

## Electricity Sector Performance: A Panel Threshold Analysis

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### *Executive Summary*

The realm of electricity industry has undergone profound structural changes regarding its market structure. For most OECD countries the industry was vertically integrated and state-owned whereas over the last decades the market has been liberalized giving the opportunity for other private companies to enter the market and provide services. The transmission toward to a more competitive market structure was based on a legal framework. As a consequence, National Regulatory Authorities (NRAs) were established in each member state of OECD whose main competence is focused upon the supervision of the liberalized electricity industry. Among their duties, NRAs monitor issues related to: a) the market structure, such as number of players, market shares and the level of vertical integration, b) the conduct, regarding pricing strategies of the firms, and c) the performance, concerning profits, investment activities and pricing.

Clearly, an important question that arises from the presence of NRAs is how the level of regulation affects the performance of the industry, as it is measured by some major indicators, such as the electricity generation, capacity utilization and labour productivity. From a theoretical point of view, in a competitive market, productive efficiency is determined when price is equal to the minimum point of average cost and it is known as producing at the “lowest cost”, whereas allocative efficiency is when price is equal to marginal cost, known as producing at the “right output”. Moreover, competition will induce reductions in retail prices and mark-up over costs leading to higher social welfare as well as to protect consumers from the abuse of dominant position by the incumbents. However, in oligopolistic markets, as in the case of electricity the concept of competition is measured by some structural concentration ratios, such as market shares, level of concentration and the Hirschman-Herfindahl Index, taking into account that for network industries these indicators are not as suitable as they should have been. In particular, for the electricity industry these indicators are not reliable in terms of measuring competition since they cannot capture the special characteristics of the industry which are the high leverage levels, the high sunk cost and the excessive risk that investors have to undertake in order to enter the market.

Similarly, regulation plays a crucial role in terms of evaluating performance of electricity industry by organizing the market and promoting competition in each segment. Indeed, the primary purpose of a well-designed regulatory system is to protect consumers from concerted practices by the incumbent, while at the same time it creates an attractive environment fostering investment activities. However, in some cases when regulation is too onerous can probably affect negatively firm's output decisions and depress productivity. Furthermore, privatization can also be regarded as a key element of assessing performance for electricity. It is argued that privatization can lead to an increase in productivity with higher utilization of the available capital stock which in turns triggers the performance. Contrary, it is stated that the effect of privatization on the level of employment is ambiguous simply because it is not clear whether employment will increase, as a result of network expansion, or decrease, as an effort to eliminate excess staff by the incumbent.

In order to investigate our research questions, we empirically estimate the main drivers of electricity performance by applying threshold panel data techniques over a sample of 30 OECD for the period 1975-2013. Our estimation shows that there is a single threshold in all of the regression relationships, splitting our sample into two parts (non-liberalised and liberalised countries). The analysis, dictates that for non-liberalised OECD countries, structural reforms may have beneficial impact on the level of electricity performance expressed by the three alternative indicators (electricity generation, installed capacity and employment). This finding has important policy implications, since the policy makers and government officials could pursue liberal policies toward electricity sectors targeted at the opening of the market and the establishment of competitive conditions. However, we argue that for the economically liberalised countries the level of economic freedom does not clearly affect electricity generation and subsequently the level of electricity performance.