Gasoline demand and Price Elasticities: 
A Panel Data Analysis on French Regions

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Abstract

Understanding the determinants of gasoline demand has been of interest to economists for almost three decades, mainly since the first oil crisis in 1973. There have been a growing number of study efforts that aim to model the demand for gasoline, see Dahl (1986), Dahl and Sterner (1991). Gasoline demand studies have always paid particular attention to the impact of change in prices. For environmental and political reasons, policy makers are highly interested in the impact of gasoline taxation and of price changes on demand. Although there is a wide agreement on the mean level of elasticities, see Goodwin (1992), Dargay, Goodwin and Hanly (2004), much is still to learn on how this mean varies across individuals (e.g. according to their location) and over time (e.g. during 1973 and 2000 sudden shocks, or over more continuous periods of increase in the late 70’s or since 2005). More recently, Espey (1997, 1998), Brons, Nijkamp, Pels and Rietveld (2008) use a meta-analysis to analyze price or income elasticities and try to explain the variation by interstudy differences. These differences are often due to the characteristics of data. In this context, the benefits of panel data sets seem high but conditional to several hypotheses.

In panel econometrics, conventional approaches (e.g. fixed or random effect models) rely on the hypotheses that elasticities are the same for all individuals (here regions) and over the whole period covered by the panel. These hypotheses, which can be tested, are seldom valid. Recently, the fundamental assumption underlying pooled models homogeneous parameters has been called into question and alternative heterogeneous estimators (pooled mean group, iterative bayes,…) proposed, see, for example, Robertson and Symons (1992), Pesaran and Smith (1995), Pesaran, Smith and Im (1996). Clearly, in panel data sets with T up to 10, traditional homogeneous panel estimators (OLS, within, between, 2SLS, GMM,…) would appear the only viable alternative. But as T reached 25 or 50 years of post-war annual data, the choice no longer seems clear-cut. Moreover, the panel data level exhibit cross-sectional correlation that has to be dealt with. So, spatial panel data models are becoming increasingly attractive in empirical economic research. These models deal with spatial interaction (spatial autocorrelation) and spatial structure (spatial heterogeneity) primarily in cross-section data, see Anselin (1988) and Anselin, Le Gallo and Jayet (2008). Using a panel of French regions over the period 1975-2001 (27 years), we propose to reconsider the homogeneous parameters hypothesis and also introduce the spatial dimension in the analysis of gasoline consumption.

Keywords: Gasoline demand, price elasticities, panel data, homogeneous estimators, heterogeneous estimators, spatial dependence.
References


