurney

In this paper, we develop a supply chain/logistics network model for critical needs in the case of disruptions. The objective is to minimize the total network costs, which are generalized costs that may include the monetary, risk, time, and social costs. The model assumes that disruptions may have an impact on both the network link capacities as well as on the product demands. Two different cases of disruption scenarios are considered. In the first case, we assume that the impacts of the disruptions are mild and that the demands can be met. In the second case, the demands cannot all be satisfied. For these two cases, we propose two individual performance indicators. We then construct a bi-criteria indicator to assess the supply chain network performance for critical needs. An algorithm is described which is applied to solve a spectrum of numerical examples in order to illustrate the new concepts.

Anti-seismic reinforcement strategy for an urban road network

- Transportation Research Part A: Policy and Practice---2012---Takeshi Nagae, Tomo Fujihara, Yasuo Asakura

This paper provides a novel practical method for analyzing an anti-seismic reinforcement (ASR) problem involving hundreds of transportation facilities on an urban road network subject to multiple earthquake risks. The relevant properties of the present method are: (i) it evaluates the performance of an ASR strategy, taking into account traffic congestion and travelers' trip-making or route-choice behavior; (ii) it estimates the realistic damage patterns on the road network and their occurrence probabilities on the basis of recent advances in structural and earthquake engineering; (iii) it has clear, sensible logic and includes neither a black-box nor a "lottery" in the necessary procedures. We examine the computational efficiency and whether the present method is reasonable by applying it to a test scenario of the Kobe urban and suburban area.

A framework for robustness analysis of road networks for short term variations in supply

- Transportation Research Part A: Policy and Practice---2012---M. Snelder, H.J. van Zuylen, L.H. Immers

There is a growing awareness that road networks, are becoming more and more vulnerable to unforeseen disturbances like incidents and that measures need to be taken in order to make road networks more robust. In order to do this the following questions need to be addressed: How is robustness defined? Against which disturbances should the network be made robust? Which factors determine the robustness of a road network? What is the relationship between robustness, travel times and travel time reliability? Which indicators can be used to quantify robustness? How can these indicators be computed? This paper addresses these questions by developing a consistent framework for robustness in which a definition, terms related to robustness, indicators and an evaluation method are

included. By doing this, policy makers and transportation analyst are offered a framework to discuss issues that are related to road network robustness and vulnerability which goes beyond the disconnected definitions, indicators and evaluation methods used so far in literature. Furthermore, the evaluation method that is presented for evaluating the robustness of the road network against short term variations in supply (like incidents) contributes to the problem of designing robust road networks because it has a relatively short computation time and it takes spillback effects and alternative routes into account.

Link-level vulnerability indicators for real-world networks

- Transportation Research Part A: Policy and Practice---2012---Victor L. Knoop,Maaike Snelder,Henk J. van Zuylen,Serge P. Hoogendoorn

It is computationally expensive to find out where vulnerable parts in a network are. In literature a variety of methods were introduced that use simple indicators (measured in real-life or calculated in a traffic simulator) to pre-determine the seriousness of the delays caused by the blocking of that link and thereafter perform a more detailed analysis. This article reviews the indicators proposed in the literature and assesses the quality of these indicators. Furthermore, a multi-linear fit of the indicators is made to find a better, combined, indicator to rank the links according to their vulnerability. The article shows that different indicators assess different links to be vulnerable. Also combined they cannot predict the vulnerability of a link. Therefore, it is concluded that to find vulnerable links, one has to look further than link-based indicators.

Sharing costs in Swedish road ownership associations

- Transportation Research Part A: Policy and Practice---2012---Sofia Grahn-Voorneveld

Usually transport systems, and roads in particular, are viewed as public goods. However, this is not always the case. In Sweden a large part of the road system is

privately owned. Most of these privately owned roads are rural roads used by farmers and summer cottage owners, or used for forest transport. These roads are mainly provided by ownership associations.

A bi-objective cyclist route choice model

- Transportation Research Part A: Policy and Practice---2012---Matthias Ehrgott,Judith Y.T. Wang,Andrea Raith,Chris van Houtte

It is widely acknowledged that cyclists choose their route differently to drivers of private vehicles. The route choice decision of commuter drivers is often modelled with one objective, to reduce their generalised travel cost, which is a monetary value representing the combined travel time and vehicle operating cost. Commuter cyclists, on the other hand, usually have multiple incommensurable objectives when choosing their route: the travel time and the suitability of a route. By suitability we mean non-subjective factors that characterise the suitability of a route for cycling, including safety, traffic volumes, traffic speeds, presence of bicycle lanes, whether the terrain is flat or hilly, etc. While these incommensurable objectives are difficult to be combined into a single objective, it is also important to take into account that each individual cyclist may prioritise differently between travel time and suitability when they choose a route.

Mobile ICTs and physical mobility: Review and research agenda

- Transportation Research Part A: Policy and Practice---2012---Anne Aguiléra,Caroline Guilhot,Alain Rallet

The question of the relationship between the spread of communication tools and the physical mobility of individuals is not new and arose with the arrival of the fixed telephone and, more recently, the development of the Internet and especially e-commerce. The extraordinary spread of individual, especially portable, communication tools like the mobile phone, has recently generated new interest in this topic in the fields of transportation economics, geography and sociology.

This article discusses the main topics that have been explored, from the debate between complementarity and substitution to analyses in terms of interactions with the spatiotemporal organization of daily activities, the size and maintenance of social networks, and, finally, perception of travel and spaces. We then identify several issues that we think merit further exploration.

The value of time and external benefits in bicycle appraisal

- Transportation Research Part A: Policy and Practice---2012---Maria Börjesson, Jonas Eliasson

We estimate the value of time savings, different cycling environments and additional benefits in cost–benefit analysis of cycling investments. Cyclists’ value of travel time savings turns out to be high, considerably higher than the value of time savings on alternative modes. Cyclists also value other improvements highly, such as separated bicycle lanes. As to additional benefits of cycling improvements in the form of health and reduced car traffic, our results do not support the notion that these will be a significant part in a cost–benefit analysis. Bicyclists seem to take health largely into account when making their travel choices, implying that it would be double-counting to add total health benefits to the analysis once the consumer surplus has been correctly calculated. As to reductions in car traffic, our results indicate that the cross-elasticity between car and cycle is low, and hence benefits from traffic reductions will be small. However, the valuations of improved cycling speeds and comfort are so high that it seems likely that improvements for cyclists are cost-effective compared to many other types of investments, without having to invoke second-order, indirect effects. In other words, our results suggest that bicycle should be viewed as a competitive mode of travel and not primarily as a means to achieve improved health or reduced car traffic.

A justice-theoretic approach to the distribution of transportation benefits: Implications for transportation planning practice in the United States

- Transportation Research Part A: Policy and Practice---2012---Karel Martens, Aaron Golub, Glenn Robinson

Transportation improvements inevitably lead to an uneven distribution of user benefits, in space and by network type (private and public transport). This paper makes a moral argument for what would be a fair distribution of these benefits. The argument follows Walzer’ s “Spheres of Justice” approach to define the benefits of transportation, access, as a sphere deserving a separate, non-market driven, distribution. That distribution, we propose, is one where the maximum gap between the lowest and highest accessibility, both by mode and in space, should be limited, while attempting to maximize average access. We then review transportation planning practice for a priori distributional goals and find little explicit guidance in conventional and even justice-oriented transportation planning and analyses. We end with a discussion of the implications for practice.

The asymmetric income effect on household vehicle ownership in Taiwan: A threshold cointegration approach

- Transportation Research Part A: Policy and Practice---2012---Rong-Chang Jou, Wen-Hsiu Huang, Yuan-Chan Wu, Ming-Che Chao

This paper uses the asymmetric threshold cointegration test to examine the asymmetric relationship between household income and vehicle ownership in Taiwan, presenting estimated asymmetric error correction models. The empirical data include information on household income, car ownership and motorcycle ownership in different regions from 1974 to 2009. The results show that, first, motorcycle ownership is asymmetrically cointegrated with household income in each region, and car ownership is asymmetrically cointegrated with

household income in all regions except Taipei city. Second, both car and motorcycle ownership levels increase faster than they decrease in the asymmetric adjustment of their long-run relationship. Third, sensitivity tests for the period 1987–2009 show that the cointegration relationship of the car ownership equations vanished. Finally, we find evidence on the effects of household income on motorcycle ownership, and the effects of income variables on car and motorcycle ownership are dissimilar. This study exhibits different results across regions. These findings may be related to the development of public transit system in each region.

Cost-benefit analysis according to Sen: An application in the evaluation of transport infrastructures in France

- Transportation Research Part A: Policy and Practice---2012---Alexandra Hyard

Made compulsory in France for major transport infrastructures, cost-benefit analysis is constantly being improved to achieve the best socio-economic evaluation possible. According to the philosopher and economist Amartya Sen, this analysis should meet two requirements: one ethical, the other democratic. We will examine the evaluation procedure in France and highlight the gap between its officially more democratic character and its still insufficiently ethical character, from the viewpoint of this dual requirement.

Value of travel time reliability: A review of current evidence

- Transportation Research Part A: Policy and Practice---2012---Carlos Carrion,David Levinson

Travel time reliability is a fundamental factor in travel behavior. It represents the temporal uncertainty experienced by travelers in their movement between any two nodes in a network. The importance of the time reliability depends on the penalties incurred by the travelers. In road networks, travelers consider the existence of a trip travel time uncertainty in different choice situations (departure time, route, mode, and

others). In this paper, a systematic review of the current state of research in travel time reliability, and more explicitly in the value of travel time reliability is presented. Moreover, a meta-analysis is performed in order to determine the reasons behind the discrepancy among the reliability estimates.

Synopsis of users' behaviour of a carsharing program: A case study in Toronto

- Transportation Research Part A: Policy and Practice---2012---Cindy Costain,Carolyn Ardron,Khandker Nurul Habib

The paper presents a comprehensive investigation of the behaviour of carsharing members through the analysis of administrative datasets of a dominant carsharing program in Toronto. The key objective of the investigation is to enhance our understanding on carsharing behaviour in the City of Toronto. Unlike other studies on carsharing, this paper intends to build a comprehensive understanding of the multiple dimensions of users' behaviour including attitude towards environment, attitude towards safety, frequency of usage, membership duration, vehicle type choice and monthly demand, in terms of total vehicle-kilometre and vehicle-hour travel. The paper uses both descriptive and econometric approaches for in-depth investigations. One of the key contributions of the paper is linking carsharing with carbon offsetting. Investigations reveal that carsharing members are in general environmentally conscious people and are willing to pay for carbon offsetting if given an option. However, having the carbon offsetting option also encouraged a higher amount of driving per month. Results show that carsharing is most often used for off-peak period travel or on weekends, when transit service is poor and traffic congestion is low. The majority of trips made by carsharing members are short-distance trips. It is clear that carsharing is providing a segment of the population with enhanced accessibility and mobility and thus playing an important role in providing a seamless, integrated transportation service in the City of Toronto.

Induced road traffic in Spanish regions: A dynamic panel data model

- Transportation Research Part A: Policy and Practice---2012---Rosa González,Gustavo Marrero

Distinguishing between traffic generated exclusively from the expansion of the road network (induced demand) and that resulting from other demand factors is of crucial importance to properly designed transport policies. This paper analyzes and quantifies the induced demand for road transport for Spain's main regions from 1998 to 2006, years that saw mobility in Spain attain its highest growth rate. The lack of research in this area involving Spain and the key role played by the sector, given its high level of energy consumption and the negative externalities associated with it (accidents, noise, traffic congestion, emissions, etc.), endow greater relevance to this type of research. Based on a Dynamic Panel Data (DPD) reduced-form model, we apply alternative approaches (fixed and random effects and GMM-based methods) for measuring the induced demand. The results obtained provide evidence for the existence of an induced demand for transport in Spain, though said results vary depending on the estimating method employed.

Demand and welfare effects in recreational travel models: Accounting for substitution between number of trips and days to stay

- Transportation Research Part A: Policy and Practice---2012---Jörgen Hellström,Jonas Nordström

In this paper we present a non-linear demand system for households' joint choice of number of trips and days to spend at a destination. The approach, which facilitates welfare analysis of exogenous policy and price changes, is used empirically to study the effects of an increased CO2 tax. In particular, we focus on the effect of including substitution between households choice of the number of trips and days to spend at a destination in the welfare analysis. The analysis reveals that the equivalent variation (EV) measure, for the count data demand system, can be seen as an upper bound for the

households welfare loss. Approximating the welfare loss by the change in consumer surplus, accounting for the positive effect from longer stays, imposes a lower bound on the households welfare loss. The difference in the estimated loss measures, from the considered CO2 tax reform, is about 20%. This emphasizes the importance of accounting for substitutions toward longer stays in travel demand policy evaluations.

Optimal starting location of an HOV lane for a linear monocentric urban area

- Transportation Research Part A: Policy and Practice---2012---Chih-Peng Chu,Jyh-Fa Tsai,Shou-Ren Hu

This paper analyzes the optimal starting location of a high-occupancy-vehicle (HOV) lane for a linear monocentric urban area. Both travel time and carpooling costs are taken into account. The research proposes an analytical framework for the case with a continuum demand distribution along a highway corridor. The objective is assumed to maximize social welfare of the transportation system, which is the difference between the total user benefit and travel cost. Numerical analysis via simulation experiments was conducted to seek the existence of an optimal solution. Based on the results of a sensitivity analysis, we find a specific relationship between the carpooling cost and the optimal design of the starting point of an HOV lane.

Generating synthetic baseline populations from register data

- Transportation Research Part A: Policy and Practice---2012---Jeppe Rich,Ismir Mulalic

The paper presents a population synthesiser based on the method of Iterative Proportional Fitting (IPF) algorithm developed for the new Danish national transport model system. The synthesiser is designed for large population matrices and allows target variables to be represented in several target constraints. As a result, constraints for the IPF are cross-linked, which makes it difficult to ensure consistency of targets in a forecast

perspective. The paper proposes a new solution strategy to ensure internal consistency of the population targets in order to guarantee proper convergence of the IPF algorithm. The solution strategy consists in establishing a harmonisation process for the population targets, which combined with a linear programming approach, is applied to generate a consistent target representation. The model approach is implemented and tested on Danish administrative register data. A test on historical census data shows that a 2006 population could be predicted by a 1994 population with an overall percentage deviation of 5–6% given that targets were known. It is also indicated that the deviation is approximately a linear function of the length of the forecast period.

Accounting for scale heterogeneity within and between pooled data sources

- Transportation Research Part A: Policy and Practice---2012---David Hensher

There is growing interest in incorporating both preference heterogeneity and scale heterogeneity in choice models, as a way of capturing an increasing number of sources of utility amongst a set of alternatives. The extension of mixed logit to incorporate scale heterogeneity in a generalised mixed logit (GMXL) model provides a way to accommodate these sources of influence, observed and unobserved. The small but growing number of applications of the GMXL model have parameterized scale heterogeneity as a single estimate; however it is often the case that analysts pool data from more than one source, be it revealed preference (RP) and stated preference (SP) sources, or multiple SP sources, inducing the potential for differences in the scale factor between the data sources. Existing practice has developed ways of accommodating scale differences between data sources by adopting a scale homogeneity assumption within each data source (e.g., the nested logit trick) that varies between data sources. This paper extends the state of the art by incorporating data-source specific scale differences in scale heterogeneity setting across pooled RP and SP data set. An example of choice amongst RP and SP transport modes

(including two ‘new’ SP modes) is used to obtain values of travel time savings that vary significantly between a model that accounts for scale heterogeneity differences within pooled RP and SP data, and the other where differences in scale heterogeneity is also accommodated between RP and SP data.

VMT, energy consumption, and GHG emissions forecasting for passenger transportation

- Transportation Research Part A: Policy and Practice---2012---Aikaterini Rentziou,Konstantina Gkritza,Reginald R. Souleyrette

Globalization, greenhouse gas emissions and energy concerns, emerging vehicle technologies, and improved statistical modeling capabilities make the present moment an opportune time to revisit aggregate vehicle miles traveled (VMT), energy consumption, and greenhouse gas (GHG) emissions forecasting for passenger transportation. Using panel data for the 48 continental states during the period 1998–2008, the authors develop simultaneous equation models for predicting VMT on different road functional classes and examine how different technological solutions and changes in fuel prices can affect passenger VMT. Moreover, a random coefficient panel data model is developed to estimate the influence of various factors (such as demographics, socioeconomic variables, fuel tax, and capacity) on the total amount of passenger VMT in the United States. To assess the influence of each significant factor on VMT, elasticities are estimated. Further, the authors investigate the effect of different policies governing fuel tax and population density on future energy consumption and GHG emissions. The presented methodology and estimation results can assist transportation planners and policy-makers in determining future energy and transportation infrastructure investment needs.

Vulnerability analysis for large-scale and congested road networks with demand uncertainty

- Transportation Research Part A: Policy and Practice---2012---Bi Yu Chen,William H.K. Lam,Agachai Sumalee,Qingquan Li,Zhi-Chun Li

To assess the vulnerability of congested road networks, the commonly used full network scan approach is to evaluate all possible scenarios of link closure using a form of traffic assignment. This approach can be computationally burdensome and may not be viable for identifying the most critical links in large-scale networks. In this study, an “impact area” vulnerability analysis approach is proposed to evaluate the consequences of a link closure within its impact area instead of the whole network. The proposed approach can significantly reduce the search space for determining the most critical links in large-scale networks. In addition, a new vulnerability index is introduced to examine properly the consequences of a link closure. The effects of demand uncertainty and heterogeneous travellers’ risk-taking behaviour are explicitly considered. Numerical results for two different road networks show that in practice the proposed approach is more efficient than traditional full scan approach for identifying the same set of critical links. Numerical results also demonstrate that both stochastic demand and travellers’ risk-taking behaviour have significant impacts on network vulnerability analysis, especially under high network congestion and large demand variations. Ignoring their impacts can underestimate the consequences of link closures and misidentify the most critical links.

The effect of uncertainty on US transport-related GHG emissions and fuel consumption out to 2050

- Transportation Research Part A: Policy and Practice---2012---Parisa Bastani,John B. Heywood,Chris Hope

The future of US transport energy requirements and emissions is uncertain. Transport policy research has explored a number of scenarios to better understand the future characteristics of US light-duty vehicles. Deterministic scenario analysis is, however, unable to identify the impact of uncertainty on the future US vehicle fleet emissions and energy use. Variables determining the future fleet emissions and fuel use are inherently uncertain and thus the shortfall in understanding the impact of uncertainty on the future of

US transport needs to be addressed. This paper uses a stochastic technology and fleet assessment model to quantify the uncertainties in US vehicle fleet emissions and fuel use for a realistic yet ambitious pathway which results in about a 50% reduction in fleet GHG emissions in 2050. The results show the probability distribution of fleet emissions, fuel use, and energy consumption over time out to 2050. The expected value for the fleet fuel consumption is about 450 and 350 billion litres of gasoline equivalent with standard deviations of 40 and 80 in 2030 and 2050, respectively. The expected value for the fleet GHG emissions is about 1360 and 850Mt CO₂ equivalent with standard deviation of 130 and 230 in 2030 and 2050 respectively. The parameters that are major contributors to variations in emissions and fuel consumption are also identified and ranked through the uncertainty analysis. It is further shown that these major contributors change over time, and include parameters such as: vehicle scrappage rate, annual growth of vehicle kilometres travelled in the near term, total vehicle sales, fuel economy of the dominant naturally-aspirated spark ignition vehicles, and percentage of gasoline displaced by cellulosic ethanol. The findings in this paper demonstrate the importance of taking uncertainties into consideration when choosing amongst alternative fuel and emissions reduction pathways, in the light of their possible consequences.

Freeway drivers’ willingness-to-pay for a distance-based toll rate

- Transportation Research Part A: Policy and Practice---2012---Rong-Chang Jou,Yu-Chiun Chiou,Ke-Hong Chen,Hao-I Tan

This paper applies the contingent valuation method to investigate and estimate the toll rate that freeway drivers are willing-to-pay (WTP) for each unit of distance they travel, after switching from per-entry based to distance-based tolling system. Due to a large portion of respondents who are unwilling to pay a toll at all, we adopt the spike model to avoid estimation errors. The estimation results show that average willingness to pay toll is TWD1Note: 30.04 Taiwanese Dollars (TWD) was equivalent to \$1 USD (October,

2011).1 0.86/km, which can be refined further to TWD 0.81/km for short distance travelers, TWD 0.93/km for medium distance travelers, and TWD 0.97/km for long distance travelers. Additionally, the WTP toll rate of short distance travelers is significantly different on public holidays but not during peak hours. In contrast, the WTP toll rates of medium and long distance travelers significantly different during peak hours but not on public holidays.

Examining transport futures with scenario analysis and MCA

- Transportation Research Part A: Policy and Practice---2012---Robin Hickman,Sharad Saxena,David Banister,Olu Ashiru

Climate change is a global problem and across the world the transport sector is finding it difficult to break projected increases in carbon dioxide (CO₂) emissions; there are very few contexts where deep reductions in transport CO₂ emissions are being made. A number of research studies are now examining the potential for future lower CO₂ emissions in the transport sector. This paper develops this work to consider some of the wider sustainability impacts (economic, social and local environmental) as well as the lower CO₂ transport impacts of different policy trajectories. Hence the central argument made is for an integrated approach to transport policy making over the longer term – incorporating scenario analysis and multi-criteria assessment (MCA) – to help assess likely progress against a range of objectives.

The determinants of long distance travel in Great Britain

- Transportation Research Part A: Policy and Practice---2012---Joyce M. Dargay,Stephen Clark

This study analyses of the determinants of long distance travel in Great Britain using data from the 1995–2006 National Travel Surveys (NTSs). The main objective is to determine the effects of socio-economic, demographic and geographic factors on long distance travel. The estimated models express the distance travelled for

long distance journeys as a function of income, gender, age, employment status, household characteristics, area of residence, size of municipality, type of residence and length of time living in the area. A time trend is also included to capture common changes in long distance travel over time not included in the explanatory variables. Separate models are estimated for total travel, travel by each of four modes (car, rail, coach and air), travel by five purposes (business, commuting, leisure, holiday and visiting friends and relatives (VFRs)) and two journey lengths (<150 miles and 150+miles one way), as well as the 35 mode-purpose-distance combinations.

Assessing the energy and greenhouse gas emissions mitigation effectiveness of potential US modal freight policies

- Transportation Research Part A: Policy and Practice---2012---Rachael Nealer,H. Scott Matthews,Chris Hendrickson

This paper estimates the total embodied energy and emissions modal freight requirements across the supply chain for each of over 400 sectors using Bureau of Transportation Statistics Commodity Flow Survey data and Bureau of Economic Analysis economic input–output tables for 2002. Across all sectors, direct domestic truck and rail transportation are similar in magnitude for embodied freight transportation of goods and services in terms of ton-km. However, the sectors differ significantly in energy consumption, greenhouse gas emissions, and costs per ton-km. Recent pressure to reduce energy consumption and emissions has motivated a search for more efficient freight mode choices. One solution would be to shift freight transportation away from modes that require more energy and emit more (e.g., truck) to modes that consume and emit less (e.g., rail and water).

Strategic sampling for large choice sets in estimation and application

- Transportation Research Part A: Policy and Practice---2012---Jason D. Lemp,Kara M. Kockelman

Many discrete choice contexts in transportation deal with large choice sets, including destination, route, and vehicle choices. Model estimation with large numbers of alternatives remains computationally expensive. In the context of the multinomial logit (MNL) model, limiting the number of alternatives in estimation by simple random sampling (SRS) yields consistent parameter estimates, but estimator efficiency suffers. In the context of more general models, such as the mixed MNL, limiting the number of alternatives via SRS yields biased parameter estimates. In this paper, a new, strategic sampling scheme is introduced, which draws alternatives in proportion to updated choice-probability estimates. Since such probabilities are not known a priori, the first iteration uses SRS among all available alternatives. The sampling scheme is implemented here for a variety of simulated MNL and mixed-MNL data sets, with results suggesting that the new sampling scheme provides substantial efficiency benefits. Thanks to reductions in estimation error, parameter estimates are more accurate, on average. Moreover, in the mixed MNL case, where SRS produces biased estimates (due to violation of the independence of irrelevant alternatives property), the new sampling scheme appears to effectively eliminate such biases. Finally, it appears that only a single iteration of the new strategy (following the initialization step using SRS) is needed to deliver the strategy's maximum efficiency gains.

Understanding the impacts of a combination of service improvement strategies on bus running time and passenger's perception

- Transportation Research Part A: Policy and Practice---2012---Ehab I. Diab,Ahmed M. El-Geneidy

Transit agencies implement many strategies in order to provide an attractive transportation service. This article aims to evaluate the impacts of implementing a combination of strategies, designed to improve the bus transit service, on running time and passenger satisfaction. These strategies include using smart card fare collection, introducing limited-stop bus service, implementing reserved bus lanes, using articulated buses,

and implementing transit signal priority (TSP). This study uses stop-level data collected from the Société de transport de Montréal (STM)'s automatic vehicle location (AVL) and automatic passenger count (APC) systems, in Montréal, Canada. The combination of these strategies has led to a 10.5% decline in running time along the limited stop service compared to the regular service. The regular route running time has increased by 1% on average compared to the initial time period. The study also shows that riders are generally satisfied with the service improvements. They tend to overestimate the savings associated with the implementation of this combination of strategies by 3.5–6.0min and by 2.5–4.1min for both the regular route and the limited stop service, respectively. This study helps transit planners and policy makers to better understand the effects of implementing a combination of strategies to improve running time and passenger's perception of these changes in service.

Not bored yet – Revisiting respondent fatigue in stated choice experiments

- Transportation Research Part A: Policy and Practice---2012---Stephane Hess,David Hensher,Andrew Daly

Stated choice surveys are used extensively in the study of choice behaviour across many different areas of research, notably in transport. One of their main characteristics in comparison with most types of revealed preference (RP) surveys is the ability to capture behaviour by the same respondent under varying choice scenarios. While this ability to capture multiple choices is generally seen as an advantage, there is a certain amount of unease about survey length. The precise definition about what constitutes a large number of choice tasks however varies across disciplines, and it is not uncommon to see surveys with up to twenty tasks per respondent in some areas. The argument against this practice has always been one of reducing respondent engagement, which could be interpreted as a result of fatigue or boredom, with frequent reference to the findings of Bradley and Daly (1994) who showed a significant drop in utility scale, i.e. an increase in er-

ror, as a respondent moved from one choice experiment to the next, an effect they related to respondent fatigue. While the work by Bradley and Daly has become a standard reference in this context, it should be recognised that not only was the fatigue part of the work based on a single dataset, but the state-of-the-art and the state-of-practice in stated choice survey design and implementation has moved on significantly since their study. In this paper, we review other literature and present a more comprehensive study investigating evidence of respondent fatigue across a larger number of different surveys. Using a comprehensive testing framework employing both Logit and mixed Logit structures, we provide strong evidence that the concerns about fatigue in the literature are possibly overstated, with no clear decreasing trend in scale across choice tasks in any of our studies. For the data sets tested, we find that accommodating any scale heterogeneity has little or no impact on substantive model results, that the role of constants generally decreases as the survey progresses, and that there is evidence of significant attribute level (as opposed to scale) heterogeneity across choice tasks.

Modelling users' behaviour of a carsharing program: Application of a joint hazard and zero inflated dynamic ordered probability model

- Transportation Research Part A: Policy and Practice---2012---Khandker M. Nurul Habib,Catherine Morency,Mohammed Tazul Islam,Vincent Grasset

This paper presents an econometric model for the behaviour of carsharing users. The econometric model is developed to jointly forecast membership duration, the decision to become an active member in a particular month, and the frequency of monthly usage of active members. The model is estimated using the membership directory and monthly transaction data of a carsharing program, 'Communauto Inc.', based in Montréal, Canada. The model shows a high degree of fit to the observed dataset and provides many behavioural details of carsharing users. The results are instructive to carsharing planners in devising efficient

policies.

Assessment of product debundling trends in the US airline industry: Customer service and public policy implications

- Transportation Research Part A: Policy and Practice---2012---Laurie A. Garrow,Susan Hottle,Stacey Mumbower

This paper reviews product debundling trends that have occurred in the US airline industry. Multiple sources of ancillary fees related to ticketing refunds and exchanges, checked baggage, on-board pets, preferred and/or advanced seating assignments, frequent flyer ticket redemptions, and day of departure standby policies are reviewed. Despite the fact that both low cost and network carriers stress the importance of future ancillary fees in their investor reports, our assessment suggests that these fees will be more broadly adopted by low cost carriers. We anticipate that many network carriers will eliminate ancillary fees, particularly as they begin to recognize how these fees can impact other system performance objectives such as minimizing the number of misconnecting passengers. We estimate that the debundling phenomenon has diluted revenues to the US Airport and Airways Trust Fund by at least 5%.

Urban public transport in Europe: Technology diffusion and market organisation

- Transportation Research Part A: Policy and Practice---2012---Álvaro Costa,Ruben Fernandes

Technological change and incremental technology, at various levels, are believed to have played an important role in the success of urban public transport in Europe. In this paper, a historical overview of the evolution of different transport modes across different European cities is presented. Our major concern is with the processes of diffusion of urban transport modes in European cities and, in particular, with the factors, mainly of an economic nature, that may explain their rates of adoption across Europe. Among these factors, special attention is given to the role played by the

dimension and organisation of public transport markets in the rates of adoption of different public transport modes. The main conclusion of the paper is that the success of the introduction of a new transport mode appeared to be mainly related to its ability to provide cheaper and more reliable transport services compared with previous transport modes, and that, in the case of the electric tram, this was achieved by transforming of the structure of the market relating to this urban transport mode into monopolies.

Should subsidies to urban passenger transport be increased? A spatial CGE analysis for a German metropolitan area

- Transportation Research Part A: Policy and Practice---2012---Stefan Tscharaktschiew, Georg Hirte

In many countries passenger transport is significantly subsidized in a variety of ways for various reasons. The objective of this paper is to examine efficiency, distributional, environmental (CO₂ emissions) and spatial effects of increasing different kinds of passenger transport subsidies discriminating between household types, travel purposes and travel modes. The effects are calculated by applying a numerical spatial general equilibrium approach calibrated to an average German metropolitan area. In extension to most studies focusing on only one kind of subsidy, we compare the effects of different transport subsidies within the same unified framework that allows to account for two features not yet considered simultaneously in studies on transport subsidies: endogenous labor supply and location decisions. Furthermore, congestion, travel mode choice, travel related CO₂ emissions and institutional details regarding the tax system in Germany are taken into account. The results suggest that optimal subsidy levels are either small or even zero. While subsidizing public transport is welfare enhancing, subsidies to urban road traffic reduce aggregate urban welfare. Concerning the latter it is shown that making investments in urban road infrastructure capacity or reducing gasoline taxes may even be harmful to residents using predominantly automobile. In contrast, pure commut-

ing subsidies hardly affect aggregate urban welfare, but distributional effects are substantial. All policies cause suburbanization of city residents and (except for subsidizing public transport) contribute to urban sprawl by raising the spatial imbalance of residences and jobs but the effect is relatively small. In addition, the policies induce a very differentiated pattern regarding distributional effects, benefits of landowners and environmental effects.

Labour market effects in assessing the costs and benefits of road pricing

- Transportation Research Part A: Policy and Practice---2012---D.P. McArthur, I. Thorsen, Jan Ubøe

Traffic congestion and the policies used to combat it have been studied extensively. One area which has received less attention is the secondary impacts of such policies. This paper uses a micro-simulation framework to study the effect on labour markets of road pricing. The key benefit of our chosen methodology is that it allows a simultaneous consideration of both commuting and migration decisions. We show that while welfare gains can be achieved through optimal charging, this may come at the price of decreased integration. This may manifest through either greater centralisation tendencies in population, or through unemployment disparities between regions.

Jobs–housing imbalance, spatial correlation, and excess commuting

- Transportation Research Part A: Policy and Practice---2012---Tsutomu Suzuki, Sohee Lee

In this paper, we use continuous urban structure instead of zonal model, try to calculate unbiased excess commuting with joint distribution of homes and workplaces developed by Vaughan (1974), and describe the relationship between urban structure and commuting distance explicitly and theoretically for generalized home–workplace assignment pattern. We simplify the quadrivariate distribution model to a model with three important parameters: the spread of homes, the spread

of workplaces, and the spatial correlation of homes and workplaces. Then we show that excess commuting and capacity utilization are expressed by the imbalance and the spatial correlation of jobs–housing structure in a theoretical context, moreover it explicitly evaluates targeting US and Japanese/Korean cities.

Speed limit laws in America: The role of geography, mobility and ideology

- Transportation Research Part A: Policy and Practice---2012---Daniel Albalade, Germà Bel

Speed limits had been centralized at the federal level since 1974, until decisions were devolved to the states in 1995. However, the centralization debate has reemerged in recent years. This paper conducts the first econometric analysis of the determinants of speed limit laws and State reactions after the repeal. By using mobility, geographic and political variables, our results suggest that geography – which reflects private mobility needs and social preferences –, is one of the main factors influencing speed limit laws, together with political ideology. Furthermore, we identify the presence of regional and time diffusion effects. By presenting first evidence on policy determinants, we provide a better understanding of the formulation of the heterogeneity of speed limits in US and offer implications for the debate on centralization and decentralization of transport policy.

Virtual reality simulation game approach to investigate transport adaptive capacity for peak oil planning

- Transportation Research Part A: Policy and Practice---2012---Montira Watcharasukarn, Shannon Page, Susan Krumdieck

The peak and decline of world oil production is an emerging issue for transportation and urban planners. Peak oil from an energy perspective means that there will be progressively less fuel. Our work treats changes in oil supply as a risk to transport activity systems. A virtual reality survey method, based on the sim game concept, has been developed to audit the participant's

normal weekly travel activity, and to explore participant's travel adaptive capacity. The travel adaptive capacity assessment (TACA) Sim survey uses avatars, Google Map™, 2D scenes, interactive screens and feedback scores. Travel adaptive capacity is proposed as a measure of long-range resilience of activity systems to fuel supply decline. Mode adaptive potential is proposed as an indicator of the future demand growth for less energy intensive travel. Both adaptation indicators can be used for peak oil vulnerability assessment. A case study was conducted involving 90 participants in Christchurch New Zealand. All of the participants were students, general staff or academics at the University of Canterbury. The adaptive capacity was assessed by both simulated extreme fuel price shock and by asking, “do you have an alternative mode?” without price pressure. The travel adaptive capacity in number of kilometers was 75% under a 5-fold fuel price increase. The mode adaptive potential was 33% cycling, 21% walking and 22% bus. Academics had adaptive capacity of only 1–5% of trips by canceling or carrying out their activity from home compared to 10–18% for students.

On the income elasticity of the value of travel time

- Transportation Research Part A: Policy and Practice---2012---Maria Börjesson, Mogens Fosgerau, Staffan Algers

Transport infrastructure is long-term and in appraisal it is necessary to value travel time savings for future years. This requires knowing how the value of time (VTT) will develop over time as incomes grow. This paper investigates if the cross-sectional income elasticity of the VTT is equal to inter-temporal income elasticity. The study is based on two identical stated choice experiments conducted with a 13year interval. Results indicate that the relationship between income and the VTT in the cross-section has remained unchanged over time. As a consequence, the inter-temporal income elasticity of the VTT can be predicted based on cross-sectional income elasticity. However, the income elasticity of the VTT is not a constant but increases with income. For

this reason, the average income elasticity of the VTT in the cross-sections has increased between the two survey years and can be expected to increase further over time.

Catching the tail: Empirical identification of the distribution of the value of travel time

- Transportation Research Part A: Policy and Practice---2012---Maria Börjesson,Mogens Fosgerau,Staffan Algers

Recent methodological advances in discrete choice analysis in combination with certain stated choice experiments have allowed researchers to check empirically the identification of the distribution of latent variables such as the value of travel time (VTT). Lack of identification is likely to be common and the consequences are severe. E.g., the Danish value of time study found the 15% right tail of the VTT distribution to be unidentified, making it impossible to estimate the mean VTT without resorting to strong assumptions with equally strong impact on the resulting estimate. This paper analyses data generated from a similar choice experiment undertaken in Sweden during 2007–2008 in which the range of trade-off values between time and money was significantly increased relative to the Danish experiment. The results show that this change allowed empirical identification of effectively the entire VTT distribution. In addition to informing the design of future choice experiments, the results are also of interest as a validity test of the stated choice methodology. Failure in identifying the right tail of the VTT would have made it difficult to maintain that respondents' behaviour is consistent with utility maximisation in the sense intended by the experimenter.

Efficiency measurement in public transport: Are findings specification sensitive?

- Transportation Research Part A: Policy and Practice---2012---Matthew G. Karlaftis,Dimitrios Tsamboulas

The need to measure transit system performance along with its various dimensions such as efficiency and ef-

fectiveness has led to the development of a wide array of approaches and vast literature. However, depending upon the specific approach used to examine performance, different conclusions are oftentimes reached. Using data from 15 European transit systems for a ten year time period (1990–2000), this paper discusses three important transit performance questions; (i) Do different efficiency assessment methodologies produce similar results? (ii) How are the two basic dimensions of transit performance, namely efficiency and effectiveness, related? and (iii) Are findings regarding organizational regimes (public operations, contracting and so on) sensitive to the methodological specifications employed? Results clearly indicate that efficiency scores and associated recommendations are sensitive to the models used, while efficiency and effectiveness are – albeit weakly – negatively related; these two findings can have far reaching policy implications.

Reliable route guidance: A case study from Chicago

- Transportation Research Part A: Policy and Practice---2012---Nie, Yu (Marco),Xing Wu,John F. Dillenburg,Peter C. Nelson

Reliable route guidance can be obtained by solving the reliable a priori shortest path problem, which finds paths that maximize the probability of arriving on time. The goal of this paper is to demonstrate the benefits and applicability of such route guidance using a case study. An adaptive discretization scheme is first proposed to improve the efficiency in computing convolution, a time-consuming step used in the reliable routing algorithm to obtain path travel time distributions. Methods to construct link travel time distributions from real data in the case study are then discussed. Particularly, the travel time distributions on arterial streets are estimated from linear regression models calibrated from expressway data. Numerical experiments demonstrate that optimal paths are substantially affected by the reliability requirement in rush hours, and that reliable route guidance could generate up to 5–15% of travel time savings. The study also verifies that existing algorithms can solve large-scale

problems within a reasonable amount of time.

Scientific research about climate change mitigation in transport: A critical review

- Transportation Research Part A: Policy and Practice---2011---Tim Schwanen,David Banister,Jillian Anable

This paper seeks to develop a deeper understanding of the research on climate change mitigation in transport. We suggest that work to date has focused on the effects of improvements in transport technologies, changes in the price of transport, physical infrastructure provision, behavioural change and alternative institutional arrangements for governing transport systems. In terms of research methodologies, positivist and quantitative analysis prevails, although there are signs of experimentation with non-positivist epistemologies and participatory methods. These particular engagements with climate change mitigation reflect mutually reinforcing tendencies within and beyond the academic transport community. We first draw on a revised version of Thomas Kuhn's philosophy of science to explore the path dependencies within transport studies, which are at least partly responsible for the predisposition towards quantitative modelling and technology, pricing and infrastructure oriented interventions in transport systems. We then employ the governmentality perspective to examine how transport academics' engagements with climate change mitigation depend on and align with more general understandings of climate change in UK society and beyond. The analysis makes clear that ecological modernisation and neo-liberal governmentality more generally provide the context for the current focus on and belief in technological, behaviour change, and especially market-based mitigation strategies. While current research trajectories are important and insightful, we believe that a deeper engagement with theoretical insights from the social sciences will produce richer understandings of transport mitigation in transport and briefly outline some of the contributions thinking on socio-technical transitions and practice theories can make.

Modal-split effects of climate change: The effect of low water levels on the competitive position of inland waterway transport in the river Rhine area

- Transportation Research Part A: Policy and Practice---2011---Olaf Jonkeren,Bart Jourquin,Piet Rietveld

Future climate change is expected to affect inland waterway transport in most main natural waterways in Europe. For the river Rhine it is expected that, in summer, more and longer periods with low water levels will occur. In periods of low water levels inland waterway vessels have to reduce their load factors and, as a result, transport prices per tonne will increase. One possible consequence of these higher transport prices is a deterioration of the competitive position of inland waterway transport compared with rail and road transport, and thus a change in modal split. We study this issue using a GIS-based software model called NODUS which provides a tool for the detailed analysis of freight transportation over extensive multimodal networks. We assess the effect of low water levels on the costs of transport operations for inland waterway transport in North West Europe under several climate scenarios. It turns out, that the effect on the modal split is limited. Under the most extreme climate scenario, inland waterway transport would lose about 5.4% of the quantity that is currently being transported annually in the part of the European inland waterway transport market considered. The very dry year of 2003 can be seen as an analogue for this scenario.

Road transport and climate change: Stepping off the greenhouse gas

- Transportation Research Part A: Policy and Practice---2011---John Stanley,David Hensher,Chris Loader

Transport is Australia's third largest and second fastest growing source of greenhouse gas (GHG) emissions. The road transport sector makes up 88% of total transport emissions and the projected emissions increase from 1990 to 2020 is 64%. Achieving prospective emission reduction targets will pose major challenges

for the road transport sector. This paper investigates two targets for reducing Australian road transport greenhouse gas emissions, and what they might mean for the sector: emissions in 2020 being 20% below 2000 levels; and emissions in 2050 being 80% below 2000 levels. Six ways in which emissions might be reduced to achieve these targets are considered. The analysis suggests that major behavioural and technological changes will be required to deliver significant emission reductions, with very substantial reductions in vehicle emission intensity being absolutely vital to making major inroads in road transport GHG emissions.

The future tourism mobility of the world population: Emission growth versus climate policy

- Transportation Research Part A: Policy and Practice---2011---Ghislain Dubois,Paul Peeters,Jean-Paul Ceron,Stefan Gössling

Much of global passenger transport is linked to tourism. The sector is therefore of interest in studying global mobility trends and transport-related emissions. In 2005, tourism was responsible for around 5% of all CO₂ emissions, of which 75% were caused by passenger transport. Given the rapid growth in tourism, with 1.6 billion international tourist arrivals predicted by 2020 (up from 903 million in 2007), it is clear that the sector will contribute to rapidly growing emission levels, and increasingly interfere with global climate policy. This is especially true under climate stabilisation and “avoiding dangerous climate change” objectives, implying global emission reductions in the order of 50% to 80% by 2050, compared to 2000. Based on three backcasting scenarios, and using techniques integrating quantitative and qualitative elements, this paper discusses the options for emission reductions in the tourism sector and the consequences of mitigation for global tourism-related mobility by 2050. It ends with a discussion of the policy implications of the results.

A regression on climate policy: The European Commission’ s legislation to reduce CO₂ emissions from automobiles

- Transportation Research Part A: Policy and Practice---2011---Manuel Frondel,Christoph Schmidt,Colin Vance

As part of its efforts to reach the targets of the Kyoto Protocol, in April 2009 the European Commission enacted new legislation to reduce the per-kilometer CO₂ emissions of newly registered automobiles. This paper critically assesses this legislation with respect to its economic and technological underpinnings. First, we argue that the reliance on targets based on per-kilometer emissions not only conceals the true cost of compliance and thereby stifles informed public discourse, but is also less cost-effective than alternative measures such as emissions trading. Second, the emission targets stipulated in this legislation are based on linear-regression methods that we demonstrate to be poorly justified and misleading. Using instead stochastic-frontier analysis, which is argued to more accurately reflect the industry’ s technological status quo, alternative targets are consequently proposed.

Personal tradable carbon permits for road transport: Why, why not and who wins?

- Transportation Research Part A: Policy and Practice---2011---Zia Wadud

Personal road transport sector poses a significant challenge in reducing carbon emissions. This paper evaluates a policy approach known as personal tradable carbon permits to reduce carbon emissions from personal vehicles. The policy is a downstream tradable permit where individuals are allocated carbon emission caps. The policy is qualitatively evaluated in the context of carbon taxes and some upstream tradable permit options. The biggest disadvantage of such a policy is the initial set up costs. Personal tradable permits, however, are more effective than carbon taxes and are also capable of stabilizing the gasoline prices faced by the consumers when the underlying oil prices fluctuate. Since equity effects are often a concern to

policy makers, the effect of such personal carbon permits on the distribution of burden is quantified in a partial equilibrium framework for the US population. Different permit allocation strategies are investigated in this regard. Using US consumer expenditure survey data, and incorporating a differentiated price response for different households, we find that all three allocation strategies considered are progressive: a per adult based allocation is the most progressive, a per vehicle allocation nearer to proportional, and a per capita allocation in between the two. Personal tradable permits therefore take care of equity concerns directly through the design of the policy.

Much Ado about Nothing? – An analysis of economic impacts and ecologic effects of the EU-emission trading scheme in the aviation industry

- Transportation Research Part A: Policy and Practice---2011---Jan Vespermann, Andreas Wald

From 2012 on, all CO₂ emissions from flights departing from or arriving at airports within the European Union have to be offset. We analyze the economic and ecological impacts that are caused by an inclusion of the aviation industry into the proposed emissions trading scheme (ETS). Building on the now fixed system design we employ a simulation model to estimate the impacts of the scheme. Our results indicate that financial impacts are highly dependant on external settings, such as allowance prices and demand growth. We show that the financial burden on the aviation industry will be rather modest in the first years after the introduction of the system and therefore induce only low competition distortions. Likewise, emission reductions within air transportation will be comparably low. While aviation will induce a decline of emissions in other sectors, significant absolute reductions within air transportation can only be reached by a more restrictive system design.

Air transportation in a carbon constrained world: Long-term dynamics of policies and strategies for mitigating the carbon footprint of commercial aviation

- Transportation Research Part A: Policy and Practice---2011---Sgouris Sgouridis, Philippe A. Bonnefoy, R. John Hansman

With increasing demand for air transportation worldwide and decreasing marginal fuel efficiency improvements, the contribution of aviation to climate change relative to other sectors is projected to increase in the future. As a result, growing public and political pressures are likely to further target air transportation to reduce its greenhouse gas emissions. The key challenges faced by policy makers and air transportation industry stakeholders is to reduce aviation greenhouse gas emissions while sustaining mobility for passengers and time-sensitive cargo as well as meeting future demand for air transportation in developing and emerging countries. This paper examines five generic policies for reducing the emissions of commercial aviation; (1) technological efficiency improvements, (2) operational efficiency improvements, (3) use of alternative fuels, (4) demand shift and (5) carbon pricing (i.e. market-based incentives). In order to evaluate the impacts of these policies on total emissions, air transport mobility, airfares and airline profitability, a system dynamics modeling approach was used. The Global Aviation Industry Dynamics (GAID) model captures the systemic interactions and the delayed feedbacks in the air transportation system and allows scenarios testing through simulations. For this analysis, a set of 34 scenarios with various levels of aggressiveness along the five generic policies were simulated and tested. It was found that no single policy can maintain emissions levels steady while increasing projected demand for air transportation. Simulation results suggest that a combination of the proposed policies does produce results that are close to a “weak” sustainability definition of increasing supply to meet new demand needs while maintaining constant or increasing slightly emissions levels. A combination of policies that includes aggressive levels of technological and operations efficiency

improvements, use of biofuels along with moderate levels of carbon pricing and short-haul demand shifts efforts achieves a 140% increase in capacity in 2024 over 2004 while only increasing emissions by 20% over 2004. In addition, airline profitability is moderately impacted (10% reduction) compared to other scenarios where profitability is reduced by over 50% which pose a threat to necessary investments and the implementation of mitigating measures to reduce CO2 emissions. This study has shown that an approach based on a portfolio of mitigating measures and policies spanning across technology and operational improvements, use of biofuels, demand shift and carbon pricing is required to transition the air transportation industry close to an operating point of environmental and mobility sustainability.

Preface

- Transportation Research Part A: Policy and Practice---2011---Michael J. Cassidy,Alexander Skabardonis

2011

Optimality of environmental policies in air transport markets and changes in the schedule delay: A theoretical approach

- Transportation Research Part A: Policy and Practice---2011---M. Pilar Socorro,Ofelia Betancor

Air transport provides essential services in modern economies, though it produces significant negative external effects on the environment. Air quality, greenhouse gas emissions and noise are the main issues. The current environmental regulatory practice in air transport usually devises policy interventions for each externality in isolation disregarding their impact on the schedule delay, which in turn affects the consumers' generalized price and social welfare. In this paper we develop a theoretical model that shows that such an approach is inadequate, and may lead to the choice of wrong environmental policies.

The economics of parking provision for the morning commute

- Transportation Research Part A: Policy and Practice---2011---Qian, Zhen (Sean),Xiao, Feng (Evan),H.M. Zhang

In this paper, we study the economics of parking provision for the morning commute, where all the parking lots are owned and operated by private operators. The parking capacity allocations, parking fees and access times are considered in a parking market. First we solve the parking market equilibrium without regulatory intervention, revealing four types of competitive equilibrium. Only one of the four types of equilibrium, however, is found to be stable and realistic, and under it each parking area is preferred by the commuters during certain time periods. Compared to the case without parking choice, provision of parking through a competitive market is able to reduce commuters' travel cost and queuing delay, but it does not necessarily lead to the most desirable market outcome that minimizes social cost or commuter cost. This issue can be addressed through market regulations, such as price-ceiling, capacity-floor or capacity-ceiling, and a quantity tax/subsidy regulation. It is found that both price-ceiling and quantity tax/subsidy regulations can efficiently reduce both the system cost and commuter cost under certain conditions, and help ensure the stability of the parking market. Numerical examples are also provided to illustrate these findings and furthermore, how a price ceiling or a quantity tax/subsidy should be set in a parking market under realistic model parameters.

Latent temporal preferences: An application to airline travel

- Transportation Research Part A: Policy and Practice---2011---Raúl Brey,Joan L. Walker

An essential element of demand modeling in the airline industry is the representation of time of day demand--the demand for a given itinerary as a function of its departure or arrival times. It is an important datum that drives successful scheduling and fleet decisions.

There are two key components to this problem: the distribution of the time of day demand and how preferred travel time influences itinerary choice. This paper focuses on estimating the time of day distribution. Our objective is to estimate it in a manner that is not confounded with air travel supply; is a function of the characteristics of the traveler, the trip, and the market; and accounts for potential measurement errors in self-reported travel time preferences. We employ a stated preference dataset collected by intercepting people who were booking continental US trips via an internet booking service. Respondents reported preferred travel times as well as choices from a hypothetical set of itineraries. We parameterize the time of day distribution as a mixture of normal distributions (due to the strong peaking nature of travel time preferences) and allow the mixing function to vary by individual characteristics and trip attributes. We estimate the time of day distribution and the itinerary choice model jointly in a manner that accounts for measurement error in the self-reported travel time preferences. We find that the mixture of normal distributions fits the time of day distribution well and is behaviorally intuitive. The strongest covariates of travel time preferences are party size and time zone change. The methodology employed to treat self-reported travel time preferences as potentially having error contributes to the broader transportation time of day demand literature, which either assumes that the desired travel times are known with certainty or that they are unknown. We find that the error in self-reported travel time preferences is statistically significant and impacts the inferred time of day demand distribution.

Modeling heterogeneous risk-taking behavior in route choice: A stochastic dominance approach

- Transportation Research Part A: Policy and Practice---2011---Xing Wu,(Marco) Nie, Yu

This paper proposes a unified approach to modeling heterogenous risk-taking behavior in route choice based on the theory of stochastic dominance (SD). Specifically, the first-, second-, and third-order stochastic dominance (FSD, SSD, TSD) are respectively linked

to insatiability, risk-aversion and ruin-aversion within the framework of utility maximization. The paths that may be selected by travelers of different risk-taking preferences can be obtained from the corresponding SD-admissible paths, which can be generated using general dynamic programming. This paper also analyzes the relationship between the SD-based approach and other route choice models that consider risk-taking behavior. These route choice models employ a variety of reliability indexes, which often make the problem of finding optimal paths intractable. We show that the optimal paths with respect to these reliability indexes often belong to one of the three SD-admissible path sets. This finding offers not only an interpretation of risk-taking behavior consistent with the SD theory for these route choice models, but also a unified and computationally viable solution approach through SD-admissible path sets, which are usually small and can be generated without having to enumerate all paths. A generic label-correcting algorithm is proposed to generate FSD-, SSD-, and TSD-admissible paths, and numerical experiments are conducted to test the algorithm and to verify the analytical results.

Cognitive cost in route choice with real-time information: An exploratory analysis

- Transportation Research Part A: Policy and Practice---2011---Song Gao,Emma Frejinger,Moshe Ben-Akiva

Real-time traffic information is increasingly available to support route choice decisions by reducing the travel time uncertainty. However it is likely that a traveler cannot assess all available information on all alternative routes due to time constraints and limited cognitive capacity. This paper presents a model that is consistent with a general network topology and can potentially be estimated based on revealed preference data. It explicitly takes into account the information acquisition and the subsequent path choice. The decision to acquire information is assumed to be based on the cognitive cost involved in the search and the expected benefit defined as the expected increase in utility after the search. A latent class model is proposed, where the decision to

search or not to search and the depth of the search are latent and only the final path choices are observed. A synthetic data set is used for the purpose of validation and ease of illustration. The data are generated from the postulated cognitive-cost model, and estimation results show that the true values of the parameters can be recovered with enough variability in the data. Two other models with simplifying assumptions of no information and full information are also estimated with the same set of data with significantly biased path choice utility parameters. Prediction results show that a smaller cognitive cost encourages information search on risky and fast routes and thus higher shares on those routes. As a result, the expected average travel time decreases and the variability increases. The no-information and full-information models are extreme cases of the more general cognitive-cost model in some cases, but not generally so, and thus the increasing ease of information acquisition does not necessarily warrant a full-information model.

Proactive detection of high collision concentration locations on highways

- Transportation Research Part A: Policy and Practice---2011---Koohong Chung,Kitae Jang,Samer Madanat,Simon Washington

In previous research (Chung et al., 2009), the potential of the continuous risk profile (CRP) to proactively detect the systematic deterioration of freeway safety levels was presented. In this paper, this potential is investigated further, and an algorithm is proposed for proactively detecting sites where the collision rate is not sufficiently high to be classified as a high collision concentration location but where a systematic deterioration of safety level is observed. The approach proposed compares the weighted CRP across different years and uses the cumulative sum (CUSUM) algorithm to detect the sites where changes in collision rate are observed. The CRPs of the detected sites are then compared for reproducibility. When high reproducibility is observed, a growth factor is used for sequential hypothesis testing to determine if the collision profiles are increasing over time. Findings from applying the

proposed method using empirical data are documented in the paper together with a detailed description of the method.

Design and implementation of efficient transit networks: Procedure, case study and validity test

- Transportation Research Part A: Policy and Practice---2011---M. Estrada,M. Roca-Riu,H. Badiá,F. Robusté,C.F. Daganzo

This paper presents and tests a method to design high-performance transit networks. The method produces conceptual plans for geometric idealizations of a particular city that are later adapted to the real conditions. These conceptual plans are generalizations of the hybrid network concept proposed in Daganzo (2010). The best plan for a specific application is chosen via optimization. The objective function is composed of analytic formulae for a concept's agency cost and user level of service. These formulae include as parameters key demand-side attributes of the city, assumed to be rectangular, and supply-side attributes of the transit technology. They also include as decision variables the system's line and stop spacings, the degree to which it focuses passenger trips on the city center, and the service headway. These decision variables are sufficient to define an idealized geometric layout of the system and an operating plan. This layout-operating plan is then used as a design target when developing the real, detailed master plan. Ultimately, the latter is simulated to obtain more accurate cost and level of service estimates. This process has been applied to design a high performance bus (HPB) network for Barcelona (Spain). The idealized solution for Barcelona includes 182 km of one-way infrastructure, uses 250 vehicles and costs 42,489 [euro]/h to build and run. These figures only amount to about one third of the agency resources and cost currently used to provide bus service. A detailed design that resembles this target and conforms to the peculiarities of the city is also presented and simulated. The agency cost and user level of service metrics of the simulated system differ from those of the idealized model by less than 10%. Although the designed and simulated HPB systems provide sub-optimal spatial

coverage because Barcelona lacks suitable streets, the level of service is good. Simulations suggest that if the proposed system was implemented side-by-side with the current one, it would capture most of the demand.

On the fundamental diagram and supply curves for congested urban networks

- Transportation Research Part A: Policy and Practice---2011---Ronghui Liu,Tony May,Simon Shepherd

Macroscopic fundamental diagrams (MFD) of traffic for some networks have been shown to have similar shape to those for single links. They have erroneously been used to help estimate the level of travel in congested networks. We argue that supply curves, which track vehicles in their passage through congested networks, are needed for this purpose, and that they differ from the performance curves generated from MFD. We use a microsimulation model, DRACULA and two networks, one synthesizing the network for Cambridge, England, and one of the city of York, England, to explore the nature of performance curves and supply curves under differing patterns of demand. We show that supply curves differ from performance curves once the onset of congestion is reached, and that the incorrect use of performance curves to estimate demand can thus seriously underestimate traffic levels, the costs of congestion, and the value of congestion relief measures. We also show that network aggregated supply curves are sensitive to the temporal distribution of demand and, potentially, to the spatial distribution of demand. The shape of the supply curve also differs between origin-destination movements within a given network. We argue that supply curves for higher levels of demand cannot be observed in normal traffic conditions, and specify ways in which they can be determined from microsimulation and, potentially, by extrapolating observed data. We discuss the implications of these findings for conventional modelling of network management policies, and for these policies themselves.

Hysteresis phenomena of a Macroscopic Fundamental Diagram in freeway networks

- Transportation Research Part A: Policy and Practice---2011---Nikolas Geroliminis,Jie Sun

Observations of traffic pairs of flow vs. density or occupancy for individual locations in freeways or arterials are usually scattered about an underlying curve. Recent observations from empirical data in arterial networks showed that in some cases by aggregating the highly scattered plots of flow vs. density from individual loop detectors, the scatter almost disappears and well-defined macroscopic relations exist between space-mean network flow and network density. Despite these findings for the existence of well-defined relations with low scatter, these curves should not be universal. In this paper we investigate if well-defined macroscopic relations exist for freeway network systems, by analyzing real data from Minnesota's freeways. We show that freeway network systems not only have curves with high scatter, but they also exhibit hysteresis phenomena, where higher network flows are observed for the same average network density in the onset and lower in the offset of congestion. The mechanisms of traffic hysteresis phenomena at the network level are analyzed in this paper and they have dissimilarities to the causes of the hysteresis phenomena at the micro/meso level. The explanation of the phenomenon is dual. The first reason is that there are different spatial and temporal distributions of congestion for the same level of average density. Another reason is the synchronized occurrence of transitions from individual detectors during the offset of the peak period, with points remain beneath the equilibrium curve. Both the hysteresis phenomenon and its causes are consistently observed for different spatial aggregations of the network.

Extended bottlenecks, the fundamental relationship, and capacity drop on freeways

- Transportation Research Part A: Policy and Practice---2011---Benjamin Coifman,Seoungbum Kim

This paper presents evidence that the commonly used

point bottleneck model is too simplistic for freeway bottlenecks, the actual mechanism appears to occur over an extended distance. We find evidence of subtle flow limiting and speed reducing phenomena more than a mile downstream of a lane drop bottleneck. These phenomena impact the fundamental relationship, FD. Close to the lane drop the free flow regime appears to come from a "parabolic" FD, but further downstream the relationship straightens to a "triangular" FD and throughput increases. We develop a theory to explain the underlying mechanisms. These insights should help resolve the decades long debate about the shape of the FD. The phenomena also provide a mechanism that may contribute to the empirically observed capacity drop often seen at bottlenecks. Although we study a lane drop, this work should be transferable to other bottlenecks where the capacity restriction persists for an extended distance, e.g., a corridor with a fixed number of lanes and an on-ramp bottleneck.

Evolution of the household vehicle fleet: Anticipating fleet composition, PHEV adoption and GHG emissions in Austin, Texas

- Transportation Research Part A: Policy and Practice---2011---Sashank Musti,Kara M. Kockelman

In today's world of volatile fuel prices and climate concerns, there is little study on the relationship between vehicle ownership patterns and attitudes toward vehicle cost (including fuel prices and feebates) and vehicle technologies. This work provides new data on ownership decisions and owner preferences under various scenarios, coupled with calibrated models to microsimulate Austin's personal-fleet evolution. Opinion survey results suggest that most Austinites (63%, population-corrected share) support a feebate policy to favor more fuel efficient vehicles. Top purchase criteria are price, type/class, and fuel economy. Most (56%) respondents also indicated that they would consider purchasing a Plug-in Hybrid Electric Vehicle (PHEV) if it were to cost \$6000 more than its conventional, gasoline-powered counterpart. And many respond strongly to signals on the external (health and climate) costs of a

vehicle's emissions, more strongly than they respond to information on fuel cost savings. Twenty five-year simulations of Austin's household vehicle fleet suggest that, under all scenarios modeled, Austin's vehicle usage levels (measured in total vehicle miles traveled or VMT) are predicted to increase overall, along with average vehicle ownership levels (both per household and per capita). Under a feebate, HEVs, PHEVs and Smart Cars are estimated to represent 25% of the fleet's VMT by simulation year 25; this scenario is predicted to raise total regional VMT slightly (just 2.32%, by simulation year 25), relative to the trend scenario, while reducing CO2 emissions only slightly (by 5.62%, relative to trend). Doubling the trend-case gas price to \$5/gallon is simulated to reduce the year-25 vehicle use levels by 24% and CO2 emissions by 30% (relative to trend). Two- and three-vehicle households are simulated to be the highest adopters of HEVs and PHEVs across all scenarios. The combined share of vans, pickup trucks, sport utility vehicles (SUVs), and cross-over utility vehicles (CUVs) is lowest under the feebate scenario, at 35% (versus 47% in Austin's current household fleet). Feebate-policy receipts are forecasted to exceed rebates in each simulation year. In the longer term, gas price dynamics, tax incentives, feebates and purchase prices along with new technologies, government-industry partnerships, and more accurate information on range and recharging times (which increase customer confidence in EV technologies) should have added effects on energy dependence and greenhouse gas emissions.

Timetable-based operation in urban transport: Run-time optimisation and improvements in the operating process

- Transportation Research Part A: Policy and Practice---2011---M. Salicrú,C. Fleurent,J.M. Armengol

Urban public transit provides an efficient means of mobility and helps support social development and environmental preservation. To avoid loss of ridership, transit authorities have focussed on improving the punctuality of routes that operate using timetables. This paper presents a new approach to generating run-

time values that is based on analytical development and micro simulations. The work utilizes previous research (described herein) and the experience acquired by Transports Metropolitans de Barcelona (TMB) in operating bus routes based on timetables. Using a sample of historical data, the method used for generating run-time values consists of the following steps: purging and screening atypical trips, based on the consideration of confidence intervals for median trips; segmenting the day into time bands based on the introduction of a new hierarchical classification algorithm; creating initial run-time values based on criteria derived from statistical analysis; adjusting and validating initial run-time values using micro simulations; and evaluating incident-recovery times at the end of trips in order to guarantee the punctual departure of the next trip in the vehicle schedule. To favour service improvement, we also introduced certain indicators that can identify the root causes of non-compliance. As a final step, in order to ensure the applicability and use of the model, we promoted the development of our model within the framework of the HASTUS(TM) software solution.

Walking frequency, cars, dogs, and the built environment

- Transportation Research Part A: Policy and Practice---2011---Bahareh Sehatzadeh,Robert Noland,Marc D. Weiner

To explain walking propensity or frequency, empirical studies have generally used two sets of explanatory variables, namely, socio-demographic variables and built environment variables. They have generally shown that both socio-demographic characteristics and built environment characteristics are associated with walking propensity. We examine the traditional walkability variables that encompass density, mix of uses, and network connectivity in New Jersey, using a statewide sample including an oversample of Jersey City. We estimate a two-stage least squares model using a conditional mixed process that combines an ordered probit model of walking frequency in the second stage based on a truncated regression of car ownership in the first stage. Our results show that built environ-

ment variables have some small effects, mainly from better network connectivity associated with increased walking frequency. One of our key findings is that built environment features also work indirectly via how they influence car ownership. In general, we find sufficient evidence that suggests fewer cars are owned in areas with more walkable built environment features. The other key variable that we control for is whether a household owns a dog. This also proved to be strongly associated with walking suggesting that dog ownership is a necessary control variable to understand the frequency of walking.

A model to assess public transport demand stability

- Transportation Research Part A: Policy and Practice---2011---Pablo Bass,Pedro Donoso,Marcela Munizaga

Transport authorities, especially those in developing countries where rising income stimulate increased car ownership rates, are often concerned with maintaining or increasing levels of public transport use. Therefore, the ability to identify clients at risk of abandoning the system can be valuable for remedial measures, allowing for more focused quality improvements. We present and apply a model that determines the probability of migrating from public to private transport at both aggregated and disaggregated levels. In application, the model predicted migration with 60% accuracy in the first preference recovery measure. The proposed model can improve the understanding of the behavior of public transport users, the analysis of demand stability and the factors influencing migration. This, in turn, can help to focus policy and management measures and increase the efficiency of public investment.

A network option portfolio management framework for adaptive transportation planning

- Transportation Research Part A: Policy and Practice---2011---Joseph Y.J. Chow,Amelia C. Regan,Fatemeh Ranaiefar,Dmitri I. Arkhipov

A real option portfolio management framework is proposed to make use of an adaptive network design problem developed using stochastic dynamic programming methodologies. The framework is extended from Smit's and Trigeorgis' option portfolio framework to incorporate network synergies. The adaptive planning framework is defined and tested on a case study with time series origin-destination demand data. Historically, OD time series data is costly to obtain, and there has not been much need for it because most transportation models use a single time-invariant estimate based on deterministic forecasting of demand. Despite the high cost and institutional barriers of obtaining abundant OD time series data, we illustrate how having higher fidelity data along with an adaptive planning framework can result in a number of improved management strategies. An insertion heuristic is adopted to run the lower bound adaptive network design problem for a coarse Iran network with 834 nodes, 1121 links, and 10⁴ years of time series data for 71,795 OD pairs.

The socio-cognitive links between road pricing acceptability and changes in travel-behavior

- Transportation Research Part A: Policy and Practice---2011---Mario Cools,Kris Brijs,Hans Tormans,Elke Moons,Davy Janssens,Geert Wets

The objective of this study is to examine the effect of road pricing on people's tendency to adapt their current travel behavior. To this end, the relationship between changes in activity-travel behavior on the one hand and public acceptability and its most important determinants on the other are investigated by means of a stated adaptation experiment. Using a two-stage hierarchical model, it was found that behavioral changes themselves are not dependent on the perceived acceptability of road pricing itself, and that only a small amount of the variability in the behavioral changes were explained by socio-cognitive factors. The lesson for policy makers is that road pricing charges must surpass a minimum threshold in order to entice changes in activity-travel behavior and that the benefits of road pricing should be clearly communicated, taking into account the needs and abilities of different types

of travelers. Secondly, earlier findings concerning the acceptability of push measures were validated, supporting transferability of results. In line with other studies, effectiveness, fairness and personal norm all had a significant direct impact on perceived acceptability. Finally, the relevance of using latent factors rather than aggregate indicators was underlined.

Mobility, social exclusion and well-being: Exploring the links

- Transportation Research Part A: Policy and Practice---2011---John Stanley,David Hensher,Janet R. Stanley,Dianne Vella-Brodrick

Building on a growing research foundation, transport policy makers have begun to associate the ability to be mobile with having a role in the facilitation of social inclusion. However, the further connection to well-being is not as well understood. This paper explores the association between a person's travel patterns, their risk of social exclusion and self-assessed well-being. Key influences on social exclusion are discussed, with trip making emerging as a significant influence. Trip making is not a significant direct influence on well-being but does exercise an indirect influence through the impact on risk of social exclusion. The modelling process enables a value for additional trips to be estimated, the value being about four times the values derived from conventional generated traffic approaches. Similar high values are found in separate metropolitan and regional case studies, confirming the significance of the results.

Urban delivery industry response to cordon pricing, time-distance pricing, and carrier-receiver policies in competitive markets

- Transportation Research Part A: Policy and Practice---2011---José Holguín-Veras

The paper develops a set of analytical formulations to study the behavior of the urban delivery industry in response to cordon time-of-day pricing, time-distance pricing, and comprehensive financial policies targeting carriers and receivers. This is accomplished by modeling the behavior of receivers in response to financial

incentives, and the ensuing behavior of the carrier in response to both pricing and the receivers' decisions concerning off-hour deliveries. The analytical formulations consider both the base case condition, and a mixed operation with both regular hour and off-hour deliveries; two pricing schemes: cordon time of day, and time-distance pricing; two types of operations: single-tour, and multi-tour carriers; and three different scenarios in terms of profitability of the carrier operation, which include an approximation to the best case, the expected value, and the worst case. The analyses, both theoretical and numerical, highlight the limitations of pricing-only approaches. In the case of cordon time of day pricing, the chief conclusion is that it is of limited use as a freight demand management tool because: (1) in a competitive market the cordon toll cannot be transferred to the receivers as it is a fixed cost and (2) the structure of the cost function, that only provides an incentive to the carrier to switch to the off-hours when all the receivers in the tour switch to the off-hours. The analyses of time-distance pricing clearly indicate that, though its tolls could be transferred to the receivers and provide an incentive for behavior change, the magnitude of the expected toll transfers under real life conditions are too small to have any meaningful impact on receivers choice of delivery times. In essence, the key policy implication is that in order to change the joint behavior of carrier and receivers, financial incentives--or programs that foster unassisted off-hour deliveries--should be made available to receivers in exchange for their commitment to do off-hour deliveries. As the paper proves, if a meaningful number of receivers switch to the off-hours, the carriers are likely to follow suit.

Anticipating new-highway impacts: Opportunities for welfare analysis and credit-based congestion pricing

- Transportation Research Part A: Policy and Practice---2011---Kara M. Kockelman,Jason D. Lemp

Pricing of roadways opens doors for infrastructure financing, and congestion pricing seeks to address in-

efficiencies in roadway operations. This paper emphasizes the revenue-generation opportunities and welfare impacts of flat-tolling schemes, standard congestion pricing, and credit-based congestion pricing policies. While most roadway investment decisions focus on travel time savings for existing trips, this work turns to logsum differences (which quantify changes in consumer surplus) for nested logit specifications across two traveler types, two destinations, three modes and three times of day, in order to arrive at welfare- and revenue-maximizing solutions. This behavioral specification is quite flexible, and facilitates benefit-cost calculations (as well as equity analysis), as demonstrated in this paper. The various cases examined suggest significant opportunities for financing new roadway investment while addressing congestion and equity issues, with net gains for both traveler types. Application results illustrate how, even after roadway construction and maintenance costs are covered, receipts may remain to distribute to eligible travelers so that typical travelers can be made better off than if a new, non-tolled road had been constructed. Moreover, tolling both routes (new and old) results in substantially shorter payback periods (5 versus 20 years) and higher welfare outcomes (in the case of welfare-maximizing tolls with credit distributions to all travelers). The tools and techniques highlighted here illustrate practical methods for identifying welfare-enhancing and cost-recovering investment opportunities, while recognizing multiple user classes and appropriate demand elasticity across times of day, destinations, modes and routes.

Where Is My Bus? Impact of mobile real-time information on the perceived and actual wait time of transit riders

- Transportation Research Part A: Policy and Practice---2011---Kari Edison Watkins,Brian Ferris,Alan Borning,G. Scott Rutherford,David Layton

In order to attract more choice riders, transit service must not only have a high level of service in terms of frequency and travel time but also must be reliable. Although transit agencies continuously work

to improve on-time performance, such efforts often come at a substantial cost. One inexpensive way to combat the perception of unreliability from the user perspective is real-time transit information. The OneBusAway transit traveler information system provides real-time next bus countdown information for riders of King County Metro via website, telephone, text-messaging, and smart phone applications. Although previous studies have looked at traveler response to real-time information, few have addressed real-time information via devices other than public display signs. For this study, researchers observed riders arriving at Seattle-area bus stops to measure their wait time while asking a series of questions, including how long they perceived that they had waited. The study found that for riders without real-time information, perceived wait time is greater than measured wait time. However, riders using real-time information do not perceive their wait time to be longer than their measured wait time. This is substantiated by the typical wait times that riders report. Real-time information users say that their average wait time is 7.5 min versus 9.9 min for those using traditional arrival information, a difference of about 30%. A model to predict the perceived wait time of bus riders was developed, with significant variables that include the measured wait time, an indicator variable for real-time information, an indicator variable for PM peak period, the bus frequency in buses per hour, and a self-reported typical aggravation level. The addition of real-time information decreases the perceived wait time by 0.7 min (about 13%). A critical finding of the study is that mobile real-time information reduces not only the perceived wait time, but also the actual wait time experienced by customers. Real-time information users in the study wait almost 2 min less than those arriving using traditional schedule information. Mobile real-time information has the ability to improve the experience of transit riders by making the information available to them before they reach the stop.

Rewarding rush-hour avoidance: A study of commuters' travel behavior

- Transportation Research Part A: Policy and Practice---2011---Eran Ben-Elia,Dick Ettema

Spitsmijden, peak avoidance in Dutch, is the largest systematic effort to date to study, in the field, the potential of rewards as a policy mean for changing commuter behavior. A 13-week field study was organized in The Netherlands with the purpose of longitudinally investigating the impacts of rewards on commuter behavior. Different levels and types of rewards were applied and behavior was tracked with state-of-the-art detection equipment. Based on the collected data, which included also pre and post-test measurements, a mixed discrete choice model was estimated. The results suggest that rewards can be effective tools in changing commuting behavior. Specifically rewards reduce the shares of rush-hour driving, shift driving to off-peak times and increase the shares of public transport, cycling and working from home. Mediating factors include socio-demographic characteristics, scheduling constraints and work time flexibility, habitual behavior, attitudes to commuting alternatives, the availability of travel information and even the weather. The success of this study has encouraged adoption of rewards, as additional policy tools, to alleviate congestion, especially during temporary road closures.

Impacts of an emission based private car taxation policy - First year ex-post analysis

- Transportation Research Part A: Policy and Practice---2011---Fionn Rogan,Emer Dennehy,Hannah Daly,Martin Howley,Brian P. Ó Gallachóir

This paper assesses the impacts of a targeted policy designed to influence car purchasing trends towards lower CO2 emitting vehicles. Vehicle registration tax and annual motor tax rates in Ireland changed in July 2008 from being based on engine size to emissions performance of cars. This paper provides a one year ex-post analysis of the first year of the tax change, tracking

the change in purchasing trends arising from the measure related to specific CO₂ emissions, engine size and fuel, and the implications for car prices, CO₂ emissions abatement, and revenue gathered. While engine efficiency improvements had been offset by purchasing trends towards larger and generally less efficient cars in the past, with the average MJ/km remaining constant from 2000 to 2007, this analysis shows that in the first year of the new taxation system the average specific emissions of new cars fell by 13% to 145 g/km. This was brought about, not by a reduction in engine size, but rather through a significant shift to diesel cars. Despite an unexpected reduction in car sales due to a recession in 2008, the policy measure has had a larger than anticipated impact on CO₂ emissions, calculated to be 5.9 ktCO₂ in the first year of the measure. The strong price signal did however result in a 33% reduction in tax revenue from VRT, in financial terms amounting to a drop of [euro]166 million compared to a baseline situation.

A dynamic modeling approach to investigate impacts to protected and low-income populations in highway planning

- Transportation Research Part A: Policy and Practice---2011---Coray Davis,Manoj K. Jha

Environmental justice (EJ) assessment has traditionally focused on identifying distributive effects to protected populations. Federal and State highway improvement programs have been established to stimulate economic development for these populations. While this issue has long been recognized as part of EJ initiatives, no quantitative comparisons of highway construction impacts on protected populations have been reported in the literature. This paper presents a dynamic modeling approach to investigate impacts to protected and low-income populations in highway planning using an integrated Geographic Information System (GIS) and Genetic Algorithms (GAs) optimization framework. Using census and county level parcel data, the model integrates various socioeconomic factors into a GIS while generating highway alignments using GAs. Examples using county level census data from North Carolina

are demonstrated to test the sensitivity of generated highway alignments with constrained distances from protected populations. The results indicate that it is important to consider local social and economic effects, in addition to regional planning objectives when measuring the effectiveness of feasibility studies associated with highway construction. Within the proposed modeling framework attention is directed on various EJ initiatives, such as environmental health and safety laws in minority and low-income areas. The model would help planners, designers, and policy-makers understand the intricate interrelationships among local communities, while facilitating more scientific and economically equitable planning for highway construction projects.

Relationships between fares, trip length and market competition

- Transportation Research Part A: Policy and Practice---2011---Derek J. Clark,Finn Jørgensen,Terje Andreas Mathisen

This paper analyses equilibrium fares that arise from Collusion, Cournot, Stackelberg, Bertrand and Sequential Price Competition when two profit maximising transport firms produce symmetrically differentiable services and have identical costs. Special focus is placed on how different equilibrium fares are linked to trip length. Higher operator costs and higher demand from the authorities regarding the quality of transport supply result in steeper relationships (larger rate of change) between all fares and travel distance. Also, a higher degree of substitutability between the services will in most cases make these relationships steeper. The competitive situation has less influence on fares, both absolutely and relatively, the longer routes the operators compete on.

Mind the map! The impact of transit maps on path choice in public transit

- Transportation Research Part A: Policy and Practice---2011---Zhan Guo

This paper investigates the impact of schematic transit

maps on passengers' travel decisions. It does two things: First, it proposes an analysis framework that defines four types of information delivered from a transit map: distortion, restoration, codification, and cognition. It then considers the potential impact of this information on three types of travel decisions: location, mode, and path choices.¹ Second, it conducts an empirical analysis to explore the impact of the famous London tube map on passengers' path choice in the London Underground (LUL). Using data collected by LUL from 1998 to 2005, the paper develops a path choice model and compares the influence between the distorted tube map (map distance) and reality (travel time) on passengers' path choice behavior. Results show that the elasticity of the map distance is twice that of the travel time, which suggests that passengers often trust the tube map more than their own travel experience on deciding the "best" travel path. This is true even for the most experienced passengers using the system. The codification of transfer connections on the tube map, either as a simple dot or as an extended link, could affect passengers' transfer decisions. The implications to transit operation and planning, such as trip assignments, overcrowding mitigation, and the deployment of Advanced Transit Information System (ATIS), are also discussed.

Geodemographic analysis and the identification of potential business partnerships enabled by transit smart cards

- Transportation Research Part A: Policy and Practice---2011---Antonio Páez,Martin Trépanier,Catherine Morency

Smart card automated fare payment systems are being adopted by transit agencies around the world. The data-storage characteristics of smart cards present novel opportunities to enhance transit services. On the one hand, there are fare policies, where smart card holders are given specific rebates on the use of the service based on usage patterns or levels. On the other, there are non-fare policies, for instance if holders receive advantages, such as rebates and offers, from commercial partners. The purpose of this paper is to present a

geodemographic framework to identify potential commercial partnerships that could exploit the characteristics of smart cards. The framework is demonstrated using data from Montreal, Canada. Household survey data, specifically trip ends, and business data points are jointly used to determine the exposure of various types of establishments to users of the Montreal Metro network. Spatial analysis of business establishments in the neighborhood of metro stations helps to identify potential commercial partners. The results illustrate the potential of geodemographic analysis to generate intelligence of commercial interest.

Public regulation and passengers importance in port infrastructure costs

- Transportation Research Part A: Policy and Practice---2011---Ramón Núñez-Sánchez,Sergio Jara-Díaz,Pablo Coto-Millán

Because ports are conceived and designed mainly to be the transfer point of various types of freight, passengers tend to be forgotten in the analysis of port costs. In this paper first we investigate the importance of passengers in port infrastructure costs by means of a multi-output cost function estimated from 20 annual observations (1986-2005) for 26 Spanish Port Authorities. Results show that, although a passenger weights on average less than one tenth of a ton, he or she represents as much as two tons of solid bulk and about three tons of containerized general cargo in terms of marginal costs. Secondly, we compare the marginal costs of different cargoes with their price caps established by law. Results suggest that some type of second best pricing is induced by present regulation.

Seaport research: A structured literature review on methodological issues since the 1980s

- Transportation Research Part A: Policy and Practice---2011---Su-Han Woo,Stephen J. Pettit,Dong-Wook Kwak,Anthony K.C. Beresford

This study aims to investigate how seaport research has been conducted from the methodological perspective. To this end, this study reviews published port

literature for the last three decades (1980-2000s). The investigation primarily categorises the literature according to various methodological issues such as research paradigm, research strategy, base-disciplines, research methods and analysis techniques in order to provide meaningful implications on methodological evolution in seaport research for the period. This study suggests methodological bias in port research to a positivistic paradigm, following a quantitative trajectory moving from conceptual to empirical studies. In addition, the increased use of mathematical modelling and advanced statistical analysis methods is clearly observed. The introduction of advanced analytical tools used in other academic disciplines facilitates discussions in particular research area and amplifies the literature in those areas. This paper also suggests research gaps from the methodological perspective and implications for future port research.

The impact of strategic management and fleet planning on airline efficiency - A random effects Tobit model based on DEA efficiency scores

- Transportation Research Part A: Policy and Practice---2011---Rico Merkert,David Hensher

As a result of the liberalisation of airline markets; the strong growth of low cost carriers; the high volatility in fuel prices; and the recent global financial crisis, the cost pressure that airlines face is very substantial. In order to survive in these very competitive environments, information on what factors impact on costs and efficiency of airlines is crucial in guiding strategic change. To evaluate key determinants of 58 passenger airlines' efficiency, this paper applies a two-stage Data Envelopment Analysis (DEA) approach, with partially bootstrapped random effects Tobit regressions in the second stage. Our results suggest that the effects of route optimisation, in the sense of average stage length of the fleet, are limited to airline technical efficiency. We show that airline size and key fleet mix characteristics, such as aircraft size and number of different aircraft families in the fleet, are more relevant to successful cost management of airlines since they have significant impacts on all three types of air-

line efficiency: technical, allocative and, ultimately, cost efficiency. Our results also show that despite the fuel saving benefits of younger aircraft, the age of an airline's fleet has no significant impact on its technical efficiency, but does have a positive impact on its allocative and cost efficiency.

Forecasting ridership for a metropolitan transit authority

- Transportation Research Part A: Policy and Practice---2011---Wen-Chyuan Chiang,Robert A. Russell,Timothy L. Urban

The recent volatility in gasoline prices and the economic downturn have made the management of public transportation systems particularly challenging. Accurate forecasts of ridership are necessary for the planning and operation of transit services. In this paper, monthly ridership of the Metropolitan Tulsa Transit Authority is analyzed to identify the relevant factors that influence transit use. Alternative forecasting models are also developed and evaluated based on these factors--using regression analysis (with autoregressive error correction), neural networks, and ARIMA models--to predict transit ridership. It is found that a simple combination of these forecasting methodologies yields greater forecast accuracy than the individual models separately. Finally, a scenario analysis is conducted to assess the impact of transit policies on long-term ridership.

Bicycling renaissance in North America? An update and re-appraisal of cycling trends and policies

- Transportation Research Part A: Policy and Practice---2011---John Pucher,Ralph Buehler,Mark Seinen

This paper reviews trends in cycling levels, safety, and policies in Canada and the USA over the past two decades. We analyze aggregate data for the two countries as well as city-specific case study data for nine large cities (Chicago, Minneapolis, Montréal, New York, Portland, San Francisco, Toronto, Vancouver,

and Washington). Cycling levels have increased in both the USA and Canada, while cyclist fatalities have fallen. There is much spatial variation and socioeconomic inequality in cycling rates. The bike share of work commuters is more than twice as high in Canada as in the USA, and is higher in the western parts of both countries. Cycling is concentrated in central cities, especially near universities and in gentrified neighborhoods near the city center. Almost all the growth in cycling in the USA has been among men between 25-64 years old, while cycling rates have remained steady among women and fallen sharply for children. Cycling rates have risen much faster in the nine case study cities than in their countries as a whole, at least doubling in all the cities since 1990. They have implemented a wide range of infrastructure and programs to promote cycling and increase cycling safety: expanded and improved bike lanes and paths, traffic calming, parking, bike-transit integration, bike sharing, training programs, and promotional events. We describe the specific accomplishments of the nine case study cities, focusing on each city's innovations and lessons for other cities trying to increase cycling. Portland's comprehensive package of cycling policies has succeeded in raising cycling levels 6-fold and provides an example that other North American cities can follow.

Estimating the effects of entry regulation in the Istanbul taxicab market

- Transportation Research Part A: Policy and Practice---2011---Tamer Cetin,Kadir Yasin Eryigit

The economic literature shows that entry regulation in taxicab markets brings about a dramatic increase in medallion prices or license values of taxicabs. However, there is no study estimating what the effect of regulation is exactly on real medallion prices. We develop a model to estimate the effect of entry restrictions in the Istanbul taxicab market over real medallion prices and inflation. Our findings contribute that entry regulation in taxicab markets increases medallion prices. Moreover, we find that entry regulation in Istanbul pressures inflation rates as well.

Modelling demand in restricted parking zones

- Transportation Research Part A: Policy and Practice---2011---Ángel Ibeas,Ruben Cordera,dell'Olio, Luigi,Jose Luis Moura

Multiple linear regression (MLR) and geographically weighted regression (GWR) models are used for estimating parking demand in areas with paid short stay parking systems. These models have been applied to the city of Santander (Cantabria, Spain) to check their goodness of fit and their predictive ability. The results show the main advantages and disadvantages of using GWR models. The technique proved to be useful in this case study because it offered a better fit and made better predictions in a scenario showing a certain degree of spatial heterogeneity unexplained by any of the variables introduced into the global model. However, the GWR model also presented situations of local correlation although this was considered moderate given the results provided by the variance inflation factors and the local condition indexes.

Multi-objective optimization of a road diet network design

- Transportation Research Part A: Policy and Practice---2011---Keemin Sohn

The present study focuses on the development of a model for the optimal design of a road diet plan within a transportation network, and is based on rigorous mathematical models. In most metropolitan areas, there is insufficient road space to dedicate a portion exclusively for cyclists without negatively affecting existing motorists. Thus, it is crucial to find an efficient way to implement a road diet plan that both maximizes the utility for cyclists and minimizes the negative effect on motorists. A network design problem (NDP), which is usually used to find the best option for providing extra road capacity, is adapted here to derive the best solution for limiting road capacity. The resultant NDP for a road diet (NDPRD) takes a bi-level form. The upper-level problem of the NDPRD is established as one of multi-objective optimization. The lower-level problem accommodates user equilibrium (UE) trip

assignment with fixed and variable mode-shares. For the fixed mode-share model, the upper-level problem minimizes the total travel time of both cyclists and motorists. For the variable mode-share model, the upper-level problem includes minimization of both the automobile travel share and the average travel time per unit distance for motorists who keep using automobiles after the implementation of a road diet. A multi-objective genetic algorithm (MOGA) is mobilized to solve the proposed problem. The results of a case study, based on a test network, guarantee a robust approximate Pareto optimal front. The possibility that the proposed methodology could be adopted in the design of a road diet plan in a real transportation network is confirmed.

Modelling the effects of road pricing on traffic using ERP traffic data

- Transportation Research Part A: Policy and Practice---2011---Litian Xie,Piotr Olszewski

Singapore's Electronic Road Pricing (ERP) system involves time-variable charges which are intended to spread the morning traffic peak. The charges are revised every three months and thus induce regular motorists to re-think their travel decisions. ERP traffic data, captured by the system, provides a valuable source of information for studying motorists' travel behaviour. This paper proposes a new modelling methodology for using these data to forecast short-term impacts of rate adjustment on peak period traffic volumes. Separate models are developed for different categories of vehicles which are segmented according to their demand elasticity with respect to road pricing. A method is proposed for estimating the maximum likelihood value of preferred arrival time (PAT) for each vehicle's arrivals at a particular ERP gantry under different charging conditions. Iterative procedures are used in both model calibration and application. The proposed approach was tested using traffic datasets recorded in 2003 at a gantry located on Singapore's Central Expressway (CTE). The model calibration and validation show satisfactory results.

A basic mathematical model for evacuation problems in urban areas

- Transportation Research Part A: Policy and Practice---2011---S. Bretschneider,A. Kimms

Real life situations like floods, hurricanes or chemical accidents may cause the evacuation of a certain area to rescue the affected population. To enable a fast and a safe evacuation a basic mixed-integer evacuation model has been developed that provides a reorganization of the traffic routing of a certain area for the case of an evacuation. This basic problem of evacuation minimizes the evacuation-time while prohibiting conflicts within intersections. Our evacuation model is a dynamic network flow problem with additional variables for the number and direction of used lanes and with additional complicating constraints. Because of the size of the time-expanded network, the computational effort required by standard software is already very high for tiny instances. To deal with realistic instances we propose a heuristic approach.

Uncertain benefits: Application of Bayesian melding to the Alaskan Way Viaduct in Seattle

- Transportation Research Part A: Policy and Practice---2011---Hana Sevcíková,Adrian E. Raftery,Paul A. Waddell

Uncertainty is inherent in major infrastructure projects, but public decision-making for such projects ignores it. We investigate the uncertainty about the future effects of tearing down the Alaskan Way Viaduct in downtown Seattle, using an integrated model of housing, jobs, land use and transportation, on outcomes including average commute times. Our methodology combines the urban simulation model UrbanSim with the regional transportation model. We assess uncertainty using Bayesian melding, yielding a full predictive distribution of average commute times on 22 different routes in 2020. Of these routes, 14 do not include the viaduct and eight do. For the 14 base routes that do not include the viaduct, the predictive distributions overlap substantially, and so there is no indication that removing the viaduct would increase commute times

for these routes. For each of the eight routes that do include the viaduct, the 95% predictive interval for the difference in average travel times between the two scenarios includes zero, so there is not strong statistical support for the conclusion that removing the viaduct would lead to any increase in travel times. However, the median predicted increase is positive for each of these routes, with an average of 6 min, suggesting that there may be some measurable increase in travel time for drivers that use the viaduct as a core component of their commute.

Logistic modeling of the equilibrium speed-density relationship

- Transportation Research Part A: Policy and Practice---2011---Haizhong Wang, Jia Li, Qian-Yong Chen, Daiheng Ni

The fundamental diagram, as the graphical representation of the relationships among traffic flow, speed, and density, has been the foundation of traffic flow theory and transportation engineering. Seventy-five years after the seminal Greenshields model, a variety of models have been proposed to mathematically represent the speed-density relationship which underlies the fundamental diagram. Observed in these models was a clear path toward two competing goals: mathematical elegance and empirical accuracy. As the latest development of such a pursuit, this paper presents a family of speed-density models with varying numbers of parameters. All of these models perform satisfactorily and have physically meaningful parameters. In addition, speed variation with traffic density is accounted for; this enables statistical approaches to traffic flow analysis. The results of this paper not only improve our understanding of traffic flow but also provide a sound basis for transportation engineering studies.

International private and public reinforcing dependencies for the innovation of automotive emission control systems in Japan and USA

- Transportation Research Part A: Policy and Practice---2011---David Bauner

In the beginning of the 1970s, the economies of USA and Japan were growing fast and environmental pollution was increasing to alarming levels. As passenger car emissions were found to be significant and rapidly increasing, their reduction was specially targeted. Following a bill passed by US Congress in 1968, requirements were set in 1970 for the vehicle manufacturers to reduce the emissions of carbon monoxide (CO) and hydrocarbons (HC) with 90% by 1975, and nitrogen oxides (NOx) with 90% by 1976. These requirements were soon adapted to the Japanese regulatory framework, and were known in both countries as the “Muskie Act” or “Muskie Law” after the senator who developed the original bill.

Understanding the role of the forecast-maker in overestimation forecasts of policy impacts: The case of Travel Demand Management policies

- Transportation Research Part A: Policy and Practice---2011---Gil Tal, Galit Cohen-Blankshtain

Forecasting the impacts of a proposed policy is an important component of the transportation planning and decision making process. Although scientific tools are often used in transportation forecasts, biases and, more specifically, overestimations of the expected impact are often observed. This study explores the correlations between forecast-maker’s characteristics and forecast bias creation and reduction. The study examines two transport-related policies aiming at the reduction of car use: telecommuting and carsharing. Both are Travel Demand Management (TDM) policies, which attract much attention from transport experts. We tested the extent to which the forecast-maker’s beliefs about the policy at stake affected the forecast bias. We found that attitudes and beliefs associates not only with overestimation bias but also with its reduction over time. We also tested the extent to which the forecast-maker’s affiliation, the performing institute and the publication type were correlated with the biases of the forecast and with the forecaster attitudes and beliefs. These characteristics are intuitively used by the forecast user as tools to assess the ‘objectivity’ of the forecast, but

our analysis found no association between these characteristics and the forecast bias.

Can we reduce car use and, if so, how? A review of available evidence

- Transportation Research Part A: Policy and Practice---2011---Ella Graham-Rowe,Stephen Skippon,Benjamin Gardner,Charles Abraham

Transport accounts for nearly a quarter of current energy-related carbon dioxide emissions with car travel constituting more than three quarters of all vehicle kilometres travelled. Interventions to change transport behaviour, and especially to reduce car use, could reduce CO₂ emissions from road transport more quickly than technological measures. It is unclear, however, which interventions are effective in reducing car use and what the likely impact of these interventions would be on CO₂ emissions. A two-stage systematic search was conducted focusing on reviews published since 2000 and primary intervention evaluations referenced therein. Sixty-nine reviews were considered and 47 primary evaluations found. These reported 77 intervention evaluations, including measures of car-use reduction. Evaluations of interventions varied widely in the methods they employed and the outcomes measures they reported. It was not possible to synthesise the findings using meta-analysis. Overall, the evidence base was found to be weak. Only 12 of the 77 evaluations were judged to be methodologically strong, and only half of these found that the intervention being evaluated reduced car use. A number of intervention approaches were identified as potentially effective but, given the small number of methodologically strong studies, it is difficult to draw robust conclusions from current evidence. More methodologically sound research is needed in this area.

Integrating short turning and deadheading in the optimization of transit services

- Transportation Research Part A: Policy and Practice---2011---Cristián E. Cortés,Sergio Jara-Díaz,Alejandro Tirachini

Urban transit demand exhibits peaks in time and space, which can be efficiently served by means of different fleets, increasing frequencies in those groups of stops with larger passenger inflow. In this paper we develop a model that combines short turning and deadheading in an integrated strategy for a single transit line, where the optimization variables are both of a continuous and discrete nature: frequencies within and outside the high demand zone, vehicle capacities, and those stations where the strategy begins and ends. We show that closed solutions can be obtained for frequencies in some cases, which resembles the classical "square root rule". Unlike the existing literature that compares different strategies with a given normal operation (no strategy - single frequency), we use an optimized base case, in order to assess the potential benefits of the integrated strategy on a fair basis. We found that the integrated strategy can be justified in many cases with mixed load patterns, where unbalances within and between directions are observed. In general, the short turning strategy may yield large benefits in terms of total cost reductions, while low benefits are associated with deadheading, due to the extra cost of running empty vehicles in some sections.

Viability of new road infrastructure with heterogeneous users

- Transportation Research Part A: Policy and Practice---2011---Pedro Cantos-Sánchez,Rafael Moner-Colonques,José Sempere-Monerris,Óscar Álvarez-SanJaime,Óscar Álvarez San-Jaime

This paper explores the importance of heterogeneity in value of time and route choice when assessing the viability of new road infrastructure to alleviate congestion problems. The model incorporates strategic interaction between road operators in a cost-benefit framework and several competitive regimes are considered. It is then employed to establish the financial and socio-economic viability of a congestion pricing demonstration entering Madrid city centre, where road users have to choose between a free but highly congested road and a priced free-flowing road (semi-private regime). A logit estimation is undertaken with infor-

mation from a questionnaire among road users in the Eastern Madrid area to obtain users' value of time and of congestion. The tolls obtained generate a traffic re-allocation towards the new roadway such that revenues suffice to render the infrastructure socio-economically viable. The private and the low toll regimes generate similar welfare gains that are close to the first best. Yet the former supposes large losses to users. The low toll and the semi-private regimes do not raise such distributional concerns. However, the low toll regime requires a sufficiently high traffic growth rate to make it financially viable; this does not happen for the other competitive regimes.

Transportation and social interactions

- Transportation Research Part A: Policy and Practice---2011---Elenna R. Dugundji, Antonio Páez, Theo A. Arentze, Joan L. Walker, Juan A. Carrasco, Fabrice Marchal, Hitomi Nakanishi

2011

Social networks as a source of private-vehicle transportation: The practice of getting rides and borrowing vehicles among Mexican immigrants in California

- Transportation Research Part A: Policy and Practice---2011---Kristin Lovejoy, Susan Handy

We examine the role of social networks in enabling access to private-vehicle transportation, through getting rides and borrowing cars. Based on qualitative findings from ten focus group discussions with recent Mexican immigrants to California, half of whom have no car, we describe the extent to which participants depend on rides and borrowed cars for transportation. We highlight the unique aspects of informal access to cars, drawing on social exchange theory and related research to characterize the procurement process and likely levels of exchange. We discuss the implications of these findings for transportation services that might serve this and other community groups.

The social context of informal commuting: Slugs, strangers and structuration

- Transportation Research Part A: Policy and Practice---2011---Jonathon E. Mote, Yuko White-stone

Despite considerable interest in the role of social interactions and social context on transportation, there have been very few attempts to explore specific cases of social interaction influencing transportation systems. This paper explores the social practice of slugging, an informal system of carpooling in the Washington, DC area. Slugging emerged in response to the establishment of Virginia's High Occupancy Vehicle (HOV) lanes in the early 1970s, as single drivers picked up riders alongside the road (slugs) in order to meet the requirements for driving in the less congested HOV lanes. Drawing on the work of sociologist Anthony Giddens, as well as the sociological insights of Georg Simmel and Stanley Milgram, we suggest that the practice of slugging highlights the processes of institutionalization and structuration. This paper details how the region's mass transportation policies and urban culture have combined to result in an institutionalized practice with particular norms and logics of behavior. We conclude that looking at specific cases where social context has affected transportation, like slugging, could provide useful insights on the impact of social context on transportation policies and systems.

Why do you care what other people think? A qualitative investigation of social influence and telecommuting

- Transportation Research Part A: Policy and Practice---2011---Robert D. Wilton, Antonio Páez, Darren M. Scott

The effect of social interactions on decision-making is a topic of current interest in the travel behavior literature. These interactions have been investigated primarily from an intra-household perspective, but increasingly too in other types of social settings. In the case of interactions within a workplace, it has been suggested that the decision to telecommute may

have some important social components. Previous research has concentrated on social isolation, and the effect on job satisfaction of qualitatively different (i.e., telecommunications-mediated) relationships with managers and colleagues. A topic that remains unexplored is the way social norms, in effect the influence of other people's behavior, may influence the decision to adopt telecommuting. In this paper we set to investigate, within a qualitative framework, the role of social contact in the process of acquiring information on, and making decisions about, telecommuting. The results indicate that social contact does play a subtle but non-trivial role in the adoption and continuation process, and offer some insights about the importance of the social dimension, institutional set-up, and how they interact to influence the decision to telecommute.

Social influences on household location, mobility and activity choice in integrated micro-simulation models

- Transportation Research Part A: Policy and Practice---2011---Dick Ettema,Theo Arentze,Harry Timmermans

Agent-based approaches to simulating long-term location and mobility decisions and short-term activity and travel decisions of households and individuals are receiving increasing attention in land-use and transportation interaction (LUTI) models to predict land-use changes and travel behaviour in mutual interaction. Social interactions between households and between individuals potentially have an influence on a wide range of the long-term and short-term choices involved in these systems. In this paper we identify the areas in which social interactions play a role and address the question how these influences can be modelled in the context of agent-based LUTI models. We distinguish impacts on activity participation (joint activity participation, support-and-help activities) and impacts on decision making (information exchange, social adaptation of preferences and aspirations) as the two main areas of social influence. A prototype of a LUTI model is proposed that accounts for impacts of the social network on longer-term mobility decision making through

information exchange and social adaptation of preferences and aspirations. The model is demonstrated in a numerical simulation.

A coupled multi-agent microsimulation of social interactions and transportation behavior

- Transportation Research Part A: Policy and Practice---2011---Jeremy Hackney,Fabrice Marchal

Choice set formation, location and mode preferences, coordinated scheduling, alternative utility valuations, and shared mobility resources are among the many activity-travel issues hypothesized to be significantly influenced by traveler interdependencies. Empirical evidence lags theory, particularly about the geography of social networks. A simulation tool is presented to let the experimenter construct and test hypothetical interdependencies between geography, socially-linked travelers, and activity-travel choices. The exploratory tool is integrated in the Multi-Agent Transportation Simulation Toolbox (MatSim-T). Initially, any social network can be constructed and embedded in geography. It can remain static, or be adapted to the travel patterns of the agents. The interactions and exchanges between agents influencing socializing and/or travel behavior can be defined in substance and in time/space. The reward for socializing or being socially linked can be varied. Finally, the co-dependence of social factors and travel behavior can be studied. This paper introduces the model and presents verification results which illustrate the coupling of extremely simplified socializing assumptions and travel behavior.

The effects of social networks on choice set dynamics: Results of numerical simulations using an agent-based approach

- Transportation Research Part A: Policy and Practice---2011---Qi Han,Theo Arentze,Harry Timmermans,Davy Janssens,Geert Wets

Activity-based analysis has slowly shifted gear from the analysis of daily activity patterns to the analysis and modeling of dynamic activity-travel patterns. In this

paper, we address one type of dynamics: the formation and adaptation of location choice sets under influence of dyad relationships within social networks. It extends the dynamic model developed in earlier work, which simulates habitual behavior versus exploitation and exploration as a function of discrepancies between dynamic, context-dependent aspiration levels and expected outcomes. Principles of social comparison and knowledge transfer are used in modeling the impact of social networks through information exchange, adaptations of spatial choice sets and formation of common aspiration levels. We demonstrate model properties using numerical simulation with a case study of shopping activities.

Work and home location: Possible role of social networks

- Transportation Research Part A: Policy and Practice---2011---Nebiyou Tilahun,David Levinson

This research explores to what extent people's work locations are similar to that of those who live around them. Using the Longitudinal Employer-Household Dynamics data set and the 2000 decennial census, we investigate the home and work locations of different census block residents in the Twin Cities (Minneapolis-St. Paul) metropolitan area. Our aim is to investigate if people who share a residence neighborhood also share work locations to a degree beyond what would be explained by distance. The observed patterns is the role neighborhood level and work place social networks play in locating jobs and residences respectively.

The effect of social interactions on travel behaviour: An exploratory study using a laboratory experiment

- Transportation Research Part A: Policy and Practice---2011---Yos Sunitiyoso,Erel Avineri,Kiron Chatterjee

This study demonstrates the use of a laboratory experiment for investigating the effects of social interaction on the dynamics of travellers' choice behaviour.

A small-scale exploratory experiment is carried out. Analyses are conducted using statistical tests, descriptive methods and learning models to investigate the net and gross effects of social interaction behaviour, as well as the direction of change of each individual's behaviour. The study shows how a laboratory experiment can enhance understanding of the effects of social interaction on travellers' behaviour at both the system and individual traveller levels.

The effect of social comparisons on commute well-being

- Transportation Research Part A: Policy and Practice---2011---Maya Abou-Zeid,Moshe Ben-Akiva

We study the effect of social comparisons on travel happiness and behavior. Social comparisons arise from exchanges of information among individuals. We postulate that the social gap resulting from comparisons is a determinant of "comparative happiness" (i.e. happiness arising from comparisons), which in turn affects subsequent behavior. We develop a modeling framework based on the Hybrid Choice Model that captures the indirect effect of social comparisons on travel choices through its effect on comparative happiness. We present an empirical analysis of one component of this framework. Specifically, we study how perceived differences between experienced commute attributes and those communicated by others affect comparative happiness and consequently overall commute satisfaction. We find that greater comparative happiness arising from favorable comparisons of one's commute to that of others (e.g. shorter commute time than others, same mode as others for car commuters, and different mode than others for non-motorized commuters) increases overall commute satisfaction or utility. The empirical model develops only the link between social comparisons and happiness in the comparisons-happiness-behavior chain. It is anticipated that the theoretical framework that considers the entire chain will enhance the behavioral realism of "black box" models that do not account for happiness in the link between comparisons and behavior.

Correcting for endogeneity in behavioral choice models with social influence variables

- Transportation Research Part A: Policy and Practice---2011---Joan L. Walker,Emily Ehlers,Ipsita Banerjee,Elenna R. Dugundji

While psychologists and behavioral economists emphasize the importance of social influences, an outstanding issue is how to capture such influences in behavioral models used to inform urban planning and policy. In this paper we focus on operational models that do not require explicit knowledge of the individual networks of decision makers. We employ a field effect variable to capture social influences, which is calculated as the percent of population in the peer group that has chosen the specific alternative. We define the peer group based on socio-economic status and spatial proximity of residential location. As in behavioral economics and psychology, the concept is that one is influenced by the choices made by one's peers. However, using such a social influence variable in a behavioral model causes complications because it is likely endogenous; unobserved factors that impact the peer group also influence the decision maker, yielding correlation between the field effect variable and the error. The contribution of this paper is the use of the Berry, Levinsohn, and Pakes (BLP) method to correct the endogeneity in a choice model. The two-stage BLP introduces constants for each peer group to remove the endogeneity from the choice model (where it is difficult to deal with) and insert it into a linear regression model (where endogeneity is relatively easier to deal with). We test the method using a mode choice data set from the Netherlands and readily available software and find there is an upward bias of the field effect parameter when endogeneity is not corrected. The procedure outlined presents a practical and tractable method for incorporating social influences in choice models.

When are subsidies to trans-European network projects justified?

- Transportation Research Part A: Policy and Practice---2011---Stef Proost,Fay Dunker-

ley,Bruno De Borger,Astrid Gühneman,Pia Koskenoja,Peter Mackie,Saskia Van der Loo

The trans-European transport network (TEN-T) encompasses the major planned transport infrastructure in Europe, ranging from high speed rail to port infrastructure. Projects in this category are considered priority projects and receive European subsidies; but these have been insufficient to get these projects off the ground. This paper addresses two research questions. First, it sketches the basic economics of cross-boundary infrastructure projects: what pricing and investment policies can we expect, what is the role of through traffic and high fixed costs of infrastructure? Second, it examines briefly what lessons the EU could draw from the experience of other existing federal funding institutions like the US and Germany. These ideas are used to propose a new subsidy scheme for the TEN-T projects.

On the use of "average delay" as a measure of train reliability

- Transportation Research Part A: Policy and Practice---2011---Maria Börjesson,Jonas Eliasson

We investigate how passengers on long-distance trains value unexpected delays relative to scheduled travel time and travel cost. For scheduled services with high reliability and long headways, the value of delays is most commonly assumed to be proportional to the average delay. By exploring how the valuation of train delays depends on delay risk and delay length, using three different stated choice data sets, we find that the "average delay" approach does not hold: the disutility increases slower than linearly in the delay risk. This means that using the average delay as a performance indicator, a guide for operations planning or for investment appraisal will underestimate the value of small risks of long delays relative to large risks for short delays. It also means that estimated valuations of "average delay" will depend on the delay risk level: valuations will be higher the lower the risk levels in the study are.

Spatial impacts of road pricing: Accessibility, regional spillovers and territorial cohesion

- Transportation Research Part A: Policy and Practice---2011---Ana Condeço-Melhorado,Javier Gutiérrez,Juan Carlos García-Palomares

Road pricing policies are gaining prominence in EU countries. These policies have positive impacts leading to mobility patterns which are socially and environmentally more desirable, but they also have negative impacts. One negative impact is to be found in regional accessibility, due to the increase in generalized transport costs. This study presents a methodology based on accessibility indicators and GIS to assess the accessibility impacts of a road pricing policy. The methodology was tested for the Spain's road network considering two road pricing scenarios. It enables not only the more penalized regions to be identified but also negative road pricing spillover effects between regions. These effects are measured in terms of accessibility changes occurring in one region produced by charges implemented in another region. Finally, the study of accessibility disparities (by calculating inequality indexes for each of the scenarios considered), provides policymakers with useful information regarding the impact of road pricing policies from the point of view of territorial cohesion.

Quantifying the benefit of responsive pricing and travel information in the stochastic congestion pricing problem

- Transportation Research Part A: Policy and Practice---2011---Lauren M. Gardner,Stephen D. Boyles,S. Travis Waller

This paper is concerned with roadway pricing amidst the uncertainty which characterizes long-term transportation planning. Uncertainty is considered both on the supply-side (e.g., the effect of incidents on habitual route choice behavior) and on the demand-side (e.g., due to prediction errors in demand forecasting). The framework developed in this paper also allows the benefits of real-time travel information to be compared

directly against the benefits of responsive pricing, allowing planning agencies to identify the value of these policy options or contract terms in publicly-operated toll roads. Specifically, six scenarios reflect different combinations of policy options, and correspond to different solution methods for optimal tolls. Demonstrations are provided on both the Sioux falls and Anaheim networks. Results indicate that providing information to drivers implemented alongside responsive tolling may reduce expected total system travel time by over 9%, though more than 8% of the improvement is due to providing information, with the remaining 1% improvement gained from responsive tolling.

Residential location and transit-oriented development in a new rail corridor

- Transportation Research Part A: Policy and Practice---2011---Doina Olaru,Brett Smith,John H.E. Taplin

The relationship of form, use, and density in urban development and their influence on human behavior and travel is a key element of many land use and transport policies. Prior research indicates high-density urban development leads to decreased travel and thus sustainable mobility; however, personal attitudes seem to have greater effect on mobility than does the urban form. This research evaluates how households consider transit-oriented development (TOD) characteristics in their location decisions with regard to new Mandurah railway line stations opened in December 2007 in Perth, Western Australia. The results indicate that the choice of residence reflects neighborhood and housing attributes, with significant heterogeneity in the populations of the three precincts in terms of their valuation of various housing characteristics, proximity to urban facilities, and transport. There is also significant variation in households' attitudes to natural and artificial environments. A better understanding of the complex relationships among environment, travel, socio-demographic characteristics, and household attitudes can help transport planners leverage the benefits of TOD and improve the quality of urban design and community life.

Carpooling and carpool clubs: Clarifying concepts and assessing value enhancement possibilities through a Stated Preference web survey in Lisbon, Portugal

- Transportation Research Part A: Policy and Practice---2011---Gonçalo Correia, José Manuel Viegas

The increase of urban traffic congestion calls for studying alternative measures for mobility management, and one of these measures is carpooling. In theory, these systems could lead to great reductions in the use of private vehicles; however, in practice they have obtained limited success for two main reasons: the psychological barriers associated with riding with strangers and poor schedule flexibility. To overcome some of the limitations of the traditional schemes, we proposed studying a carpooling club model with two main new features: establishing a base trust level for carpoolers to find compatible matches for traditional groups and at the same time allowing to search for a ride in an alternative group when the pool member has a trip schedule different from the usual one. A web-based survey was developed for the Lisbon Metropolitan Region (Portugal), including a Stated Preference experiment, to test the concept and confirm previous knowledge on these systems' determinants. It was found through a binary logit Discrete Choice Model calibration that carpooling is still attached with lower income strata and that saving money is still an important reason for participating in it. The club itself does not show promise introducing more flexibility in these systems; however, it should provide a way for persons to interact and trust each other at least to the level of working colleagues.

Assessing the cost of transfer inconvenience in public transport systems: A case study of the London Underground

- Transportation Research Part A: Policy and Practice---2011---Zhan Guo, Nigel H.M. Wilson

Few studies have adequately assessed the cost of transfers² in public transport systems, or provided useful

guidance on transfer improvements, such as where to invest (which facility), how to invest (which aspect), and how much to invest (quantitative justification of the investment). This paper proposes a new method based on path choice,³ taking into account both the operator's service supply and the customers' subjective perceptions to assess transfer cost and to identify ways to reduce it. This method evaluates different transfer components (e.g., transfer walking, waiting, and penalty) with distinct policy solutions and differentiates between transfer stations and movements. The method is applied to one of the largest and most complex public transport systems in the world, the London Underground (LUL), with a focus on 17 major transfer stations and 303 transfer movements. This study confirms that transfers pose a significant cost to LUL, and that cost is distributed unevenly across stations and across platforms at a station. Transfer stations are perceived very differently by passengers in terms of their overall cost and composition. The case study suggests that a better understanding of transfer behavior and improvements to the transfer experience could significantly benefit public transport systems.

Modeling capacity flexibility of transportation networks

- Transportation Research Part A: Policy and Practice---2011---Anthony Chen, Panatda Kasikitwiwat

Flexibility of the transportation system is one of the important performance measures needed to deal with demand changes. In this paper, we provide a quantitative assessment of capacity flexibility for the passenger transportation network using bi-level network capacity models. Two approaches for assessing the value of capacity flexibility are proposed. One approach is based on the concept of reserve capacity, which reflects the flexibility with respect to changes in terms of demand volume only. The second approach allows for variations in the demand pattern in addition to changes in demand volume in order to more fully capture demand changes. Two models are developed in the second approach to consider two types of capacity flexibility. The

total capacity flexibility allows all users to have both route choice and destination choice when estimating capacity flexibility. The limited capacity flexibility estimates how much more demand volume could be added to a fixed demand pattern by allowing the additional demand to deviate from the fixed demand pattern. Numerical examples are provided to demonstrate the different concepts of capacity flexibility for a passenger transportation system under demand changes.

Cycle commuting in Belgium: Spatial determinants and 're-cycling' strategies

- Transportation Research Part A: Policy and Practice---2011---Grégory Vandenbulcke,Claire Dujardin,Isabelle Thomas,Bas de Geus,Bart Degraeuwe,Romain Meeusen,Luc Int Panis

This paper attempts to explain the spatial variation of the use of a bicycle for commuting to work at the level of the 589 municipalities in Belgium. Regression techniques were used and special attention was paid to autocorrelation, heterogeneity and multicollinearity. Spatial lag models were used to correct for the presence of spatial dependence and a disaggregated modelling strategy was adopted for the northern and southern parts of the country. The results show that much of the inter-municipality variation in bicycle use is related to environmental aspects such as the relief, traffic volumes and cycling accidents. Town size, distance travelled and demographic aspects also have some effect. In addition, there are regional differences in the effects of the structural covariates on bicycle use: the impact of variables such as traffic volume and cycling accidents differs substantially between the north and the south of the country. This paper also suggests that high rates of bicycle use in one municipality stimulate cycling in neighbouring municipalities, and hence that a mass effect can be initiated, i.e. more cycle commuting encourages even more commuters in the area to cycle. These findings provide some recommendations for decision-makers wishing to promote a shift from car to bicycle use.

A topological route choice model for metro

- Transportation Research Part A: Policy and Practice---2011---Sebastián Raveau,Juan Carlos Muñoz,Louis de Grange

This article presents a route choice model for public transit networks that incorporates variables related to network topology, complementing those found in traditional models based on service levels (travel time, cost, transfers, etc.) and users' socioeconomic and demographic characteristics (income level, trip purpose, etc.). The topological variables represent concepts such as the directness of the chosen route and user knowledge of the network. For both of these factors, the necessary data is endogenous to the modelling process and can be quantified without the need for information-gathering beyond what is normally required for building route choice models. Other novel variables in the proposed formulation capture notions of user comfort such as vehicle occupancy rates and certain physical characteristics of network stations. We conclude that these new variables significantly improve the explanatory and predictive ability of existing route choice specifications.

Estimating multimodal transit ridership with a varying fare structure

- Transportation Research Part A: Policy and Practice---2011---Konstantina Gkritza,Matthew G. Karlaftis,Fred L. Mannering

This paper studies public transport demand by estimating a system of equations for multimodal transit systems where different modes may act competitively or cooperatively. Using data from Athens, Greece, we explicitly correct for higher-order serial correlation in the error terms and investigate two, largely overlooked, questions in the transit literature; first, whether a varying fare structure in a multimodal transit system affects demand and, second, what the determinants of ticket versus travelcard sales may be. Model estimation results suggest that the effect of fare type on ridership levels in a multimodal system varies by mode and by relative ticket to travelcard prices. Further, regardless of competition or cooperation between modes,

fare increases will have limited effects on ridership, but the magnitude of these effects does depend on the relative ticket to travelcard prices. Finally, incorrectly assuming serial independence for the error terms during model estimation could yield upward or downward biased parameters and hence result in incorrect inferences and policy recommendations.

Meta-analysis of UK values of travel time: An update

- Transportation Research Part A: Policy and Practice---2011---Pedro A.L. Abrantes, Mark R. Wardman

Numerous travel demand studies have been carried out over the past five decades, many of which produce estimates of the value of travel time. This includes a rich body of largely unpublished evidence, which can provide valuable insights into the impact of variables such as GDP, travel distance, purpose and mode on this critical parameter for transport modelling and appraisal. The work reported in this paper updates and extends our previous meta-analyses of UK values of time ([Wardman, 1998], [Wardman, 2001a] and [Wardman, 2004]) by adding recent studies and widening the range of explanatory variables included. Our current research covers 226 studies carried out between 1960 and 2008, yielding a total of 1749 valuations (a 50% increase relative to our previous work) and making this the largest data set of its kind to the best of our knowledge. This is also the most comprehensive study to date of parameters other than in-vehicle time and includes valuations of walk, wait, headway, congested, free flow, late, departure time shift and search time. Exploratory analysis of the data set provides interesting insights into methodological trends in travel demand modelling. For each valuation, over thirty quantitative and categorical variables were recorded and then included in a multivariate regression model to explain variations in the value of time. A large number of statistically significant effects were obtained from this meta-analysis, some of which are in marked contrast with, or not present in, our previous work. One finding that stands out is that the estimated elas-

ticity of the value of time with respect to GDP per capita is 0.9 and highly significant, a much closer correspondence to the widely used convention of a unit income elasticity over time than we have previously obtained. The ratio between walk and wait time and in-vehicle time was found to be substantially lower than the commonly used value of two. We also found large and significant differences between the results from studies based on different types of Stated Preference survey presentation. Other important effects include variations by mode used, mode valued, travel purpose, attribute type and distance. It is envisaged that the results are of direct relevance in the British context, as inputs to appraisal or for benchmarking, whilst the methodological implications are of broader interest and the results, in terms of time equivalents and variations in values of time, can be transferred to other contexts.

Bottleneck congestion pricing and modal split: Redistribution of toll revenue

- Transportation Research Part A: Policy and Practice---2011---François Mirabel, Mathias Raymond

The paper examines the question of the redistribution of toll revenue as seen in a bottleneck congestion model. Our objective is to analyse the impact of this redistribution on total cost and on modal split between rail-road and road. Following Tabuchi's two-mode model (Tabuchi, T., 1993. Bottleneck congestion and modal split. *Journal of Urban Economics* 34, 414-431.), we integrate a redistribution of toll revenue towards public transport into our study. In this context, we investigate two kinds of road toll regimes: a fine toll and a uniform toll. We will consider two types of railroad fare: when it is set equal to the marginal cost and when it is set equal to average cost. These models allow us to show that toll policy to be more efficient as long as toll revenue is directed towards public transport when the railroad fare is equal to average cost.

Modeling a rail transit alignment considering different objectives

- Transportation Research Part A: Policy and Practice---2011---Sutapa Samanta,Manoj K. Jha

An optimization model for station locations for an on-ground rail transit line is developed using different objective functions of demand and cost as both influence the planning of a rail transit alignment. A microscopic analysis is performed to develop a rail transit alignment in a given corridor considering a many-to-one travel demand pattern. A variable demand case is considered as it replicates a realistic scenario for planning a rail transit line. A Genetic Algorithm (GA) based on a Geographical Information System (GIS) database is developed to optimize the station locations for a rail transit alignment. The first objective is to minimize the total system cost per person, which is a function of user cost, operator cost, and location cost. The second objective is to maximize the ridership or the service coverage of the rail transit alignment. The user cost per person is minimized separately as the third objective because the user cost is one of the most important decision-making factors for planning a transit system from the users' perspective. A transit planner can make an informed decision between various alternatives based on the results obtained using different objective functions. The model is applied in a case study in the Washington, DC area. The optimal locations and sequence of stations obtained using the three objective functions are presented and a comparative study between the results obtained is shown in the paper. In future works we will develop a combinatorial optimization problem using the aforementioned objectives for the rail transit alignment planning and design problem.

Economic impact of a supply change in mass transit in urban areas: A Canadian example

- Transportation Research Part A: Policy and Practice---2011---Jean Dubé,François Des Rosiers,Marius Thériault,Patricia Dib

This paper aims at estimating the economic impact of a

supply change in the bus transit service in a Canadian city of medium size. By using a quasi-experiment approach and a difference-in-differences (DID) estimator, it evaluates the impact of the introduction of a rapid bus transit (RBT) in Quebec City (Canada) through a spatio-temporal analysis of house price variations. The hedonic price model shows that the new service generates an increase in house price ranging from 6.9% to 2.9%, for those properties located close to the service corridor where the population is quite dense and where the service was offered initially. Using sales transaction data and municipal assessment records from 1997, the effect on price is translated into an economic impact for the whole region. The paper shows that the improvement in public transit supply generates, for Quebec City, a significant fiscal impact estimated to \$6 M and a plus-value for properties owners close to \$35 M over 12 years. Finally, the implications of this kind of analysis for urban planning and development are discussed.

Experimental design influences on stated choice outputs: An empirical study in air travel choice

- Transportation Research Part A: Policy and Practice---2011---Michiel Bliemer,John Rose

Discrete choice experiments are conducted in the transport field to obtain data for investigating travel behaviour and derived measures such as the value of travel time savings. The multinomial logit (MNL) and other more advanced discrete choice models (e.g., the mixed MNL model) have often been estimated on data from stated choice experiments and applied for planning and policy purposes. Determining efficient underlying experimental designs for these studies has become an increasingly important stream of research, in which the objective is to generate stated choice tasks that maximize the collected information, yielding more reliable parameter estimates. These theoretical advances have not been rigorously tested in practice, such that claims on whether the theoretical efficiency gains translate into practice cannot be made. Using an extensive empirical study of air travel choice behaviour, this paper presents for the first time results of different

stated choice experimental design approaches, in which respective estimation results are compared. We show that D-efficient designs keep their promise in lowering standard errors in estimating, thereby requiring smaller sample sizes, *ceteris paribus*, compared to a more traditional orthogonal design. The parameter estimates found using an orthogonal design or an efficient design turn out to be statistically different in several cases, mainly attributed to more or less dominant alternatives existing in the orthogonal design. Furthermore, we found that small designs with a limited number of choice tasks performs just as good (or even better) than a large design. Finally, we show that theoretically predicted sample sizes using the so-called S-estimates provide a good lower bound. This paper will enable practitioners in better understanding the potential benefits of efficient designs, and enables policy makers to make decisions based on more reliable parameter estimates.

The traffic and behavioral effects of the I-35W Mississippi River bridge collapse

- Transportation Research Part A: Policy and Practice---2010---Shanjiang Zhu,David Levinson, Henry X. Liu, Kathleen Harder

On August 1, 2007, the collapse of the I-35W bridge over the Mississippi River in Minneapolis abruptly interrupted the usual route of about 140,000 daily vehicle trips, which substantially disturbed regular traffic flow patterns on the network. It took several weeks for the network to re-equilibrate, during which period travelers continued to learn and adjust their travel decisions. A good understanding of this process is crucial for traffic management and the design of mitigation schemes. Data from loop-detectors, bus ridership statistics, and a survey are analyzed and compared, revealing the evolving traffic reactions to the bridge collapse and how individual choices could help to explain such dynamics. Findings on short-term traffic dynamics and behavioral reactions to this major network disruption have important implications for traffic management in response to future scenarios.

The influence of (toll-related) travel costs in residential location decisions of households: A stated choice approach

- Transportation Research Part A: Policy and Practice---2010---Taede Tillema, Bert van Wee, Dick Ettema

In this paper, we investigate the impact of travel costs, in particular toll costs, on the residential location choice of households, using a stated choice survey. Within the stated choice experiment, car drivers that frequently face traffic congestion, traded-off several trip-related (including toll costs) and house/location-related factors in their decision where to locate. If we look at the influence of different variables, toll and fuel costs seem to be important. Respondents are more sensitive to travel costs (i.e. toll and fuel costs) than to equally high (monthly) housing costs. Travel time appears to play a less important role, as indicated by a low value of time (VOT). In addition, location-related factors, such as the type of location and the number of bedrooms, turn out to be important factors as well. It can be concluded that respondents generally speaking prefer to pay higher housing costs and accept longer travel times to avoid (high) travel costs. Finally, if we look at the difference in preferences in relation to toll and fuel cost, we can conclude that toll costs are valued more negatively than fuel costs, although the differences are small.

Exploring the connections among residential location, self-selection, and driving: Propensity score matching with multiple treatments

- Transportation Research Part A: Policy and Practice---2010---Cao, Xinyu (Jason), Zhiyi Xu, Yingling Fan

A large number of studies have investigated the association between the built environment and travel behavior. However, most studies did not explicitly quantify the contribution of residential self-selection to the connection. Using the 2006 data collected from a regional travel diary in Raleigh, NC, this study applies propensity score matching to explore the effects

of the regional location of individuals' residences on their vehicle miles driven. We found that residential location plays a more important role in affecting driving behavior than residential self-selection; and that the self-selection effect is non-trivial when we compare driving behavior between urban residents and people living in other areas. Therefore, for such comparisons, the observed influence of residential locations on driving should be appropriately discounted when we evaluate the causal impacts of the built environment on travel behavior.

The role of the discount rate in tendering highway concessions under the LPVR approach

- Transportation Research Part A: Policy and Practice---2010---José Manuel Vassallo

Flexible-term highway concessions are becoming quite popular around the world as a means of mitigating the traffic risk ultimately allocated to the concessionaire. The most sophisticated mechanism within flexible-term concession approaches is the least present value of the revenues (LPVR). This mechanism consists of awarding the concession to the bidder who offers the least present value of the revenues discounted at a discount rate fixed by the government in the contract. Consequently, the concession will come to an end when the present value of the revenues initially requested has been eventually reached. The aim of this paper is to evaluate the effect that the discount rate established by the government in the bidding terms has on the traffic-risk profile ultimately allocated to the concessionaire. To analyze this effect, a mathematical model is developed in order to obtain the results. I found that the lower the discount rate the larger will be the traffic risk allocated to the concessionaire. Moreover, I found that, if a maximum term is established in the contract, the lower the discount rate, the less skewed towards the downside will be the traffic-risk profile allocated to the concessionaire.

The dynamics of fare and frequency choice in urban transit

- Transportation Research Part A: Policy and Practice---2010---Ian Savage

This paper investigates the choice of fare and service frequency by urban mass transit agencies. A more frequent service is costly to provide but is valued by riders due to shorter waiting times at stops, and faster operating speeds on less crowding vehicles. Empirical analyses in the 1980s found that service frequencies were too high in most of the cities studied. For a given budget constraint, social welfare could be improved by reducing service frequencies and using the money saved to lower fares. The cross-sectional nature of these analyses meant that researchers were unable to address the question of when the oversupply occurred. This paper seeks to answer that question by conducting a time-series analysis of the bus operations of the Chicago Transit Authority from 1953 to 2005. The paper finds that it has always been the case that too much service frequency was provided at too high a fare. The imbalance between fares and service frequency became larger in the 1970s when the introduction of operating subsidies coincided with an increase in the unit cost of service provision.

Evaluating the feasibility of a passive travel survey collection in a complex urban environment: Lessons learned from the New York City case study

- Transportation Research Part A: Policy and Practice---2010---Cynthia Chen,Hongmian Gong,Catherine Lawson,Evan Bialostozky

The combination of increasing challenges in administering household travel surveys and advances in global positioning systems (GPS)/geographic information systems (GIS) technologies motivated this project. It tests the feasibility of using a passive travel data collection methodology in a complex urban environment, by developing GIS algorithms to automatically detect travel modes and trip purposes. The study was conducted in New York City where the multi-dimensional challenges

include urban canyon effects, an extreme dense and diverse set of land use patterns, and a complex transit network. Our study uses a multi-modal transportation network, a set of rules to achieve both complexity and flexibility for travel mode detection, and develops procedures and models for trip end clustering and trip purpose prediction. The study results are promising, reporting success rates ranging from 60% to 95%, suggesting that in the future, conventional self-reported travel surveys may be supplemented, or even replaced, by passive data collection methods.

What is paratransit worth?

- Transportation Research Part A: Policy and Practice---2010---Phuong Nguyen-Hoang,Ryan Yeung

Paratransit is a flexible demand-responsive form of public transportation intended for transporting mobility impaired individuals. This is the first study that estimates both demand and cost functions for publicly provided paratransit in the United States and the first to conduct a benefit-cost analysis for this mode. We find that the benefits of paratransit far exceed its associated costs. The results suggest that paratransit riders have few transportation alternatives available to them. We also find that the level of service matters in the demand for paratransit.

Estimating spatial interdependence in automobile type choice with survey data

- Transportation Research Part A: Policy and Practice---2010---Michael Adjemian,C.-Y. Cynthia Lin,Jeffrey Williams,C.-Y. Cynthia Lin Lawell

In this article, we show that vehicle type ownership is spatially dependent at both the regional and household-level even after controlling for income and population density. We discuss reasons for the existence of spatial effects in vehicle ownership, and note potential implications for policymakers. Our results point to the importance of spatial relationships in transportation research and highlight the hazards of ignoring their

role in affecting transportation outcomes. For example, if vehicle type choice is affected by neighborhood spillovers, agencies that regulate traffic flow and road safety could tailor their choice projections and policy tools to account for such interdependence.

Pareto-improving ramp metering strategies for reducing congestion in the morning commute

- Transportation Research Part A: Policy and Practice---2010---Wei Shen,H.M. Zhang

This paper presents an alternative approach to internalize congestion externality during the morning commute. We consider a linear freeway with multiple on-ramps and a downstream bottleneck and commuters accessing the freeway via different on-ramps try to arrive at work on time. Rather than charging congestion tolls as widely suggested by economists, we show that the old-fashioned engineering approach - ramp metering - can be a powerful tool to affect travelers' departure time choice and thereby alter the congestion externality distribution among travelers. With carefully designed time-dependent metering plans, travelers from different origins can be channelized and will access the freeway bottleneck in different time periods, resulting in less total cost for the system compared to the no-metering case. The metering strategies are Pareto-improving, with travelers from the on-ramp with the highest priority having the smallest individual costs and travelers from the on-ramp with the lowest priority having their costs equal to those in the no-metering scenario. By changing the priority order of the ramps periodically, the benefit of the Pareto-improving metering strategies can be distributed evenly among all travelers. Numerical experiments show that the total user cost can be reduced by up to 40% with the proposed metering strategies. This study offers researchers and policy makers a different angle of looking at congestion externality, and the results provide an overview of the potential long term benefits that dynamic ramp metering strategies can achieve.

Relationship between proximity to transit and ridership for journey-to-work trips in Chicago

- Transportation Research Part A: Policy and Practice---2010---Marshall Lindsey,Joseph L. Schofer,Pablo Durango-Cohen,Kimberly A. Gray

The use of privately owned vehicles (POVs) contributes significantly to US energy consumption (EC) and greenhouse gas emissions (GHGe). Strategies for reducing POV use include shifting trips to other modes, particularly public transit. Choices to use transit are based on characteristics of travelers, their trips, and the quality of competing transportation services. Here we focus on the proximity of rail stations to trip origins/destinations as a factor affecting mode choice for work trips. Using household travel survey data from Chicago, we evaluate the profile of journey-to-work (JTW) trips, assessing mode share and potential for more travelers to use rail. For work trips having the origin/destination as close as 1 mile from rail transit stations, POVs were still the dominant travel mode, capturing as much as 61%, followed by rail use at 14%. This high degree of POV use coupled with the proportion of JTW trips within close proximity to rail stations indicated that at least some of these trips may be candidates for shifting from POV to rail. For example, shifting all work trips with both the origin/destination within 1 mile of commuter rail stations would potentially reduce the energy associated with all work-related POV driving trips by a maximum of 24%. Based on the analysis of trips having the origin and destination closest to train stations, a complete shift in mode from POV to train could exceed CO2 reduction goals targeted in the Chicago Climate Action Plan. This could occur with current settlement patterns and the use of existing infrastructure. However, changes in traveler behavior and possibly rail operation would be necessary, making policy to motivate this change essential.

Evaluating locational accessibility to the US air transportation system

- Transportation Research Part A: Policy and Practice---2010---T.C. Matisziw,Tony Grubestic

Although there are hundreds of airports that support commercial air passenger traffic in the United States (US), not all areas are equivalently served by the commercial air transportation system. Locations in the US differ with respect to their level of access to the commercial air network and their overall accessibility within the system. Given the complexity of the domestic commercial air passenger network and supporting infrastructure, past research has only been able to provide a limited assessment of locational accessibility within the United States. To address these complexities, this paper proposes a new metric that incorporates measures of access to air transport as well as accessibility within air transportation networks. Using a comprehensive dataset on scheduled airline service, the developed approach is then applied to the US domestic commercial passenger air transportation network to explore geographic differentials in accessibility. Results suggest marked differences between core-based statistical areas throughout the US.

Out-of-home activities, daily travel, and subjective well-being

- Transportation Research Part A: Policy and Practice---2010---Dick Ettema,Tommy Gärling,Lars E. Olsson,Margareta Friman

It is argued that utility theory that underpins current cost-benefit analyses of daily travel needs to be complemented. An alternative theoretical framework is to this end proposed which applies subjective well-being (SWB) to travel behaviour analysis. It is posited in this theoretical framework that participation in goal-directed activities, facilitated or hindered by travel, contributes to SWB, that the degree of travel-related stress in participating in these activities reduces SWB, and that positive affect associated with travel in itself has an impact on SWB.

Zonal centrality measures and the neighborhood effect

- Transportation Research Part A: Policy and Practice---2010---Keemin Sohn, Daehyun Kim

The goal of this study is to develop a robust methodology for computing zone centrality measures in an urban area. Centrality refers to the relative importance of a zone in terms of network efficiency and utility for both transportation and urban study. Centrality indices that were developed to describe human relationships in the field of structural sociology were adopted. It is important to accommodate the neighborhood effect in dealing with centrality. The neighborhood effect describes the phenomenon whereby the attractiveness of a specific zone is affected by its neighbor zones. Kernel functions were employed to accommodate the neighborhood effect. The optimal bandwidth parameters were derived indirectly within the framework of trip attraction estimation under the assumption that the trip attraction of a zone is influenced by the integrated centrality, which includes the neighborhood effect. The well-known estimation tool of maximum likelihood estimation (MLE) was adopted to find the optimal bandwidth. As a byproduct of accommodating the neighborhood effect in centralities, a considerable advantage of the present study is an enhancement of the performance of trip attraction model. Another meaningful contribution of this study is a solution to the question of an acceptable delineation of the two city centers in Seoul. The boundaries of the two city centers were derived based on both the kernel function and its bandwidth.

Inclusion of latent variables in Mixed Logit models: Modelling and forecasting

- Transportation Research Part A: Policy and Practice---2010---M.F. Yáñez, S. Raveau, J. de D. Ortúzar

Travel demand models typically use mainly objective modal attributes as explanatory variables. Nevertheless, it has been well known for many years that attitudes and perceptions also influence users' behaviour.

The use of hybrid discrete choice models constitutes a good alternative to incorporate the effect of subjective factors. We estimated hybrid models in a short-survey panel context for data among many alternatives. The paper analyses the results of applying these models to a real urban case study, and also proposes an approach to forecasting using these models. Our results show that hybrid models are clearly superior to even highly flexible traditional models that ignore the effect of subjective attitudes and perceptions.

Route choice of cyclists in Zurich

- Transportation Research Part A: Policy and Practice---2010---G. Menghini, N. Carrasco, N. Schüssler, K.W. Axhausen

This paper presents the first route choice model for bicyclists estimated from a large sample of GPS observations and overcomes the limitations inherent in the generally employed stated preference approach. It employs an improved mode detection algorithm for GPS post-processing to determine trips made by bicycle, which are map matched to an enriched street network. The alternatives are generated as a random sample from an exhaustive, but constrained search. Accounting for the similarity between the alternatives with the path-size factor the MNL estimates show that the elasticity with regards to trip length is nearly four times larger than that with respect to the share of bike paths. The elasticity with respect to the product of length and maximum gradient of the route is small. No other variable describing the routes had an impact. The heterogeneity of the cyclists is captured through interaction terms formulated on their average behaviour.

On the identification of the effect of prohibiting hand-held cell phone use while driving: Comment

- Transportation Research Part A: Policy and Practice---2010---Breno Sampaio

In a paper recently published in this journal (Nikolaev, A.G., Robbins, M.J., Jacobson, S.H., 2010. Evaluating

the impact of legislation prohibiting hand-held cell phone use while driving. Transportation Research Part A 44, 182-193.), Nikolaev et al. (2010) provide evidences on the effect of hand-held cell phone bans on driving safety. More specifically, they analyze the impact of a state-wide ban on hand-held cell phone use while driving on the number of fatal automobile and personal injury accidents per 100,000 licensed drivers per year and conclude that the ban had a significant negative impact on both the mean fatal accident rate and the mean personal injury accident rate. In this paper I argue that they lack of a good identification strategy that enables them to correctly identify the causal effect of the ban. I also provide evidence that the effect they find is a combination of the ban effect and of unobservable variables not accounted for in their analysis. Finally, I provide a way where one can control for unobservables when estimating the causal effect of the ban and find that indeed that ban appears to have a negative effect on fatal automobile accidents.

Editorial

- Transportation Research Part A: Policy and Practice---2010---Deb Niemeier

2010

The role of VMT reduction in meeting climate change policy goals

- Transportation Research Part A: Policy and Practice---2010---Adrian T. Moore,Samuel R. Stanley,Robert W. Poole

This article evaluates the case for vehicle miles traveled (VMT) reduction as a core policy goal for reducing greenhouse gases (GHGs), concluding the economic impacts and social consequences would be too severe given the modest potential environmental benefits. Attempts to reduce VMT typically rely on very blunt policy instruments, such as increasing urban densities, and run the risk of reducing mobility, reducing access to jobs, and narrowing the range of housing choice. VMT reduction, in fact, is an inherently blunt policy instrument because it relies almost exclusively on changing

human behavior and settlement patterns to increase transit use and reduce automobile travel rather than directly target GHGs. It also uses long-term strategies with highly uncertain effects on GHGs based on current research. Not surprisingly, VMT reduction strategies often rank among the most costly and least efficient options. In contrast, less intrusive policy approaches such as improved fuel efficiency and traffic signal optimization are more likely to directly reduce GHGs than behavioral approaches such as increasing urban densities to promote higher public transit usage. As a general principle, policymakers should begin addressing policy concerns using the least intrusive and costly approaches first. Climate change policy should focus on directly targeting greenhouse gas emissions (e.g., through a carbon tax) rather than using the blunt instrument of VMT reduction to preserve the economic and social benefits of mobility in modern, service-based economies. Targeted responses are also more cost effective, implying that the social welfare costs of climate change policy will be smaller than using broad-brushed approaches that directly attempt to influence living patterns and travel behavior.

Planning for economic and environmental resilience

- Transportation Research Part A: Policy and Practice---2010---Steve Winkelman,Allison Bishins,Chuck Kooshian

Climate protection will require major reductions in GHG emissions from all sectors of the economy, including the transportation sector. Slowing growth in vehicle miles traveled (VMT) will be necessary for reducing transportation GHG emissions, even with major breakthroughs in vehicle technologies and low-carbon fuels (Winkelman et al., 2009). The Center for Clean Air Policy (CCAP) supports market-based policy approaches that minimize costs and maximize benefits. Our research indicates that significant GHG reductions can be achieved through smart growth and travel efficiency measures that increase accessibility, improve travel choices and make optimum use of existing infrastructure. Moreover, we find such measures can deliver

compelling economic benefits, including avoided infrastructure costs, leveraged private investment, increased local tax revenues and consumer vehicle ownership and operating cost savings (Winkelman et al., 2009). As a society, what we build - where and how - has a tremendous impact on our carbon footprint, from building design to transportation infrastructure and land-use patterns. The empirical and modeling evidence is clear - people drive less in locations with efficient land use patterns, high quality travel choices and reinforcing policies and incentives (Ewing et al., 2008). It is also clear that there is growing and unmet market demand for walkable communities, reinforced by demographic shifts and higher fuel prices ([Leinberger, 2006] and [Nelson, 2007]). Transportation policy in the United States must rise to meet this demand for more travel choices and more livable communities. The academic, ideological and political debates about the level of GHG reductions and penetration rates that can or should be achieved via smart growth and pricing on the one hand, or measures such as 'eco-driving' and signal optimization on the other, have served their purpose: we know which policies are 'directionally correct' - policies that reduce GHG emissions even though we may not know the scope of those reductions. Now is the time to implement directionally correct policies, assess what works best where, and refine policy based on the results. It is a framework that CCAP calls "Do. Measure. Learn." The Federal government is poised to spend \$500 billion on transportation (Committee on Transportation and Infrastructure, 2009). CCAP encourages Congress to "Ask the Climate Question" - will our transportation investments help reduce GHG emissions or exacerbate the problem? Will they help increase our resilience to climate change impacts or increase our vulnerability? And, while we're at it, will our investment foster energy security, livable communities and a vibrant economy? Federal transportation and climate policies should empower communities to implement locally-determined travel efficiency solutions by providing appropriate funding, tools and technical support.

Planning, climate change, and transportation: Thoughts on policy analysis

- Transportation Research Part A: Policy and Practice---2010---Marlon Boarnet

2010

A framework for evaluating the dynamic impacts of a congestion pricing policy for a transportation socioeconomic system

- Transportation Research Part A: Policy and Practice---2010---Shiyong Liu,Konstantinos P. Triantis,Sudipta Sarangi

This paper provides a modeling framework based on the system dynamics approach by which policy makers can understand the dynamic and complex nature of traffic congestion within a transportation socioeconomic system representation of a metropolitan area. This framework offers policy makers an assessment platform that focuses on the short- and long-term system behaviors arising from an area-wide congestion pricing policy along with other congestion mitigation policies. Since only a few cities in the world have implemented congestion pricing and several are about to do so, a framework that helps policy makers to understand the impacts of congestion pricing is currently quite relevant. Within this framework, improved bus and metro capacities contribute to the supply dynamics which in turn affect the travel demand of individuals and their choice of different transportation modes. Work travel and social networking activities are assumed to generate additional travel demand dynamics that are affected by travelers' perception of the level of service of the different transportation modes, their perception of the congestion level, and the associated traveling costs. It is assumed that the, population, tourism and employment growth are exogenous factors that affect demand. Furthermore, this paper builds on a previously formulated approach where fuzzy logic concepts are used to represent linguistic variables assumed to describe consumer perceptions about transportation conditions.

Exploring day-to-day variability in time use for household members

- Transportation Research Part A: Policy and Practice---2010---Hejun Kang,Darren M. Scott

Studies of activity-travel patterns typically use 1-day or pooled samples, and more often than not, are conducted at the individual level. By default, they assume that activity-travel decisions are uniform from 1 day to the next and individuals are independent from one another. Such assumptions do not reflect reality. This research investigates day-to-day variability in activity time-use patterns of household members while incorporating variations in their interactions. Results from a descriptive analysis and a series of daily structural equation models provide evidence of day-to-day variability in activity time-use patterns. Specifically, time-use patterns on weekdays are substantially different from those on weekends. Furthermore, compared to independent activities, there is a higher proportion of intra-personal variability and a lower proportion of inter-personal variability for joint activities. These findings suggest that transportation planners should not combine independent and joint activities as has been the case in the recent past, nor should they use single-day or pooled models when estimating activity time-use patterns.

Prospects for plug-in hybrid electric vehicles in the United States and Japan: A general equilibrium analysis

- Transportation Research Part A: Policy and Practice---2010---Valerie Karplus,Sergey Paltsev,John Reilly

The plug-in hybrid electric vehicle (PHEV) may offer a potential near term, low-carbon alternative to today's gasoline- and diesel-powered vehicles. A representative vehicle technology that runs on electricity in addition to conventional fuels was introduced into the MIT Emissions Prediction and Policy Analysis (EPPA) model as a perfect substitute for internal combustion engine (ICE-only) vehicles in two likely early-adopting markets, the United States and Japan. We investigate

the effect of relative vehicle cost and all-electric range on the timing of PHEV market entry in the presence and absence of an advanced cellulosic biofuels technology and a strong (450 ppm) economy-wide carbon constraint. Vehicle cost could be a significant barrier to PHEV entry unless fairly aggressive goals for reducing battery costs are met. If a low-cost PHEV is available we find that its adoption has the potential to reduce CO₂ emissions, refined oil demand, and under a carbon policy the required CO₂ price in both the United States and Japan. The emissions reduction potential of PHEV adoption depends on the carbon intensity of electric power generation. Thus, the technology is much more effective in reducing CO₂ emissions if adoption occurs under an economy-wide cap and trade system that also encourages low-carbon electricity generation.

Unintended environmental impacts of nighttime freight logistics activities

- Transportation Research Part A: Policy and Practice---2010---Nakul Sathaye,Robert Harley,Samer Madanat

In recent years, the reduction of freight vehicle trips during peak hours has been a common policy goal. To this end, policies have been implemented to shift logistics operations to nighttime hours. The purpose of such policies has generally been to mitigate congestion and environmental impacts. However, the atmospheric boundary layer is generally more stable during the night than the day. Consequently, shifting logistics operations to the night may increase 24-h average concentrations of diesel exhaust pollutants in many locations. This paper presents realistic scenarios for two California cities, which provide diesel exhaust concentration and human intake estimates after temporal redistributions of daily logistics operations. Estimates are made for multiple redistribution patterns, including from 07:00-19:00 to 19:00-07:00, similar to daytime congestion charging policies, and from 03:00-18:00 to 18:00-03:00, corresponding to the PierPASS program at the ports of Los Angeles and Long Beach. Results for these two redistribution scenarios indicate that 24-h average exhaust concentrations would increase at most

locations in California, and daily human intake is likely to worsen or be unimproved at best. These results are shown to be worse for inland than coastal settings, due to differences in meteorology. Traffic congestion effects are considered, using a new graphical method, which depicts how off-peak policies can be environmentally improving or damaging, depending on traffic speeds and meteorology.

Effects of contracting on cost efficiency in US fixed-route bus transit service

- Transportation Research Part A: Policy and Practice---2010---Hiroyuki Iseki

Contracted service comprises a significant proportion of total operating expenses in the provision of fixed-route bus transit service in the US. Despite its importance, the literature on the economic effects of transit service contracting has been limited to only a few studies since the mid-1990s, and is inconclusive due to problems with the nature and methodology of the past studies. This paper examines how the cost efficiency of providing fixed-route bus transit service varies by the degree of contracting. I make several improvements to previous studies and conduct a regression analysis that: (1) addresses the endogeneity problem between the contracting decision and cost efficiency, (2) differentiates between agencies that contract out only a portion of service from those that contract out all service, (3) takes into account the moderating effects of several factors on the effect of contracting on cost efficiency, and (4) uses a relatively larger set of cross-sectional time-series data constructed from the National Transit Database from 1992 to 2000. The analysis results show that the combined effects of contracting lower operating costs by \$4.09 and \$2.89 per vehicle hour for partial and full-contracting agencies, respectively, in the average case. These average cost savings translate into 7.8% and 5.5%, using the average operating cost per vehicle hour of \$53.06. However, this improvement is not universal, because the effects of contracting on cost efficiency vary by factors such as peak-to-base ratio, agency size, the wage gap between bus operators in the public and private sectors, and agency type.

Understanding successful workplace travel initiatives in the UK

- Transportation Research Part A: Policy and Practice---2010---S. Cairns,C. Newson,A. Davis

Across the world, there is increasing interest in managing car traffic. One approach developed for addressing the journey to work is known as 'workplace travel planning'. This paper primarily reports on 20 case studies of UK employers undertaking travel planning, who had cut commuter driving by an average of 18%. It concludes that considerable behavioural change can be achieved in a variety of contexts - but employers usually need an overall strategy that addresses car parking, in addition to improving alternative travel modes. Moreover, a more comprehensive national strategy is needed, if travel planning is to achieve its potential.

Designing a route planner to facilitate and promote cycling in Metro Vancouver, Canada

- Transportation Research Part A: Policy and Practice---2010---Jason G. Su,Meghan Winters,Melissa Nunes,Michael Brauer

With increasing fuel costs, greater awareness of greenhouse gas emissions and increasing obesity levels, cycling is promoted as a health promoting and sustainable transport mode. We developed a cycling route planner (<http://cyclevancouver.ubc.ca>) for Metro Vancouver, British Columbia, Canada, to facilitate cycling amongst the general public and to facilitate new route location by transportation planners. The geographical information system-based planner incorporates variables that influence choices to travel by bicycle (e.g., distance, elevation gain, safety, route features, air pollution and links to transit) in selecting the preferred routing. Using a familiar and user-friendly Google Maps interface, the planner allows individuals to seek optimized cycling routes throughout the region based on their own preferences. In addition to the incorporation of multiple user preferences in route selection, the planner is unique amongst cycling route planners in its use of topology to minimize data storage redundancy, its reliance on node/vertex index tables to increase

efficiency of the route selection process, and the use of web services and asynchronous technologies for quick data delivery. Use of this tool can help promote bicycle travel as a form of active transportation and help lower greenhouse gas carbon dioxide (CO₂) and air pollutant emissions by reducing car trips.

Integrated modeling of urban hierarchy and transportation network planning

- Transportation Research Part A: Policy and Practice---2010---João F. Bigotte,Dmitry Krass,António P. Antunes,Oded Berman

A major problem addressed during the preparation of spatial development plans relates to the accessibility to facilities where services of general interest such as education, health care, public safety, and justice are offered to the population. In this context, planners typically aim at redefining the level of hierarchy to assign to the urban centers of the region under study (with a class of facilities associated with each level of hierarchy) and redesigning the region's transportation network. Traditionally, these two subjects - urban hierarchy and transportation network planning - have been addressed separately in the scientific literature. This paper presents an optimization model that simultaneously determines which urban centers and which network links should be promoted to a new level of hierarchy so as to maximize accessibility to all classes of facilities. The possible usefulness of the model for solving real-world problems of integrated urban hierarchy and transportation network planning is illustrated through an application to the Centro Region of Portugal.

Testing the decentralization effects of rail systems: Empirical findings from Israel

- Transportation Research Part A: Policy and Practice---2010---Emil Israel,Galit Cohen-Blankshtain

Many sustainable urban development approaches are based on mass public transportation ventures, especially railway development, which has been considered

a panacea for the unfavorable effects of suburban development. But rail transit also improves accessibility to the fringes, thus encouraging an exodus to the suburbs. This paper explores suburbanization and sprawling effect of commuter rail transit on the rural exurbia of the Tel Aviv metropolis by analyzing its effect on residential location decisions. The findings indicate that the suburban rail system was a determinant factor in the location choice of households which migrated from the inner parts of the Tel Aviv metropolis, since it allowed them to maintain strong commuting connections to their residential origin. This suggests that rail transit, along with its potential to strengthen the inner cities, also accelerates suburbanization and counter urbanization.

Enjoyment of commute: A comparison of different transportation modes

- Transportation Research Part A: Policy and Practice---2010---Antonio Páez,Kate Whalen

This study investigates how socio-demographic and attitudinal variables of university students affect their desire to increase or decrease their daily commute. The case study is McMaster University in Hamilton, Canada, and data was obtained by means of a web-based survey that included questions regarding travel behavior, socio-demographic information, and attitudes toward travel, land use, and the environment. The objective variable is defined as the ratio of ideal to actual commute time, and regression analysis is implemented to test the relationship between this variable and socio-demographic variables and attitudinal scores. The impact of different attitudes on the gap between ideal and actual commute time is expanded to include three different modes, active travel (walk/cycle), transit, and personal automobile. Interestingly, the results indicate that active travelers tend to be less dissatisfied with their commute, followed by those who travel in a personal vehicle and transit users. A number of attitudinal responses are shown to impact the desire to travel more or less, including variables that relate to the social environment, availability of local activities, quality of facilities, productive use of the commute,

and the intrinsic value found in the commute travel. The picture emerges of a traveler who would like to spend more time commuting, as someone who is an active traveler, thinks that getting there is half the fun, dislikes traveling alone, but rather likes to live in an active neighborhood where there is a sense of community. The results suggest that enjoyment of commuting, while a challenge from the perspective of motorized mobility, may provide valuable policy opportunities from the perspective of active transportation.

A decision analysis framework for intermodal transport: Comparing fuel price increases and the internalisation of external costs

- Transportation Research Part A: Policy and Practice---2010---Cathy Macharis, Ellen Van Hoeck, Ethem Pekin, Tom van Lier

This paper presents the impact of fuel price increases on the market area of intermodal transport terminals. Aim of this research is to determine whether an increase in fuel prices is sufficient enough to raise the market area of intermodal transport to the same degree that would be accomplished by stimulating intermodal transport through policy instruments. Therefore, several fuel price scenarios are analysed in order to verify the impact of different fuel price evolutions on the market area of unimodal road transport compared to intermodal transport in Belgium. The LAMBIT-model (Location Analysis for Belgian Intermodal Terminals), which is a GIS-based model (Macharis and Pekin, 2008), is used to analyse the different fuel price increases and enables a visualisation of the impact on the market area. The LAMBIT model incorporates the different network layers for each transport mode by setting up a GIS network that includes four different layers: the road network, the rail network, the inland waterways network and the final haulage network. The geographic locations of the intermodal terminals and the port of Antwerp are added as nodes in the network and the Belgian municipality centres are defined and connected to the different network layers. Based on the different fuel price scenarios representing respectively a fuel price increase with 10% (low price case), 50% (business

as usual case) and 90% (high price case), the results of the LAMBIT model show that the market areas rise in favour of intermodal barge/road and intermodal rail/road. Depending on the scenario, the degree of modal shift however differs. Additionally, in order to compare policy measures with the effect of a fuel price increase, the internalisation of the external costs is analysed with the LAMBIT model. For some years, the European Commission is supporting the idea that transportation costs should reflect the true impacts on environment and society, and is relentlessly pushing towards the so called 'internalisation of external costs' as a policy instrument in order to establish fair and efficient pricing of different transport modes. This requires monetarizing the external effects of transport and adding them to the already internalized costs in order to give the correct price signals. Results of this comparative analysis performed with the LAMBIT model are also presented in this paper.

A practical model for transfer optimization in a transit network: Model formulations and solutions

- Transportation Research Part A: Policy and Practice---2010---Yousef Shafahi, Alireza Khani

This paper studies the transit network scheduling problem and aims to minimize the waiting time at transfer stations. First, the problem is formulated as a mixed integer programming model that gives the departure times of vehicles in lines so that passengers can transfer between lines at transfer stations with minimum waiting times. Then, the model is expanded to a second model by considering the extra stopping time of vehicles at transfer stations as a new variable set. By calculating the optimal values for these variables, transfers can be better performed. The sizes of the models, compared with the existing models, are small enough that the models can be solved for small- and medium-sized networks using regular MIP solvers, such as CPLEX. Moreover, a genetic algorithm approach is represented to more easily solve larger networks. A simple network is used to describe the models, and a medium-sized, real-life network is used to compare

the proposed models with another existing model in the literature. The results demonstrate significant improvement. Finally, a large-scale, real-life network is used as a case study to evaluate the proposed models and the genetic algorithm approach.

Estimating bus run times for new limited-stop service using archived AVL and APC data

- Transportation Research Part A: Policy and Practice---2010---Paul R. Tétreault,Ahmed M. El-Geneidy

In recent years, several transit agencies have been trying to be more competitive with the automobile to attract choice riders. Transit agencies can only be competitive if they can provide services that are reliable, have a short access and egress time, and have run times that are comparable to automobiles. Several transit agencies try to be competitive through offering faster service, such as limited-stop (express) bus service. This study uses AVL and APC data, in addition to a disaggregate data obtained from a travel behavior survey, to select stops and estimate run times for a new limited-stop service that will run parallel to a heavily used bus route (67 Saint-Michel) in Montréal, Canada. Three different scenarios are developed based on theory and practice to select stops to be incorporated in the new limited service. The time savings for each scenario are then evaluated as a range and a fourth scenario is developed. A limited-stop service is recommended based on selecting stops serving both directions of the route, major activity points and stop spacing. This study shows that implementing a limited-stop service would yield substantial time savings for both, the new limited service and the existing regular service running in parallel.

The role of cities in achieving the EU targets on biofuels for transportation: The cases of Berlin, London, Milan and Helsinki

- Transportation Research Part A: Policy and Practice---2010---A. Silvestrini,S. Monni,M. Pregernig,A. Barbato,J.-F. Dallemand,E. Croci,F. Raes

Road transportation is a strongly growing source of CO₂, and use of biofuels represents one option to reduce end-of-pipe emissions of the existing car fleet. In this contribution, the implementation of the EU Biofuels Directive (2003/30/EC) and related voluntary measures at the local level are examined in Germany, UK, Italy and Finland and the cities of Berlin, London, Milan and Helsinki. Even though they are not directly involved in the implementation of the biofuel directive, all four cities studied have played an important role in emissions reduction by voluntarily participating in research and demonstration projects and by using biofuels in their own fleet. An analysis of the numerous causes and driving forces leading to different local level measures is provided. The environmental sensitivity, usually examined at national level, and the national level implementation of the EU Biofuels Directive (2003/30/EC) were not directly correlated with the city-level activities. Instead, support from local businesses and acquisition of EU funds were considered to be valid explanatory factors for the city-level activities. In addition, through horizontal networking cities are starting to exchange know-how gained in their projects, contributing in this way to the accumulation of experience for future policies and technologies.

Optimal resource allocation among transit agencies for fleet management

- Transportation Research Part A: Policy and Practice---2010---Tom V. Mathew,Snehamay Khasnabis,Sabyasachee Mishra

Most transit agencies require government support for the replacement of their aging fleet. A procedure for equitable resource allocation among competing transit agencies for the purpose of transit fleet management is presented in this study. The proposed procedure is a 3-dimensional model that includes the choice of a fleet improvement program, agencies that may receive them, and the timing of investments. Earlier efforts to solve this problem involved the application of 1- or 2-dimensional models for each year of the planning period. These may have resulted in suboptimal solution as the models are blind to the impact of the fleet

management program of the subsequent years. Therefore, a new model to address a long-term planning horizon is proposed. The model is formulated as a non-linear optimization problem of maximizing the total weighted average remaining life of the fleet subjected to improvement program and budgetary constraints. Two variants of the problem, one with an annual budget constraint and the other with a single budget constraint for the entire planning period, are formulated. Two independent approaches, namely, branch and bound algorithm and genetic algorithm are used to obtain the solution. An example problem is solved and results are discussed in details. Finally, the model is applied to a large scale real-world problem and a detailed analysis of the results is presented.

The persevering commuter - Duration of long-distance commuting

- Transportation Research Part A: Policy and Practice---2010---Erika Sandow,Kerstin Westin

A growing number of people are long-distance commuters. For some long-distance commuting is a temporary solution, while as for others it can be a more long-term strategy to promote career and income. This study addresses duration of long-distance commuting - 30 km or more between home and work - in Sweden, and what characterizes individuals who commute for shorter or longer periods. The effects of long-distance commuting in terms of economic outcome for both partners in a commuter household are analysed. The study is based on register data for the years 1995-2005 covering all long-distance commuters in Sweden. One finding is that previous experience of long-distance commuting makes it more likely to have a long duration of long-distance commuting. In addition economic incentives, such as a higher income, are positively correlated for continuing to long-distance commuting more than a few years. Furthermore, the analysis shows that male commuters benefit more in terms of economic outcome of long-distance commuting. It is concluded that the trend with increasing long-distance commuting can sustain not only gender differences on the labour market but also within households. Finally, the paper indicates

that long-distance commuting is a strategic mobility choice for households, rather than a short-term solution for a few years.

A dynamic analysis of household car ownership

- Transportation Research Part A: Policy and Practice---2010---Anne Nolan

This paper examines the determinants of household car ownership, using Irish longitudinal data for the period 1995-2001. This was a period of rapid economic and social change in Ireland, with the proportion of households with one or more cars growing from 74.6% to 80.8%. Understanding the determinants of household car ownership, a key determinant of household travel behaviour more generally, is particularly important in the context of current policy developments which seek to encourage more sustainable means of travel. In this paper, we use longitudinal data to estimate dynamic models of household car ownership, controlling for unobserved heterogeneity and state dependence. We find income and previous car ownership to be the strongest determinants of differences in household car ownership, with the effect of permanent income having a stronger and more significant effect on the probability of household car ownership than current income. In addition, income elasticities differ by previous car ownership status, with income elasticities higher for those households with no car in the initial period. Other important influences include household composition (in particular, the presence of young children) and life-cycle effects, which create challenges for policymakers in seeking to change travel behaviour.

Red-light cameras at intersections: Estimating preferences using a stated choice model

- Transportation Research Part A: Policy and Practice---2010---Aklesso Egbendewe-Mondzozo,Lindsey M. Higgins,W. Shaw

Red-light cameras placed at intersections have the potential to increase safety, but they are often viewed as an invasion of privacy. Preferences for these cameras were explored using a stated choice model that presents

key attributes of camera placements. Stated choice models involve careful experimental design, akin to experimental control in laboratory settings. A variety of design approaches were used, settling on a composition of the choice sets people face in the survey. To illustrate the approach, an internet survey was used with a convenience sample containing a high percentage of college students. The results show that while not the case independently, as the number of cameras and fines for violators are simultaneously increased, the preferences for one particular red light cameras program are likely to improve.

The statistical analysis of crash-frequency data: A review and assessment of methodological alternatives

- Transportation Research Part A: Policy and Practice---2010---Dominique Lord,Fred Mannering

Gaining a better understanding of the factors that affect the likelihood of a vehicle crash has been an area of research focus for many decades. However, in the absence of detailed driving data that would help improve the identification of cause and effect relationships with individual vehicle crashes, most researchers have addressed this problem by framing it in terms of understanding the factors that affect the frequency of crashes - the number of crashes occurring in some geographical space (usually a roadway segment or intersection) over some specified time period. This paper provides a detailed review of the key issues associated with crash-frequency data as well as the strengths and weaknesses of the various methodological approaches that researchers have used to address these problems. While the steady march of methodological innovation (including recent applications of random parameter and finite mixture models) has substantially improved our understanding of the factors that affect crash-frequencies, it is the prospect of combining evolving methodologies with far more detailed vehicle crash data that holds the greatest promise for the future.

Urban form and long-term fuel supply decline: A method to investigate the peak oil risks to essential activities

- Transportation Research Part A: Policy and Practice---2010---Susan Krumdieck,Shannon Page,André Dantas

The issue of a peak in world oil supply has become a mainstream concern over the past several years. The petroleum geology models of post-peak oil production indicate supply declines from 1.5% to 6% per year. Travel requires fuel energy, but current transportation planning models do not include the impacts of constrained fuel supply on private travel demand. This research presents a method to assess the risk to activities due to a constrained fuel supply relative to projected unconstrained travel demand. The method assesses the probability of different levels of fuel supply over a given planning horizon, then calculates impact due to the energy supply not meeting the planning expectations. A new travel demand metric which characterizes trips as essential, necessary, and optional to wellbeing is used in the calculation. A case study explores four different urban forms developed from different future growth options for the urban development strategy of Christchurch, New Zealand to 2041. Probable fuel supply availability was calculated, and the risk to transport activities in the 2041 transport model was assessed. The results showed all the urban forms had significantly reduced trip numbers and lower energy mode distributions from the current planning projections, but the risk to activities differed among the planning options. Density is clearly one of the mitigating factors, but density alone does not provide a solution to reduced energy demand. The method clearly shows how risk to participation in activities is lower for an urban form which has a high degree of human powered and public transport access to multiple options between residential and commercial/industrial/service destinations. This analysis has led to new thinking about adaptation and reorganization of urban forms as a strategy for energy demand reduction rather than just densification.

Identifying critical road segments and measuring system-wide robustness in transportation networks with isolating links: A link-based capacity-reduction approach

- Transportation Research Part A: Policy and Practice---2010---J.L. Sullivan,D.C. Novak,L. Aultman-Hall,D.M. Scott

A wide range of relatively short-term disruptive events such as partial flooding, visibility reductions, traction hazards due to weather, and pavement deterioration occur on transportation networks on a daily basis. Despite being relatively minor when compared to catastrophes, these events still have profound impacts on traffic flow. To date there has been very little distinction drawn between different types of network-disruption studies and how the methodological approaches used in those studies differ depending on the specific research objectives and on the disruption scenarios being modeled. In this paper, we advance a methodological approach that employs different link-based capacity-disruption values for identifying and ranking the most critical links and quantifying network robustness in a transportation network. We demonstrate how an ideal capacity-disruption range can be objectively determined for a particular network and introduce a scalable system-wide performance measure, called the Network Trip Robustness (NTR) that can be used to directly compare networks of different sizes, topologies, and connectivity levels. Our approach yields results that are independent of the degree of connectivity and can be used to evaluate robustness on networks with isolating links. We show that system-wide travel-times and the rank-ordering of the most critical links in a network can vary dramatically based on both the capacity-disruption level and on the overall connectivity of the network. We further show that the relationships between network robustness, the capacity-disruption level used for modeling, and network connectivity are nonlinear and not necessarily intuitive. We discuss our findings with respect to Braess' Paradox.

Nonlinear pricing of taxi services

- Transportation Research Part A: Policy and Practice---2010---Hai Yang,C.S. Fung,K.I. Wong,S.C. Wong

This paper examines the effects of nonlinear fare structures in taxi markets using an extended taxi model with an explicit consideration of perceived profitability. The expected profit, defined as the profit per unit time (inclusive of both occupied and vacant taxi times), that a taxi driver expects to receive from picking up a customer in a particular zone or location, has great impact on the taxi driver's choice of location in the search for customers. The fare structure directly governs the profitability of taxi rides of different distances originating from different locations. With these explicit considerations, the extended model is intended to look into the market effects of adopting a nonlinear fare structure with declining incremental charges. The proposed nonlinear fare structure could help restore a level-playing field for taxi operators whose businesses have been affected by some taxi drivers who resort to practices such as offering fare discounts or accepting requests for discounted fares from passengers for long-haul trips. Analysis of sensitivity of social welfare and profit gain as well as taxi/customer wait/search times is conducted with respect to the parameters in the nonlinear fare structure for the Hong Kong taxi market, and Pareto-improving nonlinear fare amendments are identified that neither disadvantage any customer nor reduce the taxi operators' profits.

Analyzing loss aversion and diminishing sensitivity in a freight transport stated choice experiment

- Transportation Research Part A: Policy and Practice---2010---Lorenzo Masiero,David Hensher

Choice behaviour might be determined by asymmetric preferences whether the consumers are faced with gains or losses. This paper investigates loss aversion and diminishing sensitivity, and analyzes their implications on willingness to pay and willingness to accept measures in a reference pivoted choice experiment in

a freight transport framework. The results suggest a significant model fit improvement when preferences are treated as asymmetric, proving both loss aversion and diminishing sensitivity. The implications on willingness to pay and willingness to accept indicators are particularly relevant showing a remarkable difference between symmetric and asymmetric model specifications. Not accounting for loss aversion and diminishing sensitivity, when present, produces misleading results and might affect significantly the policy decisions.

The urban road pricing scheme to curb pollution in Milan, Italy: Description, impacts and preliminary cost-benefit analysis assessment

- Transportation Research Part A: Policy and Practice---2010---Lucia Rotaris,Romeo Danielis,Edoardo Marcucci,Jérôme Massiani

Starting from January 2008 Milan implemented a charging scheme to enter an 8 km² area of the city centre. The term used to denote the scheme is Ecopass, conveying the stated political objective of the scheme: a pass to improve the quality of the urban environment (ECO). The charge depends on the Euro emission standard of the vehicle. The paper illustrates the main features and impacts of the Milan Ecopass scheme, and presents a preliminary cost-benefit analysis. The scheme has been effective in curbing not only pollution emissions, but also congestion, and the result has been achieved with low implementation costs and without major political opposition. The cost-benefits analysis presents an overall net benefit. The identification of the winners and losers of the policy is conditioned by penalty payments. Without including the penalties, the surface public transport users and the society at large are the main winners, whereas car and especially freight vehicle users are net losers.

Measuring unobserved prices using the structural time-series model: The case of cycling

- Transportation Research Part A: Policy and Practice---2010---David Broadstock,Alan Collins

This study presents a means of determining a historic

(generalised cost based) price index for cycling in the UK for the period 1949-2006 using annual demand data. By specifying demand as a function of generalised price and income and then applying a structural time-series model to elucidate the unobserved component of prices (while controlling for observed income levels), it is illustrated that the role of prices in influencing demand is non-trivial. Over the sample period price responses generally influence demand for cycling to a greater extent than income effects.

Improving the efficiency of demand-responsive paratransit services

- Transportation Research Part A: Policy and Practice---2010---Diwakar Gupta,Hao-Wei Chen,Lisa A. Miller,Fajarrani Surya

State agencies responsible for ADA-eligible paratransit services are increasingly under pressure to contain costs and maximize service quality. Many do not operate vehicles themselves; instead, they contract out the provision of services. Contractors are paid for each hour of service. They are responsible for hiring crew, forming routes, dispatching, and operating and maintaining agency-owned vehicles. In the Twin Cities of Minneapolis and Saint Paul, Metro Mobility, the agency responsible for providing paratransit services, requires contractors to use agency-approved software for booking trips dynamically and sets parameters that guide contractors' practices. Customer trips booked in this fashion may not utilize capacity in the most efficient manner. Therefore, beginning with the daily trip schedules generated by the software, this paper proposes two approaches for improving the efficiency of paratransit operations and estimates the benefit of using these approaches via experiments that utilize Metro Mobility data. The first approach re-optimizes routes developed at the end of each day. The second approach evaluates the benefit to state agencies of selectively using non-dedicated service providers such as taxis. Both approaches are tested on actual data obtained from Metro Mobility. The study shows that a conservative estimate of savings from re-optimization would be approximately 5% of Metro Mobility's oper-

ating costs. Savings from the use of taxis are smaller and in the range of hundreds of dollars per day.

Ramp metering and freeway bottleneck capacity

- Transportation Research Part A: Policy and Practice---2010---Lei Zhang,David Levinson

This study aims to determine whether ramp meters increase the capacity of active freeway bottlenecks. The traffic flow characteristics at 27 active bottlenecks in the Twin Cities have been studied for seven weeks without ramp metering and seven weeks with ramp metering. A methodology for systematically identifying active freeway bottlenecks in a metropolitan area is proposed, which relies on two occupancy threshold values and is compared to an established diagnostic method - transformed cumulative count curves. A series of hypotheses regarding the relationships between ramp metering and the capacity of active bottlenecks are developed and tested against empirical traffic data. It is found that meters increase the bottleneck capacity by postponing and sometimes eliminating bottleneck activations, accommodating higher flows during the pre-queue transition period, and increasing queue discharge flow rates after breakdown. Results also suggest that flow drops after breakdown and the percentage flow drops at various bottlenecks follow a normal distribution. The implications of these findings on the design of efficient ramp control strategies, as well as future research directions, are discussed.

Risk-based maintenance and rehabilitation decisions for transportation infrastructure networks

- Transportation Research Part A: Policy and Practice---2010---S. Reza Seyedshohadaie,Ivan Damnjanovic,Sergiy Butenko

A method for determining optimal risk-based maintenance and rehabilitation (M&R) policies for transportation infrastructure is presented. The proposed policies guarantee a certain performance level across the network under a predefined level of risk. The

long-term model is formulated in the Markov Decision Process framework with risk-averse actions and transitional probabilities describing the uncertainty in the deterioration process. The well known Conditional Value at Risk (CVaR) is used as the measure of risk. The steady-state risk-averse M&R policies are modeled assuming no budget restriction. To address the short-term resource allocation problem, two linear programming models are presented to generate network-level policies with different objectives. While the proposed methodology is general and can be used with any performance indicator, pavement roughness is used for numerical studies and an analytical expression for computing CVaR is derived.

Which road do I take? A learning-based model of route-choice behavior with real-time information

- Transportation Research Part A: Policy and Practice---2010---Eran Ben-Elia,Yoram Shiftan

This paper presents a learning-based model of route-choice behavior when information is provided in real time. In a laboratory controlled experiment, participants made a long series of binary route-choice trials relying on real-time information and learning from their personal experience reinforced through feedback. A discrete choice model with a Mixed Logit specification, accounting for panel effects, was estimated based on the experiment's data. It was found that information and experience have a combined effect on drivers' route-choice behavior. Informed participants had faster learning rates and tended to base their decisions on memorization relating to previous outcomes whereas non-informed participants were slower in learning, required more exploration and tended to rely mostly on recent outcomes. Informed participants were more prone to risk-seeking and had greater sensitivity to travel time variability. In comparison, non-informed participants appeared to be more risk-averse and less sensitive to variability. These results have important policy implications on the design and implementation of ATIS initiatives. The advantage of incorporating insights from Prospect Theory and reinforced learning to improve the realism of travel behavior models is also

discussed.

Causal linkages between highways and sector-level employment

- Transportation Research Part A: Policy and Practice---2010---Piyapong Jiwattanakulpaisarn,Robert Noland,Daniel Graham

While transport infrastructure investments have usually been viewed to have long-term impacts on employment, what is perhaps not immediately clear is the direction of causality. This paper has sought to disentangle the causal relationship between highway infrastructure and employment, using panel data for the 48 contiguous US states from 1984 to 1997. Of particular emphasis in this analysis is the sectoral differences in the causal and spatial effects of highway capacity expansions for employment growth in alternative sectors of the economy. The results indicate that lane-mile additions of own-state major highways could increase state employment growth in the services sector while reducing growth in manufacturing. However, the causal relationship is also found to work the other way around. That is, both the rapid growth in services employment and the slowdown in manufacturing jobs temporally lead to increases in roadway capacity of non-interstate major roads. Our analysis also shows that highway infrastructure could produce both positive and negative employment spillovers across states. We find that improvements in non-interstate major roads outside the state border are beneficial to the manufacturing sector which generally serves regional and national markets. For the services sector, however, employment gains from interstate highways in the same state may come at the expense of other states as there is clear evidence of negative employment spillovers from interstate lane-mile additions.

A model to design a national high-speed rail network for freight distribution

- Transportation Research Part A: Policy and Practice---2010---Jennifer A. Pazour,Russell D. Meller,Letitia M. Pohl

High-speed rail is often touted as a means to reduce congestion on the United States' highways by removing passenger car traffic. But highway congestion can also be reduced by reducing the amount of freight traffic. So, given the advances in high-speed rail, the potential exists for developing a national high-speed network for freight distribution. To design such a network considering highway traffic and transit times, we present an uncapacitated network design model with a post-processing step for the capacity constraint. To illustrate how our modeling approach could be used by policy makers to evaluate the impacts of a high-speed rail network, we apply our models with preliminary data on high-speed rail operating parameters for freight applications and from current data on shipments from a major truckload carrier and the US Census Bureau.

Contracting in highway maintenance and rehabilitation: Are spatial effects important?

- Transportation Research Part A: Policy and Practice---2010---Panagiotis Ch. Anastasopoulos,Raymond Florax,Samuel Labi,Mathew G. Karlaftis

Highway agencies around the world strive to improve practices for infrastructure maintenance and rehabilitation, using project delivery policies that range from total 'in-house' responsibility to complete privatization, with a number of flexible contracting policies such as performance-based contracting, variants of design-build-maintain, and lane rentals among others between these two extremes. In this paper, we present a methodology that duly accounts for underlying spatial effects and estimates the expected cost savings of innovative contracting policies for highway maintenance and rehabilitation relative to in-house execution of these activities. Spatial econometric modeling is used to analyze highway contract data from 49 countries. We also investigate the marginal effects of key explanatory variables on contract cost savings using spatial multipliers. Our findings show that there are significant relationships between cost savings and contract characteristics, and that there is an apparent direct relationship between the average cost savings

of contracts in a country and contract average cost savings and contract sizes in neighboring countries.

Analysis of the optimal length of road expansion - A case study of the Taipei metropolitan area

- Transportation Research Part A: Policy and Practice---2010---Jyh-Fa Tsai,Chih-Peng Chu

This study explores the optimal investment in the length of an expanded section of road to mitigate the congestion on a transportation corridor. It is assumed that one end of the road is in the central business district (CBD) and that the households are uniformly distributed along the road. Each individual makes trips from his/her residence to the CBD. Trip demand is elastic and depends on the cost of the trip (including congestion costs). During the first stage, the government determines the length of the expanded section given the width of that section. In the second stage, road users determine their trip demands by taking into consideration the trip cost function. In the process of solving this problem, the equilibrium traffic volume is first solved using differential equations. The optimal length of the expanded section is then solved by maximizing the social welfare. The analysis is then applied to the case of the Tucheng city - Banciao city - Taipei CBD corridor in the Taipei metropolitan area. The scheme of road expansion without tolling performs closely to the first-best scheme for the case of a high potential demand. This study's approach can serve as valuable reference for city planners engaged in road planning in a transportation corridor between the CBD and satellite cities in a metropolitan area.

Forecasting vs. observed outturn: Studying choice in faster inter-island connections

- Transportation Research Part A: Policy and Practice---2010---José María Grisolíá,Juan de Dios Ortúzar

Passenger demand and, in particular, mode choice between the islands of Gran Canaria and Tenerife has experienced important changes in the last decade. In 2005 the jetfoil, which had been the dominant mode for

many years, was replaced by a slower but cheaper fast ferry service. This induced important changes in the market shares of all competing modes (airplane, slow ferry and another fast ferry with a shorter in-sea time, but needing a bus connection in land). We estimated several discrete choice models, with data collected two years before, with the aim to test their forecasting performance in relation with observed behaviour. Interestingly, we found that an easy to interpret multinomial logit model allowing for systematic taste variations performed best in forecasting. We also discuss some model assumptions related to forecasting that allow replicating the effects of introducing a new mode more accurately. We finally show how the model can be used to examine the social benefits of a related infrastructure improvement project in the island of Gran Canaria.

Quantifying individuals' trade-offs between privacy, liberty and security: The case of rail travel in UK

- Transportation Research Part A: Policy and Practice---2010---Dimitris Potoglou,Neil Robinson,Chong W. Kim,Peter Burge,Richard Warnes

Public transport systems have been targets in several terrorist attacks, notably in recent years, resulting in tight security measures worldwide. However, individuals' privacy and liberty often conflict with efforts towards safety and security, making it difficult to assess the implications of security measures balanced against the costs (e.g., citizens may be stopped, searched and asked to provide personal identification data to authorities without any particular reason). Henceforth, our research question asks, "to what extent would people sacrifice their right to privacy and liberty in exchange for potentially safer and more secure travel?" This paper uses a stated choice experiment to quantify individuals' trade-offs between privacy and security within a real-life context, namely rail travel in the UK. Using a nationwide sample, the empirical analysis yields the importance of improvements in the security infrastructure and identifies areas of concern with regard to privacy and liberty controlling for travel related factors.

Further, trade-offs across different security measures for rail travel are quantified in terms of individuals' willingness-to-pay extra on top of the average ticket price.

Evaluating the impact of legislation prohibiting hand-held cell phone use while driving

- Transportation Research Part A: Policy and Practice---2010---Alexander G. Nikolaev,Matthew J. Robbins,Sheldon H. Jacobson

As of November 2008, the number of cell phone subscribers in the US exceeded 267 million, nearly three times more than the 97 million subscribers in June 2000. This rapid growth in cell phone use has led to concerns regarding their impact on driver performance and road safety. Numerous legislative efforts are under way to restrict hand-held cell phone use while driving. Since 1999, every state has considered such legislation, but few have passed primary enforcement laws. As of 2008, six states, the District of Columbia (DC), and the Virgin Islands have laws banning the use of hand-held cell phones while driving. A review of the literature suggests that in laboratory settings, hand-held cell phone use impairs driver performance by increasing tension, delaying reaction time, and decreasing awareness. However, there exists insufficient evidence to prove that hand-held cell phone use increases automobile-accident-risk. In contrast to other research in this area that uses questionnaires, tests, and simulators, this study analyzes the impact of hand-held cell phone use on driving safety based on historical automobile-accident-risk-related data and statistics, which would be of interest to transportation policy-makers. To this end, a pre-law and post-law comparison of automobile accident rate measures provides one way to assess the effect of hand-held cell phone bans on driving safety; this paper provides such an analysis using public domain data sources. A discussion of what additional data are required to build convincing arguments in support of or against legislation is also provided.

Machine learning for multi-jurisdictional optimal traffic corridor control

- Transportation Research Part A: Policy and Practice---2010---Celine Jacob,Baher Abdulhai

Urban traffic corridors are often controlled by more than one agency. Typically in North America, a state of provincial transportation department controls freeways while another agency at the municipal or city level controls the nearby arterials. While the different segments of the corridor fall under different jurisdictions, traffic and users know no boundaries and expect seamless service. Common lack of coordination amongst those authorities due to lack of means for information exchange and/or possible bureaucratic 'institutional grid-lock' could hinder the full potential of technically-possible integrated control. Such institutional gridlock and related lack of timely coordination amongst the different agencies involved can have a direct impact on traffic gridlock. One potential solution to this problem is through integrated automatic control under intelligent transportation systems (ITS). Advancements in ITS and communication technology have the potential to considerably reduce delay and congestion through an array of network-wide traffic control and management strategies that can seamlessly cross-jurisdictional boundaries. Perhaps two of the most promising such control tools for freeway corridors are traffic-responsive ramp metering and/or dynamic traffic diversion possibly using variable message signs (VMS). Technically, the use of these control methods separately might limit their potential usefulness. Therefore, integrated corridor control using ramp metering and VMS diversion simultaneously might be synergetic and beneficial. Motivated by the above problem and potential solution approach, the aim of the research presented in this paper is to develop a self-learning adaptive integrated freeway-arterial corridor control for both recurring and non-recurring congestion. The paper introduces the use of reinforcement learning, an Artificial Intelligence method for machine learning, to provide optimal control using ramp metering and VMS routing in an integrated agent for a freeway-arterial corridor. Reinforcement learning is an approach whereby

the control agent directly learns optimal strategies via feedback reward signals from its environment. A simple but powerful reinforcement learning method known as Q-learning is used. Results from an elaborate simulation study on a key corridor in Toronto are very encouraging and discussed in the paper.

The smoothing effect of carpool lanes on freeway bottlenecks

- Transportation Research Part A: Policy and Practice---2010---Michael J. Cassidy,Kitae Jang,Carlos F. Daganzo

Real data show that reserving a lane for carpools on congested freeways induces a smoothing effect that is characterized by significantly higher bottleneck discharge flows (capacities) in adjacent lanes. The effect is reproducible across days and freeway sites: it was observed, without exception, in all cases tested. Predicted by an earlier theory, the effect arises because disruptive vehicle lane changing diminishes in the presence of a carpool lane. We therefore conjecture that smoothing can also be induced by other means that would reduce lane changing. The benefits can be large. Queueing analysis shows that the smoothing effect greatly reduces the times spent by people and vehicles in queues. For example, by ignoring the smoothing effect at one of the sites we analyzed one would predict that its carpool lane increased both the people-hours and the vehicle-hours traveled by well over 300%. In reality, the carpool lane reduced both measures due to smoothing. The effect is so significant that even a severely underused carpool lane can in some instances increase a freeway bottleneck's total discharge flow. This happens for the site we analyzed when carpool demand is as low as 1200 vph.

New highways and land use change: Results from a quasi-experimental research design

- Transportation Research Part A: Policy and Practice---2010---Richard Funderburg,Hilary Nixon,Marlon Boarnet,Gavin Ferguson

Understanding links from new highway construction

or capacity expansion to regional growth patterns is crucial for transportation planners and policy makers. In this paper, we incorporate a lagged adjustment regional growth model into a quasi-experimental research design to examine the association between new highway investments and land use change in three California counties. Our study areas provide a mix of urban, small town, and exurban highway projects in order to explore the different effects across project types and geographic contexts. The central finding of this research is that while improvements in surface transportation infrastructure can have large impacts on growth patterns, the nature of the effect depends on the context of the highway investment.

Explaining differences in acceptability before and acceptance after the implementation of a congestion charge in Stockholm

- Transportation Research Part A: Policy and Practice---2010---Geertje Schuitema,Linda Steg,Sonja Forward

A field experiment was conducted in Stockholm where a congestion charge trial was introduced in 2006. Respondents completed a questionnaire before and after the trial. Acceptance of the congestion charge was higher after the trial as opposed to its acceptability judgments before the trial. Respondents believed the charge had more positive consequences (viz., decreasing parking problems, congestion, and pollution) and less negative consequences (viz., financial cost increases) after the trial than they had expected beforehand. Furthermore, we examined the relative importance of various beliefs for the acceptability of the congestion charge before and after it was implemented. Results are that before the implementation of the charge acceptability was significantly related to beliefs about the expected consequences for one's own car use and financial costs, whereas acceptance after the trial was related to beliefs about the perceived consequences for one's own car use and parking problems. These results indicate that acceptance of the congestion charge had increased because people experienced positive consequences of the charge. This conclusion is discussed in the broader

context in which the Stockholm trial took place.

Travel demand in the US urban areas: A system dynamic panel data approach

- Transportation Research Part A: Policy and Practice---2010---Qing Su

Using panel data from 85 urban areas over a 20-year period and applying a system panel data approach, this paper examines the relationship between travel demand in terms of per-capita VMT and urban spatial characteristics. Regression results show that road density and urban spatial size have positive and statistically significant effects on travel demand in the US urban areas. Urban population density and urban congestion have negative and statistically significant effects on travel demand.

Unintended impacts of increased truck loads on pavement supply-chain emissions

- Transportation Research Part A: Policy and Practice---2010---Nakul Sathaye, Arpad Horvath, Samer Madanat

In recent years, the reduction of freight truck trips has been a common policy goal. To this end, policies aimed at influencing load consolidation have been suggested and implemented, resulting in higher gross vehicle weights. The purpose of such policies has generally been to mitigate congestion and environmental impacts. However, trucks cause most of the damage incurred by pavements. The supply chain associated with pavement maintenance and construction releases significant air emissions, raising the question of whether increased vehicle weights may cause unintended environmental consequences. This paper presents scenarios with estimated emissions resulting from load consolidation and changes in load factors. These scenarios reveal several points having to do with the tradeoff between tailpipe versus pavement supply-chain emissions. In some cases, unintended emissions from the pavement supply chain are found to be significant.

Forecasting automobile petrol demand in Australia: An evaluation of empirical models

- Transportation Research Part A: Policy and Practice---2010---Zheng Li, John Rose, David Hensher

Transport fuel consumption and its determinants have received a great deal of attention since the early 1970s. In the literature, different types of modelling methods have been used to estimate petrol demand, each having methodological strengths and weaknesses. This paper is motivated by an ongoing need to review the effectiveness of empirical fuel demand forecasting models, with a focus on theoretical as well as practical considerations in the model-building processes of different model forms. We consider a linear trend model, a quadratic trend model, an exponential trend model, a single exponential smoothing model, Holt's linear model, Holt-Winters' model, a partial adjustment model (PAM), and an autoregressive integrated moving average (ARIMA) model. More importantly, the study identifies the difference between forecasts and actual observations of petrol demand in order to identify forecasting accuracy. Given the identified best-forecasting model, Australia's automobile petrol demand from 2007 through to 2020 is presented under the "business-as-usual" scenario.

Existence of self-financing and Pareto-improving congestion pricing: Impact of value of time distribution

- Transportation Research Part A: Policy and Practice---2010---Nie, Yu (Marco), Yang Liu

This paper considers a static congestion pricing model in which travelers select a mode from either, driving on highway or taking public transit, to minimize a combination of travel time, operating cost and toll. The focus is to examine how travelers' value of time (VOT), which is continuously distributed in a population, affects the existence of a pricing-refunding scheme that is both self-financing (i.e. requiring no external subsidy) and Pareto-improving (i.e. reducing system travel time while making nobody worse off). A

condition that insures the existence of a self-financing and Pareto-improving (SFPI) toll scheme is derived. Our derivation reveals that the toll authority can select a proper SFPI scheme to distribute the benefits from congestion pricing through a credit-based pricing scheme. Under mild assumptions, we prove that an SFPI toll always exists for concave VOT functions, of which the linear function corresponding to the uniform distribution is a special case. Existence conditions are also established for a class of rational functions. These results can be used to analyze more realistic VOT distributions such as log-normal distribution. A useful implication of our analysis is that the existence of an SFPI scheme is not guaranteed for general functional forms. Thus, external subsidies may be required to ensure Pareto-improving, even if policy-makers are willing to return all toll revenues to road users.

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- Transportation Research Part A: Policy and Practice---2010---Jiaoe Wang,Fengjun Jin,Huihui Mo,Fahui Wang

2010