

Olutomi I Adeyemi, David C Broadstock, Mona Chitnis and Lester C Hunt

**MODELLING OECD AGGREGATE ENERGY DEMAND:
ASYMMETRIC PRICE RESPONSES AND THE UNDERLYING ENERGY
DEMAND TREND: ARE THEY SUBSTITUTES OR COMPLEMENTS?**

Olutomi I Adeyemi, David C Broadstock, Mona Chitnis and Lester C. Hunt
Surrey Energy Economics Centre (SEEC), Department of Economics
University of Surrey, Guildford, Surrey GU2 7XH
Tel: +44(0)1483 686956, Fax: +44(0)1483 689548, e-mail: L.Hunt@surrey.ac.uk

Overview

Various authors have considered the importance of modelling asymmetric effects in energy demand in response to price (and income) changes (e.g. inter alia Dargay (1992), Gately (1993), Dargay and Gately (1995), Gately and Huntington (2002), Ryan and Plourde (2001)). Griffin and Schulman (2005), however questioned the asymmetric approach arguing that this is really only capturing energy saving technical progress. However, Huntington (2006) showed that for whole economy aggregate energy and oil demand there is a role for both asymmetric price responses and exogenous energy saving technical change. This has also been explored by Adeyemi and Hunt (2007) for OECD Industrial energy demand.

In a separate strand of the literature the idea of the Underlying Energy Demand Trend (UEDT) has been developed, establishing the importance of allowing for stochastic (non-linear) trends when estimating models of energy demand (for example, Hunt et al (2003), Hunt and Ninomiya (2003), Dimitropoulos et al (2005)). This work has been based on the structural time series/dynamic regression methodology recommended by Harvey (1989, 1997).

Methods and Preliminary Results

In this paper, we conduct tests for asymmetric effects in energy demand models within both a panel context (consistent with the Huntington (2006) approach) and the structural time series modelling framework (consistent with the Hunt et al (2003) approach). In particular, a 'general to specific' philosophy is employed in order to test whether asymmetric price responses and energy saving technical change (or the more general UEDT) are substitutes for each other when modelling energy demand or whether they are actually picking up different effects and are therefore complements.

Using annual whole economy data for 17 OECD countries over the period 1960 – 2004 preliminary results suggest that in general the two approaches are substitutes for each other but may well vary across different countries (and/or panel of countries). Further analysis will be undertaken to fully clarify the situation.

Conclusion

Although the results are still preliminary, the research so far clearly illustrates the importance, when modelling whole economy aggregate energy demand, of using a general flexible framework allowing for asymmetric price responses and a general way to capture the underlying energy demand trends driven by technical progress and other exogenous factors. Moreover, the preliminary results show that assuming a specific model or imposing, rather than testing, particular assumptions can be misleading and wherever possible the data should be allowed to determine the model - but guided by economic intuition and theory.

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