EXTENDED ABSTRACT

Title: Gasoline demand of the Spanish households depending on the type of house

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Abstract:

There are hundred of papers estimating gasoline demand and elasticities for different countries and periods of time. Obviously the main traditional interest of most of the studies was analysing the effect of petrol price over the demand in the short and long run as well as the income effect, especially relevant in developing countries. Nevertheless, during the last decade the literature about gasoline demand reborn due to the global warning concern and pollution effects of traffic in large cities. Recent studies are focused in analysing the effect of particular policies to reduce the intensive use of the private vehicles in developed cities. There are also many analyses studying the effect of new technologies such as electric cars. But the number of papers that connect the gasoline demand with the urban form or, more specifically, with the urban sprawl phenomenon, is very reduced.

There are some interesting research pieces about the influence of low prices of gasoline in the dispersion of the cities, but very specific analysis of how the sprawl affect to the demand of gasoline. Our hypothesis is that the families which live in detaches isolated houses located in peripheral suburbs have a total dependency of the private vehicle for their day a day mobility presenting higher elasticities in gasoline demand in opposition to the families who live in compacted urban areas with more alternatives for their daily mobility. That would means that the growing trend of urban sprawl observable in countries like Spain has a significant effect over the petrol dependency with macroeconomic consequences.

The data used in this analysis are obtained from the Household Budget Survey (HBS) of the National Statistical Institute (INE), a survey that provides information about the patterns of consumption, income and other socioeconomic and demographic characteristics of Spanish households. The dataset is formed from 21,790 observations that are disaggregated across the 17 regions at the NUTS-II level. This survey is obtained yearly since 2006. In this work, the most recently available information from 2010 to 2017 is used.

With this information we are going to estimate a typical model of gasoline demand with pooled data. To test the possible heterogeneity across the distribution we also estimate a quantile regression model.

This work is in a preliminary phase subject to improvements in the formulation of the model, the variables included and the estimate itself. For the moment, the model proposed in Figure 1 has been estimated using the HBS data from 2010 to 2017.

Figure 1. Estimation model proposed and variables considered

$$LogG = \beta_0 + \beta_{LogP} LogP + \beta_{INCOME} INCOME + \beta_{HOUSE} HOUSE + \sum \beta_x X + \sum_{R=1}^{15} \beta_R REGION + \sum_{10-17} \beta_{year} YEAR + \varepsilon$$

LogG	Sum of household demand of gasoline and gasoil for mobility use in logarithms
LogP	Prize (unitary cost) of gasoline and gasoil for mobility use in logarithms
INCOME	Family income in a discrete variable (four levels): implemented by three dummies
HOUSE	Dummy that takes value 1 if the family lives in a apartment (compact model) and 0 if they live in an detached house (sprawled model)
URBAN	Dummy that takes value 1 if the family live in a urban area and 0 if the family lives in a rural environment
FSIZE	Number of members of the family living in the household
REGION	Dummies (14) to identify the autonomous community in which the family is located (Madrid is taken as reference)
YEAR	Trend variables, one per year from 2010 to 2017

The main results are shown in Figure 2. The expected behaviour is obtained for all the variables. Regarding the type of house variable, with which we reflect whether you reside in a regular independent single-family dwelling in the dispersed city or a typical apartment of a compact city, it is clearly significant showing how the families that live in typical neighbourhood houses disperses consume up to 12% more gasoline after controlling for all observable variables. We have made estimates by dividing the sample according to the type of house, verifying that families living in dispersed areas have a more inelastic demand for gas.

The results are consistent throughout the quartiles although it is observed that impact on consumption is stronger in the upper reaches of the distribution. Everything seems to result in the importance of the type of housing and type of city in the understanding of the demand for gas, encouraging the improvement of the model proposed in this work.

Figure 2. Main preliminary results: pooled data estimation (2010-2017)

$$LogG = \beta_0 + \beta_{LogP} LogP + \beta_{INCOME} INCOME + \beta_{HOUSE} HOUSE + \sum \beta_x X + \sum_{R=1}^{15} \beta_R REGION + \sum_{10-17} \beta_{year} YEAR + \varepsilon$$

	Coef.	Std. Err.	t	[95% Conf.	Interval]
LogP	-2.3156***	0.0217	-106.57	-235.8240	-227.3060
INCOME1	-0.7358***	0.0180	-40.71	-0.7712	-0.7004
INCOME2	-0.5288***	0.0092	-57.18	-0.5469	-0.5107
INCOME3	-0.1983***	0.0083	-23.64	-0.2147	-0.1810
URBAN	-0.0951***	0.0090	-10.51	-0.1129	-0.0774
FSIZE	0.0934***	0.0025	36.79	0.0884	0.0984
HOUSE	-0.1240***	0.0074	-16.7	-0.1386	-0.1094
REGION	*Significant*				
YEAR	*Significant*				
Const	8.0032***	0.0125	-27.46	-0.3703	-0.3210

Keywords: Gasoline demand, urban sprawl, household consumption patterns and Spain.