REGULATORY BENCHMARKING IN CENTRAL EUROPE: CURRENT PRACTICE AND POSSIBILITIES OF DEVELOPMENT FOR THE ENERGY SECTOR

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Benchmarking is a technique of performance evaluation in which comparisons are made to benchmarks that represent external performance standards. In the field of regulation of public utilities, benchmarking can be used as an element of performance-based regulation or as a pure regulatory method, called yardstick competition. In the absence of competition, benchmarking can be used to simulate competitive pressures by comparing a regulated firm's performance against an efficient standard.

The aim of this paper is to examine the Central European regulatory benchmarking practices in the energy sector, namely the electricity and natural gas distribution industries, and to analyse the possibilities of further development of regulatory benchmarking in this region. The countries onto which we focus are Czech Republic, Slovakia, Hungary, Poland, Germany, Austria and Switzerland. In the region of Central Europe there are still significant differences between countries, especially in terms of experiences in modern regulation, regulatory methods and practices, level of economic development etc. Differences are considerable especially between Western countries (Germany, Austria and Switzerland) and the countries of former Eastern Bloc (Czech Republic, Slovakia, Hungary and Poland). As a result, the degree of the use of regulatory benchmarking is also very diverse within this region.

In the first part of the paper, we develop basic theoretic concepts of economic regulation. Then we describe the most frequently used regulatory methods – cost-of-service regulation, incentive regulation and yardstick competition – and we deal with common regulatory benchmarking techniques, describe their principles and main challenges. Subsequenty, we provide an overview of regulatory methods and benchmarking practices for each country in the region of interest. In the final part of the paper, we analyse the challenges and possibilities for further development of regulatory benchmarking in the Central Europe.

We have found that except for Switzerland, all Central European regulatory regimes are based on some form of incentive regulation. The most sophisticated methods of benchmarking are used in Germany and Austria. In these countries, benchmarking is used in both electricity and natural gas industries. The Polish regulator is using a benchmarking method in cost efficiency analysis in electricity distribution. In Hungary, a specific method of benchmarking is used. In Switzerland, no benchmarking is used at present. In Czech Republic and Slovakia, some principles of benchmarking are adopted, but not directly to the revenue requirements setting. We summarize that the possibilities for development of regulatory benchmarking in the Central Europe could be extended by reducing market concentration, unbundling large vertically integrated companies, establishing a closer cooperation with the private sector and closer harmonization of regulatory frameworks.

Keywords: regulatory benchmarking, public utilities benchmarking, Central European utilites, public utilites regulation, regulatory framework
JEL Codes: L43, L51, L9

1. Introduction

Energy sector, which traditionally includes electricity, gas and heat industry, has some inherent characteristics which result in state regulation of energy utilities. Contemporary trends, such as privatisation, mergers, legal unbundling, separation of competitive and non-competitive segments produce new challenges for regulation in Europe. The main purpose of economic regulation is to achieve competitive results in an environment where competition is (for various reasons) not feasible.

An efficient competition puts a company under pressures, sometimes reffered to as „carrot and stick". The carrot means that if a firm produces at lower costs than its competitors, then its profits will be higher. The stick means that an unability to keep costs below its competitors will make the firm go out of business in long term. Regulatory commisions, willing to achieve maximum efficiency, therefore face the challenge to simulate competitive pressures, which should induce a company to behave as if it were exposed to real competition. However, traditional methods of regulation do not provide sufficient incentives for utilities to increase productivity in a quest for lower costs.

Regulatory benchmarking is an element of incentive regulation that can be used to set efficiency requirements based on a relative efficiency assessment. This paper examines the actual practice in central Europe (ie Czech Republic, Slovakia, Hungary, Poland, Germany, Austria and Switzerland) and possibilities of improvement in the field of regulatory benchmarking within this region.

2. Basic concepts of economic regulation

Regulation usually takes place when (Phillips, 1993)

- competition is feasible but does not last long, so a competitive output is not achievable;
- competition is feasible but a competitive output is not achievable due to market imperfections;
- competition is feasible and a competitive output is achievable, but with regard to the social welfare this output is not sufficient.

Usually, regulated companies have characteristics of natural monopolies, although not all of them (eg trucking in the United States). Market conditions are constantly changing – new technologies are being developed, market size is changing – so a demise of natural monopoly is almost never excluded.

Public utilities often have the following properties (Bonbright, 1961):

- inherent economies of scale and scope;
- essential product with a low price and cross elasticity of demand;
- capital-intensive production, the product represents an essential input for other industries of the entire economy;
- non-storable and non-transferable product, synchronous production and consumption, excess capacity, fixed connection with customers;
- variable and seasonal character of demand;
- obligation to serve all customers who are able and willing to pay for the service (public service obligation).

Following the concepts of natural monopoly or destructive competition (Kahn, 1988) or for social reasons, governement may decide to regulate price level, quality-of-service, market entry and exit conditions and impose public service obligations.

This paper focuses on price (tariff) regulation. The main task of regulatory agencies is to set a price level that mimics the competitive price level. However, when competition is not feasible, this is a formidable task. The situation of natural monopoly tariff setting is illustrated below.

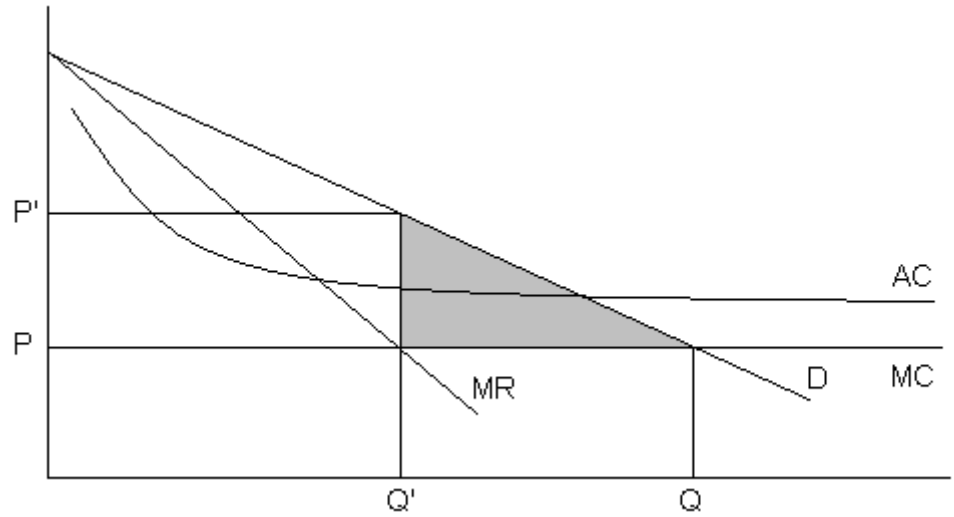

Figure 1: The concept of natural monopoly

Source: Lesser, A., Giacchino, L. Fundamentals of Energy Regulation. Vienna, Public Utility Reports, 2009.

In conditions of natural monopoly, the curve of average costs (AC) is decreasing due to the economies of scale. Monopoly power causes that the marginal revenues curve (MR) has a lower slope than the demand curve (D). The competitive output (Q) and price (P) is achieved at the intersect of demand (D) and marginal costs (MC). However, if the price was set at P, total revenues ($P \times Q$) would not cover total costs ($AC \times Q$) and the company would eventually go out of business. The task of regulators is to achieve competitive output and to allow the regulated company to cover its costs and achieve a reasonable rate of return on its capital.

3. Basic methods of tariff regulation

Traditional tariff setting is based on revenue requirements (RR) that should allow a company to cover its expenses and have a reasonable rate of return on its invested capital. Eligible expenses must be „prudent", „known and measurable" and „used and useful" (Lesser, 2009). All other expenses are excluded from revenue requirements.

Usually, revenue requirements for a regulatory period (typically 5 years) are calculated using the following formula (Lesser, 2009):

$$RR = O\&M + A\&G + T + D + (WACC \times RB), \quad (1)$$

where *RR* denotes revenue requirements, *O&M* denotes operation and maintenance costs, *A&G* denotes administration and general costs, *T* denotes taxes, *D* denotes depreciation and amortization, *WACC* is the weighted average cost of capital (after taxes) and *RB* denotes regulatory asset base (sum of assets book value and working capital).

A classical **cost-of-service regulation** (COS regulation) is based on summing eligible expenses and calculating a required rate of return. This approach has several disadvantages – information asymmetries between regulator and regulated companies, incentive to overinvest (A-J-W effect) or to invest imprudently (gold plating) – and does not simulate competition pressures, especially the above-mentioned „stick".

The aim of **incentive regulation** (performance-based regulation, PBR regulation) is to reduce the impact of information asymmetries and to provide a stronger incentive for a company to reduce its costs. Usually, it is based on a price cap or a revenue cap. For each year, the regulatory agency limits the price level or revenues. The regulated company is motivated to reduce its costs in order to increase profits. The revenues are capped according to the inflation rate (RPI-factor) and

efficiency factor (X-factor), that's why this method is also called RPI-X regulation. However, if the cap is set also according to a company's own costs, then the negative effects of COS regulation (overinvestment, gold plating etc.) are not fully eliminated.
In a competitive environment, a firm's earnings are related to the industry average and to the firm's relative market position. A firm has to reduce its costs below its competitors in order to survive. Setting the cap with respect to the performance of other companies is the main principle of the third regulatory method, **yardstick competition**, which is based entirely on regulatory benchmarking.

4. Regulatory benchmarking

The idea of regulatory benchmarking is that a firm's revenue requirements should not be based on its own costs, but rather on a relative efficiency measurement (Schleifer, 1985). The objective of benchmarking is to establish a system that determines a firm's efficient revenue requirements based on measuring a firm's efficiency against a reference performance. If correctly applied, this approach eliminates the negative consequences of information asymmetries. Regulatory benchmarking can be used to determine both price and quality efficient levels.
However, some issues arise when applying this approach. Firstly, regulatory agencies have to choose an adequate sample of firms, but firms and their environment tend to be heterogeneous. Difficulties also arise in gathering and comparing data. Thirdly, modelling can become more and more costly and marginal benefits of more accurate price setting can be overwhelmed by marginal costs of doing so. Fourthly, regulated firms could agree to act in some collusive fashion and to manipulate with data together. Fifthly, a threat of going out of business has to be credible, but governments usually tend to protect utilities from bankruptcy (Lesser, 2009). Sixthly, adequate methods have to be chosen.
A utility's performance can be measured in three basic areas: quality, efficiency and productivity. Productivity is measured as a ratio of output and input. These indices can be based on partial indicators (labour, costs etc) or total factor productivity (TFP), but issues resulting from heterogeneity prevail.
In regulatory practice, frontier methods for estimating efficiency are the most widely used. Cost frontiers define minimum cost level of producing a given output with a given input. Inefficiency is then represented as the distance of a company from this frontier.
Deterministic methods (OLS, COLS, MOLS) assume that all data can be observed. OLS (ordinary least squares) is a classical technique of estimating cost frontiers: it is an estimate of an average cost function of a sample of firms based on the relationship between total costs and other variables (market conditions, area, grid length etc). Statistical analysis can be used to isolate the impact of specific conditions. This method can be used in the case of companies with relatively similar cost structure and requires large data sets to obtain reliable results. COLS (corrected OLS) is a modification of OLS, with a shift of the frontier towards the best performing company. MOLS (modified OLS) is less restrictive than COLS with a slighter shift of the cost frontier.
Stochastic methods (stochastic frontier analysis, SFA) take into account possible measurement errors and chance factors. An estimate of noise distribution has to be made for each observed firm. Typically, higher efficiency scores are achieved than when using deterministic methods.
Data envelopment analysis (DEA) is a method in operations research. It is based on comparison of multiple variables (costs per customer, costs per km of grid etc), searching for points with the lowest unit costs and connecting these points to form an efficiency frontier. Companies not on the frontier are considered inefficients. As with above-mentioned methods, inefficiency is represented by the distance of a company from the frontier.

5. Benchmarking in the Central Europe: an overview

In this paper, we focus on regulatory benchmarking practices in following countries: Czech Republic, Slovakia, Hungary, Poland, Austria, Germany and Switzerland.

Czech republic

The Czech energy regulatory agency (Energetický regulační úřad, ERÚ) is using a revenue-cap incentive regulation. To determine revenue requirements, an ordinary RPI-X regulatory formula has been used, where certain parameters (WACC, D/E ratio, beta coefficient) and X-factor were determined using simple benchmarking methods. As the Czech energy market is relatively small, foreign experiences have been used. For example, the beta coefficient was set as an average of comparable european firm‘s beta from abroad. However, revenue requirements are being set based on a firm’s own costs, which causes that issues of traditional regulatory methods are not eliminated. No true regulatory benchmarking was used (ERÚ, 2009). The number of firms operating on regulated markets is relatively low.

Slovakia

The Slovak energy market is regulated by the Agency for regulation of network industries (Úrad pre reguláciu sieťových odvetví, ÚRSO). Price regulation is based on a traditional price-cap incentive regulation. Prices are set individually according to regulatory formula which takes into account price inflation and X-factor (ÚRSO, 2008). The formula and its parameter setting are very similar to the Czech ones. No true regulatory benchmarking was used. The regulated markets are very concentrated, for instance, only one pipeline (Slovenský plynárenský priemysel) is operating in natural gas regional distribution. The price caps in gas transportation and gas storage are based on comparing Slovak tariffs with EU tariffs (ÚRSO, 2009). The analysis has to take into account only similar european firms, with regard to geological, technical and other (working capacity, injection rate and production capacity) characteristics.

Hungary

Similarly to the Slovak ÚRSO agency, the Hungarian energy regulatory agency (Magyar Energia Hivatal, MEH) is using a price-cap RPI-X incentive regulation for the electricity sector. Unlike ERÚ and ÚRSO, MEH calculates regulatory formula parameters (beta, WACC etc) based on Hungarian local conditions, such as BUX stock exchange index and companies stocks (MEH, 2009). D/E ratio is determined using domestic benchmarking. In the field of natural gas and electricity transportation and distribution, a relatively complicated but promising non-frontier benchmarking system has been used to determine allowed operational costs. Before benchmarking, costs were corrected in order to mitigate regional differences (wages, consumer structure) and geographical and technical differences. Average (benchmark) operational costs were then incorporated into revenue requirements. Both international and domestic data have been used (Haney, 2009). A simple frontier technique has been used in setting quality requirements, where desired quality performance has been calculated from average values over a short period. Failure to comply with these standards was penalized, although there was a 5% tolerance in order to mitigate chance factors (Tersztyanszky, 2005).

Poland

The Polish energy market is regulated by the agency Urząd Regulacji Energetyki (URE), but rules of tariff setting are determined by the Ministry of Economy (Ministerstwo Gospodarki). A price-cap RPI-X incentive regulation has been used. As the Polish energy market is relatively large, benchmarking methods are more easily appliable. However, there are only a relatively few companies are operating on the market, with regard to the total country area and population. Benchmarking has been used only in the field of electricity distribution. Electricity transmission and gas transportation and distribution are not regulated using benchmarking techniques.

As benchmarking technique, a Bayesian random effect model (a SFA method) in cost efficiency analysis was used. A DEA or COLS methods are in consideration for the next regulatory period (Haney, 2009).

Germany

The German energy market is significantly larger (in terms of system operators) than the above-mentioned markets. It is regulated by Bundesnetz-agentur (BNetzA). A revenue-cap RPI-X regulation has been used since 2009. BNeztA uses a regulatory formula which contains a general and an individual X-factor. The individual X-factor is determined using benchmarking DEA and SFA methods fot both electricity and gas industries. The two methods are applied to two cost bases and a „best-of-four" scheme is then applied: out of four results, the efficiency score that is the most favourable to a company is taken to calculate its individual X-factor. A total controllable expenditures (totex) benchmarking has been used, in contrast with UK, where operational costs (opex) and capital costs (capex) are treated separately.

After benchmarking, an intransparency has remained, so legal steps by many operators have been undetaken.

Austria

The Austrian regulatory agency Energie-Control (E-Control) is using benchmarking methods for both electricity and gas industries. As in Germany, the Austrian energy markets is much less concentrated than in other previously mentioned countries and there is a large number of system operators in the market. Domestic and international data have been used for regulatory benchmarking. As in Germany, total expenditures (totex) are taken into consideration. The regulator has been using DEA and MOLS methods. DEA and MOLS give different results, which are then weighted using a „weak-of-method": the better results gets weighted by 60%, the worse result by 40%. Contrarily to Germany, benchmarking results were widely accepted by regulated companies.

Switzerland

Having only a short history of regulation, the Swiss energy regulatory framework is carried out by multiple institutions – for example the ElCom regulatory agency, the association of companies operation in the electricity sector - Verband Schweizerischer Elektrizitätsunternehmen (VSE), Bundesamt für Energie (BFE) and more.

As natural gas plays only a minor role in the Swiss energy industry, tariffs in the gas sector are not specifically regulated, but they must comply to the national antitrust law. Tariffs for electricity distribution have been regulated based on a rate-of-return (COS) method. The methodology has been co-prepared by the VSE association, so regulated firms have been directly involved into the regulatory process. Due to a large number of companies involved in distribution sector, possibilities for benchmarking are considerable, but still it is not used.

6. Conclusion

Regulatory methods differ across the region of Central Europe, but except for Switzerland all of them are based on some form of incentive regulation. Regulatory benchmarking can be used as an element of incentive regulation or as a pure regulatory method (yardstick competition).

The most sophisticated methods of benchmarking are used in Germany and Austria, where energy markets are developed and a large number of firms are operating on the market. In these countries, benchmarking is used in both electricity and natural gas industries. The Polish regulator is using a SFA method in cost efficiency analysis in electricity distribution. However, the Polish energy market is still very concentrated, which limits the possibilities of further development of domestic benchmarking. In Hungary, a non-frontier method of benchmarking is used. The Hungarian energy market is relatively small, causing the need for data from foreign

companies. In Switzerland, no benchmarking is used at present. In Czech Republic and Slovakia, some principles of benchmarking are adopted, but not directly to the revenue requirements setting. These markets are small and relatively concentrated.
The possibilities for development of regulatory benchmarking in the Central Europe could be extended by reducing market concentration in order to obtain a larger sample of firms. Domestic benchmarking is more accurate due to more similar environment (including political and economic conditions, legislation, regulatory framework etc). However, long time series are not obtainable, due to only a short history of modern regulation in most countries (notably those from the former Eastern Bloc). In addition, large vertically integrated companies are still present in the markets, which complicates the separation of regulated and non-regulated activities. An unbundling of these companies would facilitate data collection and comparability. A cooperation with the private sector is needed in order to establish an acceptance of the benchmarking results, which would reduce court costs due to companies undertaking legal steps. A closer harmonization of regulatory frameworks would slightly reduce the disparity of companies and data gathered. Although regulatory agencies are members of pan-european organisations such as ACER or CEER, regulatory policies remain still in the hands of individual countries.

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