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Free public transport: A socio-cognitive analysis

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ABSTRACT

In this study, the modal shift potential of introducing a free alternative (free public transportation) and of changing the relative prices of transportation is examined. The influence of a cognitive analysis on the zero-price effect is also analyzed. The data used for the analysis stem from a stated preference survey with a sample of approximately 670 respondents that was conducted in Flanders, Belgium. The data are analyzed using a mixed logit model. The modeling results yield findings that confirm the existence of a zero-price effect in transport, which is in line with the literature. This zero-price effect is increased by the forced cognitive analysis for shopping trips, although not for work/school or recreational trips. The results also demonstrate the importance of the current mode choice in hypothetical mode choices and the importance of car availability. The influence of changing relative prices on the modal shift is found to be insignificant. This might be partially because the price differences were too small to matter. Hence, an increase in public transport use can be facilitated by the introduction of free public transport, particularly when individuals evaluate the different alternatives in a more cognitive manner. These findings should be useful to policy makers evaluating free public transport and considering how best to target and promote relevant policy.

1. Introduction

Transportation has become extremely important in modern life. Everybody is, in some way, either directly or indirectly affected by transport. Its availability and accessibility delineate how, where and when we travel. Transport modal choice impacts many aspects of our lives, including our work, leisure and health (Kingham et al., 2001). The dependence on the car in everyday travel has increased enormously in recent decades, resulting in serious and growing consequences for the environment (e.g., greenhouse emissions) and health (e.g., casualties). Simultaneously, these consequences are very expensive for business (e.g., time lost due to congestion) and society (Brög et al., 2004). Growing concerns over these increasingly intolerable externalities have generated particular interest in how transport-planning policies might moderate the pressures resulting from growth in personal mobility and support the principles of sustainable development (Janssens et al., 2009; Cools et al., 2012). The problems concerning car use might be reduced in different ways. First, the negative impact of car use may be reduced via technological innovations that, e.g., increase the energy efficiency of cars or reduce the emissions per car kilometer. However, this type of policy tends to be overtaken by the continuing growth of motorized traffic worldwide. A second type of policy that has previously been very popular is the creation of new road infrastructure. This reduces

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congestion problems; however, environmental and health problems are likely to be exacerbated (Steg, 2003). A third type of policy is encouraging people to drive at other times or to other places. The fourth type of policy aims at reducing the level of car use by encouraging people to use other modes of transport, to combine trips, or to travel less. The fifth type of intervention aims at making people drive safer or in a more environmentally friendly manner (Steg, 2003).

This paper attempts to identify factors that influence an individual's mode choice by anticipating people's motivation to use other modes of transport and therefore can be framed in the fourth type of policy as described above. In this view, public transport (especially electric trains, trams and buses) appears to be a promising means of providing passenger transportation because it performs perhaps five or ten times better than cars in terms of energy per passenger-km (MacKay, 2009). Regardless, the car is more attractive than public transport because of its convenience, independence, flexibility, comfort, speed, and reliability and because driving is perceived to be more pleasurable (Steg, 2003). Another reason that it is so difficult to persuade people to use other travel modes instead of the car is the habitual character of the modal choices. Habits are formed when a behavior is repeated frequently in a stable context and leads to rewarding outcomes (Thøgersen, 2009). Nonetheless, there exists the potential to persuade people to switch to public transport when a set of circumstances are met. These circumstances include travel cost savings, frequency of service, time savings, accessibility to jobs, a variety of payment types, and the opportunity to do other things while traveling (Majumdar and Lentz, 2012). Other studies have indicated that travel choice is governed by a number of factors, most notably travel time and the availability of a car and of discounted long-term tickets and fares (Borndörfer et al., 2012). When one of these factors can be so powerful that it disrupts the context wherein habitual behavior is performed, progress can be made in influencing the modal split. In this context, the savings on travel cost, or travel fares, represents a factor in the modal choice worth investigating. Various studies (Kingham et al., 2001; Steg, 2003) have shown that the transportation price is one of the few evaluation factors where public transport can beat car transport. Fares are a direct and flexible instrument for influencing passenger behavior (Borndörfer et al., 2012). Therefore, to motivate people to use public transport, fares would need be lowered to a level whereby the traveler is enticed to choose public transport. This can be achieved by offering public transport at a reduced price or as free public transport. Nevertheless, free public transport to the user implies that a third party pays for the cost of provisioning (van der Vliet, 2010).

This paper examines the effect of transport at a reduced price and at a zero price. To investigate this effect, a respondent's actual (revealed) mode choice is compared (i) with the mode choice knowing the genuine prices of transport, (ii) with the mode choice of the respondent when faced with reduced transport prices and (iii) with the mode choice of the respondent when the transport prices are further reduced such that public transport becomes free to the transport user.

2. Literature review

2.1. Zero-price effect

In this section, an explanation of the zero-price effect and some factors influencing the zero-price effect are provided. The word "free" has several meanings but essentially denotes that a product or service is made available at a zero price (Anderson, 2009). A free product used to be nothing more than an attention-grabbing marketing trick; however, under certain conditions, businesses can now obtain greater profits by giving products away than by charging for them. Smith (2008) indicated that when there is a voluntary exchange between two parties, both parties will benefit. Free is becoming a strategy that is essential for any company to survive. The success of a free product lies in the zero-price effect. The zero-price effect is an overreaction to a free product when people are faced with a choice between two products, of which one is free. This overreaction is to such an extent that the zero price means not only a low cost of buying the product but also an increased valuation of the product (Shampanier et al., 2007). People see zero as more than simply another price. The power of "free" also suggests that once a free item is priced above zero, the demand for that item could decrease significantly, namely by more than what conventional economics would predict (Leong and Lew, 2011). An explanation of this zero-price effect can be found in the mental transaction costs (Szabo, 1999). The mental transaction cost is a process that appears with every purchase of a priced product. The customer will ask himself whether this product is worth its price. In case of a free product, the lacking of this mental transaction cost makes it easier to convince people. The disadvantage of lacking a mental transaction cost is that there is no commitment and that people attach more value to products that they paid for (Szabo, 1999).

In prospect theory (Kahneman and Tversky, 1979), an explanation for the individual consumer choice behavior is examined. Prospect theory assumes that the choice process consists of two stages. In the preparation stage, the individual sets a reference point for a certain choice. In the evaluation stage, the outcome is compared to the reference point. The zero-price effect makes the reference point for relative thinking disappear (Nicolau, 2012). This disappearance creates a positive feeling within the consumer, who is used to making the decision concerning the purchase of a product. It has been suggested that this positive feeling is derived from the fact that the purchase implies only benefits, not costs. When this feeling is eliminated, the zero-price effect disappears.

The zero-price effect was examined for several products, including chocolates (Shampanier et al., 2007; Baumbach, 2011), telecommunication (Driouchi et al., 2011) and stereo systems (Baumbach, 2011). These studies generally confirm the zero-price effect. Especially in regard to simple decisions, the zero-price effect is found to be significant. In more complex decisions concerning more expensive products, a unilateral conclusion about the significance of the zero-price effect could not be found. Of all the possible explanations for the zero-price effect, the psychological mechanism affect was found to be the only