The cost efficiency analysis of Turkish electricity distribution firms

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Summary

For the last two decades we have been faced with several reform experiences in energy markets worldwide. The restructuring of the policies on electricity industry are debated internationally. The electricity deregulations have been in the agenda in OECD countries since the early 1990s.

Electricity reforms are underway in Turkey with the purpose of not only offering better services to consumers at lower prices but also gearing up for the EU membership. The Turkish governments have been trying to implement major serious macroeconomic structural reforms since early 1980s. The energy sector is one of the most important areas in which structural reforms are expected to draw considerable foreign direct investment. With an estimated worth of 10 to 15 billion US dollars the electricity distribution industry has attracted much attention.

The Turkish electricity reforms have been initiated in 1993. After an initial phase of policy studies followed by, in 2004 the Turkish Electricity Distribution Company (TEDAS) has been restructured under twenty new distribution companies. In spite of the delay in the process, the privatization of two utilities out of twenty has been done in 2008.

A credible regulatory model is one of the crucial parts of the market liberalization. Besides, the regulation of natural monopolies is a challenging task. A common approach to regulation in
electricity distribution business is so called incentive regulation and applied in several European countries in order to decrease price and improve supply quality. Regulators have faced the challenge of developing regulatory models that meet the requirements of market regulation. They have been able to introduce incentive schemes dealing with quality and price issues when they have gained more information on distribution companies. This requires often very complicated regulatory models and sophisticated benchmarking methods, such as Stochastic Frontier models.

As in other OECD countries, in Turkey the market liberalization reforms tend to split the distribution companies into separate entities. This process might compromise the firms’ ability to benefit from the economies of scale. An established incentive regulation can achieve intended gains on efficiency, whereas sacrifices on economies of scale must be investigated. A possible solution may lie in allowing large private companies with high-powered incentive regulations. Benchmarking is a commonly used method for incentive regulation schemes. In these methods the regulator measures a company’s productive efficiency against a reference performance, and rewards the firms according to their performance. Since benchmarking has a variety of methods and models, further empirical analysis is needed. Panel data models can be employed for this purpose.

The objective of this thesis is to analyze the efficiency of Turkish electricity distribution utilities for benchmarking purposes. In order to accomplish this, various benchmarking methods are reviewed and different econometric methods are discussed in detail. The empirical analysis is performed to estimate Turkish electricity distribution utilities’ efficiency scores and to calculate economies of scale and economies of density of these utilities. A Cobb-Douglas frontier cost function is estimated with a balanced panel data set of 18 utilities between the year 2004 and 2007 for these objectives.

The various random effects models used in this study produce similar results in terms of economies of density and scale. The results suggest that these economies for Turkish electricity utilities are not sensitive to the unobserved heterogeneity among the firms. The optimal size is close to the median value of the sample. Previously performed studies, using panel data prior to the reform in the Turkish electricity market in 2004, on the estimation of Turkish electricity
distribution industry’s inefficiency scores and our new findings are compared. Our estimations suggest that the new efficiency improvements could be materialized by further mergers among adjacent utilities or regulating the market using reliable links between efficiency measurements and incentive-based price regulation. On the other hand the electricity loss is still one of the major problems in this industry. The reduction of the loss will improve the overall efficiency of the industry and making reliable benchmarking in the industry.