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The social support for policy measures in passenger transport. A statistical analysis for the Netherlands

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Abstract

This paper empirically analyses the social feasibility of a wide range of transport policy measures. After a literature review, some general results of a project on the support for transport policy measures in the Netherlands are discussed. Next, a statistical analysis of opinions of various relevant subgroups of citizens is carried out. It appears that safety problems are considered most important from an individual point of view, while environmental problems are most severe from a social point of view. Measures with small direct effects on the behaviour of respondents are generally regarded as most effective by the respondents. The support for safety measures is highest, while perceived problems and effectiveness as well as personal features also influence the support for policy measures. It is concluded that the social support for transport policy measures and packages can be increased by attending to these underlying factors.

1. Introduction

The so-called social feasibility of policy measures, and the narrowly related political feasibility, have come to the forefront as one of the major issues in contemporary transport policy debates. Ongoing growth in mobility, especially for road transport, poses severe threats to our social and ecological environments, and only a few optimists would advocate a *laissez-faire* approach to these problems. Four major categories of external costs of transport are usually distinguished: the largely intra-sectoral phenomenon of congestion (especially relevant for road transport), two mainly inter-sectoral external costs of noise annoyance and environmental pollution, and fourthly

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the intermediate externality of accidents (Verhoef, 1994). Road transport is the most important (inland) transport mode in terms of external cost generation. [1]

Transport economists have traditionally confined themselves to the advocacy of pricing solutions to such market failures in transport. Building on the insights of Pigou (1920), it is not difficult to demonstrate the efficient properties of such marginal external cost pricing in the regulation of externalities. However, after some 60 years, pricing solutions still had not received broad support outside the academic world in the eighties (see e.g., Borins, 1988). Transport economists accordingly began to broaden their viewpoints by investigating why neither policy makers nor the greater public seemed to embrace the 'obviously correct' solution to externality regulation that economists offered, and to ask how such resistance could be overcome. From a theoretical perspective, one could say that economists began to realize that the traditional criterion for the evaluation of social welfare, namely the *potential Pareto criterion*, is concerned with allocative efficiency and social welfare (summed over individuals) only, and completely ignores distributional aspects and individual welfare changes due to regulation. These latter elements, however, are more important to democratically elected politicians, because it is individuals, not groups, who vote.

For a better understanding of these issues, psychology oriented theories may also be relevant. For example, a rational opinion on policy measures assumes that all pros and cons of an alternative are weighted. In reality, this may not be the case. Apart from having incomplete information, individuals may be largely biased as a result of selective perception and cognitive dissonance mechanisms (Festinger, 1954). People try to reduce dissonance on the consequences of their current behaviour psychologically by: changing their opinion when new information becomes available; perceiving the currently chosen alternative as more attractive than it actually is; perceiving competing alternatives as less attractive than they actually are; failing to get new information and by providing funds to environmental organisations which claim to be the solution for a problem (Brady et al., 1995). As a consequence of these psychological dissonance reduction mechanisms, individuals may be largely opposed to measures in transport (Rienstra and Nijkamp, 1997). Another consequence is that the support for policy measures is heavily influenced by the personal features and the current mobility behaviour of a respondent.

In this paper, the support for a wide range of policy measures in transport – safety, environmental and congestion measures – is analysed in an empirical context. The procedure of the paper is as follows. First, a concise literature review on the social and political feasibility of transport policy measures is presented in Section 2. In Section 3 the data used will briefly be discussed. Afterwards, in Section 4, the general results on the support for transport policy measures in the Netherlands will be presented. A statistical analysis of the opinions of various relevant subgroups is presented in Section 5. Finally, Section 6 offers some concluding remarks.

[1] One might argue that in addition to external costs also external benefits of road transport should be considered. However, as spelled out in Verhoef (1994), the external benefits of road transport are quite limited. The reason is that most of potential candidates of external benefits are just indirect effects that do not have the character of an externality.

2. Review of the literature

Various types of analysis can be applied to investigate the social feasibility of transport policies. First, the feasibility can be predicted by means of theoretical models which assume rational behaviour of individuals. Second, empirical studies can be applied, e.g. by setting out questionnaires and interviewing people. Third, ex post studies can be carried out by investigating behavioural changes of individuals due to the measure. The way the behaviour changes may be an indication of the acceptance of the measure (see e.g., Cavalini et al., 1995; Tertoolen, 1995; Salomon and Mokhtarian, 1997). We will not further discuss the latter approach, because this type of research is less relevant in the context of our paper. Instead, we focus on particular theoretical and empirical studies without intending to provide a complete overview.

2.1. Theoretical studies

Most research into the political and social feasibility of transport policies has been dedicated to the case of road pricing in the context of congestion regulation. Emmerink et al. (1995) provide an extensive literature survey. A well established result is that some road users may actually benefit from road pricing when heterogeneity of road users is allowed for. The typical case considered concerns income differences. A higher income implies, ceteris paribus, a lower marginal utility of money and hence a higher value of time (Richardson, 1974; Layard, 1977). More generally, price measures in regulation are likely to harm lower incomes more seriously, because of their ceteris paribus higher marginal utility of money, and their (consequently) decreased willingness to pay to reduce externalities. Therefore, low income groups will most often oppose road pricing or other pricing measures. The literature indicates that the way road pricing is introduced is important for the social feasibility: when too few people gain from the system, and the allocation of the tax revenues is unclear, the acceptance is likely to be low (Goodwin, 1989; Jones, 1991; Small, 1992).

Research into the social and political feasibility of other types of transport regulation is more scarce. Rietveld (1997) discusses the issue of sustainable transport policies from a political economy perspective. He concludes that because of diverging utility functions of politicians and voters, the possibilities for environmentally friendly transport policies are limited. The same conclusion can be drawn from Rienstra and Nijkamp (1997), in which the utility functions of several stakeholders in the decision-making process in transport are analysed.

Verhoef et al., 1996a, 1997b discuss, respectively, the trade-off between efficiency and social feasibility of transport regulation in a theoretical framework, and the potential of tradeable permits as a socially more feasible alternative to Pigouvian taxes in the regulation of road transport.

2.2. Empirical studies

Bartley (1995) presents results from a survey on the awareness of urban problems, and the awareness, perceived effectiveness and acceptance of various policy measures; the survey has been conducted in various European cities. It appears that improvement of public transport systems is the most acceptable policy, followed by measures which restrict driving possibilities. Both measures are also regarded as being most effective. Other measures – parking policies, road and

congestion pricing – are generally not regarded as acceptable, although there is some variance of acceptance in the different cities. The main conclusions are that awareness is loosely related to user acceptance, while he finds few systematic differences between various segments of the sample.

A feasibility study of road pricing in the Dutch Randstad confirmed elements found in the theoretical studies (Verhoef et al., 1997a): in the first place, road pricing receives more support from higher income groups; and second, the respondents' opinions on road pricing are very sensitive to the way tax revenues are to be allocated.

Seale (1993) investigates London politicians' attitudes towards road pricing, and finds for instance that there is a positive correlation between knowledge of the concept and the support for road pricing. Also for London, Sheldon et al., 1993 report the results of an interview study among London residents. Some main conclusions are that road pricing is more likely to be accepted when the system is simple, enforcement is guaranteed, and the revenues are used in a transparent manner; in particular, efforts should be made to neutralise any potential equity concerns.

Jones (1995) summarizes recent investigations into the perception of problems, perception of effectiveness and social support of transport policies. The results of these studies are mostly in line with these reported here, but a statistical analysis of the interdependence of these elements is lacking.

The social feasibility of speed policies is investigated by Rienstra and Rietveld (1996). They find, for instance, that speed policies are more accepted for safety reasons rather than for environmental reasons. In a statistical analysis of subgroups, it is found that younger respondents are supporting measures less strongly than older groups do. The support is also relatively low for men, higher income categories, respondents driving many kilometres a year, and respondents driving fast cars. In general, it is concluded that subjective psychological issues (restriction of personal freedom: car driving is nicer when one is driving fast) are very important for the support of speed measures.

Another empirical study concerns the case of employers' parking policies (Verhoef et al., 1996b). Two important conclusions are that the social feasibility of policy measures could be increased by explicitly including the non-road users (who may benefit from the policies) in the discussion, and informing them of the benefits of the policies so as to increase social momentum for the policy; and secondly that those road users who are the least able to avoid the policy are also the most strongly opposed to it. Possible ways of increasing these road users' acceptance include supply-side measures and pull-measures such as the supply of better public transport: people may support these measures, they may often think that their proverbial neighbour, not themselves, should use these options.

A general conclusion from the empirical studies is that the opinion of respondents on price measures strongly depends on the way the tax revenues are distributed. Income is an important determinant of the opinion of respondents.

This paper discusses an empirical study carried out in the Netherlands [2] that is rather unique. It is, as far as we know, the first study simultaneously dealing with a whole range of transport policies for both the urban and long distance system in subsequent years, and in addition allows

[2] The project was funded by the Dutch Ministry of Transport and carried out by Traffic Test. Results have been published in Dutch by Veling (1992, 1994, 1995).

for a statistical analysis of opinions of various segments of the research population. Moreover, it allows a simultaneous treatment of problem perception, effectiveness perception and support for measures, which distinguishes the analysis from the more qualitative studies summarized in Jones (1995).

3. Discussion of data

The data on which this paper is based have been gathered in three years: 1992, 1994 and 1995, and is based on a questionnaire survey among Dutch persons being 18 years and older (see Veling, 1992, 1994, 1995). The questionnaire was sent to a subset of a population which had been asked at an earlier stage whether they were willing to participate in research by means of questionnaires (the positive response to that question is 20–25%). Every year a different population is asked. From this population, a stratified random sample has been selected. By applying this procedure the response to the questionnaire (in the second stage) is high: 53% on average (see Table 1).

The aim of the questionnaires is to monitor the perception and acceptance of current and future policy measures of the national government in passenger transport. Three primary policy fields have been distinguished for this purpose: (i) traffic safety, (ii) environment, and (iii) congestion. In this paper, data are used on four issues.

- The respondents' *perception of 'individual' problems* caused by transport; in these questions it is asked whether the respondent encounters problems varying from congestion at three types of roads or during five types of activities, parking problems at five different kind of places, and air pollution in seven and noise annoyance in eight situations. The respondent was asked to indicate 'yes' or 'no' only, so the resulting variable is binary.
- The respondents' *perception of 'social' problems*; the respondent is asked to indicate whether a certain problem is acceptable or unacceptable from a social point of view (again resulting in a binary variable) for a wide range of problems: congestion on four types of roads, environmental problems (exhaust gases, scarce resources, waste, noise annoyance), and traffic safety on four types of roads.
- The *perceived effectiveness* of measures is asked for congestion (11 in total: e.g., fuel price increases, carpooling, public transport improvements) safety (5 in total: e.g., better driving education, police control), environment (10 in total, e.g, cleaner engines, parking fees, speed limiters, road pricing, public transport improvement). People could answer 'no', 'partly', 'largely' or 'yes' on the question of whether the measure will contribute to solving the problem.

Table 1
Response in the subsequent years

	Useful response rate (%)	Number of useful responses
1992	59	738
1994	50	1048
1995	54	1074
Total	53	2860

- For the same measures the respondents' *support* is investigated by asking if the respondent is a 'strong opponent', 'opponent', 'advocate' or 'strong advocate' of the measure.

In addition, various questions are asked about personal features (age, sex, living situation, etc.) and current mobility behaviour (car ownership, distance to work, etc.), which allows us to analyse also the opinions of various segments of the research population.

The analyses to be discussed in Section 5 typically have more cases than the number of responses mentioned in Table 1. The reason is that these models study individuals' opinions on the above mentioned measures, which means that per respondent more than one observation is available: every respondent-measure combination is treated as an individual observation, and all these observations are used in the statistical analyses.

For a more extensive description of the results and an account of the questionnaire, we refer to Veling (1992, 1994, 1995). In the next sections, the data set will be analysed. First, some general descriptive results of the questionnaire will be presented in Section 4. The focus of the paper, however, is on a statistical analysis of factors influencing the support for policy measures in passenger transport, presented in Section 5.

4. General outcomes

In this section, some general descriptive results of the questionnaire will be discussed relating to the perception of transport problems, the perceived effectiveness of policy measures and the support for policy measures in transport.

4.1. Perception of problems caused by transport

A first set of questions concerns the perception of problems caused by transport for the respondent himself, and the perception of which problems are important for the society as a whole. Specific questions are asked on safety, environment and congestion problems. Representative results on the perception of both types of problems are presented in Fig. 1 for the whole sample.

From the general results, it is clear that individual *safety* is by most respondents seen as an important problem; the same result is found in Rienstra and Rietveld (1996). The problems are smallest for pedestrians (59%) and largest when the respondents are cycling (69%); an intermediate value is found for safety when the respondent is driving a car (63%). In contrast, safety is in general not seen as an important social problem. Within built-up areas more respondents (39%) consider safety to be a problem than outside built-up areas (31%). When the opinions on the different road types are analysed, it appears that especially highways (73%) are considered to be safe.

About half of the research population indicate that *congestion* on highways is an important individual problem; for other road types, the problem is not regarded as large for the respondent (24–32%). Most respondents indicate that parking is only a problem when they are shopping (51%), while it is no problem at the work place. Interestingly, congestion is more often seen as a social rather than as an individual problem. It is only for highways, however, that (again) a majority consider congestion to be a social problem (69%).

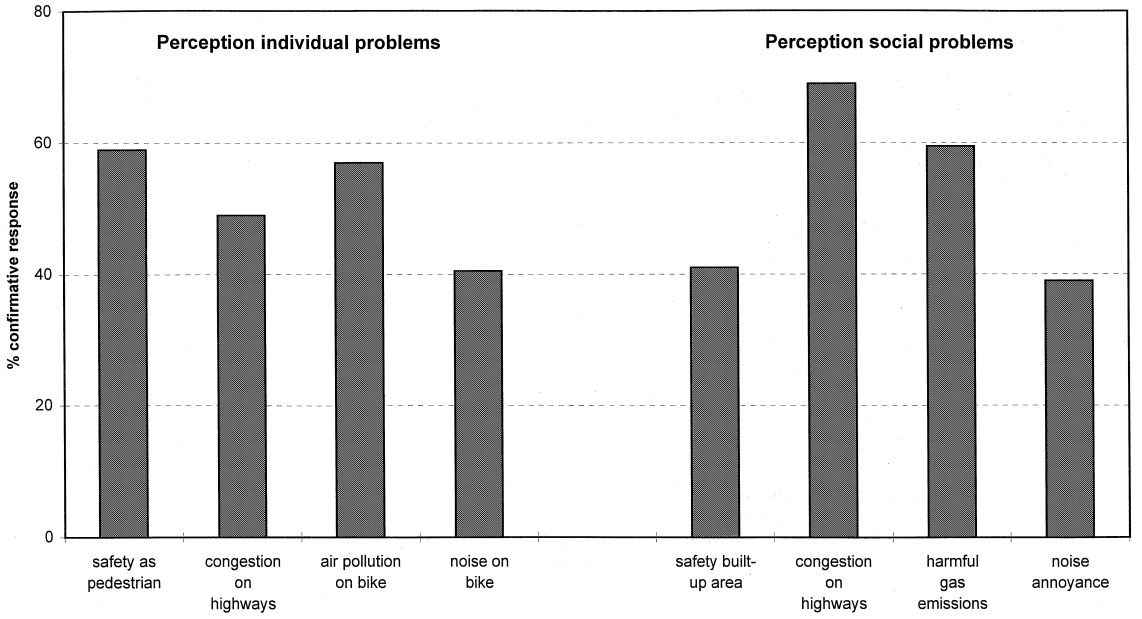

Fig. 1. Perception of selected individual and social problems caused by transport. *Note*: $n = 2840$.

Environmental problems caused by emissions of harmful gases are mainly considered to be a social problem; only when walking or cycling a majority (52–57%) consider air pollution as an individual problem. Noise annoyance is not perceived as a major problem, although still a large share of bike users (41%) indicate it as a problem. Environmental effects are mainly considered as a social problem: for example, 60% of the respondents consider local air pollution as a problem, the same holds true for waste. For noise annoyance this share is only 39%. Another result is that – according to a majority of the respondents – all social problems caused by transport are expected to become larger in the future (the year 2010).

Some interesting conclusions can be drawn from this analysis. Safety is considered to be the most important individual problem; at the social level, however, safety is considered as less important. The opposite holds for environmental problems and, to a lesser extent, congestion.

4.2. The perceived effectiveness of policy measures in transport

Questions on the effectiveness of measures are divided into three policy fields. The response to some representative questions on the perception of the effectiveness of policy measures is presented in Fig. 2 for the whole sample. The bars represent the average scores on the four point scale used for this question. In general, policies aiming at improving *traffic safety* are considered to be more effective than measures in the other fields. This holds for measures which influence behaviour (improved education, providing information), for stricter police control, and for the construction of improved bicycle infrastructure.

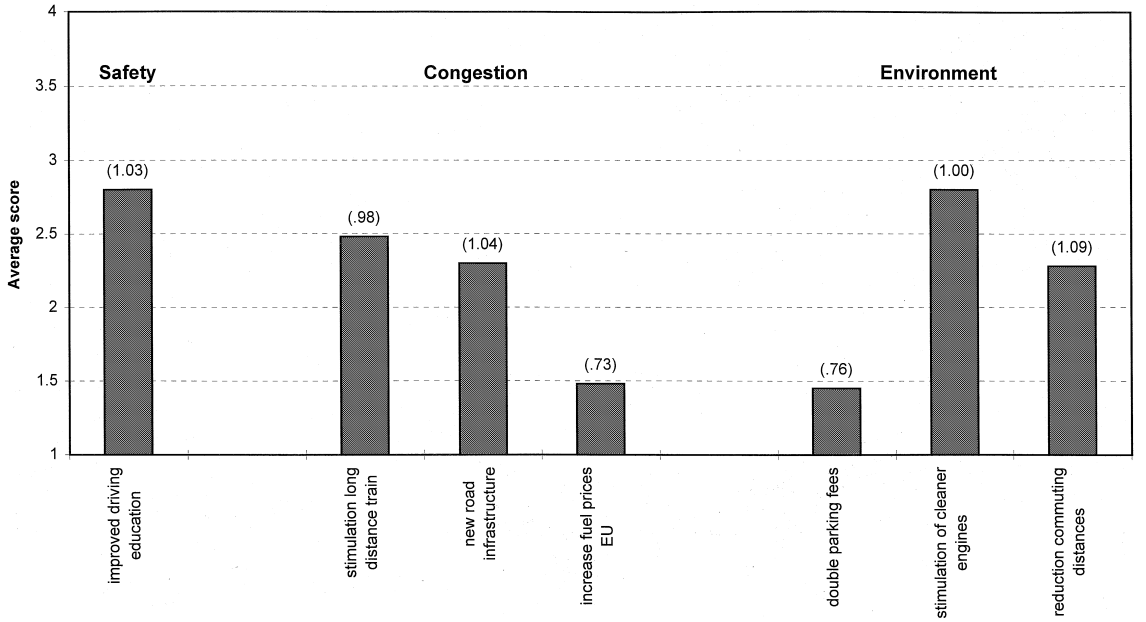

Fig. 2. Perception of effectiveness of selected policy measures in transport. Notes: (1) $n = 2840$; (2) the average score is calculated by valuing: no = 1, partly = 2, largely = 3, yes = 4; (3) standard deviations between brackets.

In the other fields, the measures are considered to be less effective. Most respondents do not believe that *congestion* problems can be solved by price measures (increasing fuel prices, taxes, road pricing, etc.); improvements in public transport and the construction of new road infrastructure are perceived as somewhat more effective.

Price measures are also not considered to be very effective for solving *environmental* problems. More impact is expected from technological measures and the stimulation of public transport. From the standard deviations, it appears that the respondents also strongly agree on the low scores for price measures for solving congestion and environmental problems: the variations are relatively small.

In conclusion, in the views of the respondents, policies may have a positive impact on traffic safety, but congestion and environmental objectives are more difficult to achieve by applying the proposed measures. This is striking, because safety is not considered to be a main social problem compared to congestion and environmental problems. Another observation is that there seems to be a negative bias in the opinion of respondents on the effectiveness of measures which aim at influencing their behaviour (especially price measures). This may be an indication of some kind of 'strategic' answering by the respondents.

It is striking that the perceptions of the respondents concerning the effectiveness of policy measures are not entirely in line with the views of experts. For example, according to model based studies (see for example Bovy, 1991), 'pull measures' such as the improvement of the supply of alternative transport modes are rather ineffective means to reduce car traffic, whereas push measures (including price measures) are more effective. For a broader discussion of this issue we refer to Rietveld and Verhoef (1998).

4.3. The support for policy measures in transport

Next, it is interesting to analyse whether the respondents support or oppose measures in transport policies. The same instruments as used in the effectiveness analysis were requested. Some representative results – the same as in Fig. 2 – are presented in Fig. 3.

All *safety* measures – which were also considered to be effective – mentioned in the questionnaire are (largely) supported by a majority of the respondents, although compulsory re-education of car drivers has only a small majority. This may be explained by the fact that this measure is perceived as most intrusive by the respondents.

Congestion policies – less effective according to most respondents – are supported to a smaller extent. Price measures appear to have little support, while measures stimulating public transport investments, carpooling, etc. are broadly supported. This is not striking since these measures only provide more alternatives to the respondents, without imposing obligations or restricting current behaviour. The construction of new road infrastructure to reduce congestion is supported by only about half of the research population, which is less than one might expect. It can be concluded that measures directly influencing the behaviour of respondents in a restrictive way (especially price measures) are unpopular.

The same conclusion seems to hold for *environmental* measures. Price measures (e.g., doubling parking tariffs) are opposed by the majority of respondents, while other measures (supporting public transport and cycling, technological innovations, etc.) receive much more support.

The standard deviations for the support for measures are much lower than was the case for the perceived effectiveness of measures. There is no large distinction per type of measure.

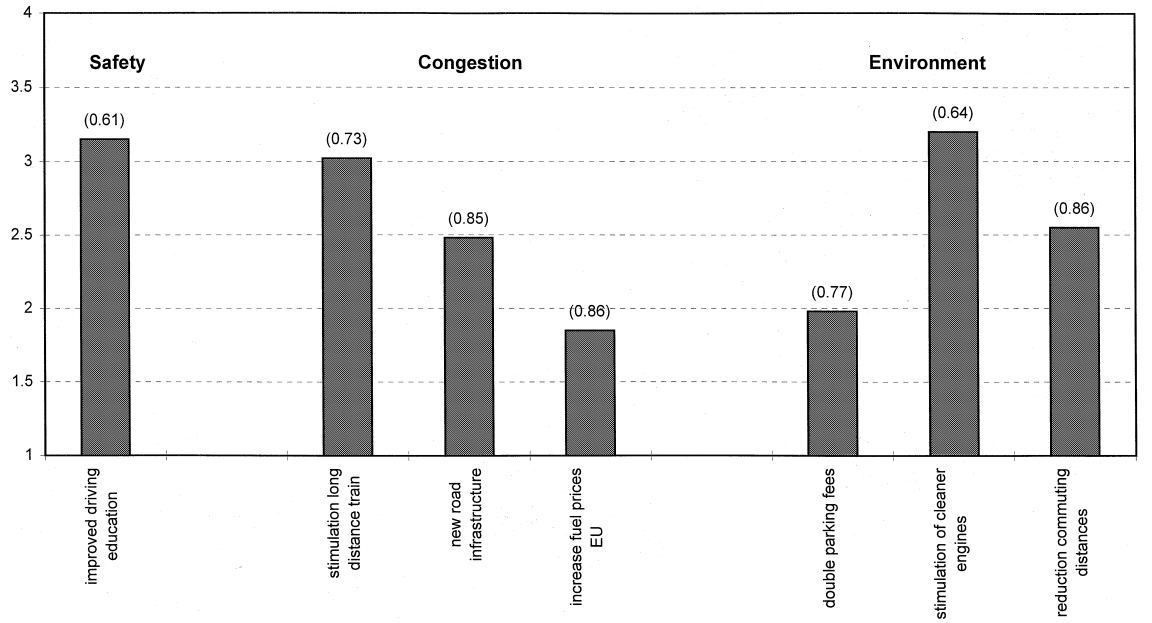

Fig. 3. The support for policy measures in transport. *Notes*: (1) $n = 2840$; (2) the average score is calculated by valuing: strong opponent = 1, opponent = 2, supporter = 3, strong supporter = 4; (3) standard deviations between brackets.

It can be concluded that safety policies are supported most by the respondents; environmental and congestion policies receive much less support. When the types of measures are analysed it appears that price measures are less popular than technological measures. Furthermore, it is noteworthy that the perceived effectiveness and support are largest for safety measures, which was perceived as the largest individual problem. There seems to be a mutual relationship between the perception of the effectiveness of and the support for measures. This will be further investigated in the next section by applying a more detailed statistical analysis of the factors influencing the support for measures.

5. A statistical analysis of the support for policy measures in transport

The support for policy measures aimed at reducing negative external effects may be influenced by several factors. Fig. 4 gives a graphical presentation of the theoretical framework used.

First, it is likely (and also found in other research: see Section 2) that the support for measures is influenced by personal features of the respondent (age, income, education level, etc.). For example, high income earners may be less opposed to price measures in order to reduce congestion than people with lower incomes, because their value of time is higher and their marginal value of income is generally lower (see Section 2). Personal mobility patterns may also influence the support. For instance, car drivers are more likely to be opposed to road pricing than non-car driving respondents, because the former group is more likely to be harmed by this measure, whereas the latter may foresee to benefit from the tax revenues raised.

Second, the perception of problems may influence the support for policy measures. This holds in the first place for the perception of individual problems: when a respondent considers an externality as a problem, (s)he may benefit from the measures. The perception of social problems may influence opinions in the same way, because it is not likely that a measure is supported when a respondent does not recognize the problem it aims to reduce. The problem of perception, however, may be influenced once again by the personal features of the respondent and the mobility pattern (relation 1 in Fig. 4). It also seems likely that there is a relation between the individual and the social perception of problems.

Third, the perception of the effectiveness of a measure will also influence the support for measures, because *ceteris paribus* the higher the effectiveness of a problem solving measure, the more attractive it is. The perception of the effectiveness will in turn be influenced by the personal features and the mobility pattern of the respondent. Note however, that strategic responses on

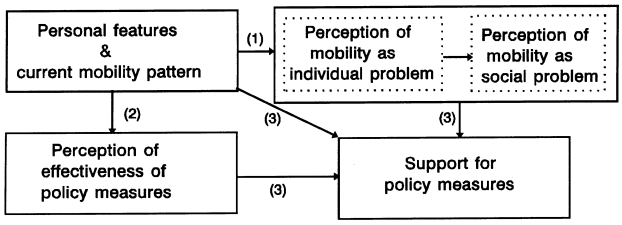

Fig. 4. A conceptual framework of factors influencing the support for policy measures in transport.

perceived effectiveness may occur when respondents try to justify their rejection of painful policy measures by claiming that they perceive them as ineffective. These observations lead to three relations which will be estimated in the next subsections: (i) the perception of problems, (ii) the perception of effectiveness of measures and (iii) the support for policy measures.

Finally, note that a limitation of the theoretical framework of Fig. 4 is that the distinction between the *objective* as opposed to the *subjective* effectiveness of policy measures is ignored. As indicated in Section 4, there is probably a considerable gap between the two. A further analysis of this gap would be a promising theme of future research.

Limited dependent variable techniques will be used because of the nature of the dependent variables. In the first relation the dependent variable is a dummy variable (perceived as problem? yes versus no) so that logit analysis is an appropriate tool. In the two other relations the dependent variable is measured by ordered response categories (see Fig. 2). We have therefore used *ordered* probit analysis for these relations (Maddala, 1983).

We analyze responses for the three policy fields (safety, environment, congestion) *jointly*. An alternative approach would have been that separate equations be estimated for the policy fields. The advantage of our choice of analysis is that the results for the three fields are easier to compare via pertaining policy area dummies. [3] Of course the joint estimation means that coefficients for the three policy fields are arbitrarily made equal. To address this limitation we have allowed for a limited number of interaction effects between the policy field variable and other relevant independent variables.

5.1. The perception of individual and social problems

The first relation to be estimated in the conceptual model of Fig. 4 concerns the perception of the individual and social problems. In both estimations, the personal features of the respondents and the kind of problem (safety, environment or congestion) were taken into account as explanatory variables. To investigate some particular cross-effects, dummies were created representing the joint occurrence of some characteristics [4]. The analysis has been carried out by applying logit estimation, because the dependent variable is a binary one. The results of the estimations are presented in Table 2. In this table a positive coefficient means a positive impact of the variable concerned. For example, the positive coefficient for the year 1995 dummy means that in 1995 the probability is higher that an individual considers a transport issue as a serious individual problem compared to the base year 1992.

At the individual level safety issues are considered to be most serious: both congestion and environment are considered to be less important. At the social level the opposite holds: environmental problems are indicated to be most important, while safety is considered to be least important (as also appeared in Section 4).

[3] Thus we will be able to give results on the perceived seriousness of transport problem A compared with problem B, other factors being equal. An additional practical advantage of a joint estimation is that it saves presentation space.

[4] The cross-effect dummies are: safety measure in combination with having a child; and people living in the – densely populated and congested – Randstad in combination with congestion and safety problems.

Table 2
Results of logit-analysis of individual and social perception of problems in transport as dependent variable

Variable	Individual problem	Social problem	Variable	Individual problem	Social problem
Year 1994	0.01	−0.21 ***	Randstad	−0.19 ***	0.04
Year 1995	0.04 **	−0.10 ***			
			Commuter	0.12 ***	−0.18 ***
Age 30–45	0.05 **	0.10 ***			
Age 45–60	−0.13 ***	−0.07 **	Car owner	0.09 ***	−0.24 ***
Age >60	−0.33 ***	−0.33 ***			
			Driving license	0.26 ***	−0.03
Women	0.06 ***	0.16 ***			
			Income 1500–2000	0.05	−0.08 *
Living together	0.07 **	0.02	Income 2000–3000	0.14 ***	0.03
With child(ren)	0.05 *	0.05	Income >3000	0.24 ***	0.04 *
Education 2	0.00	0.01	Congestion	−1.33 ***	0.32 ***
Education 3	0.17 ***	0.23 ***	Environment	−1.39 ***	0.97 ***
Education 4	0.18 ***	0.24 ***			
Education 5	0.12 ***	0.16 ***	Safety + child	0.18 ***	−0.02
Education 6	0.19 ***	−0.03			
Education 7	0.32 ***	0.25 ***	Randstad + env.	0.30 ***	−0.08 *
Education 8	0.30 ***	0.09 **	Randstad + cong.	0.43 ***	0.10 **
Small city	−0.11 ***	−0.03	Individual perc.	...	1.10 ***
Village	−0.24 ***	−0.06 ***	Constant	−0.27 ***	−0.47 ***
Likelihood χ^2				5724 ***	3004 ***
−2 log likelihood full model				93212	75580
−2 log likelihood restricted model (constant only)				98936	78584
Pseudo R^2				0.06	0.04

Notes: (1) two sided *t*-test: *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level. (2) $n = 78606$ for the individual estimation; $n = 57168$ for the social estimation. (3) the education level ranges from: education 1 lower than secondary school to education 8 = university; the levels in between are specific to the Netherlands. (4) reference values for the independent variables are: year 1992, age <30, male, living alone, lower than secondary school, big city, not Randstad, no commuter, no car owner, no driving license, income <1500, safety.

According to the estimates, the perceived seriousness of individual problems seems to have increased slightly, while from the social perspective the problems are considered to be less important compared to the year 1992. Older respondents regard both individual and social problems as less serious than the youngest category, while respondents in the category 30–40 years think the problems are more severe; the latter also holds for women. Households with two or more persons consider individual and social problems as more severe compared with people living alone. The perception of seriousness of problems (especially at the individual level) is generally higher when the educational level is higher. As expected, respondents living in big cities face more problems caused by transport than in the smaller municipalities; their perception of the social character of problems is also higher.

People in the highly urbanised and congested Randstad consider the individual safety problems to be less severe than do people from other regions; for the social perception, no significant difference in opinion is found. Apparently, safety is considered to be less important in the

Randstad, which may be due to the fact that there are relatively few accidents in this area (Halm and Van Gils, 1992), probably because of the high quality of the infrastructure (highways, crossings at unequal levels, pedestrian areas, etc.). At the individual level, environmental and congestion problems are considered to be more important by Randstad respondents compared with non-Randstad respondents.

Next, commuters, car owners and driving license holders perceive transport related issues as individually more problematic than do other respondents: these respondents travel more, and therefore face such problems on a more regular basis. However, their perception of these problems for society as a whole is lower than that of the other respondents. Apparently, the social problems these respondents cause – especially by driving cars – are somewhat denied. It may also show that people who consider these problems as serious are sooner inclined to give up car use, so that these are not part of this subgroup anymore.

Higher income groups encounter more individual problems than do lower income groups, which is rather surprising since higher income groups may live in better living areas and drive in safer cars. As expected, respondents having children think safety is more important compared with other respondents. For social problems, however, this cross-effect dummy is not significant. The perception of problems from an individual perspective has a significant positive impact on the perception of problems from a social perspective.

When the importance of the explanatory variables is analysed, it appears that the type of problem (i.e., safety, congestion, environment) receives the highest and most significant coefficients (and are therefore more important in the model) compared with personal feature variables.

5.2. The perception of the effectiveness of measures

The next relation of the conceptual model to be estimated is the analysis of the perception of the effectiveness of measures. The same explanatory variables as in the estimation on the perception of problems are included. The type of measure (price, infrastructural/spatial organisation, stimulating alternative transport and technological measures) and the type of problem addressed (safety, congestion, environment) are included. The estimation is carried out by applying an ordered probit analysis. In the estimation some additional cross-effect dummies have been used compared with the previous estimation [5]. The results of this estimation are presented in Table 3.

Congestion and environmental measures are considered to be less effective than safety measures (see also Section 4). When comparing Tables 2 and 3, there appears to be a correspondence between the perceived problem (especially at the individual level) and the perception of effectiveness of policies: the safety scores are high in both tables compared to congestion and environment measures. Furthermore, the respondents consider price measures and infrastructure/spatial organisation measures to be less effective than technical measures or the stimulation of alternative transport modes (public transport, bicycles) [6].

[5] The additional cross-effect dummies are: the income categories in combination with price measures and the combination of car owner and price measure.

[6] As indicated above, an interesting extension of the analysis would be to introduce the actual effectiveness (according to experts) of policy measures as a determinant of perceived effectiveness of respondents.

Table 3
Results of ordered probit-analysis with the perception of the effectiveness of measures as dependent variable

Variable	Coeff.	Variable	Coeff.
Year 1994	0.01	Driving license	−0.11 ***
Year 1995	−0.01		
		Income 1500–2000	0.10 ***
Age 30–45	0.07 ***	Income 2000–3000	0.05 *
Age 45–60	0.11 ***	Income >3000	−0.01
Age >60	0.22 ***		
		Congestion measure	−0.53 ***
Women	0.09 ***	Environm. measure	−0.21 ***
Living together	0.03 *	Price measure	−0.42 ***
With child(ren)	−0.01	Alt. transport meas.	0.08 ***
		Infrastr./spat. org.	−0.27 ***
Education 2	0.03		
Education 3	0.06 ***	Safety + child	0.06 **
Education 4	0.01		
Education 5	−0.01	Randstad + env.	0.06 *
Education 6	−0.04	Randstad + cong.	0.01
Education 7	−0.04 **		
Education 8	−0.08 ***	Income 2 + price	−0.17 ***
		Income 3 + price	−0.15 ***
Small city	−0.03 **	Income 4 + price	−0.09 *
Village	−0.04 ***		
		Car + price measure	−0.11 ***
Randstad	−0.02		
		Constant 1	−1.20 ***
Commuter	−0.04 ***	Constant 2	−0.14 ***
		Constant 3	0.37 ***
Car owner	−0.05 ***		
Likelihood χ^2			7042 ***
−2 log likelihood full model			132 408
−2 log likelihood restricted model (constant only)			139 450
pseudo R^2			0.05

Notes: (1) two sided *t*-test: *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level. (2) $n = 52159$. (3) the education level ranges from: education 1 = lower than secondary school, to education 8 = university; the levels in between are specific for the Netherlands. (4) reference values for the independent variables are: year 1992, age <30, men, living alone, lower than secondary school, big city, not Randstad, non-commuter, no car owner, no driving license, income <1500, safety, technical measures.

It appears that the opinion on the effectiveness of measures has not significantly changed in the subsequent years. Interestingly, older people consider the effectiveness of measures higher than younger people; the same holds for women compared to men. As far as the education level is concerned, higher educated respondents in general consider measures to be less effective, although there are several insignificant education dummies. Commuters and respondents with a driving license – who may be harmed by the measures – perceive the effectiveness of measures lower; car ownership however, has no significant impact on the perception of the effectiveness in general; from a cross-effect dummy with price measures – which may affect car owners most – a negative bias is found in the perception of car owners towards such measures.

When the cross-effects are analysed, it appears that the higher income groups are less negatively oriented towards price measures, maybe partly because their value of time is higher for congestion measures, and because they feel less harmed by price measures. Strikingly, however, the lowest income group perceives price measures as most positive. This result is not confirming theoretical models as presented in Section 2. The result might be explained by the fact that they expect to be compensated or not to be harmed by these measures.

As in the previous estimation, the most significant factors in explaining the differences in the opinions of respondents are the type of problem the measure aims to reduce, and the type of measure. Among the personal features, the age dummies receive rather high coefficients.

It may be concluded that there is a negative bias in the perception of the effectiveness of measures which aim at directly affecting the behaviour of the respondents. This holds true for the type of measures, for instance price measures are most negatively perceived by the groups which are most affected by the measure (e.g., car users). Therefore, there seems once again to be some strategic answering by the respondents on this issue. In the following section, the support for measures will be analysed.

5.3. The support for policy measures in transport

The final relation in the conceptual model concerns the impact of personal features, the perception of social and individual problems, and the perception of effectiveness of measures on the support for policy measures. The same cross-effect dummies as in the previous estimation are included. The results of the ordered-probit estimation are presented in Table 4.

Focusing on the type of measure, safety measures are most strongly supported by the respondents, which is consistent with the findings in earlier sections. More striking is that environmental measures have more support than congestion measures. Price measures and infrastructure measures are less supported, which is not surprising, because these measures have more direct impact on the respondents' behaviour than the supply of new modes or technical improvements of current modes (see also Section 2). The same results were found in the estimation on the perceived effectiveness of measures.

In 1995, the general support for measures was higher than in 1992, but lower than in 1994, so there does not seem to be a clear increase or decrease in the support for policy measures. The youngest age category clearly has the lowest support, while there are few differences found between the opinions of the older age categories. The gender and type of household have no significant impact on the support for policy measures. Strikingly, respondents with children do not support safety measures significantly more than other respondents.

When the educational level of the respondent becomes higher, the support also increases; only the lowest educational level also appears to have a relatively high support for general policy measures. This is surprising, since in the previous estimation, it appeared that the higher educated respondents perceive the effectiveness of measures lower than do lower educated respondents.

Living in the Randstad or being a commuter does not have a significant impact on the support, although these groups may be more affected by the measures. Car and driving license owners support measures significantly less, which is predictable because these groups may be affected most directly by the measures. This especially holds for car drivers, whose support for price measures is lower than for other types of measures. The lowest income group has the lowest

Table 4
Results of ordered probit-analysis with the support for measures as dependent variable

Variable	Coeff.	Variable	Coeff.
Year 1994	0.08 ***	Income 1500–2000	0.10 ***
Year 1995	0.04 ***	Income 2000–3000	0.03
		Income >3000	0.10 ***
Age 30–45	0.11 ***		
Age 45–60	0.09 ***	Congestion measure	−0.41 ***
Age >60	0.07 ***	Environm. measure	−0.19 ***
Women	−0.01	Price measure	−0.15 ***
		Alt. transport meas.	0.66 ***
Living together	−0.02	Infrastr./spat. org.	−0.15 ***
With child(ren)	−0.02		
		Effectiveness 2	0.95 ***
Education 2	−0.10 ***	Effectiveness 3	1.45 ***
Education 3	−0.08 ***	Effectiveness 4	1.92 ***
Education 4	0.03		
Education 5	0.04 **	Problem individual	0.06 **
Education 6	0.04	Problem social	0.32 ***
Education 7	0.11 ***		
Education 8	0.23 ***	Safety + child	0.04
Small city	−0.02	Randstad + env.	−0.06 *
Village	−0.06 ***	Randstad + cong.	−0.05
Randstad	−0.00	Income 2 + price	−0.05
		Income 3 + price	−0.01
Commuter	−0.00	Income 4 + price	0.01
Car owner	−0.14 ***	Car + price measure	−0.25 ***
Driving license	−0.15 ***	Constant 1	−0.82 ***
		Constant 2	0.40 ***
		Constant 3	2.09 ***
Likelihood χ^2			27773 ***
−2 log likelihood full model			103 903
−2 log likelihood restricted model (constant only)			131 675
pseudo R^2			0.21

Notes: (1) two-sided *t*-test: *** significant at the 0.01 level; ** significant at the 0.05 level; * significant at the 0.1 level. (2) $n = 52159$ (3) the education level ranges from: education 1 lower than secondary school to education 8 = university; the levels in between are specific for the Netherlands. (4) the perceived effectiveness of a measure is defined as: 1 = no, 2 = partly, 3 = largely, 4 = yes. (5) reference values for the independent variables are: year 1992, age <30, men, living alone, lower than secondary school, big city, not Randstad, non-commuter, no car owner, no driving license, income <1500, safety, technical measures, effectiveness 1.

support, while for the other income groups no (significant) differences are found. It is striking that the income level has no significant impact on the support for price measures; one might expect that lower incomes are stronger opponents of such measures. It may be the case that this impact is

entirely included in the opinion on the effectiveness, since in that estimation the impact was significant.

As expected in the conceptual model, the perception of individual and social problems in transport has a positive impact on the support for measures. In this respect, it is noteworthy that the perception of social problems has a stronger impact on the support than the individual perception. Apparently, the respondents seem to be more socially oriented than one might expect, or the individual problems are considered to be less important. The perceived effectiveness of measures also has a clear positive impact: when the perceived effectiveness of a measure is higher, the support becomes larger. As was the case in the previous estimations, the type of problem and type of measure have high coefficients; the same holds for the perception of social problems. This latter result was also found in Verhoef et al. (1997a). These variables have clearly more impact on the support for a measure than the personal features of the respondent.

In conclusion, the support for measures is clearly different per type of measure and of the problem it tries to solve. However, several personal features and the perceived effectiveness also have a significant impact on the respondent's support for policy measures in transport.

6. Conclusions

The social and political feasibility of transport policy measures to solve external effects such as congestion, pollution and safety is often problematic. Measures that are efficient from an economic perspective are often unfeasible from a social and political viewpoint, since the distribution of benefits and costs is not balanced among actors. Fortunately for the acceptance of policies, also social considerations and perceptions of problems play a role.

Interesting in this respect is that the three fields of *problems* – congestion, safety and environment – analysed in this paper are not considered to be equally important. From an individual perspective, safety problems are considered to be most serious, while environmental and congestion problems receive a clearly lower score. Congestion gets a low score, although drivers experience it directly. When respondents are asked to use a social rather than an individual perspective when valuing the seriousness of transport problems a rather different ranking is found.

From a social perspective, the environment receives the highest score, followed by congestion, whilst safety is considered to be least problematic. The distinction between the individual and social perspective in problem perception is important, since, as we will indicate below, the two perspectives have distinct implications for the support of policy measures.

The impact of individual features as an explanatory factor of the perception of the seriousness of transport problems appears to be limited: older people take transport problems less seriously than younger people, while women and people with high educational levels or high incomes are more concerned about transport problems.

The *effectiveness* of measures is most positively judged in the field of safety. The respondents' perceptions of the supply of more and better alternative transport means is positive. This is in line with the findings of Bartley (1995), but seems to be in contrast with the results of numerous transport studies which indicate that the supply of better public transport tends to have only rather small effects on modal choice. Push policies – regarded as much more effective in the theoretical literature – are regarded as much less effective by the respondents. This seems to be an

example of cognitive dissonance reduction. The impact of individual features on the perception is again low and sometimes opposite to the findings of the problem perception. The most positive perceptions of the effectiveness are found with respondents who are older, less educated or are members of lower income groups.

The *support* for certain policy measures is highest for safety measures, followed by environmental and congestion measures. The additional supply of alternative transport receives much support, but price measures are unpopular. It is interesting to find that both individual and social perception of transport problems have a positive impact on the support for policy measures, but that the social perception's impact is clearly higher. The perceived effectiveness also increases the acceptance of policy measures. High levels of support are found with persons who are older, highly educated, not owning a car or having a driver's license, or are members of higher income groups.

Comparing the outcomes on problem perception, effectiveness perception and support for measures, we note that a similar score for the support of policy measures may result from a rather different combination of the underlying variables. For example, when respondents of different age groups are compared, older persons have low perceptions of problems, but high perceptions of the effectiveness of measures. A similar pattern is found for persons with low educational levels.

In certain respects the results are disappointing because people tend to have a low perception of the effectiveness of policy measures which, according to transport models based on actual behaviour, really do have an effect (e.g., price measures, as mentioned in Section 4). This is a problem that can only be partially solved by providing the public with better information. Cognitive dissonance reduction mechanisms will probably prevent a complete solution to this problem. On the other hand, we note that people do take into account a social perspective in their support for policy measures; they are not always using a narrow view guided by self interest. An important limitation of our analysis is of course that it is based on statements of respondents made during interviews, not on their actual behaviour; there is no guarantee of absolute consistency between the two.

In conclusion, the analysis in this paper clearly shows that the support for policy measures is influenced by the problem perception (both at the individual and the social level), the perceived effectiveness of a measure, the type of measure (e.g., price measures) and to a lesser extent by the personal features of respondents. Therefore, the social support for transport policy measures and packages can be increased by paying attention to these underlying factors.

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