

# Asymmetric effects of electricity regulatory reforms in the EU15 and in the New Member States: Empirical evidence from residential prices 1990–2011



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## ABSTRACT

This paper shows that there are asymmetric effects of regulatory reforms within two country groups in the EU. We consider the EU27 countries, and update and enlarge the OECD/ETCR regulatory country indicators up to year 2011. When distinguishing between EU15 countries and New Member States (NMS), we find that market liberalization reduces the price of energy in the EU15 countries, while having the opposite effect for the NMS. The paper concludes that the uniform electricity market reforms in the EU apparently have had different effects between the EU15 and the NMS. This asymmetric shock is not at variance with the principles of market opening, given the different starting points, but may in turn call for different policy responses, as consumers in some NMS have faced significant price increases in a relatively short period of time.

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## 1. Introduction

To what extent have electricity market reforms had different effects in the EU15 and in the New Member States (NMS), particularly in the former planned economies of Central and Eastern Europe (CEE)? The policy relevance of a potential asymmetric shock on prices associated to the reforms supported by the European Union regulation is related to the geographical divide of energy poverty in Europe (Braubach and Ferrand, 2013; Herrero and Bouzarovski, 2014). Furthermore, Bouzarovski (2014) finds that one of the causes of energy poverty is high energy prices, a phenomenon that is “particularly widespread in Eastern, Central, and Southern Europe, where it tends to affect groups who are already vulnerable to income poverty” (Bouzarovski, 2014; page 276). While we do not study energy poverty per se in this paper,

we focus on the possible determinants of an asymmetric price shock in the two country groups.

Across European Union (EU), the standard electricity industry reform is comprised of three main dimensions (Newbery, 2002; Jamasb and Pollitt, 2005; Pollitt, 2009; Pompei, 2013; Florio, 2013): unbundling (separation of network segments of the industry from potentially competitive ones); liberalization (allowing entry and competition in generation and retail services); and privatization (divestiture of publicly owned assets). Although the European Commission remains fairly neutral about the last pillar of the reform package, several EU Member States, following in UK's footsteps in the 1990s, moved along the path of privatization or instructed public firms to act as private producers and maximizing “profits”. Despite this general tendency, there are still many industries in which profit maximizing and welfare maximizing oligopolists simultaneously operate in the same sector. In these markets with “mixed oligopolies”, public enterprises (i.e. ex-monopolists) and private firms with different objectives coexist (De Fraja and Delbono, 1989). Thus, the ownership structure and market opening will affect firms'

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objective functions, which in turn will lead to different pricing behaviors.<sup>1</sup>

The electricity industry supplies an essential service for households. Although EU institutions have promoted a unified approach, the implementation and pattern of reforms vary widely across Member States in terms of starting points, timing, political choices, and economic policies; we take advantage of this variability to study the effects of reforms on consumers.

In the previous empirical literature, the impact of electricity regulatory reforms produces mixed evidence. For example, Steiner (2001) finds that privatization increases both industry price and the ratio between industrial and residential price, while unbundling and liberalization (i.e. the creation of wholesale spot market) have the opposite impact. Fiorio et al. (2007), focusing on EU-15 countries, find that entry regulation is associated with higher prices, whilst privatization and vertical integration have no significant impact. In more recent research, Fiorio and Florio (2013) argue that public ownership is associated with lower prices, while Nagayama (2009) finds that higher electricity prices are associated with liberalization.

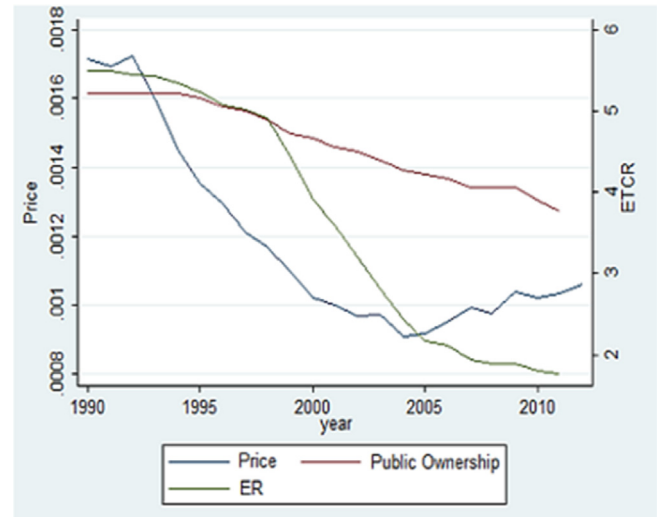
In our empirical analysis we focus on 27 EU Member States, considerably enlarging<sup>2</sup> the empirical model of Fiorio and Florio (2013). We also consider a more recent time horizon, from 1990 to 2011. A considerable part of the research is devoted to data collection for countries that were not considered previously, mainly due to lack of information about the regulatory indicators (ETCR) not covered by the OECD database. Enlarging the set of investigated countries allows a comparison of the impact of privatization and liberalization between the EU15 countries and the New Member States (NMS). This comparative analysis is the main contribution of this paper, allowing us to highlight the different effects of the reforms. Indeed, our study also aims to identify which aspect of the market reforms has led to asymmetrical results between former EU15 countries and NMS.

In order to examine the impact of regulatory reforms on household prices for electricity, net of taxes, we use a static panel model, estimated by fixed-effects specifications. Our empirical results show that, overall (i.e. for the EU27), private ownership is not significantly associated with lower electricity prices, whereas we find evidence that vertical integration (only partially) and entry regulation are associated with lower prices. Different results emerge from the analysis between the EU15 and the NMS, as in the latter group of countries residential prices for electricity have tended to converge to the EU average prices faster than in the former group. Given the different incomes of households in the two areas, this implies that social affordability problems may be more relevant in the NMS than in the EU15, an issue requiring further research and possibly more responsive policies.

The paper is organized as follows: In Section 2, we discuss the motivation and research question of the paper and in Section 3 we cite some earlier literature. Section 4 presents the econometric approach, the data collected and used in the empirical analysis, and the results of the estimated fixed-effects panel regressions. Finally, concluding remarks are provided in Section 5.

<sup>1</sup> The public firm will maximize the social welfare, bearing a marginal cost higher than the efficient one (because of X-inefficiencies, Leibenstein, 1966); it faces a budget constraint that forces it to make non-negative profits (the 1967 White Paper stated the objectives of public corporations). The aim of private firms is to maximize profits. The resulting equilibrium ensures a lower level of social welfare than the second best equilibrium, which would emerge if all firms maximized social welfare within a budget constraint (i.e. Ramsey-Boiteux prices).

<sup>2</sup> We extend our analysis to Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.



**Fig. 1.** EU-27: Public ownership, overall electricity industry indicator (ER) and average price for the electricity industry, 1990–2011. Note: Price (source: Eurostat) deflated using CPI (source: WDI), at 2010 base. Overall electricity industry indicator (ER) and Public Ownership are ETCR 0–6 scores for the overall industry and public ownership indicators, respectively.

**Table 1**

EU15, NMs, EU27. Electricity average prices, (1990–1995, 1996–2006, 2007–2011) (kWh).

	Nr. Obs	Average price		
		1990–2011	1990–1995	1996–2006
EU15	310	0.10	0.10	0.13
NMS	147	0.05	0.07	0.10
EU27	457	0.09	0.09	0.12
St. Dev				
EU15		0.027	0.025	0.023
NMS		0.010	0.018	0.030
EU27		0.031	0.026	0.029

n.a = not available.

Source: Own calculations on Eurostat data

## 2. Motivation and research question

Here we present some stylized characteristics of the electricity market, which highlight the motivations and research questions driving our analysis.

Fig. 1 indicates that average residential electricity prices for the EU-27 show a downward trend. The first reduction happened before the starting date of reforms and before the approval of the first EU Directive (1996).<sup>3</sup> After the approval of the second EU Directive (2003), prices began to rise, showing some correlation with the increasing cost of oil. In 2011, prices were higher in many markets, except for Nordic countries due to a milder winter and greater hydro availability.<sup>4</sup>

Table 1 shows that the average nominal price for residential consumers in the EU 15 was 0.10 Euro per kWh (net of taxes) between 1996 and 2006, and increasing to 0.13 Euro per kWh in the

<sup>3</sup> Better integration of European wholesale power market is a factor that both helped the price convergence and has not allow prices to follow the sharp increase in fossil fuel prices in the last years.

<sup>4</sup> The Nord Pool Spot market is one of the largest coupling areas in Europe and exhibits the lowest price level, since the abundant hydro-based power generation in Norway and Sweden.

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