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The influence of (toll-related) travel costs in residential location decisions of households: A stated choice approach

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ABSTRACT

In this paper, we investigate the impact of travel costs, in particular toll costs, on the residential location choice of households, using a stated choice survey. Within the stated choice experiment, car drivers that frequently face traffic congestion, traded-off several trip-related (including toll costs) and house/location-related factors in their decision where to locate. If we look at the influence of different variables, toll and fuel costs seem to be important. Respondents are more sensitive to travel costs (i.e. toll and fuel costs) than to equally high (monthly) housing costs. Travel time appears to play a less important role, as indicated by a low value of time (VOT). In addition, location-related factors, such as the type of location and the number of bedrooms, turn out to be important factors as well. It can be concluded that respondents generally speaking prefer to pay higher housing costs and accept longer travel times to avoid (high) travel costs. Finally, if we look at the difference in preferences in relation to toll and fuel cost, we can conclude that toll costs are valued more negatively than fuel costs, although the differences are small.

1. Introduction

(Road) pricing policies are being considered and even implemented more and more in urbanised areas around the world, with the aim of alleviating/internalising traffic-related external costs, for instance traffic congestion. Generally speaking, car drivers do not consider the extra costs they may impose on other car drivers, for example in the form of additional delays. Such external costs related to costs inside the transport system, e.g., congestion and accident costs, can be regarded as in-system costs. However, costs outside the transport system are also part of the externalities, for example environmental costs, such as noise pollution, local air pollution, acidification and climate change (Van Wee, 1995). In particular the reduction of congestion (costs/effects) seems to be an important reason to implement road pricing (see, e.g., EC,[1] 2001; Ministry of Transport, Public Works and Water Management, 2006; Phang and Toh, 1997; TfL, 2003). An additional motivation may be the generation of revenues that can be used to build and maintain infrastructure.

Road users may respond in different ways to road pricing. In the short-term, road pricing may cause people to change their route choice, departure time, travel mode, destinations or trip frequencies (see, e.g., May and Milne, 2000; Verhoef et al., 2008). In the longer term, road pricing may also affect (re)location decisions, such as (changes in) residential or work locations (Banister, 2002). Such (re)location choices are relevant when studying the effects of road pricing, in the sense that

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[1] The importance of internalizing externals costs can also be found in the document "European transport policy for 2010: time to decide".

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relocations will influence trip patterns and travel mode choices, ultimately affecting traffic densities and congestion on particular parts of the transportation network.

In contrast to the short-term responses to road pricing, however, the influence of road pricing on household location choices (the residential or work location) to date has received limited attention. This paper aims at providing such insight. More specifically, we examine the importance of travel costs (including road pricing) in comparison to location-related variables in residential location decisions of car commuters facing traffic delays regularly.

This article is structured as follows. In Section 2, we provide a review of existing literature (implicitly or explicitly) studying the influence of transport costs on relocation decisions. In Section 3, we describe the contribution of this article. Section 4 focuses on the study design and the data. The importance of trip (i.e. toll cost, fuel cost and travel time) and location-related variables in a location decision is described in Section 5. Finally, we present our conclusions in Section 6.

2. Transport (costs) and location decisions

The impact of transport on location choices and land-use (i.e. the whole spatial constellation of activity locations) has attracted much less attention from researchers than the influence of land-use on transport. A limited number of theoretical and empirical studies have, however, addressed the issue.

Micro-economic location theories have provided a theoretical basis with regard to the relationship between residential and work locations (e.g., Alonso, 1964; Wingo, 1961). A central theoretical element is the notion that transport costs are traded-off against other factors, for instance land prices. However, empirical studies, which have become more popular since the 1960s, have criticized the emphasis on transport costs at the expense of other factors (see, e.g., O'Farrell and Markham, 1975; Weisbrod et al., 1980). Empirical studies can be divided into those that focus on the overall location (and land-use) impacts of transportation investments (e.g., building new roads) on the one hand, and studies that look at the importance of (commute) trip impedances (i.e. level of service of infrastructure) on household location choices. In this article, we focus on the latter group because it is more relevant to road pricing.

Empirical (implicit or explicit) studies of the impact of (commute) trip impedances on residential location choices include stated preference as well as revealed preference studies. The stated preference experiments primarily focus on determining the importance of transport characteristics versus work and house (location) related variables in people's decision where to locate (see, for instance, Kim et al., 2005; Molin and Timmermans, 2003; Rouwendal and Meijer, 2001; Timmermans et al., 1996; Weisbrod et al., 1980). Kim et al. (2005) have found that increasing work-related travel time and costs makes it more likely that people will relocate. In addition, they have found that transport plays a significant role in people's decision where to live. Rouwendal and Meijer (2001) found that households dislike spending time in traffic. However, preferences for certain housing characteristics like the size of the town/city or the type of house are strong enough to make substantially longer commuting acceptable. Correspondingly, the results of Weisbrod et al. (1980) suggest that there are significant trade-offs between transport costs and other factors, such as housing costs and living environment. However, the role of transport is, again, relatively small compared to socio-economic and demographic factors. Molin and Timmermans (2003), finally, review the relative importance of accessibility with regard to residential choice on the basis of six stated preference studies. Their results suggest that, regardless of the research area and model specification, considerations regarding accessibility are significantly less important than housing attributes and neighbourhood attributes. It would appear that, as long as people can afford flexible means of transport, the impact of accessibility on their residential location choice is limited. In general, the stated preference studies point to location and house/work-related characteristics as possibly being more important with regard to location decisions than transport-related factors.

A review of revealed preference studies by Giuliano (1989) draws a similar conclusion. She concludes that transport costs are much less important than (classical) location theory predicts. This is primarily the result of decentralization and a well-developed transport system that has reduced differences in accessibility between locations and increased the importance of local characteristics. Further evidence of the limited role of transport resistance decisions is provided by O'Farrell and Markham (1975). Based on research among Dublin commuters, they find that a majority of car-owning commuters have never considered the cost of travelling to work by car and have never traded-off site costs against travel costs in their decision where to locate. Clark et al. (2003) find that both single and two-worker households with greater separation between work and residence tend to reduce distance and time. However, there does not seem to be a continuous relationship between distance and relocation. Their analyses suggest a critical isochrone[2] beyond which the likelihood of decreasing the distance to work grows rapidly (see also Clark and Burt, 1980; Van Ommeren et al., 1997; Verster, 1986). In contrast to O'Farrell and Markham (1975), the authors conclude that commuting distance does matter and that households are actually aware of the trade-off between distance to work and residential location. In addition, a series of papers discusses empirical results obtained from longitudinal revealed preference studies (see, e.g., Rouwendal and Rietveld, 1994; Van Ommeren et al., 1997, 1999; Kim, 2008). In contrast to, for example, Clark et al. (2003) and Kim (2008), Rouwendal and Rietveld (1994) found that people who change jobs will often commute over a greater distance after the change took place. Changes in people's housing situation, however, are neutral in their effect on the average commuting distances. Van Ommeren et al. (1999) conclude that job-related and residential

[2] With respect to the possible existence of critical or constant travel time budgets, see also Van Wee et al. (2002) and Mokhtarian and Chen (2004).