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Energy Demand Estimation and Forecasting in Qatar

Ahmed Ali Khalifa*

Qatar University
* aliabdelkh@qu.edu.qa

The economic theory provides a rationale for linking the energy demand to a number of variables that might affect it. Starting from that, the empirical analyses specify a number of alternative specifications of the energy demands (water, electricity and fuel). For instance, Zarnikau (2003) suggests three possible forms. First, a linear specification involving the levels of the variables, where the energy demand is a linear function of production factors or of other elements affecting demand. The second form is still a linear specification, but where the log-levels of the variables replace the levels. These two forms are coherent with production (or consumption) functions being additive or multiplicative, respectively, in the underlying factors. The third case focuses on the share equations, most common in a production-based framework, where the share cost of energy, over the total cost of production, depends on the production factors in a linear fashion. We provide an estimation for energy demand and forecasting. We will use the Auto Regressive Distribute Lag (ARDL) specification. The ARDL model might be estimated again by least squares methods. Notably, this specification allows computing short-run elasticities, the parameters, as well as long-run elasticities, which can be obtained by standardizing the coefficients by the autoregressive polynomial, i.e. . A further advantage of the ARDL specifications comes from their coherence with the existence of a long-run equilibrium relation across the modelled variables. In fact, if we assume that the variables of interest are possibly cointegrated (and are thus non-stationary in their levels) and also characterized by short-term dynamic, we might recast the ARDL model into the so-called Error Correction Model representation (ECM) for the series first difference.The estimation approach of such a model might follow the bounds testing approach to cointegration of Pesaran and Shin (1999) and Pesaran et al. (2001). Despite its appealing form, the ECM representation of the ARDL model is appropriate when only a single

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cointegration relation exist across the modelled variables. A more general structure is that associated with Vector Error Correction Model (VECM) where the dynamic of a set of variables is jointly estimated. The estimation and testing for cointegration might follow the approaches proposed by Johansen (1988, 1991, 1992, 1994 and 1995). Moving back to the three approaches listed by Zarnikau (2003), we now briefly discuss the estimation of share equations. This approach focuses on the estimation of the share cost of various inputs with respect to the total cost of production for a specific good. We express energy demand as a function of energy prices, the appropriate price should be a weighted average of the prices of the underlying energy sources (electricity, gas, oil...etc.). The weights might be interpreted as share costs, and therefore the approaches for the estimation of share equations turn out to be relevant in this case, see Fuss (1986). Share equations are nothing more than linear equations for the share of the specific energy source on the total energy demand. However, the crucial aspect to be here considered is the presence of constraints: the shares must be positive and must sum up to one. However, various approaches have been proposed to introduce the appropriate constraints, see for instance the methods by Zellner (1962 and 1963). Further, we can take gasoline price as an indicator for energy price in the demand function. We close this set of methodological approaches by taking into account the use of structural time series methods, see Harvey (1989).Such an approach might be extended with the presence of stochastic cyclical and seasonal components and could represent an alternative approach to classical time series methods.Building on an ARDL specification with a latent trend, Dilaver and Hunt (2011a) provide a scenario analysis for Turkey industrial energy demand and Dilaver and Hunt (2011b) analyze scenarios for residential electricity demand in Turkey. Both studies consider three scenarios, the reference one and two opposite cases representing an increase/decrease in the energy demand due to changes in the production levels, the energy efficiency and the prices. Jiang and Li (2012) provide three different scenarios for the evolution of China energy demand starting from a static long-run relation and using scenarios for the underlying factors. Li et al. (2010) analyze the evolution of energy demand and CO_2 emissions in Shanghai under two alternative scenarios, one associated with energy conservation policies. Tajudeen (2015) performs a forecast and scenario analysis for aggregated energy demand. He consider three scenarios, the reference one and two alternatives with increases/decreases in the factors affecting energy demand. Zachariadis and Taibi (2015) provide a scenario analysis for Cyprus energy demand based on different projections of underlying macroeconomic factors as well as in terms of energy efficiency improvements.The estimation and the results wil lbe presented in the conference