DOES PUBLIC OWNERSHIP PROVIDE AFFORDABLE AND RELIABLE ELECTRICITY TO HOUSEHOLD CUSTOMERS?

CASE STUDIES OF POWER REFORMS IN THE UK, GERMANY, ITALY AND FRANCE

EUSERS SUMMER SCHOOL
GROUP: ELECTRICITY

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INTRODUCTION

Liberalization of electricity systems has been the paradigm model used by policy makers and international institutions as the essential framework for dealing with issues such as inadequate pricing, lack of capacity, fiscal constraints, efficiency problems and underinvestment. The core principle is the potential competitiveness of generation and retail that could drive commercial investment and efficiency.

Global energy markets have embarked on liberalization during the 1980s (Chile in 1983 and the UK 1989). Deep reforms have been undertaken in order to open these sectors to cross-border supply, competition and market dynamics. In the British Model (Newbery, 1989), privatisation of state-owned incumbents is the final and essential step after unbundling and competitive open markets of wholesale and retail which arguably is expected to bring about better efficiency. Whereas privatisation was the initial goal in the UK, in the EU this was not the point. In Germany, private corporations existed since the beginning of the power sector whilst the French government has not considered the transfer of ownership as the sectoral agenda yet. Meanwhile, Italy has partially sold its incumbent to investors but cautiously retains control of the company. Notably, the power markets in these 4 EU countries have all opened up to access for third parties, allowed customer choices of supplier and have all achieved complete grid connection for their population.

This paper aims to investigate what type of ownership is more beneficial for household customers. Whilst the power sector is subject to the energy trilemma, different groups of stakeholders expect and perceive the sector and its performances from their perspectives and access to information (Figure 1). Above all, the electricity sector is of general interests. Safe, reliable and affordable electricity provide the backbone for social and economic well-being (Thomas, 2014). From the power sector household customers expect affordable electricity bill that they can pay (affordability), access to the service (accessibility) and the certainty to have power in any moment (reliability) (Figure 2).

Because the EU Directives do not require a change in ownership in pathway to liberalisation but EU Directive 2009 specify the need to protect customers as pivotal, it is important to investigate whether public or private ownership in each of these countries have benefited the largest group of stakeholders of the power service. Having known that accessibility is 100% in these 4 countries (Appendix A), this paper then focuses on whether the changes in ownership in the sector have had an impact on delivering the services to meet the expectations in affordability and reliability by households.

Literature focuses on the relationship between price and ownership, as price is an indicator of affordability. However, a lack of focus on the relationship between ownership and quality of service has been detected. The paper investigates directly to the issue of affordability of electricity supply and the reliability of services by computing the proportion of real disposable income

spent of electricity annually by households and the severity of service interruptions.

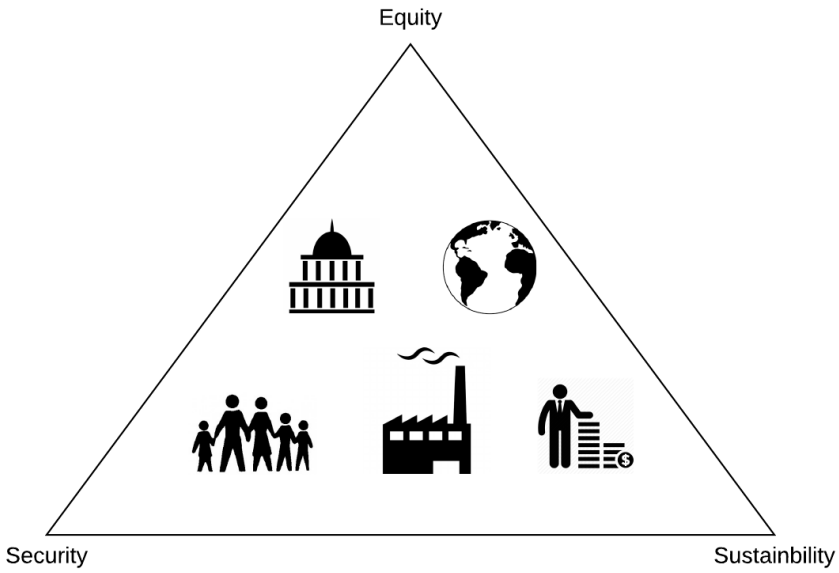

Figure 1 Energy Trilemma and Stakeholder Groups

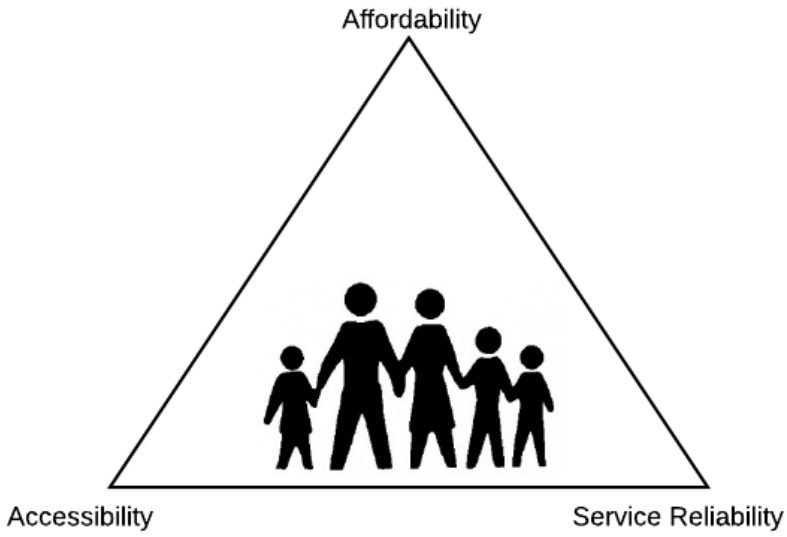

Figure 2 Indicators of Power Service for Household's Welfare

ELECTRICITY REFORM MODEL AND OWNERSHIP

Public infrastructure sectors became important and difficult targets for governments which want to reform because their traditional set-up of the networks is vertically and horizontally integrated to allow easy central control and involve national and social security issues. There was no room for any private company to build or join the network. So unbundling came in as a necessary step to separate input and output, lowering entry barriers and allowing for bidding or contracting to privately owned companies.

Under this model, the system is expected to move from monopoly to a single buyer of electricity and wholesale competition, to a free choice of energy source for supply companies, to retail competition where consumers can choose their suppliers. Electricity market liberalization primarily aims to 'improve performance: financial performance, supply side efficiency and demand-side efficiency' (World Bank, 1994). It is expected that liberalization attracts new investment in generation, reduces prices, ensures security of supply and provides universal coverage.

Table 1. Main Steps in Electricity Reform

Restructuring	Vertical unbundling of generation, transmission, distribution, and retail supply activities Horizontal splitting of generation and retail supply
Competition and Markets	Wholesale market and retail competition Allowing new entry into generation and retail supply
Regulation	Establishing an independent regulator Provision of third-party network access Incentive regulation of transmission and distribution networks
Ownership	Allowing new private actors Privatising the existing publicly owned businesses

Figure 3 Electricity Liberalisation Model (Jamasb and Pollitt, 2005)

The period between World War II and the 1970s witnessed a regulatory stability in Western Europe and other OECD countries which favoured public ownership in public infrastructure services including electricity. This traditional model was a safe and certain choice for governments to resolve conflicts between investors and consumers (Newbery, 2004), to ensure social justice (Van de Walle, 2009) and to address the strategic positions of these sectors for economic development. However, since the early 1990s, OECD countries, led and modelled by the UK's privatisation-then-liberalisation policies, had taken their turns to embark on the marketization and liberalisation process to deeply reform these public sectors (Borgnetti and Obermann, 2008).

The reform in the UK inspired the EU bloc and were widely replicated. The EU electricity market was created by a series of Directives in the 1990s and 2000s. The Directives address four aspects: opening generation and retail markets; access to transmission and distribution networks, unbundling integrated companies and regulatory bodies of ESI (Thomas, 2005). By 2000, most EU

member countries had opened retail markets with the exception of Greece (Pollitt, 2009).

With time, scholars have critically addressed the potential benefits of the liberalisation process. As the European Commission showed in 2014, electricity prices for households, after a period of decline, went up. Such an outcome of the liberalisation process was not expected. An EU-wide analysis found that both privatisation and unbundling had a negative effect: "public ownership tends to decrease prices [and] vertical disintegration tends to increase prices" (Fiorio and Florio, 2007).

Meanwhile, quality of services has not been equally investigated. A series of blackouts and system failures in the early 2000s in California, US (2003), Italy (2003), Switzerland (2003), southern Sweden (2003), Northeast blackout of 2003 in America, Malaysia (2003, 2005) and Rio de Janeiro (2005) have raised questions on efficiency of unbundled and liberalised systems. UK government also believed that the system only works if it can deliver 'secure, sustainable and affordable electricity' (CCC, 2009; DECC, 2011). Fiorio and Florio 2011 in their study explored data on perceptions by European consumers, i.e. subjective data on happiness with the price of electricity and interruptions of services across the EU-15. According to the results consumers are happier with the prices they pay when in their country there are both public ownership and liberalisation.

Several studies investigated the drivers behind demand and supply of the electricity service. Some of the most important are quoted in figure 4.

Figure 4 Empirical Literature Synthesis of Drivers of Price and Quality of Services in the EU in the last 10 years

Influenced on	Driver	Author (Date)	Countries, Periods	Findings
Price	Ownership	Fiorio and Florio (2013)	EU-15, 30 years	Public ownership is associated with lower residential net-of-tax electricity prices in Western Europe
Price	Ownership	Lehto (2011)	Finland, 1997-2006	Local Ownership (in particular municipally owned companies) offers 5-15% lower retail prices than investors-owned companies
Price	Ownership	Bacchiocchi et al.,2015	EU15 countries and New Member, States (NMS) 1990-2011	Market liberalization reduces the price of energy in the EU15 countries, while having the opposite effect for the New Member States
Price & Services	Ownership	Fiorio and Florio 2011	EU-15, 2000, 2002, 2004	Consumers are happier with the prices and service quality when in their country there are both public ownership and liberalisation

Energy price Real GDP	GDP Growth	Berk, Ý. and Yetkiner, Ý.H., 2013.	1978 and 2011	significantcointegration between energy prices and real GDP per capita, as well as between energy prices and energy consumption per capita.
Price	Fuel Costs	DECC (2011)	UK, 2011	Increase in household electricity prices is due to international fossil fuel prices, particularly gas prices.

METHODOLOGY

The overall research question of this work is the following one: does public ownership benefit household welfare in the EU electricity sector? This paper approaches the question focusing on the two main consumer objectives outlined in the framework.

Hypothesis A: ***Public Ownership is beneficial for affordability of electricity for domestic consumers.***

Affordability is a vague concept and differs from mere low cost. Price is a good proxy of affordability but it does not tell the all story about the ability to pay for electricity bill. As employed in Winkler et al (2011), EBRD (2003) and Frankhauser and Tepic (2005), we decided to address the proportion of electricity bill per household customers out of their real disposable income.

For the purpose of testing this hypothesis, 'unaffordability' has been defined as it follows:

$$Unaffordability = \frac{P_{el} * Cons_{el}}{Income} \qquad (1)$$

where:
P_{el} – electricity price for domestic consumers at constant price
$Cons_{el}$ – annual residential consumption of electricity per capita (national average)
Income – net disposable income of households per capita at constant prices (national average)

Public ownership is estimated based on the OECD indicators of regulation in energy, transport and communications (ETCR). For the electricity sector, the ECTR public ownership is evaluated based on the ownership structure (private, mostly private, mixed, mostly public or public) of the largest companies in the generation, transmission, distribution, and supply segments (OECD, 2016).

Hypothesis B: ***Public Ownership is beneficial for reliability of electricity services for consumers***

There are several measurements of quality of power service. This paper uses the compound measures of the frequency of interruptions of service and the duration of such interruptions for average household customers so as to show the severity of the interruptions. For the purpose of the analysis, the 'reliability of electricity services' has been assessed based on System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI), two indicators which are often used as measures for the reliability of the service provided to electricity consumers (Council of European Energy Regulaors, 2015). These are defined as follows:

$$SAIDI = \frac{sum\ of\ all\ customer\ interruption\ durations}{total\ number\ of\ customers} \quad (2)$$

$$SAIFI = \frac{total\ number\ of\ customer\ interruptions}{total\ number\ of\ customers\ served} \quad (3)$$

Indicator	Unit of measure	Period covered	Source
Electricity price for domestic consumers (taxes and levies not included)	Euro/kWh	1990-2015	Eurostat, 2016
Annual residential consumption of electricity	GWh	1990-2014	
Net disposable income of households	Euro at current prices	1995-2014/2015	
Population	Inhabitants	1990-2015	
Consumer Price Index	-	1990-2015	World Bank, 2016
SAIDI	Minutes	1999/2006-2013	Council of European Energy Regulators, 2015
SAIFI	No. of interruptions	1999/2006-2013	
Access to electricity	% of population	1990-2012	World Bank, 2016

Figure 5 Data Sources used in the analysis

In order to test the hypotheses, we investigated the relationship between public ownership and the other relevant variables using an analysis based on the Pearson correlation coefficient.

In order to further advance the discussion on the issue of public ownership effects on the EU consumers' objectives in the electricity sector, a by-country time series regression analysis was proposed. However, given the limited availability of key data (between 7-20 data points exist for each dependent variable), the plurality of possible relevant variable, the generation of a time series model is not recommended.

EU DIRECTIVES AND VARIATIONS OF NATIONAL REFORMS

The main rationale for liberalising the electricity market is to "increase efficiency in the production, transmission and distribution of this product, while reinforcing security of supply and the competitiveness of the European economy and respecting environmental protection". In the end, this would improve the EU's competitiveness level and should lead to several benefits for consumer of electricity. Finally, an internal electricity market should also lead to significant incentives for producers of energy to invest in new power generation including from renewable energy sources (RES) (EC, 1996). The motivation for liberalised energy markets in the EU were not only economic, this reform also had strategic and political goals such as the improvement of the security of supply (Karan &Kazdağli, 2011: 11-12).

The EU included all the steps as expressed by Jamasb & Pollitt (2005) in the three legislative packages concerning the creation of the internal electricity market. Starting in 1996 the directive 92/EC on the creation of the internal electricity market was adopted after many years of negotiations. Two directives followed in 2003 (54/EC) and 2009 (72/EC) which established more and stricter rules for the liberalisation of the European electricity market. However, due to legal restrictions within the Treaty the EU has no authority to govern the type of ownership of the companies in the internal market (Art. 345 TFEU). The Commission realized that unbundling would only be effective when vertically integrated undertakings would be discouraged to discriminate against other companies or customers, in terms of network access or investments (Commission, 2009). Therefore, the 2009 directive suggested full ownership unbundling. Countries that had already unbundled their electricity sector were in favour, such as the UK, Italy and Belgium. However, mainly France and Germany opposed this idea by doubting whether it would improve the internal electricity market and lower energy prices (Buchan, 2009). This eventually resulted in three options concerning for unbundling at the transmission level. Starting with the option for full ownership unbundling with two fall back options of Transmission System Operators (TSOs) and the Independent Transmission Operator (ITO).

Third Party Access became the norm for accessing the transmission and distribution system. Meaning that any electricity supplier from any member state should be able to supply electricity anyway without experiencing barriers or discrimination. Relating to this, also the consumers are free to choose their supplier. Consumer protection became more important over the years, resulting in specific rules for non-discriminatory consumers and protecting vulnerable consumers. Several new actors were established to stimulate the process of liberalisation. All member states have to designate a national regulatory authority which ought to be independent from other entities and has to monitor the electricity market. This also led to the establishment of the Agency for Cooperation of Energy Regulators (ACER) consisting of all national regulators. They should promote regional cooperation as a first step towards total EU electricity market integration (Commission, 2009).

Reforms in the EU in general and specifically in the following 4 countries have varied in adopted elements of the reform model as well as in the periods of policy implementation. Figure 6 shows these variations.

	Ownership Unbundling	Open Wholesale Market	Retail Market (Customer Choice)	Privatisation of SOEs
The UK	1989*	1990 (Spot market)	1999**	1989*
France	No***	2001	2007	No
Germany	2010*	2005 (exchange)	1998	(Historically private corporations)
Italy	2005	2004 (exchange)	2007**	2003*

Figure 6 Variations of Electricity Reform Stages and Periods in the EU

*Starting point
**Fully competitive market
***Since 2013 there is an Independent Transmission Operator

Country	Largest Electricity Company	Revenue (as of 2015)	Ownership	Market Share in Home Market (%)
UK	British Gas	GBP12.4bn(2)	Private	24% (as of June 2015)(1)
France	EDF	EUR75bn (4)	Public	78.8% (as of 2014) (3)
Germany	E.on	EUR46bn (6)	Private	32% (as of 2014) (5) *
Italy	Enel	EUR75.7bn(8)	Partly privatised and Controlledby the Government	29% (as of 2014)(7)

Figure 7 The Biggest Power Companies

(1)Data from Ofgem (2015)
(2)Data from Centrica (2016), inc Gas sales
(3)Data from EDF (2015), inc Gas sales and outside France
(4)Data from EDF(2016)inc Gas sales and outside France
(5), (7) Data from Eurostat (2015), for generation
*17.4% market capitalization including Gas (Data from E.ON, 2016)
(6)Data from E.ON (2016) - Round-up figure
(8)Data from Enel(2016)

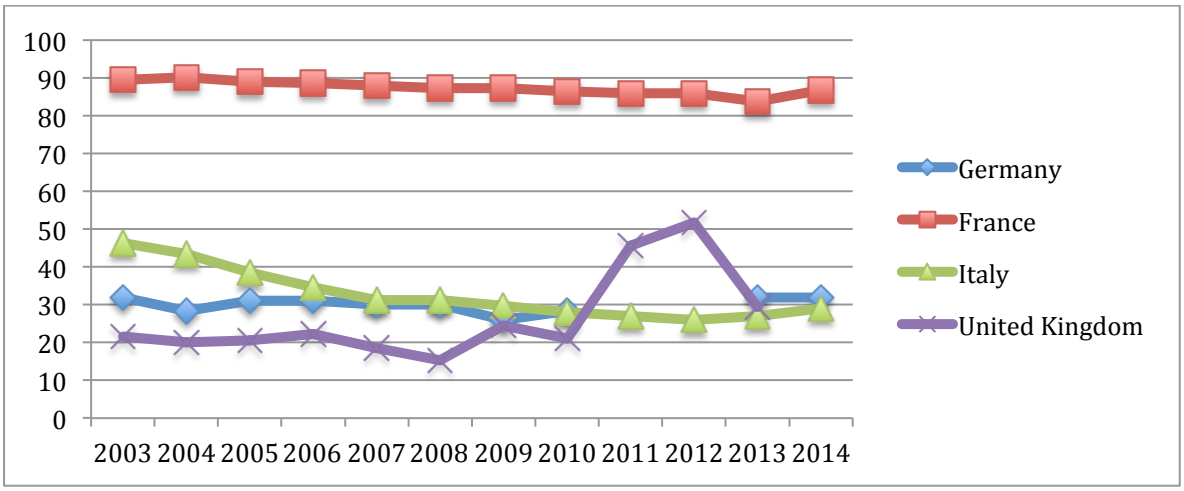

Figure 8 Market Share of the Biggest Power Company Eurostat

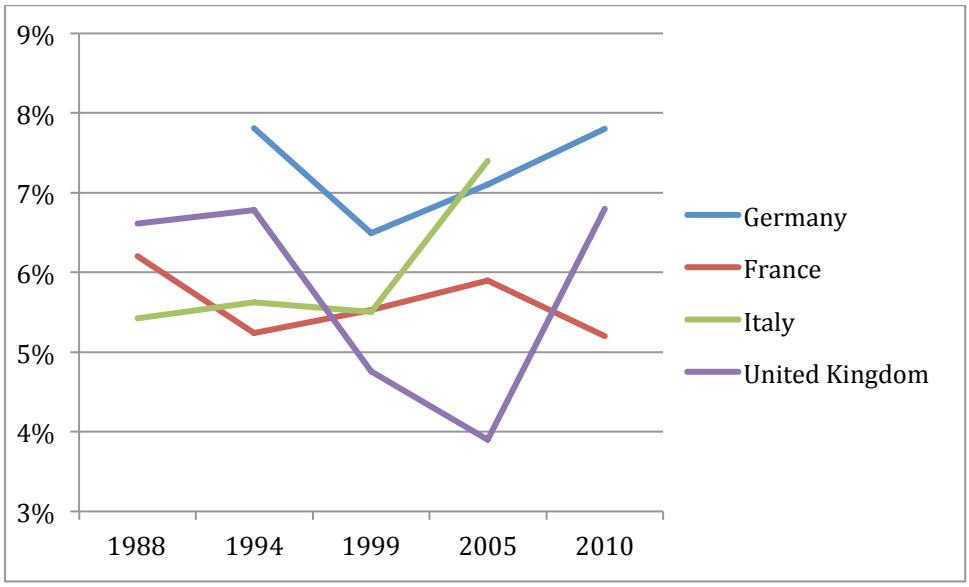

Figure 9 Affordability of Electricity for 1st Quintile Household

Figure 9 shows the trends in the affordability of electricity for the poorest quintile (First Quintile) in the population in the 4 countries. Seemingly, there is no common identifiable pattern in the country group, buffering from 4-8% of disposable income for electricity. There is less volatility in real costs of electricity bill in France, accounting for 5-6% in the 22-year period. The period from early 1990s to early 2000s illustrates the largest fluctuation in the ability to pay with the largest plummet in the UK and Germany and Italy saw a sharp increase. This period resonates with the starting of reform implantation in the 3 countries, notably around the time when private companies started to be given access to the wholesale market.

THE UK

In the 1990, in the UK, 'liberalisation was a domestic political decision': the Labour party believed in the Keynesian model of nationalisation to boost aggregate demand through government spending, whilst the Conservative party argued for the market mechanism as the answer to state-owned enterprises' inefficiency and national budget deficit (Newberry, 2002). Starting with privatisation and restructuring the British electricity supply industry, the sector then embarked on full liberalisation by unbundling CEGB generation and transmission units into one privatised transmission company (NGC) and 3 generation companies (Powergen, National Power and Nuclear Electric) which were then gradually broken up into 8 generation companies. A Power Pool was set up in 1990 for generators to bid against each other, marking the creation of a wholesale market. The UK model was the most complete version of electricity liberalisation (Newbery and Pollitt, 1997).

In the last two years, the implementation of the EMR means the government heavily subsidizes the electricity sector to keep the lights on. This happens mainly via the introduction of the Capacity Market, a mechanism that remunerates fossil fuels-based and nuclear plants for being able to add capacity in the electricity system when this is needed and within specific timeframes.

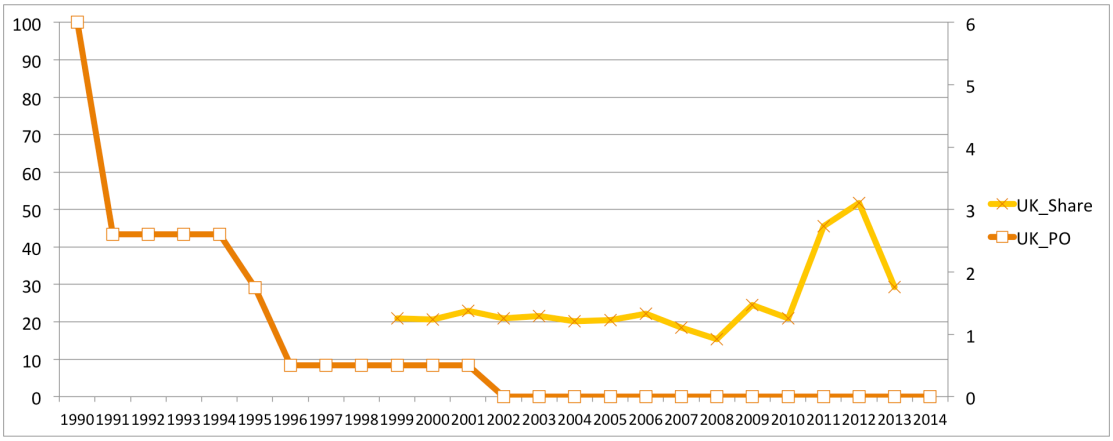

Figure 10 Public Ownership and Market Share of the Biggest Power Company in the UK

The privatisation-to-liberalisation reform model in the UK brought down public ownership in the power sector dramatically in the early 1990s. The sale of state-owned unbundled power companies allowed entry and growth of private companies in the sector. Since then, the market is populated with the Big 6 with the biggest company as British Gas which owns 24% of the electricity market as of June 2015. Since 2000, its market share has not dropped to below 20% with the peak of over 50% in 2012. There has been no official effort by the government to bring in competition to the oligopolistic market.

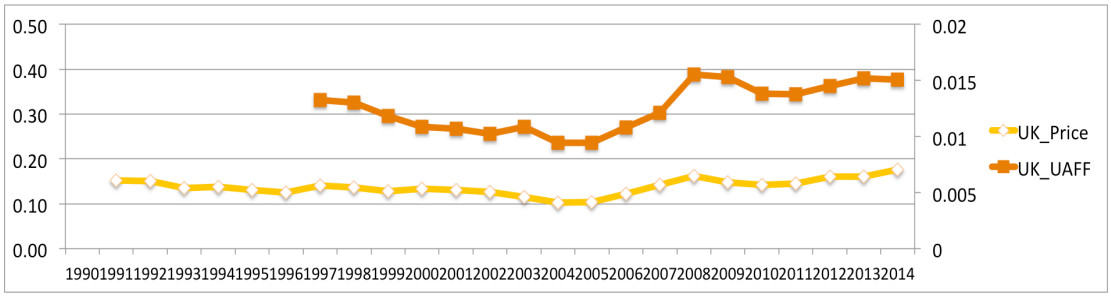

Figure 11 Electricity Prices and Unaffordability in the UK

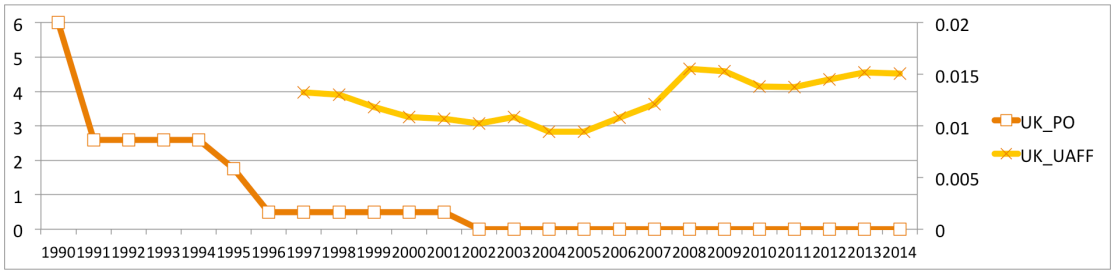

Figure 12 Public Ownership and Unaffordability of Electricity per Capita in the UK

In gaining privatisation, the UK's average residential consumers experience an increase in real electricity prices and an overall increase in their electricity bill. Unaffordability increases as public ownership decreases.

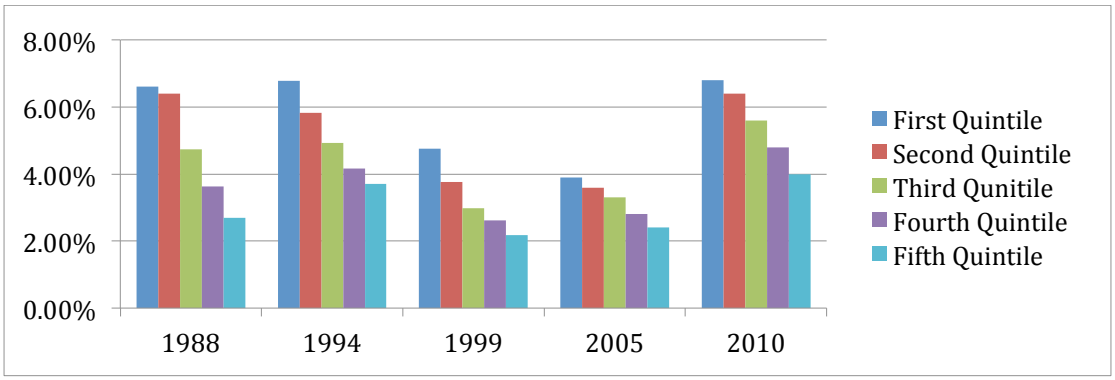

Figure 13 Affordaibility of Electricity for Household Income Group

Looking at households by income group, expectedly the costs of electricity for the poorest households are the highest among all other income groups. It is difficult to say that privatisation has a measureable impact on these costs for any income group looking at the period before liberalisation (1988) and after liberalisation. In fact, in 2010, all income groups of households had to pay for higher bill of electricity knowing that the rate of electricity penetration due to technological progress is exponential.

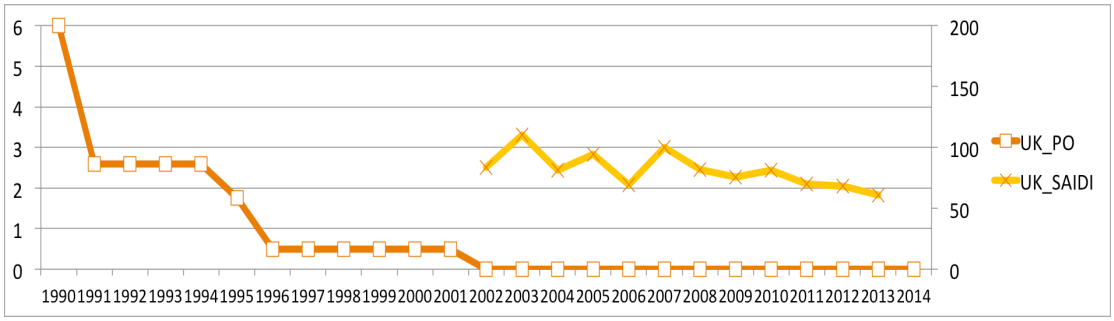

Figure 14 Public Ownership and SAIDI in the UK

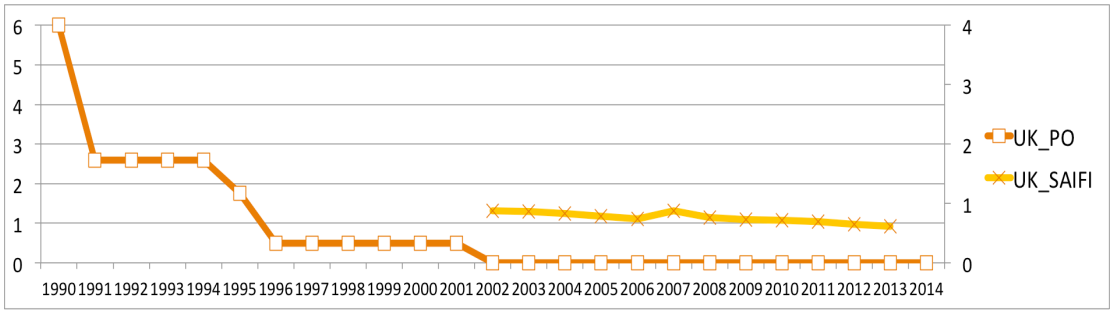

Figure 15 Public Ownership and SAIFI in the UK

Since 2002, the quality of services seem to improve. The frequency of interruptions and the duration of such interruptions reduced marginally. Since transmission and distribution networks in the UK have been privatised to a few private investors, investment to maintain and upgrade the systems is their responsibility. But the slight improvement in the service can hardly be related to the privatised market.

ITALY

Italy began to reform its electricity industry in the 1990s. First, a national regulatory authority for electricity and gas was established (1995). Then, generation was liberalized and the largest consumers were allowed to choose their own supplier (1999). An Independent System Operator model was adopted, with the incumbent Enel still owning the transmission grid. Beside that Enel was compelled to divest from some of its power plants, which were sold to new entrants (2001-02). In the same time the company was partly privatized, with the government still controlling the largest share.

At the beginning competition was not working very well because Enel still enjoyed a dominant position. Wholesale prices remained pretty high even after the starting of the official power exchange in 2004. Smaller generators like Eni, Edison and the like preferred to avoid real competition and share the gains from the high prices set by Enel's bids on the market.

After a row of bad black-outs and reduced margins in transmission and generation, Italy pushed for the introduction of ownership unbundling. Terna was separated from Enel in 2005. In the meanwhile a big wave of investments took place in generation with lot of new CCGTs built in a short period of time. Natural gas became the main fuel for generation by far.

In July 2007 every electricity customer became eligible for choosing its own supplier. However, in order to smooth the transition and protect households and small enterprises, it was decided that those who do not choose a supplier on the free market were going to be supplied by the Acquirente Unico and billed directly by their local distributor (Servizio a maggior tutela). For these customers the tariff is defined every three months by the national regulator, based on the costs incurred by the Acquirente Unico.

In the past several years the switching rate has been rather low, also because the tariff provided by the Servizio a maggior tutela is among the best on offer (AEEGSI, 2015). Currently discussions are going on because there is a plan to get rid of the Servizio a maggior tutela by 2018. The idea is that the transition period is now concluded, more competitive conditions exist on the generation and retail markets. No reference tariff should exist anymore also because issues of energy poverty are addressed by the Bonus elettricità and by the Bonus disagio fisico. The first provides a rebate on energy bills for poor families, the second for families with a person using essential medical devices.

The problem of electricity prices has become more relevant in the last few years because despite an improvement in the industry and a reduction in wholesale prices, end customers pay tariffs among the highest in Europe. Today this is due not much to the particular energy mix or the difficult geographical characteristics of the Italian system but to the significant subsidies which are provided to renewable generation out of final tariffs.
About service quality Italy improved significantly in the last years and thanks to large investments by Terna and local distributors enjoys today one of the most reliable electricity service in the EU (CEER, 2015).

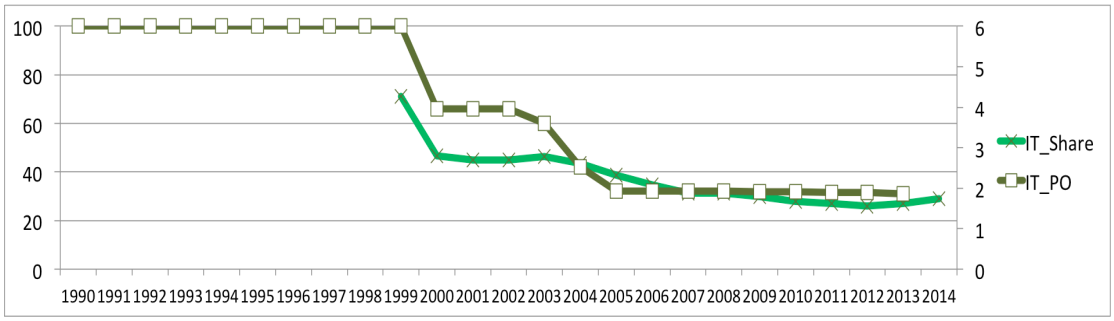

Figure 16 Public Ownership and Market Share of the Biggest Power Company in Italy

Similarly to the UK, the electricity market is dominated by the incumbent Enel. It was corporatized in 1992 but a partial sale of the shares began only in 1999. Since then, Italian's power market has seen gradual increase in private participation with the reduction of market share for Enel. However, both ownership and market share since 2006 have plateaued, indicating a resistance to move forward with complete privatisation and letting go of control from the government.

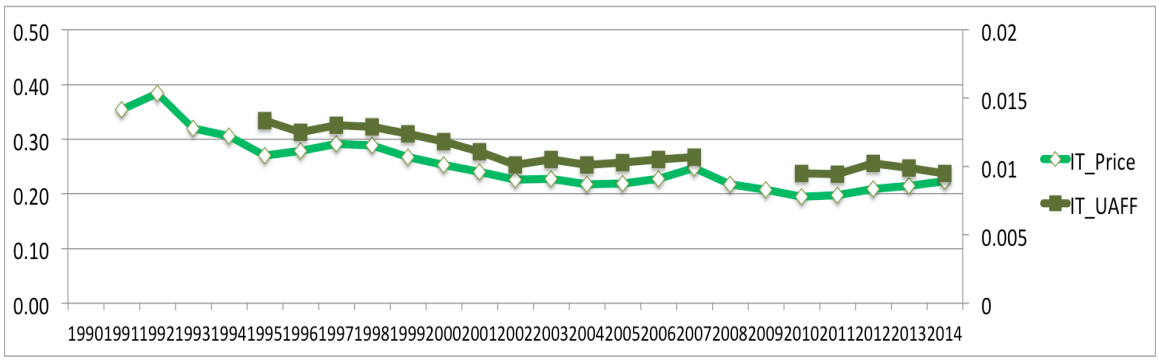

Figure 17 Electricity Price and Unaffordability in Italy

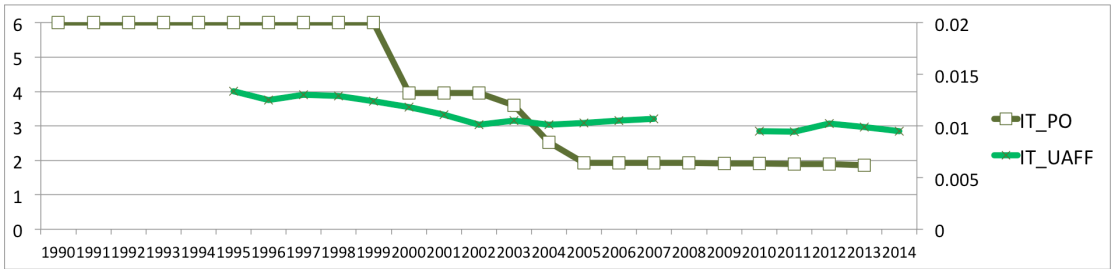

Figure 18 Public Ownership and Unaffordability of Electricity Per Capita in Italy

(Note: 2008, 2009 data unavailable)

The trend of affordability illustrates a correlation between the maintenance of public ownership and the real costs of electricity for household customers. There is in fact a reduction in the proportion of power bill per head since 1995. However, the costs for the poorest quintile of the population increased by 2 percentage points whilst reduced for the richest quintile. The discrepancies in ability of pay for all income groups widened in the early 2000s while remaining almost static in the late 1980s to 1990s.

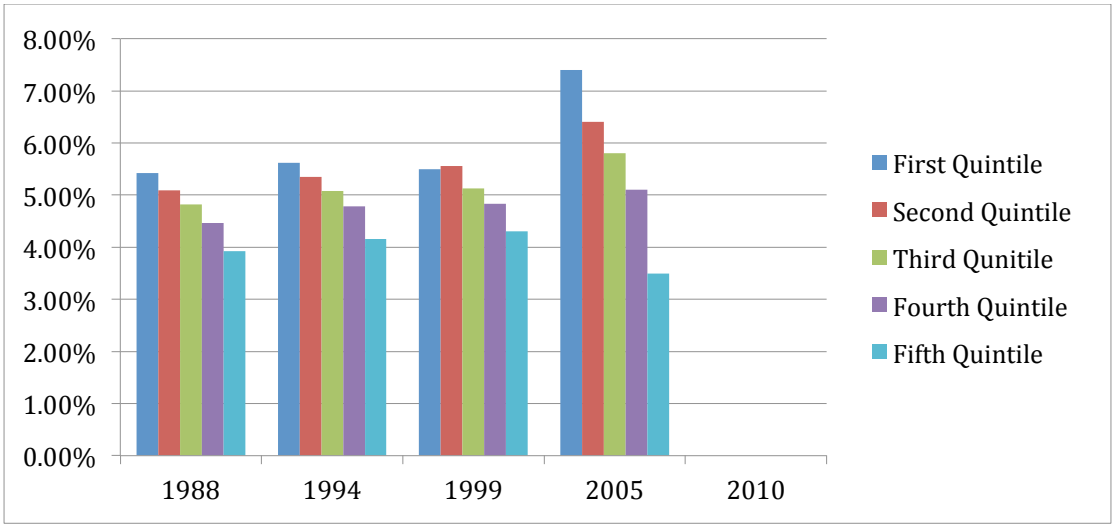

Figure 19 Affordabiity of Electricity for Household Income Group in Italy

Since the late 1990s when Italy started liberalisation, the reliability of power supply improved a lot. Both frequency and duration of power interruptions reduced.

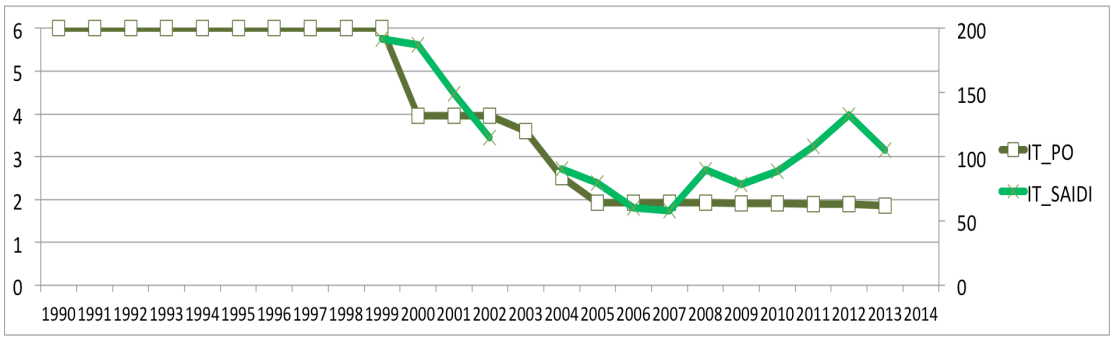

Figure 20 Public Ownership and SAIDI in Italy

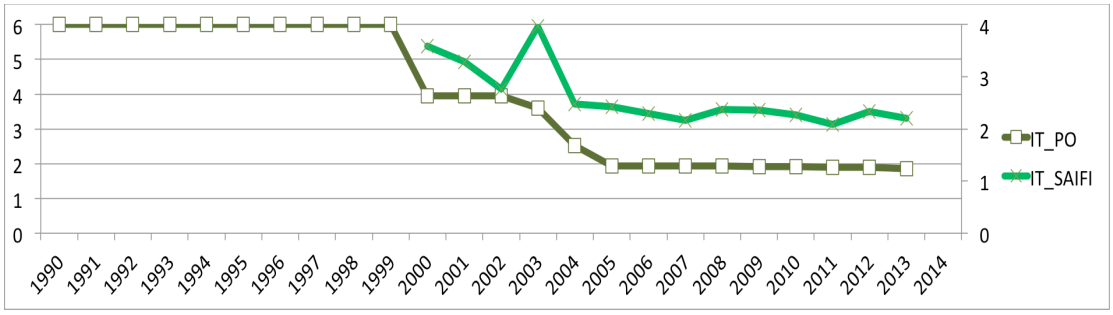

Figure 21 Public Ownership and SAIFI in Italy

GERMANY

Referring to 2005's energy law, Pfaffenberger and Chrischilles (2013) note that this led to the legal unbundling of transmission and distribution networks from other activities of integrated companies and the regulation of network access conditions including network pricing, thus establishing the conditions for competition in the wholesale and retail markets. Pfaffenberger's and Chrischilles's (2013) note though is incomplete because it fails to mention the character of Germany's unbundling of power networks, which doesn't necessarily mean ownership separation between the power networks and generation companies.

Nevertheless, Germany's energy system is vastly unbundled today and the unbundling process stated in the beginning of this decade.

So, in the previous decade, Germany's high-voltage lines were operated by the country's four large utility companies EoN, RWE, Vattenfall Europe and EnBW. Their management became separated from the parent companies following the European Commission's guidelines.

On the power distribution front, a large percentage of the distribution lines were owned by local municipalities, who also engaged in the retail market. Unbundling of the retail market from the distribution networks is not compulsory according to the EU legislation.
Today, the four German transmission grid operators are Amprion, which operates the grid in West Germany (RWE, 2011); Tennet, which operates about 40% or the country's grid running from north to south; 50 Hertz Transmission, which operates the grid in North and east Germany (50 Hertz is also responsible for linking the Baltic Sea's offshore wind farms to the German grid); and Transnet BW, which operates the transmission grid in Baden- Württemberg, in South-West Germany.

Amprion, was owned by Germany's second largest utility, the RWE, which sold a 74.9 % share in Amprion in July 2011 to a consortium of mainly German institutional financial investors consisting of insurance companies and special pension funds. Tennet is owned by Dutch company TenneT, which also operates the transmission grid in the Netherlands and which bought the German high voltage grid from Germany's largest utility, the EON, in 2010 (Tennet, 2015a). 50 Hertz was once owned by Vattenfall, who sold it to foreign investors in 2010. Belgium's transmission system operator Elia now holds 60% of the company's shares and another 40% is held by Australian infrastructure fund IFM Investors (50 Hertz, 2015). Transnet BW is the only publicly owned high voltage grid operator in Germany.

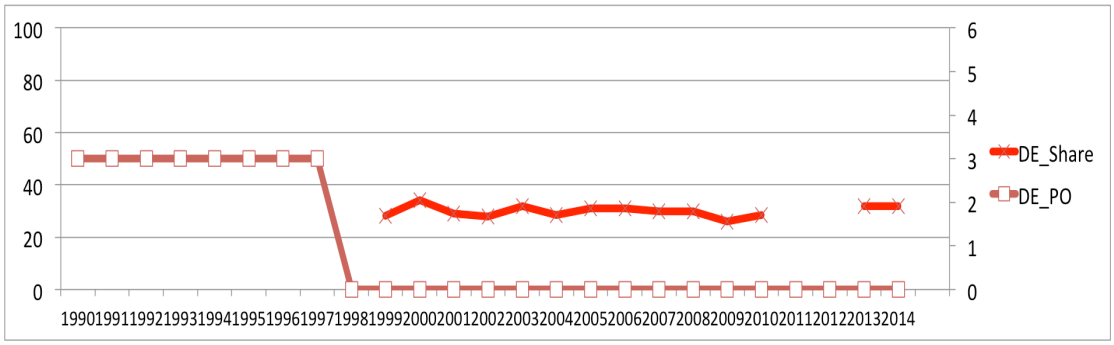

Figure 22 Public Ownership and Market Share of the Biggest Power Company in Germany

The market share of E.on hardly changed since the late 1990s and this persistent concentration of market power correlates to the minimal change in the real costs of electricity for average consumers (Figure 24). The gap in this cost for different household income groups remained almost unchanged and there has been no significant difference between that in 2010 and that in 1994 (before privatisation) (Figure 25).

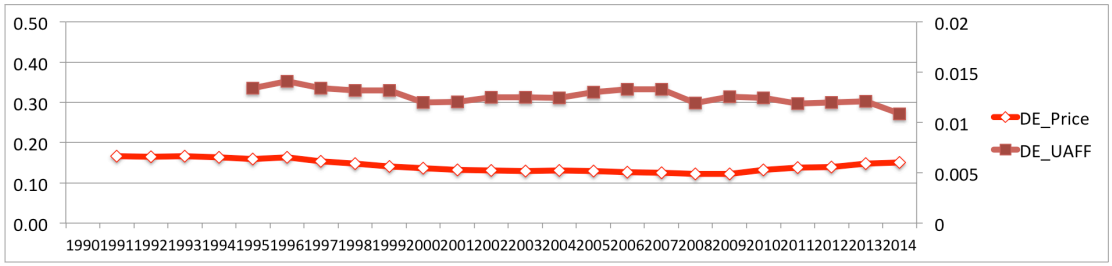

Figure 23 Electricity Price and Unaffordability in Germany

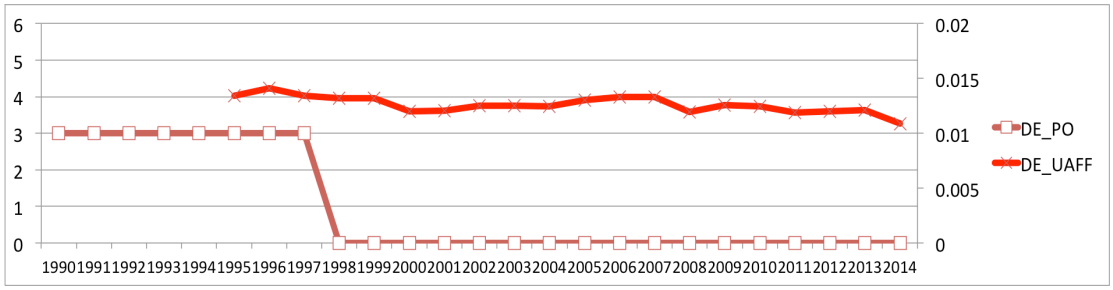

Figure 24 Public Ownership and Unaffordability of Electricity per Capita in Germany

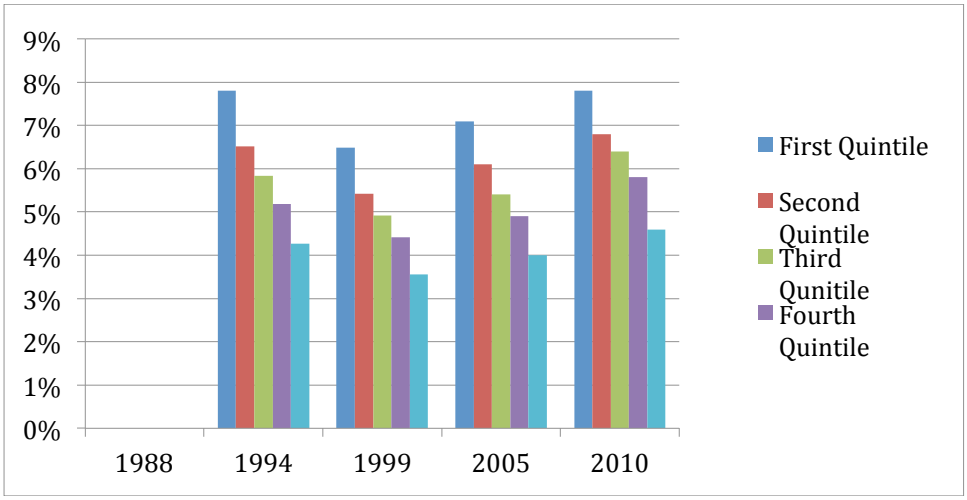

Figure 25 Affordability of Electricity for Household Income Group in Germany

FRANCE

France transposed the EU Electricity Directive 96/92 in 2000 and thereby launched the liberalisation of the electricity sector in France. However, the changes in legislation did not substantially affect the position of EDF (Électricité de France), the former public utility. Only with the further liberalisation stemming from the subsequent Electricity Directives in 2003 and 2009 respectively the sector opened up. Today, 85% of EDF's shares are hold by the French state and EDF is responsible for about 95% of electricity supply. Due to the fact that electricity supply has long tradition as 'service public', the task of electricity supply is subject to a concession regime. The concession is granted by local authorities for a defined territory. Under that regime EDF is responsible for about 90% of electricity supply.

The transmission system of France is operated by a single transmission system operator (TSO), namely Réseau de Transport d'Électricité (RTE). RTE is a limited liability company and a subsidiary of EDF, who holds all the shares. The companies are under supervision of various regulatory authorities. Two main distribution system operators (DSOs) are responsible for the operation of the distribution system, Électricité Réseau Distribution France (ERDF), which is also a EDF subsidiary and SORÉGIES Réseau de Distribution. Additionally, there are about 150 small distribution companies.

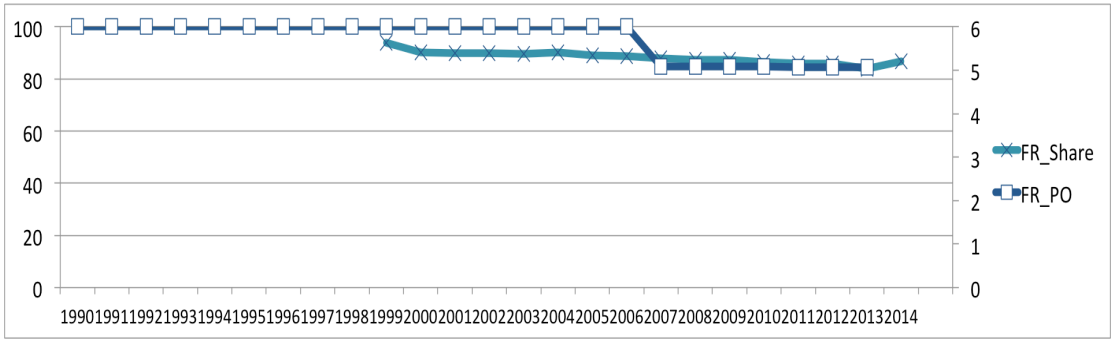

Figure 26 Public Ownership and Market Share of the Biggest Power Company in France

It is not surprising to see little change in public ownership and market share of EDF. EDF remains controlled by the government and of nearly 80% of the market. The bill then should be mainly affected by the investment from the state and EDF as the result. Figure 21 then shows marginal reduction in the real costs of power bill. Interestingly, from 2007 when customers have a choice of power providers, the proportion of electricity bill for average consumer started to pick up (Figure 21). It could be explained by the fact that competition in the retail market comes with additional costs of marketing and legislation, which are then passed onto the consumers.

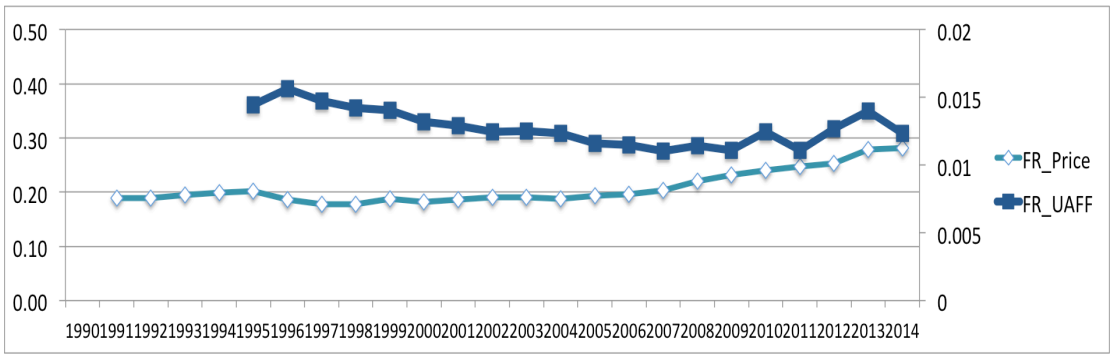

Figure 27 Electricity Price and Unaffordability in France

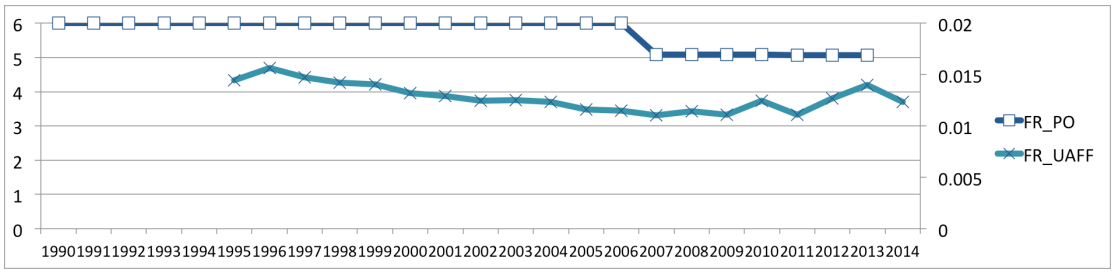

Figure 28 Public Ownership and Unaffordability of Electricity Per Capita in France

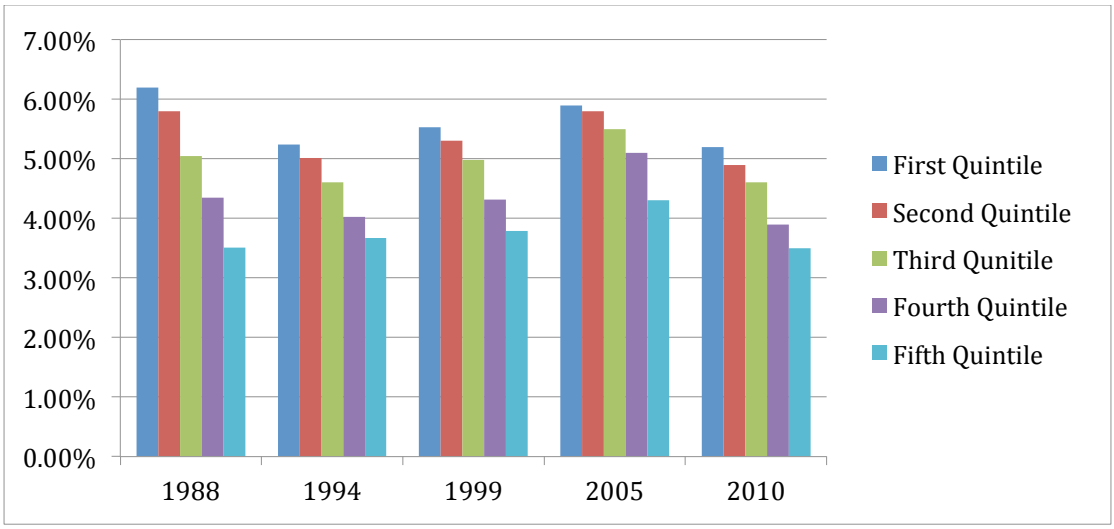

Figure 29 Affordability of Electricity for Household Income Group in France

(Note: 2010 Data for Italy unavailable)

Regarding the services, whilst frequencies of interruptions have marginally decreased over the years, the duration of such interruptions has fluctuated significantly. T&D losses during this period also show a resonation with this instability in SAIDI. Knowing that the transmission network is state-owned, it is difficult to say that the changes in public ownership relate to the instability of the market and provision of generated output.

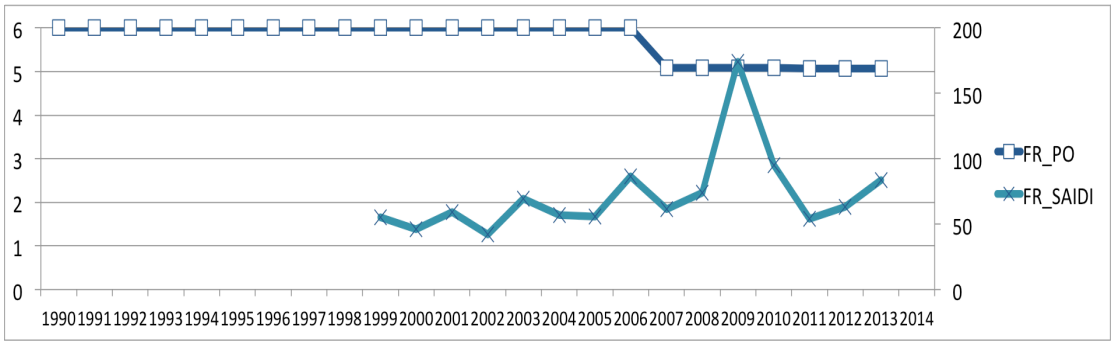

Figure 30 Public Ownership and SAIDI in France

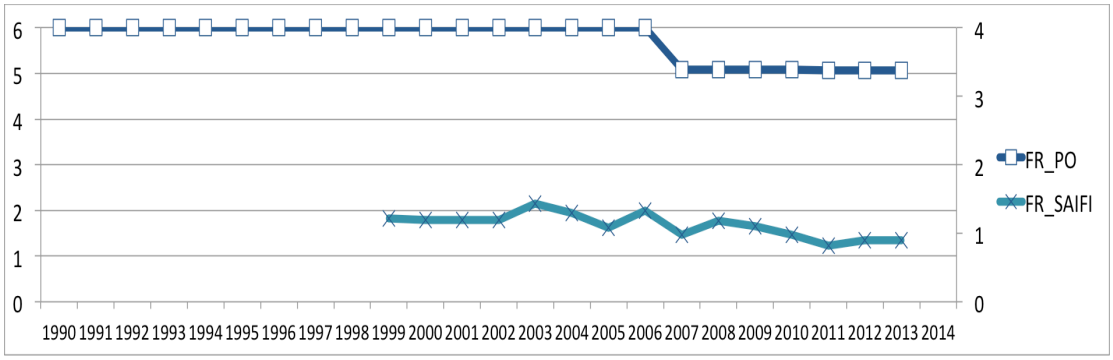

Figure 31 Public Ownership and SAIFI in France

CONCLUSIONS

Liberalisation of the electricity sector often implied the partial or total privatisation of the incumbent company. Contrary to the early common belief that this change could improve the affordability of electricity supply for households, this paper suggests that the story is more nuanced. Indeed, the share of electricity expenditure for low income household customers did not clearly decrease in the period considered.

Similarly, reliability of electricity supply after strong improvements in the 1990s almost stagnated in recent years, with some cases of short lived deterioration. Therefore, we can conclude that the reduction of public ownership was at least partially correlated with a more reliable service. However, since distribution is not always unbundled and issues of reliability much depend on the distribution segment of the supply chain, we cannot totally exclude the relevance of other factors.

In conclusion, at the beginning of this millennium European households appeared to be better off. However, subsequent developments cast doubts that such improvements are linked mainly to the new ownership structure of the electricity industry. The emergence of the prosumer paradigm and the smart grid add further complexity to this picture and may reduce the relevance of the ownership structure of the incumbent for the welfare of household customers.

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