NHTS 2017 LONG-DISTANCE TRAVEL DATA ANALYSIS: A COMPARISON WITH 2010 RSG DATA

Yantao Huang
Graduate Research Assistant
Department of Civil, Architectural and Environmental Engineering
The University of Texas at Austin
yantao.h@utexas.edu

Kara M. Kockelman
(Corresponding Author)
Dewitt Greer Professor in Engineering
Department of Civil, Architectural and Environmental Engineering
The University of Texas at Austin
kkockelm@mail.utexas.edu
Phone: 512-471-0210

Background

The long-distance (LD) travel behavior has been investigated in 2001 NHTS (Hu and Reuscher, 2004) and defined as one-way trips greater than 50 miles. This LD travel definition has been used since then, recognizing that researchers also pay attention to overnight travel (Presser and Herman, 1996; Backer, 2012; Dellaert et al., 1998), which does not necessary to be LD travel. Based on the LD travel statistics in 2001 NHTS, personal vehicle travels account for about 90% of the total LD trips, which is about 7.2 million trips per day across the U.S. (Gudzinas, 2012). The 2017 NHTS data has the potential to provide exciting results for the LD travel analysis. After 16 years, the LD travel pattern could be substantially different, also with a different distance collection method of the google map tools instead of self-reported (McGuckin and Fucci, 2018).

There are not enough LD travel data sources for U.S. apart from the NHTS 2001 and 2017 data, while several data sources are available in other countries like Netherlands, Sweden, Japan and Canada (Gudzinas, 2012). 2010 rJourney data from RSG, which is created by RSG for the United States Department of Transportation Federal Highway Administration, is another valuable U.S. LD travel data source (Outwater et al., 2015). This executive summary of results provides insights of the 2017 NHTS LD travel data and discusses the trend based on the comparison with the rJourney data from FHWA.

Methodology

RSG created the nationwide tour-based travel model for tours greater than 100 miles. This is assumed to be 50 miles one way, although which is not often exactly the case, since people could make more than two trips for a tour. However, two trips would be expected to be the most common case and one-way distance of 50 miles is the threshold length to be a LD travel.

At the early stage of the data analysis of 2017 NHTS LD travel data, mathematical models have not been created. The NHTS data analysis is performed through Excel spread sheet tool and the RSG data analysis utilizes python programming language. Firstly, interesting facts about the long-distance travel are summarized. Then the RSG long-distance travel data is analyzed to provide detailed comparisons.

Considering the modeled data that RSG does not have one-way trip less than 50 miles, the total trip counts, or person-mile traveled (PMT) across all distances are considered to be the value obtained from 2017 NHTS. Compared with basic statistics of LD data from McGuckin (2018), NHTS trip records that have a distance greater than 50 miles across all ages are used, instead of only LD trips made by adults. This is because RSG does not differentiate the age of the travelers, although it makes sense that non-adults often do not make LD travel by themselves.

Analysis

Table 1 shows the comparison of the descriptive statistics of the LD travel between 2017 NHTS and 2010 RSG. The RSG data has almost half LD trips of the NHTS. It should be noted that across RSG household trip record, trips made by four people or more are categorized as trips only by four people, which means that the trip counts is actually greater than 5.05 billion. However, the great recession could be a reason why RSG has such a low trip counts, while it could also be possible that NHTS has overestimated the LD trips. It can be the overestimated Euclidian flight distance (for example, use shortest road network instead) for flight travel, or that trips made by flight were not stated clearly in the response.

On the contrary, RSG captures a greater air average trip distance of 1317.5 miles with a low air market share. RSG also shows a longer average distance across all modes, with a length of 260 miles compared to 190 miles in NHTS. The air trips almost double in NHTS but air PMT share only increasing a little compared to RSG, also indicating a shorter air travel distance in 2017. If sound distance collection method in NHTS is assumed, the U.S. has experienced an increase in LD travel but with a shorter travel distance.

The distributions of trips and PMT for all modes (Automobile, bus, rail, and air) summarized from RSG data are also shown below in Figure 1, compared with trip distribution of 2017 NHTS data. Across all modes of LD travel in RSG, the most frequent trips focus on the distance of less than 250 miles, and frequency decreases while the trip distance increases. This trend is the same as NHTS 2017 data while the LD trip counts of less than 250 miles is more than double the trip counts from RSG. For PMT distribution, two data sources show similar PMT for shorter LD trips less than 250 miles, while the RSG data shows more PMT across all other distances.

Conclusion

The 2017 NHTS data shows a great gap between the 2010 RSG data. Assuming sound distance collection method from NHTS 2017, it could be inferred that there has been an increase in LD travel including the air travel since 2001. However, researchers are expecting a longer travel distance and larger market share of automobile, due to the advent of the automated vehicles, which have the potential to reduce the drivers' value of travel

time (LaMondia, et al., 2016; Perrine et al., 2018). The future pattern of LD travel still remains uncertain due to the new technologies.

Reference

Backer, E., 2012. VFR travel: It is underestimated. *Tourism Management*, *33*(1), pp.74-79.

Dellaert, B.G., Ettema, D.F. and Lindh, C., 1998. Multi-faceted tourist travel decisions: a constraint-based conceptual framework to describe tourists' sequential choices of travel components. *Tourism Management*, *19*(4), pp.313-320.

Gudzinas, B., 2012. Development of Long-Distance Multimodal Passenger Travel Modal Choice Model.

Hu, P.S. and Reuscher, T.R., 2004. Summary of travel trends: 2001 national household travel survey.

LaMondia, J.J., Fagnant, D.J., Qu, H., Barrett, J. and Kockelman, K., 2016. Long-Distance Travel Mode Shifts Due to Automated Vehicles: A Statewide Mode-Shift Simulation Experiment and Travel Survey Analysis. In *Transportation Research Board 95th Annual Meeting* (Vol. 11).

McGuckin, N. and Fucci, A. 2018. Summary of Travel Trends: 2017 National Household Travel Survey. No. FHWA-PL-18-019

McGuckin, N, 2018. Can We Use the NHTS To Estimate Long-Distance Travel? Retrieved from http://www.travelbehavior.us/home

Outwater, M., Bradley, M., Ferdous, N., Trevino, S. and Lin, H., 2015. Foundational Knowledge to Support a Long-Distance Passenger Travel Demand Modeling Framework: Implementation Report.

Presser, H.B. and Hermsen, J.M., 1996. Gender differences in the determinants of work-related overnight travel among employed Americans. *Work and Occupations*, *23*(1), pp.87-115.

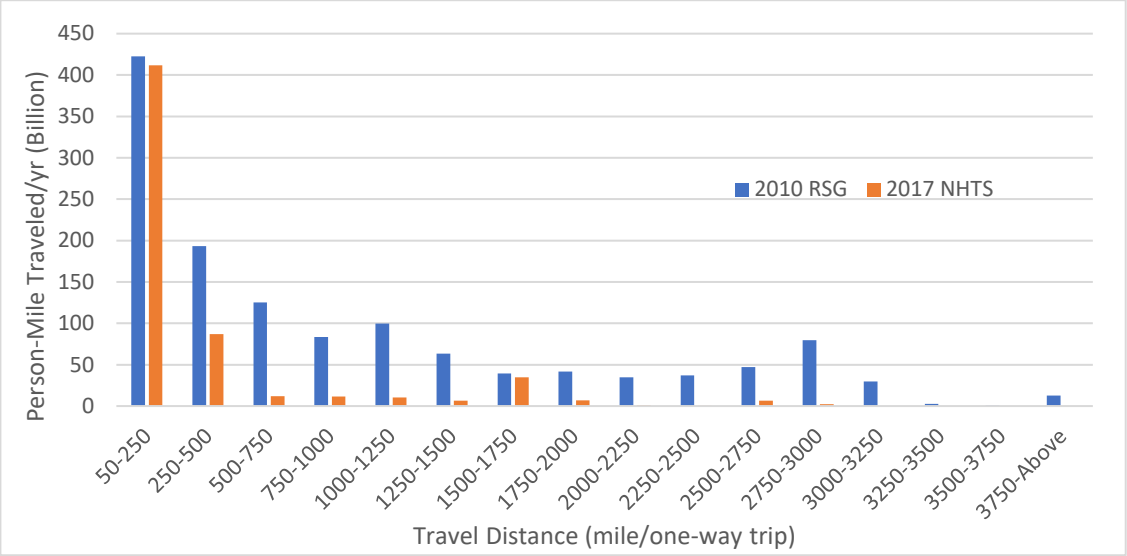
Perrine, K.A., Kockelman, K.M. and Huang, Y., 2018. Anticipating Long-Distance Travel Shifts Due to Self-Driving Vehicles. Presented at the 97th Annual Meeting of the Transportation Research Board (No. 18-00709).

Appendix

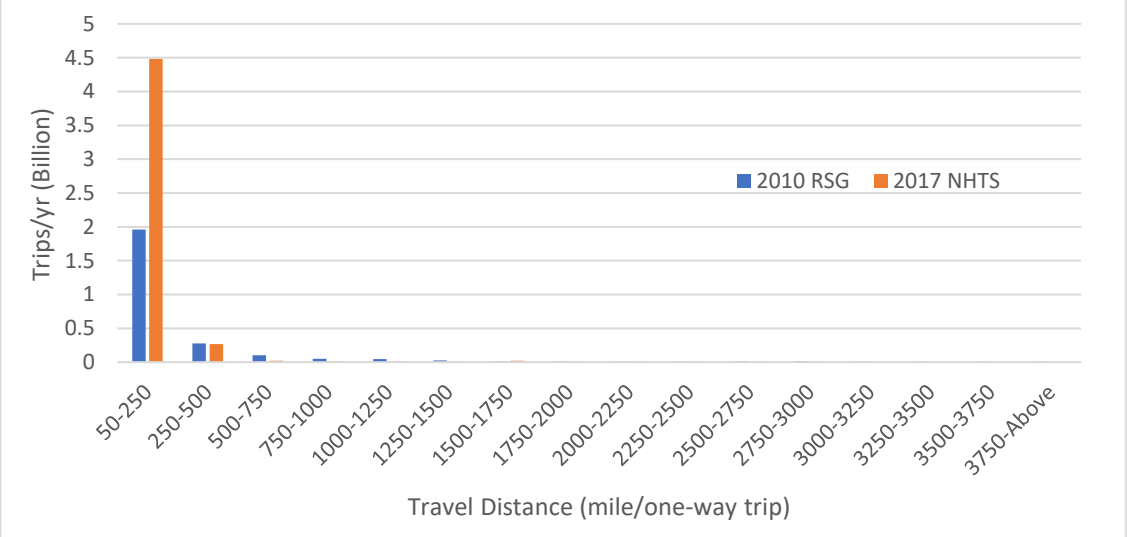
Table 1 Statistics Comparison Between NHTS and RSG

	NHTS	FHWA/RSG
Total LD Trips (Billion)	9.01	5.05
Total LD PMT (Billion)	1714.0	1312.6
Air Average	1070.0	1317.5
All Modes Average	190.2	260.0
LD Trips/Year	30.0	16.8

LD PMT Share	43.2%	33.1%
Air Trips Share in LD Trips	6.9%	6.9%
Air PMT Share in LD PMT	38.9%	34.8%
Air Trips Share in Total Trips	0.17%	0.09%



a) PMT distribution Comparison of Long-distance Travel



b) Trip distribution Comparison of Long-distance Travel

Figure 1 Comparison of Long-distance Travel between 2010 RSG and 2017 NHTS