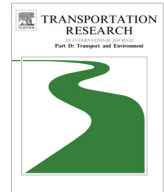




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Contents lists available at ScienceDirect

Transportation Research Part D

journal homepage: www.elsevier.com/locate/trd

Rural environment stakeholders and policy making: Willingness to pay to reduce road transportation pollution impact in the Western Pyrenees



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ARTICLE INFO

Keywords:

Air pollution
Environmental impact
Externalities
Noise
Road transportation
Willingness to pay
ZIOP model
Public policy

ABSTRACT

In spite of the strategic national and regional development importance of transportation infrastructures, road transportation is one of the major sources of externalities worldwide. Using data collected from 900 residents living in 14 rural towns near the roads crossing the Spanish Pyrenees, we model citizens' willingness-to-pay (WTP) to reduce noise and air pollution. We collect the data adopting a contingent valuation method (CVM) design and we analyze the data employing a Zero-Inflated Ordered Probit (ZIOP) model, which allows us to account for an excessive number of zero observations. Our results are in contrast with previous studies' results with regard to environmental attitudes and socio-economic profiles of residents. Our findings indicate that the stakeholders living near major roads have higher incentives to offset environmental costs. Also, younger, better educated, and more environmentally-aware citizens are willing to pay more to reduce externalities, as they are influenced by their values and environmentally friendly sub-culture, possibly fostered during the past 30 years of green movement worldwide campaigning.

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Introduction

Transportation is a strategic sector of Western economies and a major contributor to social and economic progress throughout the world. The prevalence of the transportation industry is due to its recent growth and obvious importance in modern societies. In particular, road transportation has significantly increased, sometimes showing an exponential growth pattern in the use of motorized vehicles (European Economic and Social Committee, 2010). However, transportation also bears the side effects of noise pollution, air pollution, and traffic congestion. Unfortunately, current city planning strategies hardly take these effects into account. Given that the transport sector accounted for more than a quarter of world energy consumption in 2004 (International Energy Agency, 2010) – and producing energy increases air pollution – we must consider these externalities to ensure the sustainable growth of transportation in the world (Sinha and Labi, 2007). A complete description of the problem of externalities in transportation would involve the introduction of the following sources of

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external costs: noise, air pollution, visual intrusion, traffic accidents, infrastructure wearing, flow congestion, and so on. Nevertheless, we are going to focus our attention on the noise and air pollution caused by transportation, due to the fact that the two first externalities are well-known and having an important impact of the environmental impacts of transportation.

Various studies have tried to quantify the economic impact of these externalities in Europe. Nevertheless, this quantification problem is under discussion in many scientific fora, due to the fact that there is a great discrepancy in the externalities' overall cost estimation (Piecnyk et al., 2012). Actually, according to INFRAS/IWW (2004), external costs from transportation in 2000 almost reached 8.5% and 9.5% of Gross Domestic Product (GDP) in the European Union and Spain, respectively. In spite of its economic importance to national economies, road transportation generates major environmental problems (INFRAS/IWW, 2004): it is the largest source of freight-related CO₂ emissions and it is responsible for nearly 91% of the external costs of transportation in Europe. Most concerns amongst policy makers relate to road transportation as the primary source of freight in developed countries (Intergovernmental Panel on Climate Change, 2007).

Presently, there is general agreement on the need to take these negative externalities into account when formulating infrastructure policies and logistics strategies. The European Union, for example, has developed an infrastructure-use taxation system (Directives 1999/62/EC and 2006/38/EC, 'Eurovignette') based on the 'user and polluter pays' principle (European Commission, 1998, 1999, 2006). In exceptional cases involving infrastructure in mountainous regions, the directives suggested the increase of toll charges. For instance, one directive emphasizes that 'particular attention should be devoted to mountainous regions such as the Alps or the Pyrenees' (European Commission, 2006), with the consequent allocation of EU taxpayers' money to its related projects. The economic valuation of the impacts of transport-related externalities is absolutely essential to the success of normative proposals.

Previous research has indicated that there are two main types of traffic-related environmental pollution: air pollution (Sinha and Labi, 2007) and noise (Navrud, 2002). Consequently, this paper aims to investigate what personal factors influence citizens' willingness to pay (WTP) to reduce noise and air pollution deriving from transportation in affected neighborhoods. In the current case, the units of analysis are residents in areas bordering the Pyrenees, within the Navarre region (Spain). We selected the five most important roads crossing the Pyrenees in Navarre as well as the 14 localities where roads pass through. We then surveyed 900 adult residents of the selected localities. Other previous results in the same study area were already given by Lera-Lopez et al. (2012, 2013).

We examine both noise and air pollution valuations within the same sample of residents and we apply a ZIOP (Zero-Inflated Ordered Probit) model to capture real differences. Only a few empirical studies have analyzed both externalities together (Kondo et al., 2003; Rehdanz and Maddison, 2008; Saelensminde, 1999; Wardman and Bristow, 2004). Another novel contribution of this paper is its assessment of the relationship between current levels of noise and air pollution in the study area and its economic evaluation as given by residents in the area. Due to its difficulty (Andersson et al., 2010; Barreiro et al., 2005; Lambert et al., 2001), the combined use of economic and technical tools in environmental impact evaluation studies is not common. Nevertheless, our work is in contrast with the results found in other studies, especially with regard to environmental attitudes and socio-economic profiles of residents.

A final notable aspect of our work is its geographic scope, which is predominantly rural. Our work focuses on small and medium-size localities in the Spanish Western Pyrenees where pollution seems to produce less concern than in big cities. Extant research has been focusing so far mainly on large and medium-sized cities (e.g. Barreiro et al., 2005; Martín et al., 2006; Wang et al., 2006; Yoo and Chae, 2001).

This article is organized into five main sections. Following this introduction (Section 'Introduction'), Section 'Rural context of the study: geographical scope' defines and justifies the context of the study. Section 'Willingness to pay determinants' analyzes current literature on determinants of WTP for noise and air pollution reduction. Section 'Methodology and data' focuses on the paper methodology. Section 'Environmental physical measurements' presents the main results of the paper. Lastly, the conclusion summarizes the main ideas while suggesting policy implications and potential avenues for future research.

Rural context of the study: geographical scope

The study area was chosen because the Pyrenees form a natural boundary between Spain and the rest of Europe. More than 150,000 vehicles, almost 30% of which are freight trucks, cross daily the Pyrenees (Observatorio Hispano-Francés del tráfico en los Pirineos, 2008). In fact, the Pyrenees is a region with very dense road transportation, with the busiest routes located close to the mountains in Catalonia (La Junquera), the Basque Country and Navarre (Irún-Behovia). These routes cut through areas of great ecological value. Currently, these crossroads are greatly impacted by pollution as a result of intense road traffic. Nevertheless, we recognize that national economies do benefit from intense transportation and international commerce. Of all these infrastructures, our study focuses on the main international routes crossing the Pyrenees in the Navarre region. Thus, five main routes are considered, all beginning in Pamplona (the capital of Navarre) and ending in France. These routes, which pass through various towns and villages, include highways with heavy traffic to quieter national routes.

Following the selection of roads, we selected the towns for the survey on noise and air pollution. We chose the towns according to the following criteria: (a) their importance according to the selected roads which transect or pass in close proximity (b) number of residents, making a distinction between rural and semi-urban areas and (c) other factors, such as village organization and land uses. We finally chose 14 towns distributed almost equally between the five routes (Fig. 1).

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