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Support and opposition to a Pigovian tax: Road pricing with reference-dependent preferences☆

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ABSTRACT

Loss aversion can affect support and opposition to Pigovian taxes to reduce externalities. This paper studies road pricing with reference-dependent preferences, modeled by a linear gain-loss utility function. Given this specification, we find that the socially optimal road toll is smaller than the optimal toll in the absence of reference dependence, and it declines in the degree of loss aversion. Loss aversion can also explain the empirical observation that support for road pricing is lower before than after its introduction. We further show that loss aversion may increase or reduce lobbying efforts by driver organizations against the introduction of tolling. It will increase lobbying if a high toll is proposed but drivers initially believe that the probability that it will be introduced is small. Lastly, loss aversion unambiguously reduces lobbying by organizations of non-drivers (representing, for example, environmentalists or public transport users) in favor of the introduction of a toll.

1. Introduction

This paper studies the effects of reference-dependent preferences on support and opposition to a Pigovian tax on an externality. Although the model applies more generally, the particular policy studied is road pricing to reduce congestion. We assume that people have reference-dependent preferences characterized by loss aversion, implying that they give more weight to losses than to gains of equal size (Kahneman and Tversky, 1979; Tversky and Kahneman, 1991). We capture this idea by specifying a linear gain-loss utility function and explore the implications of loss aversion for the political economy of road pricing policies.

Several studies emphasize the importance of reference-dependent preferences and loss aversion for pricing and taxation policies. For example, Alm et al. (1992) and Dhami and al-Nowaihi (2007) argue that such preferences may explain why people pay taxes and why we do not observe more tax evasion. Herweg and Mierendorff (2013) show the relevance of loss aversion for the optimal design of two-part tariffs. In an empirical study, Engström et al. (2015) find that loss aversion affects tax compliance, suggesting that compliance will increase and auditing costs will be reduced, if preliminary taxes are calibrated so that most taxpayers receive refunds. Alesina and Passarelli (2015) explore the implications of loss aversion in politics. However, despite these observations, a survey of the applicability of prospect theory notes that public economics is one of a few areas where more research on loss aversion may be highly relevant (Barberis, 2013).

The effect of loss aversion on congestion pricing is interesting for several reasons.[1] First, despite widespread support from economists, congestion pricing is rare. The cities of London, Stockholm and Milan are well known examples of successful introduction of some form of pricing, but the list of cities and countries where proposals to implement such pricing were voted down is much longer.[2] Interestingly, however, in the few cases where some form of road pricing was introduced, people have reacted more

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[1] We consider road pricing on an existing road, not a toll to raise revenue to construct a new road. The former may hurt drivers, the second may benefit all drivers.

[2] In Edinburgh, Birmingham and Manchester, road tolls were opposed by an overwhelming majority in local referenda. Although Mayor Bloomberg of New York strongly favored tolling, in 2008 the New York State Assembly ultimately decided not to vote on a proposal to introduce road tolls. In Belgium and the Netherlands, road pricing has been on the agenda for decades, but implementation has been repeatedly postponed. In the UK, an online petition against road pricing in

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favorably after its introduction than before. The difference is especially well documented for the Swedish city of Stockholm (see, for example, Eliasson et al., 2009; Winslott-Hiselius et al., 2009). Just before the introduction of a trial congestion toll in Stockholm in 2005, only 36% of poll respondents supported the toll. After the trial started, support increased to 52%.[3] The trial ended in July 2006, and was followed by a referendum in September. Excluding blank votes, 53% of Stockholm citizens voted to keep the charges. A poll in December 2007, after the toll was permanently adopted, indicates that 74% supported the toll; this is more than a 20% increase. A similar pattern of attitude changes appeared in London, which introduced congestion tolls in the central city in 2003. Transport for London reports at regular intervals the public attitude on the London congestion toll. Before the start of London's congestion pricing system in late 2002, 40% rejected congestion charging, while 40% supported it. After introduction of the charging system in 2003 only 25%–30% rejected congestion pricing, whereas 50–60% were in favor. More recently, these same Transport for London surveys showed that more than 70% of Londoners said the system was effective and twice as many supported the charge as opposed it (Naparstek, 2007).[4] Lastly, a study of attitudes to congestion pricing in Göteborg before and after congestion charges were introduced in January 2013 also finds that attitudes towards the charges became more favorable after they were introduced, and that the effect occurs because of a status quo bias (Börjesson et al., 2016).

Many arguments have been put forward to explain the lack of popular and political support for welfare-improving road pricing, and for the change in attitudes towards pricing after its introduction. Potential explanations include uncertainty about the costs of switching modes, political uncertainty about the use of the toll revenues, attitude structures and framing, unexpectedly large benefits of road pricing, and cognitive dissonance (see, among many others, Schade and Baum, 2007; De Borger and Proost, 2012; Börjesson et al., 2016). Reference dependence and loss aversion were mentioned as possible explanations by several authors, including Hess et al. (2008) and Börjesson et al. (2016). Surprisingly, however, with one exception (Lindsey, 2011, see below) the theoretical literature neglects the effects of loss aversion on attitudes towards road pricing.

A second reason why economists are interested in the effect of loss aversion on congestion pricing is that the announcement of the potential introduction of road pricing has generated intense lobbying in several countries. The interests of road users are often defended by well-organized driver organizations such as the American Automobile Association in the US, and similar organizations in most European countries. Moreover, some countries also have influential 'anti-car' lobbies; for example, environmentalists, public transport users, and bikers have organizations that defend their interests. The result was that, although most lobbying opposed road pricing, some groups favored its introduction.[5] The incentives to lobby, and the effect of loss aversion on lobbying efforts by such organizations, have not been examined in the literature.

Lastly, although strong empirical evidence on the effect of loss aversion on road pricing is lacking (not surprisingly, given that congestion pricing is rare), substantial evidence indicates that loss aversion affects both individuals' and firms' transport decisions, including their responses to changes in monetary costs and in travel times. For example, Hess et al. (2008) find clear evidence of an asymmetrical response to gains and losses relative to the reference, where the degree of asymmetry varies across attributes and population segments. De Borger and Fosgerau (2008) and Hjörth and Fosgerau (2011) explicitly study loss aversion with respect to travel time and money, finding significant loss aversion in both dimensions. Hjörth and Fosgerau (2011) further find that loss aversion depends on how well the reference is established; moreover, it depends, among others, on age and education. Masiero and Hensher (2010) analyze a freight transport experiment and find asymmetries in responses and declining sensitivity over time.

Loss aversion raises several questions about the political economy of pricing. How does reference dependence and loss aversion affect socially optimal tolls? How does loss aversion affect votes by potential road users, where voting is either for or against an arbitrary (possibly not socially optimal) toll? How does the reference point affect consumers' attitudes towards road pricing? Does loss aversion contribute to the widespread lobbying against road pricing that is observed in some countries? The model developed in this paper sheds light on these and related questions.

The analysis in this paper relates to several strands of literature. By studying how loss aversion affects the attitudes of users and non-users towards Pigovian taxes, it adds to the literature, referred to before, on the effect of loss aversion for tax policies. More specifically, our analysis complements Lindsey (2011).[6] Our focus differs from Lindsey (2011) in several respects: (i) We do not look at state-contingent prices. Instead, we look at the implications of reference-dependence when the reference is defined in terms of a particular pricing regime; (ii) We look not only at the effect of loss aversion on socially optimal tolls, but also study the political economy of road pricing; (iii) We study the effect of loss aversion on lobbying by special interest groups such as driver organizations.

Our paper further relates to the literature on the political economy of transport pricing (see, e.g., Borck and Wrede, 2005; Brueckner and Selod, 2006; De Borger and Proost, 2012). This literature neglects the possible effect of reference-dependent preferences on behavior and consumer attitudes. Note that, although we do not formally consider distributional issues, loss aversion may also be highly relevant to study the distributional effects of pricing policies (see, e.g., Mayeres and Proost, 2001; West, 2004; van den Berg and Verhoef, 2011).

In a broader perspective, our paper also relates to the literature on lobbying and on rent seeking. A theoretical analysis of rent seeking under loss aversion is provided in Cornes and Hartley (2012), who find that loss aversion reduces aggregate lobbying. However, our examination of lobbying under loss aversion differs in two main ways: (i) They consider an exogenously fixed rent that will be assigned to one of the players. They therefore have everyone expect a gain from the availability of the rent. In contrast, a road toll can directly hurt some individuals; (ii) We de-

2006-2007 attracted more than 1.8 million signatures (http://news.bbc.co.uk/2/hi/uk_news/6381279.stm).

[3] The media image also changed. The percentage of related newspaper articles with a positive angle increased from 3 % in the autumn of 2005 to 42% in the spring of 2006; the share of negative newspaper articles was almost halved from 39 % to 22%.

[4] A comparison of attitudes in Stockholm, Helsinki and Lyon concluded that the higher support in Stockholm appeared because it had experienced congestion pricing, while the others had not (see Hamilton, 2012).

[5] Urban areas saw lobbying by retailer organizations as well as residents (see the evidence provided in De Borger and Russo, 2015). Road pricing on highways generated intense lobbying by driver organizations (see the German experience). In Belgium, the day after the media discussed the possibility that road pricing may be introduced, both driver organizations and individual drivers responded fiercely. Representatives of the main driver organizations went on national radio and television to argue that road pricing would be extremely unfair and unacceptable, and that it should not be introduced. Individual action consisted, for example, in protests on a website set up for opponents to register, attracting an enormous number of participants in just one day. A counter-campaign by supporters of tolling attracted much fewer participants.

[6] Lindsey (2011) models state-dependent road pricing with reference-dependent preferences and shows that uncertainty with respect to the toll to be paid may explain the absence of state-dependent tolls observed in reality. Demand or supply shocks affect the capacity and the service quality of the road system, and the model studies optimal road pricing contingent on different possible states.