

Franck Nadaud

ON THE ORIGINS OF INERTIA IN GASOLINE DEMAND: AN ILLUSTRATION ON THE DATA FOR FRANCE

CIREA, 45 bis avenue de la Belle Gabrielle, 94736 Nogent-sur-Marne Cedex
Phone: 33-1-43-94-73-94, Fax: 33-1-43-94-73-70, e-mail: nadaud@centre-cired.fr

Overview

The extensive literature on gasoline demand since the first Oil Shock is still open to debate especially under the threat of climate change. Many hundred of papers have been written on the subject, and if no definitive answer emerge there are strong evidence for a low price elasticity and a roughly unit income elasticity. We first sum up these evidences from recent surveys and meta analyses (Goodwin & al., 2004; Graham and Glaister, 2002; Espey, 1998). This allows pinpointing some interesting questions seldom treated in aggregate studies. It is hardly doubted that on such a long period of more than three decades gasoline consumption has showed considerable inertia. This means for example that income elasticity should have decreased under the growth of the vehicle park. On another side, price elasticity may also change both in the short and long run because of higher dependence on automobile transports, in response to urban sprawl. Both of those effects have been mitigated by technical progress incorporated in cars and in the case of France by a very strong tax differential between regular (super) gasoline and diesel which led french households quite rationally to buy diesel cars, thus leading to one of the highest levels of diesel equipment in Europe.

This paper proposes to explore the question of the long run inertia in gasoline demand on French aggregate data. We propose a model based on annual data running from 1960 to 2005. In a first stage, a traditional autoregressive distributed lags dynamic model is estimated as a benchmark for the short and long run price and income elasticities. The second stage is based on a more elaborate model which takes inertia into account by allowing for variable income elasticity depending on vehicle stock and other variables. A second aspect of inertia is the effect of the urban sprawl on the service demand (kilometers). The comparison of our results to the benchmark model show that inertia alters the values of the long run elasticities, both for prices and income. We discuss some policy implications in French context.

Methods

The estimations are conducted using a database developed at CIREA by the compilation, cross-validation and harmonization of several different sources. The data are of annual frequency and are documented from 1960 to 2005. We use cointegration estimators to derive our results because the data series are non stationary in levels.

The general methodology is based on the decomposition of per capita gasoline consumption in three multiplicative terms: per capita car park, kilometers per car and consumption per kilometers. We propose to model each of these terms separately and to derive long term gasoline consumption elasticities that take into account gradual change in their respective contributions. This allows non constant elasticities which can be compared to more traditional techniques (ie: the Cobb-Douglas dynamic specification).

Results

Not surprisingly, the results on the variable elasticity model are different from the reference model. However they do not differ from the values seen in surveys of this literature. The change in income elasticity is very clear but less so for other variables, especially prices.

Note that in this preliminary work, technical progress is modeled in a rather crude way. Our results show strong inertia in gasoline demand.

Conclusions:

As income inertia seems strong, we propose a policy that has more detractors than advocates in France. Because the price effect is small but also the income effect, it may be interesting to bring back the annual car ownership tax or "vignette" with a very green emphasis, to tax polluting vehicles at their sale and to increase far more fuel prices or at least impose a carbon tax on energies and thus on gasoline. We also urge for strong policies to mitigate urban sprawl which seems to be one of the main factors of inertia in gasoline consumption. However, our results are to be moderated by the still rather crude treatment of incorporated technical progress.

References:

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