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MEASURING THE IMPACT OF EXISTING ENVIRONMENTAL REGULATIONS AND FISCAL LEGISLATIONS ON THE EUROPEAN ROAD TRANSPORT DEMAND: A DYNAMIC PANEL DATA ECONOMETRIC ANALYSIS

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Overview

In Europe, traffic and particularly road traffic is one of the main greenhouse gas emission sources. The transport sector is one of the most important sectors for the development of energy consumption (the transport sector is the largest consumer of oil products in the EU energy system) and environmental emissions[1] (source: energy baseline to 2030). In 2010, passenger car represented the dominant transport mean in road transport 84.1% of inland passenger transport in the EU-27 (Eurostat). In Europe, road passenger transport attained 4822,13 Gpkm. The cars serving road transportation are mainly using gasoline and diesel oil (LPG, CNG, electricity have small shares of total energy for road transportation). The road transport is arguably a factor of economic growth. Yet, in a scarce energy resources context, this development may appear problematic leading to an increased interest for policy makers. Policy makers may promote low-carbon vehicles by demand-side measures such as fiscal ones. In Europe, despite a Commission proposal, these measures are not harmonised across Member States. Vehicle and fuel tax regimes as well as the aim pursued by these legislations differ greatly among countries. This wide variety of national fiscal legislations is often cited as a possible explanation of European car fleet composition, which differs among countries.

Hence, modelling road transport demand has become more and more a central issue for public policy that this article aims at pursuing.

Method

This article proposes to analyse and quantify the impact of existing environmental regulations and fiscal legislations (car, fuel tax, subsidy, levy, scrappage scheme) on the size/composition of the vehicle stock in various European countries (EU-15).

Time-series of EU-15 national vehicle registration data and/or size/composition statistics and vehicle stock evolution over time (from 1990 to 2012) are used to estimate the relationship between automobile ownership behaviour and a variety of socioeconomic and policy variables.

Road transport demands are estimated using econometric methods. Road traffic drivers are mainly prices, taxes, income, socio-economic effects, and vehicle characteristics. But the influence of these drivers also depends on road transport market maturity. To take into account the latter criteria, the modeling is realized for the 15 European countries composing our dataset, by using dynamic panel-data models.

Results

We provide an econometric analysis of the demand for mobility in the road transport sector in European countries. The influence of road transport determinants previously presented is estimated using the Arellano-Bond estimator (1991). Three different models are presented depending the variable we choose to use in order to proxy the road transport demand: i) the stock of cars, ii) the mobility (pkm) and iii) the new registrations.

Regarding the socio-economic variables, the most important drivers of road transport demand appear to be the GDP per capita (positive effect) and the evolution of the population (size and composition between urban and non-urban areas). The price of fuel always have a negative influence on the road transport demand disregarding whether the latter is modeled thanks to i) the stock of cars, ii) the mobility (pkm) or iii) the new registrations variable. Scrappage policies also appear to have an impact (positive) on road transport demand but only on the new registrations. The other policies (such as CO_2-based car tax and feebate systems) do not appear to have any

[1] A potential for reducing GHG by 60% in the transport industry for 2050 has been identified by the European Commission (European Commission 2011).

influence. Last but not least, the dynamic panel-data modeling lead us to conclude that the magnitude of the influence of these road transport demand drivers differs from country to country.

Conclusion

Our analysis investigates the relationship between national passenger car demand and various variables such as prices, taxes, income, socio-economic effects, and vehicle characteristics. Using dynamic panel data modeling, this econometric analysis allows to estimate the impact of regulatory and fiscal systems on vehicle choices of individuals and firms and to determine how fiscal policies influence size and composition of the vehicle fleet in European countries.

This article addresses the question of the effectiveness of the influence of fiscal legislations on the carbon performance of the new and old car fleet. It attempts to determine which variables are the most important drivers of vehicle carbon intensity in the EU. Is it for instance due to car technical characteristics, vehicle prices, fiscal legislations (such as vehicle taxes, fuel prices and taxes) or other country-specific socio-economic variables?

Hence we focus on how sensitive European consumers are to economic instruments when buying cars. These insights are useful for the development of appropriate public policies to encourage the adoption of low-carbon vehicles.

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