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Changes to Vehicle Distance Travelled in Germany, USA and Melbourne, Australia and demographic trends and the external influences

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This work addresses the following topic(s) from the Call for Contributions:
(Please check at least one box)

- Placemaking to integrate urban spaces and mobility
- Promoting sustainable mobility choices in metropolitan regions
- Governing responsible mobility innovations
- Shaping the transition towards mobility justice
- System analysis, design, and evaluation
- other: _____

Extended Abstract

Problem statement

The need to accurately understand induced demand for new infrastructure projects is critical in ensuring the right balance in maximising asset usage by the target users while avoiding over-catering. Target users should have no alternatives and should be making the journey at that time, while over-catering can be to the detriment of alternative infrastructure/ transport services.

As shown in Figure 1, historical traffic growth exceeded forecasts significantly; however, more recently, this has not been the case potentially due to lower growth rates and a levelling out of total vehicle miles travelled (VMT). The figure shows significantly higher levels of VMT in the USA compared to what was forecast until around 2007. Since then, planning has maintained a more accurate level of forecasting, albeit through adjusting for the recession, given the drop in total VMT because of the recession.

Improvements to forecasting induced demand are of benefit for planning projects. However, practitioners generating more accurate forecasts do not preclude new projects from resulting in induced travel demand. Ivanchak showed that at a disaggregate level, increasing lane miles increases VMT in the USA at a relatively consistent rate between 1980 and 2019 (regarding the percentage influence available road lane miles have on vehicle miles travelled) (Ivanchak, 2022).

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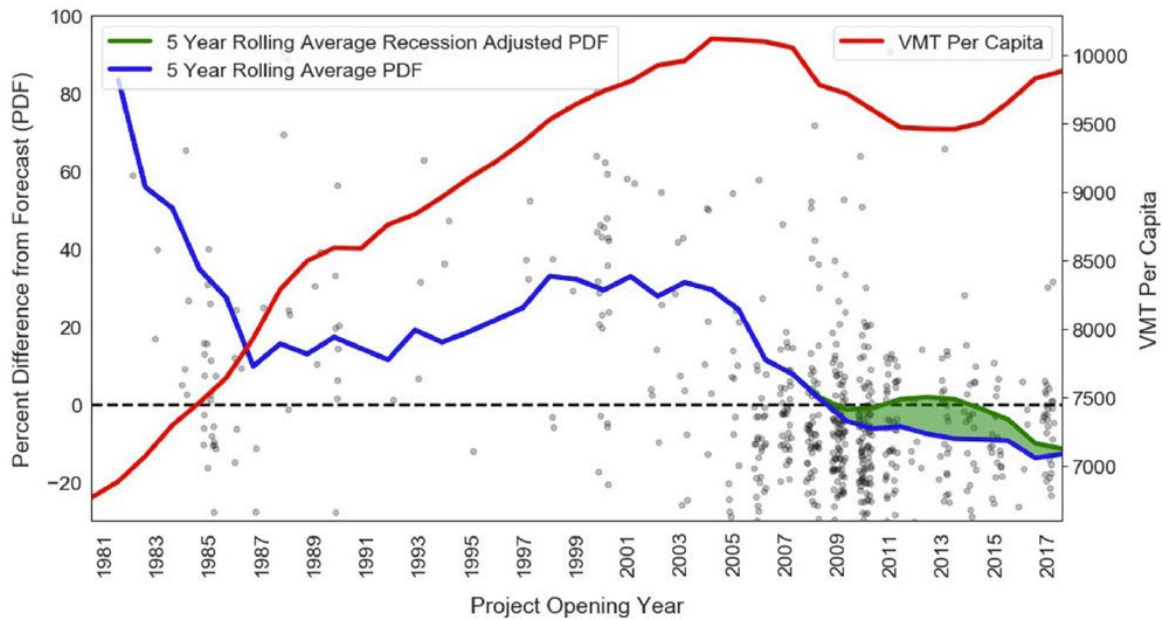


Figure 1: Trend in percent differences from forecast, excluding resurfacing projects (Hoque, et al., 2021)

Research objectives

In practice, a simple approach to measure induced demand is understanding the relationship between available road length and vehicle distance travelled over time. This analysis will investigate the factors that drive vehicle distance travelled using multinomial regression analysis at a disaggregate person level over the past 20 years (depending on the available dataset for each country/region). Adopting a person-level approach provides a disaggregate way to understand influences on vehicle distance travelled while still allowing for the inclusion of disaggregate external variables such as total road length available and fuel prices. It is expected that including these additional person and household-level variables will provide a more robust understanding of the influence of the external variables by accounting for more attributes of the people analysed. Additionally, this expanded approach sets out to understand differences between countries with lower and similar levels of private vehicle use and other varied attributes of the population and city/country-built form and transport connections.

Germany and Melbourne, Australia report vehicle kilometres travelled, whereas the USA reports vehicle miles travelled, and the approach will simplify the reference to just vehicle distance travelled.

Methodological approach

The national household travel surveys from Germany and the USA and the city regional travel survey from Melbourne, Australia, are analysed to extract person-level vehicle distance travelled and various person and household level attributes. The datasets are analysed using a multinomial regression model for each year of the survey available in each location. Monetary variables have been inflation-adjusted to obtain comparable yearly results. Correlation analysis is conducted to remove any variables that showed high levels of collinearity. Log transformations are adopted for some variables for each dataset and the dependent variable. As the focus is on car travel, the number of potential drivers is more important than the number of household members. The dependent variable adopted is the total vehicle distance travelled per person.

External data sources for the available road length, fuel prices and inflation rates are obtained from national agencies in each corresponding country and applied at the available aggregate levels. For example, road length in Germany was available at a state level and fuel prices at a national level.

Expected results

Descriptive statistics show intuitive trends, such as the average trip distance per person increased between 1996 and 2019 in Germany. The total distance travelled has remained similar, indicating longer trips are paired with fewer trips. The analysis for the USA and Melbourne, Australia is ongoing and anticipated to conclude post-submission of this abstract but is expected to show an increase in both metrics.

In Germany, the changes in available road distance have been low between 1996 and 2019. However, it is still shown in the multinomial regression analysis that the changes to road length positively contribute to the vehicle distance travelled. While the initial findings provide insights into the German context, the forthcoming results for the USA and Melbourne, Australia will contribute a more comprehensive insight into the different countries and are expected to show a more significant influence of road length on person distance travelled than shown in Germany, given the more pronounced driving culture/reliance typically.

This direct relationship between changed available road length and vehicle distance travelled indicates that induced demand is still occurring. Without proper management of induced demand, it can be concluded that these trips are part of a cyclic process to the detriment of alternative modes, their infrastructure, and investment into them, such as active and public transport.

References

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