A meta-analysis of price elasticities of transport demand in a general equilibrium framework

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Abstract

Price elasticities of transport demand are an important tool to assess the impacts of pricing policies. Empirical research on these elasticities leads to a rather wide range of outcomes. There is obviously a need for a more rigorous methodological framework. This paper provides a new integrative approach to the estimation of price elasticities whilst taking into account any combination of characteristics of transport demand found in various empirical studies. To this end, we apply meta-analysis to this set of studies. From the various modelling approaches that underlie these studies we develop an overlapping general equilibrium framework that provides a meta-regression equation relating the price elasticity estimate to the study characteristics. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

The last decades have witnessed an explosive growth in the demand for transport all over the world following an increase in economic activities in the EU, the USA,

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and Asian countries like Japan and Korea. Statistics show a structural rise in mobility of travellers, while the liberalisation of trade worldwide (WTO) and in the EU has caused a drastic increase in transboundary freight transport [see for figures, Reggiani et al. (2001)]. There is apparently no natural limit to the rise in physical movements of people and commodities. Both local and global transport is on a rising edge. This explosive growth in transport has clearly an important environmental impact in the form of heavily increased pollution, more accidents, noise, and congestion, causing national as well as international governmental bodies to worry about the sustainability of their transport systems [see for an overview, Nijkamp and Pepping (1998)].

In many cases transport is not an aim in itself, but it derives its value from production of other consumption aims. Therefore, it is plausible to assume that an increase in economic activities causes an increase in transport demand. The cost of transport modes tends not to reflect the true costs they inflict on society, because environmental costs are not accounted for. These costs are not equal for all transport modes and, hence, the distribution of demand for transport over various modes is not efficient from a societal viewpoint. Governments are, therefore, trying to include the environmental costs of each transport mode into its price hoping to obtain a more efficient distribution of transport demand over the various transport modes. This redistribution of transport demand may then lead to a substantial decrease in the environmental impact of the country's transport system.

'Fair pricing' has become even a policy objective with a view to better incorporation of externalities in transport policy. Nijkamp and Pepping (1998) mention the price elasticity of transport demand as the most important parameter to understand how pricing policies will affect transport demand. This price elasticity is defined as the relative change in demand for a given mode induced by a relative change in price.

It is no surprise that in the last few years several studies in European countries have assessed price elasticities of demand in the transport sector, which has led to a great diversity of empirical results. Nijkamp and Pepping (1998) state that most of these investigations have been made on a non-controlled basis, resulting in a rather feeble comparability of the results from these studies. The well-known survey of Oum et al. (1992) argues that even across-the-board generalisations about transport demand are impossible. Competition between modes, routes or firms, and site-specific conditions give rise to a wide range of price elasticities. Factors such as time horizon, degree of aggregation, functional specification and the like, used in these studies turn out to have a significant bearing on elasticity estimates.

Despite the variety in background of these elasticity estimates, Nijkamp and Pepping (1998) consider it sensible to analyse the differences in statistical results in order to identify commonalties and site-specific differences more precisely, as it would allow for more transferability of results under varying quasi-experimental conditions. In their view, meta-analysis may play an important role in this framework. The authors carry out a comparative analysis of various elasticity values of