



The impact of regulatory quality and corruption on residential electricity prices in the context of electricity market reforms



Alexander Kaller, Samantha Bielen, Wim Marneffe*

Hasselt University, Faculty of Business Economics, Hasselt, Belgium

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ABSTRACT

The European electricity markets have been undergoing significant regulatory reforms since the introduction of the first liberalisation directive in 1996. Theory predicts that liberalisation promotes cost-efficient production and competition and hence leads to lower prices. The goal of this paper is to assess the impact of regulatory quality and non-compliance with the law on electricity prices in the context of electricity market reforms. We address problems of endogeneity by using the Blundell-Bond System GMM estimator and find that vertical integration and market concentration lower end-user prices, all else equal. Moreover, improving regulatory quality and reducing corruption, both have a negative impact on prices when holding other factors constant. The intensity of the reforms has limited impact on electricity prices when these reforms are introduced in an institutional environment characterised by high levels of corruption and low quality regulation.

1. Introduction

Two decades have passed since the first major European-wide electricity market reforms were introduced in 1996. Following the reforms in the late eighties in Great Britain with the introduction of the Electricity Act in 1989, the reform process earned an important place on the policy agenda of the European Commission. The main goal of the European market reforms was and still is the creation of a competitive internal market with free choice for consumers so they can benefit from lower prices and efficient services. Moreover, the reforms aimed at stimulating an environmentally friendly energy production and to ensuring greater security of supply.

A vast amount of research has been pursued in the field of market reforms of the electricity sector pointing out its flaws, successes and difficulties. Based on the literature, the outcomes of these reforms are highly uncertain. Economic theory predicts that deregulation,¹ or in this case liberalisation, would promote cost-efficient production, leading to lower prices. Furthermore, this would also lead to more choice, attract foreign investments and increase the quality and quantity of services enjoyed by the consumers. The goal of this paper is twofold. First, we will provide a literature review of research on the drivers of end-user electricity prices in the context of electricity market reforms. Second, we want to assess the impact of institutional variables,

more specifically of regulatory quality and corruption, on residential electricity prices in the context of these reforms. Since the restructured electricity market is subject to different market forces, regulation and the functioning of the institutions responsible for enforcing these regulations play an increasingly important role in protecting different consumer groups and ensuring that the benefits of market reforms are passed on to consumers. We believe that the institutional design of the reforms and the compliance with the rules stemming from them, play an important role in reducing electricity prices for end-users. To the best of our knowledge, an analysis of institutional factors within the context of electricity market reforms and their impact on prices, has not been performed before.

This paper is structured as follows. Section 2 provides a summary of the European legal framework concerning electricity market reforms. The third section consists of a literature review of the existing literature on the drivers of end-user electricity prices. Section 4 takes a closer look at the dataset, the regression models used in our analysis and the results. Finally, the last section contains concluding remarks and policy recommendations along with some suggestions for further research.

2. Electricity market reforms in the European Union

The electricity market reforms were initiated with the first

* Corresponding author.

E-mail address: wim.marneffe@uhasselt.be (W. Marneffe).

¹ Deregulation might be a somewhat misleading term since old regulation is being replaced by new regulation. The deregulation movement always involves some form of re-regulation.

liberalisation directive 96/92/EC, which laid down a regulatory framework for the internal electricity market in the European Union. One of the main objectives of this directive was the partial and gradual opening of the electricity markets in the Member States. Furthermore, when organising the access to their transmission and distribution networks, the Member States had the choice to either opt for a regulated or negotiated third party access (TPA) or for a single buyer model. The first directive was then repealed by directive 2003/54/EC.² The main goals of this directive were; the creation of an independent regulatory agency by each Member State, the appointment of transmission and distribution system operators, and their legal unbundling with the separation of the internal accounts of electricity companies for each of their transmission and distribution activities. Furthermore, the directive introduced a fair TPA to the grid, further strengthened the protection of the end-users and allowed electricity consumers to freely choose their supplier. Growing concerns and complaints expressed by end-users and new entrants in the sector led the European Commission to launch an inquiry in 2005 to investigate the functioning of the electricity and gas market. The final report of this sector inquiry was published in January 2007 and pointed out some serious obstacles (e.g. high market concentration, vertical foreclosure, limited market integration, lack of transparency, non-effective and non-transparent price formation, limited retail competition and malfunctioning balancing markets) which stood in the way of pursuing the goals of the liberalisation policy (European Commission, 2007). Next to enforcing competition rules through courts, this report also led to the introduction of the third liberalisation directive. Directive 2009/72/EC repealed directive 2003/54/EC and had to be implemented by the Member States by March 2011. It required the electricity companies to either opt for a full separation of their transmission assets from their generation and supply activities or for retaining their assets but letting them being managed by an independent system operator appointed by the government of the Member State. Furthermore, Member States were allowed to opt for a legal separation with the transmission activities being managed by an independent transmission operator. Additionally, the independence and the authority of the national regulatory agencies were strengthened, a new European agency³ was created and the end-user rights were improved.

3. Literature on the impact of electricity market reforms on electricity prices

In the following section, we will provide a review of the literature on the impact of regulatory reforms in the electricity sector on end-user electricity prices. Studies regarding wholesale electricity prices have been omitted.⁴ Consequently, end-users who are supplied directly by generators (e.g. medium to large industrial customers) have also been excluded from this review if they have been analysed as a separate group by the authors. Papers with a specific focus on electricity generation from renewable sources in the EU have been included since renewables have been explicitly mentioned on multiple occasions in the liberalisation directives as one of the instruments in achieving a well-functioning liberalised electricity market.

The search process was conducted in 2017. We performed an extensive search for relevant research material (including working papers, conference papers, and reports) starting from 1995⁵ on EBSCOhost,

² This directive had to be transposed into national regulation by July 2004, except for Article 15, which had to be transposed by July 2007.

³ Agency for Cooperation of Energy Regulators.

⁴ Retail electricity prices are influenced differently if compared to wholesale prices. A drop in wholesale prices does not automatically imply that retail prices will drop as well.

⁵ This date has been chosen because electricity market reforms in Europe would only start showing an effect after a few years into the reforms.

Google Scholar, Science direct and Web of Science with Hasselt University authentication. We used a combination of the following keywords in the research process: electricity price, electricity rate, market reforms, liberalisation, deregulation, impact, effect, drivers, industrial, residential. Furthermore, we analysed all references in relevant studies in order to verify that we captured most of the literature on this topic. Nevertheless, it is still possible that the literature list presented in this paper is non-exhaustive.⁶ Even though the focus of our paper is on electricity market reforms in Europe, literature on non-European countries has also been taken into account in order to capture all relevant variables within the context of reforms. A first screening of the papers was performed based on the abstract and the conclusions. This allowed us to exclude studies, which were not relevant to our analysis. This procedure resulted in 38 papers, which we clustered in four major categories based on the method used: regression analyses (15), descriptive analyses (11), simulations⁷ (6) and reviews/discussions (6).

The majority of the studies focused on Europe or European countries (22). Six papers investigated electricity market reforms in multiple countries throughout different continents while the rest of the studies (8) focused on specific countries or regions worldwide (excluding European countries). Two of the remaining studies did not mention specific countries but rather looked at the available evidence of electricity market reforms to date. A graphic overview of the papers per region and research method is displayed in Fig. 1.

A more detailed overview of the reviewed articles by author, methods used, time interval and region is presented in Table 1.

Each paper was analysed in order to extract relevant variables, which could influence end-user electricity prices. This overall process resulted in 81 unique variables. We then excluded all variables not related to papers that used regression analyses, which will allow us to select suitable variables for our econometric models later on. It is possible that variables can be partly overlapping. However, the variables included in the table are distinct in the sense that they may relate to each other in general (e.g. market reforms) but they differ based on the underlying data and the specific topic they try to measure. For example, “time to privatisation” measures the expected amount of years remaining until the electricity sector is privatised while “privatisation” either uses a dummy or a scale in order to indicate if they electric sector is privatised and to what extent. The goal of this analysis was to examine whether the underlying data of the variables was the same but just labelled differently. In the latter case, we grouped the variables together and assigned the same label. The most used 20 variables together with their influence on electricity prices are presented in Table 2. The second column shows the number of occurrences of a specific variable in the reviewed papers. The last three columns indicate whether the variable had a positive, negative, or no significant influence on electricity prices. Some variables can have both a positive and negative impact on electricity prices in a given paper or no impact at all. This difference in results can be ascribed to the different models utilised or if the author(s) analysed data across different regions/countries. For example, Nagayama (2009) finds that market reforms had a negative influence on prices in Asian developing countries whereas prices increased after market reforms in developed countries. Therefore, the sum of these three columns is always equal or higher than the number specified in the “Count” column.

Around one fifth of the analysed papers used a variable for hydro generation to investigate its influence on electricity prices. Scholars mostly find that hydro generation has no significant impact on prices or leads to a decline of prices for end-users.

A country's or region's economic growth⁸ was found to have a

⁶ We did not have access to all available papers, especially those published before the year 2000.

⁷ Using simulation models to predict future price movements.

⁸ Measured by GDP or GDP per capita.

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