



Aggregate Road Passenger Travel Demand in New Zealand

Dr Mingyue (Selena) Sheng and Professor Basil Sharp
University of Auckland

Introduction

Road transport in New Zealand is escalating. In terms of private vehicles, as the Ministry for the Environment warns, on average, New Zealanders are driving further, owning more cars, choosing an increasing engine size; and the fleet profile is comparatively old. NZ has the highest motor vehicle ownership (motor vehicle/population ratio) amongst 34 OECD nations and the fourth highest passenger car ownership (passenger car/population ratio).

Key Research Questions:

- Are disturbances in demand for the four major road passenger transport choices correlated?
- What are the factors that affect the demand for each mode of road passenger travel in NZ?
- How much will these factors impact on the demand for road passenger travel in NZ?

This high level of automobile dominance in NZ is at least in part a result of past government transport policies, which makes cars the “default” form of personal transport for New Zealanders. The development of automobile-oriented urban forms and highway improvements in 1950s have had the effect of encouraging car travel. Furthermore, deregulation of the vehicle industry from 1980s, which removed import quotas and reduced tariffs on vehicles purchased abroad, has made second-hand overseas cars more affordable for domestic consumers.

In terms of public transport, buses are the most common form of public transport mode in NZ as all cities and most towns have bus services available. Over 90% of the bus fleet is powered by diesel, according to the vehicle fleet statistics by the Ministry of Transport. Although public transport patronage has been growing in recent years, gaining greater social acceptability and contributing to the promotion of environmentally friendly lifestyles, the percentage of people travelling by public transport still remains relatively low compared to car trips. New Zealanders rely primarily on private vehicles for travel, supplemented with public transportation. Unsurprisingly, due to this car-dependence, energy consumption, congestion on local roads and highways, and CO₂ emissions from the road transport sector have increased.

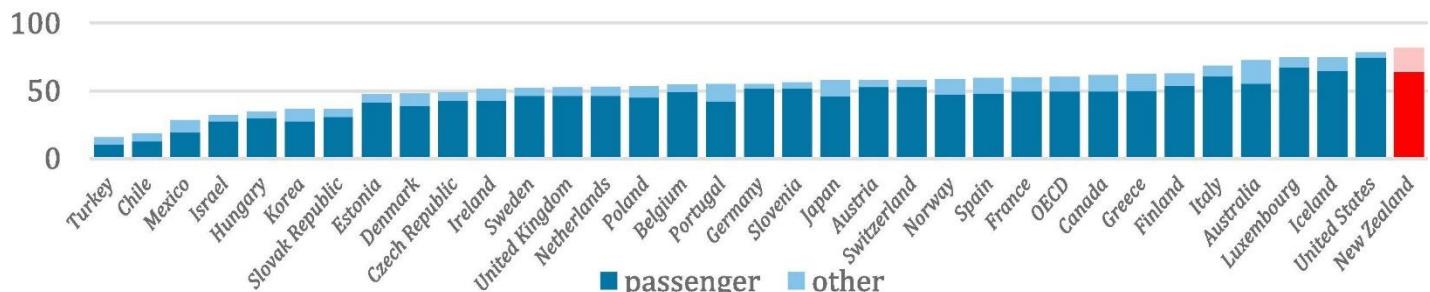
Study

Although a wealth of studies have investigated the demand for cars and public transportation, little investigation has been undertaken into the demand for cars by different fuel types, a classification that is crucial in examining road users’ transport mode preferences in the light of energy consumption, CO₂ emissions, and policy implications. The purpose of this research, therefore, is to fill the empirical gap in the literature by differentiating private vehicles by fuel types. This is achieved via analysis of the relationships between the four main road passenger transport choices: petrol cars, diesel cars, buses and motorcycles in NZ, based on a SUR (Seemingly Unrelated Regression) model. Specifically, this paper focuses on two key areas:



1. Whether the differences between expected demand & observed demand for transport choices are correlated
2. the principal determinants of the demand for each available transport choice.

Vehicles/100 people



Data Source: OECD

Results*

- On average, for every 10% increase in road user's income, the VKT (Vehicle Kilometres Travelled) demanded for petrol cars is expected to increase by 5.1%.
- With a rise in fuel prices of 10%, an average motorist will reduce the consumption of driving his/her petrol vehicle by 0.8% (i.e. fuel price is inelastic)
- The price elasticity of demand for diesel is similar to the price elasticity of demand for petrol, as a 10% increase in the diesel price will also reduce the usage of diesel cars by 1.1%
- The age of diesel cars and the unemployment rate both have a significant negative impact on the VKT demanded for diesel cars. This finding implies that for those who are unemployed, the ability to possess and drive a private vehicle is normally outside of their financial means.
- The mature population age group has a significant positive preference for diesel powered vehicles.
- As incomes rise, the demand for bus services declines, indicating that public transport is an inferior good. Moreover, an increase in unemployment will negatively impact travel demand by buses.
- The results for motorcycle demand show similar patterns as the ones found in the demand for buses. The demand for motorcycles falls as income, or the percentage unemployed, increases.
- Petrol cars, diesel cars and motorcycles are substitutes, implying that an increasing effect in one mode will decrease the effect on the other modes.
- All private transport modes are complements to buses. This finding confirms the first-mile/last-mile problem in NZ's public transport system. Because only a small percentage of the population lives within walkable distance to any existing mass transit stop/station, a large part of public transport users must rely primarily on cars or motorcycles to supplement the trips from their home to a transportation hub, and vice versa.

*Note: these results are with everything else held constant

Key Policy Implications:

- Price inelasticity of fuel provides government with an opportunity to raise revenue for investing in infrastructure and/or subsidising public transport. However, a fuel tax is unlikely to reduce congestion or emissions. Targeted road user charges will be necessary in the future.
- To achieve a reduction in the demand for private transport modes, different policies could be implemented according to fuel types, as the factors affect demand for these transport modes in NZ differently.
- To address the first-mile/last-mile problem, transport planners should consider urban planning reform, provide more frequent feeder bus services, construct more infrastructure for cyclists, encourage car-sharing programs, and/or adopt the use of autonomous vehicles.

To find out more about this research, please visit: <https://doi.org/10.1016/j.tra.2019.03.005>
Contact: m.sheng@auckland.ac.nz

Adapted with assistance from Sarah Hendrica Bickerton & Suzanne Woodward, PPI