The economic geography of active commuting: regional insights from Wellington, New Zealand

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Historically in New Zealand, car travel has replaced walking and cycling among commuters as wage rates have risen. However, time-series data from the Wellington region show the relationship between income and active commuting differs from the historical trend. While higher incomes do allow people to purchase motorized transport, they also allow workers to purchase shorter commutes and to integrate active modes with public transport. As a result, the probability of active commuting rises with income. Raising urban density can help stem some of the negative environmental and health effects of rising affluence.

Keywords: active transport; commuting; economic geography; income; density

Introduction

This research examines an interesting regional outlier in New Zealand’s overall commuter transport picture. Wellington region, home to New Zealand’s eponymous capital city, is an intriguing case study, with high incomes and a high rate of ‘active commuting’ (walking and cycling to work) that are anomalous in light of New Zealand’s overall historical trend for active commuting to decline as incomes increase.

New Zealand is a South Pacific island nation with total area comparable with Italy but fewer than 5 million population, meaning most settlement is very low density. New Zealand’s temperate maritime climate is favourable for walking and cycling year-round. Despite the favourable climate, New Zealand’s car ownership has steadily risen since the 1970s to one of the highest rates globally, whilst commuter walking and cycling have declined. Rising car ownership has closely paralleled income increases: gross domestic product (GDP) per person rose from NZS8500 to NZS14 000 between 1970 and 2006, and cars per person rose from 0.31 to 0.58 (Conder, 2009).

Increasing average incomes and car use, and a simultaneous decline in active commuting, have occurred in the context of growing urbanization and the expansion of local labour markets throughout New Zealand. By world standards, New Zealand is highly urbanized: 72% of the population lives in 16 main urban centres (Department of Internal Affairs, 2008). Wellington region provides an interesting case study as it has both a particularly high urban population – 86.9% of commuters live in the region’s main urban areas (Ministry of Transport, 2011) – and is also one of New Zealand’s least deprived regions (Figure 1), with the highest national median household income (Statistics New Zealand, 2013).

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This paper aims to discuss active commuting’s benefits, to identify factors shaping active commuting decisions and to explain why commuter walking is substantially more common in Wellington than anywhere else in New Zealand.

Why walk or cycle to work?
There are at least five compelling reasons for attempting to stem and reverse shifts away from active commuting: health, public finance, climate change, social connectedness and labour productivity.

Physical inactivity is currently a major international public health issue. In New Zealand, as in many other developed countries, the pandemic of physical inactivity is strongly linked to growing affluence reducing exposure to physical labour. Most efforts to engage people in physical activity are promoted within the leisure sphere. But promoting physical activity within the work experience, as commuter transport, can be more cost-effective and convenient in incorporating the necessary level of exercise into people’s lives (World Health Organization (WHO), 2002).

Secondly, from an economic perspective, active transport brings mental and physical health benefits that may reduce financial burdens on public health systems. Cost–benefit models show that active transport investments in New Zealand cost a fraction of the cost of investing in motorized modes, and the health benefits of a 5% modal shift (car → bicycle) outweigh costs ten to one (Woodward & Macmillan, 2012).

Thirdly, shifting to non-motorized transport modes reduces society’s reliance on fossil fuel, reducing carbon emissions. Global atmospheric CO₂ levels are now at almost 400 ppm, up 40% since the Industrial Revolution and the highest for the last 650 000 years.
Climate scientists warn that further increases may trigger serious and wide-ranging effects including dramatic sea level rise, alongside more frequent, intense extreme weather events (US National Oceanic and Atmospheric Administration, 2013).

Fourthly, heightened engagement in non-motorized modes of transport cultivates more liveable streets, stimulating social capital and increasing community connectedness (Leyden, 2003). More pedestrians and cyclists may help improve perceived safety, particularly at night when streets may feel threatening, especially to the most vulnerable.

Lastly, in a workplace context, productivity gains are delivered by reducing absenteeism and increasing employee alertness and energy. Job performance is positively associated with moderate and vigorous-intensity physical activity, and perceived work quality positively linked to moderate-intensity physical activity engagement (Pronk et al., 2004).

Research context

To date, much active transport research has focused either exclusively or predominantly on barriers (e.g. Nagel, Carlson, Bosworth, & Michael, 2008; Pucher, Dill, & Handy, 2010; Southworth, 2005). Considerable attention is given to supply-side factors, particularly bike lanes, pedestrian walkways, and the level of access and linkage of facilities to appropriate locations.

While attention to barriers is necessary, it is equally important to examine demand-side factors affecting people’s inclination and ability to take up active modes. Given that economic growth is most governments’ main objective, including New Zealand’s, it is important to question how increasing affluence might affect propensity for physically active daily commutes.

From this perspective, the relationship between income and active commuting is central. Previous studies present a complicated picture of the relationship between income and active transport use. Studies in both the UK (Adams, 2010) and the USA (Kruger, Ham, Berrigan, & Ballard-Barbash, 2008) found active transport use more prevalent among less affluent groups; conversely, studies in Australia (Merom, van der Ploeg, Corpuz, & Bauman, 2010), Germany (Buehler, Pucher, Merom, & Bauman, 2011), and the UK (Brockman & Fox, 2011) found cycling more prevalent among the most affluent.

Few authors have examined the interactive effects of location and income on active transport use, and even fewer have explored income impacts specifically in an active commuting context. This is surprising given that work is a dominant activity in most adults’ lives and most working-age individuals face a commute. The lack of attention to the relationship between affluence and active commuting is therefore this study’s key point of departure.

A regional case study: Wellington

Across New Zealand the percentage of all commutes mainly involving walking fell by almost half between 1976 and 2006 with the prevalence of cycling to work diminishing to the point where just 2% of all work commutes are cycle commutes (Ministry of Transport, 2011). As wages rose, commuters tended to substitute physical effort, and engagement with the elements during travel, with the ease of the automobile.

However, one area with both comparatively higher income levels and a higher proportion of active commuters is the Wellington region. The Wellington example indicates
that active commuting does not simply decline with higher income. Exploring the spa-
tial context in which commuting choices are made reveals that the relationship between
active commuting and income is significantly modified by other factors; chief among
these is population density.

Methods
This study uses data from the New Zealand Household Travel Survey (NZHTS), an
ongoing, nationwide survey conducted by New Zealand’s Ministry of Transport. Particip-
pating households are chosen from randomly selected census meshblocks, with around
100 households per city block. Over a five- to seven-year cycle, every household in the
selected meshblock is invited to participate in the survey. Each selected household is
randomly allocated two consecutive travel days on which each person is asked to main-
tain a travel diary. The interviewer returns after the travel days to conduct a personal
interview with each participant. Surveying takes place on every day of the year.
Between 2003/04 and 2007/08, 2200 households were invited to participate in the
NZHTS each year. This study uses NZHTS data from five different data collection peri-
dods: 2003/04, 2004/05, 2005/06, 2006/07 and 2007/08.

Firstly, logistic regression modelling is used to estimate probabilities of using active
modes of transport for commuting for different income groups. The median spline
method is used as it is robust to outliers and is therefore a useful way of tracking the
way average probabilities change with factors like income and population density. Sec-
ondly, relevant regional policies are reviewed to help explain the statistical modelling
results.

Wellington – ‘the walking capital’
In the context of New Zealand’s regional active commuting patterns, Wellington is an
instructive outlier; at over 35%, the region’s rates of commuter walking are considerably
higher than any other region (Figure 2).

So what is special about Wellington? Firstly, Wellingtonians are high users of public
transport relative to other areas of New Zealand, and most public transport use involves
some degree of walking. Coupled with this, the cost of car parking in Wellington is
considerably higher than in most other regions, providing an economic incentive for
commuters to use alternative modes.

Regional land-use patterns and infrastructure investment also play an instrumental
role. Wellington has seen considerable investment in active commuting initiatives and
infrastructure. In comparison, transport infrastructure investment in the Auckland region
has been largely centred on road investments, hindering active transport opportunities
by designing urban form around motor vehicles.

Topography also matters, and here the contrast between Auckland’s sprawling popu-
lation and Wellington’s centrally constrained capital city is clear. Hemmed in by steep
hills and a harbour, commercial and residential development in Wellington city has
taken a compact form.

The impact of density
In Wellington, as noted, average incomes are significantly higher than the national aver-
age and a high proportion of Wellington commuters live in main urban areas. This is
where the interactive effects of affluence and density come into effect. The decision to choose active transport is not simply one of economics or geography, but of economic geography.

Opportunities to commute actively rise in densely populated areas because of agglomeration effects on land values, causing stratification of income groups. The probability of active commuting rises with income in Wellington because high density allows higher income commuters to shorten their commute by living closer to their local labour markets’ centres. Figure 3 indicates how the main urban areas’ (population > 30,000) greater size and density shifts the probability of active commuting from a negative to a positive income relation.

Shorter home-work distances swing the relative costs of motorized and active transport in favour of active transport. It is well recognized that compact settlements encourage more sustainable commuting, but it is higher income earners that are able to afford real estate in centralized areas, explaining why the probability of active commuting rises among these groups. By extension, the burden of the long commute is redistributed to lower income groups who increasingly live on the periphery (Goodyear & Ralphs, 2009).

Several other characteristics of dense urban centres have contributed to shifts in the commuting income function. Firstly, high-density areas tend to have more mixed land use, placing more amenities within inner-city residents’ walking and cycling distances. Secondly, car parking’s financial and time cost is higher in main centres, disincentivizing car use. Thirdly, better public transport provision enables heightened opportunities for integration with active modes.

A fourth factor relates to high-density areas’ critical mass: pro-walking and cycling campaigns and community programmes are more prevalent in cities, and active transport

Figure 2. Proportion of all commutes that mainly involved walking or cycling in each region of New Zealand, 2003–08.
infrastructure is more likely to be funded in densely populated areas where more people reap the benefits. In turn, better connectivity of pedestrian paths and cycle lanes in inner-city areas makes using active transport modes both safer and more efficient. Motoring speed limits tend to be lower in densely populated areas, increasing pedestrian and cyclists’ safety perception.

In addition to geographical characteristics that alter how active commuting relates to income, links between income and education should also be considered. To the extent that higher incomes are associated with higher levels of education (e.g. active transport’s health benefits), health can be expected to play an increasingly important role in people’s lifestyle decisions as their incomes rise. Concern for environmental sustainability might also be expected to rise with the education component of income. Given that 46.3% of people aged 15 years and over in the Wellington region have a post-school qualification (compared with 39.9% nationally), the theory that the income effect is to some degree attributable to education seems likely in the Wellington example (Statistics New Zealand, 2007).

Conclusions

Previous studies in this area painted a confusing picture of the relationship between income and active commuting. At face value, this research complicates the picture even further. Taken together, the international literature demonstrates this study’s fundamental point, namely the singular importance of context; actors in a particular place share common physical and/or social environments and are thus exposed to opportunities and constraints not shared by others.

This study highlights that settlement nature and density plays a key role in influencing whether a person will walk or cycle to work. In short, when it comes to the
incidence of active commuting, the person matters less than the place. The importance of spatial context is clearly demonstrated in the Wellington region example; Wellington city’s capital status ensures significant regional infrastructural investment and human capital are concentrated centrally in a labour market dominated by the public sector. The compact nature of development is also a product of the region’s geographical position on the southern tip of the North Island, bounded to the south, east and west, by water.

In sprawling, geographically dispersed settlements, central residential locations are typically in short supply, and their acquisition relies on the ability to outbid less affluent workers. Higher earners will always be able to outbid less affluent commuters, making it necessary for the latter to live in more distant, lower density residential locations where the scope for active commuting is limited. This serves to widen the health gradient because the benefits of active commuting become captured by the more affluent.

An equitable strategy for facilitating active commuting would be focusing on regional development policies maximizing the number of commuters living in compact areas where residential locations are clustered around dense local labour markets. As with Wellington, this would ensure greater access to public transport hubs, and render the distance between residential locations and local labour markets easily walkable and cycleable, not just for affluent workers, but for a greater proportion of commuters across the income spectrum. Such an approach to regional planning would help stem some of the negative environmental and health effects of rising affluence and car ownership as well as addressing some of the social justice consequences that accompany the current decentralization of the poor who by virtue of their peripheralization are far less likely to be among voluntary active commuters.

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