

SYSTEMATIC APPROACH TO ECONOMIC REGULATION OF NETWORK INDUSTRIES IN ESTONIA

Raigo Uukkivi, Märt Ots, and Ott Koppel

Tallinn University of Technology

Abstract. Naturally monopolistic network industries such as railways, water and sewage, district heating and electricity infrastructure etc. are often subject to economic regulation in order to avoid wasteful duplication and to restrict monopolistic behaviour in the industry. A variety of different regulatory approaches have emerged as a result. The volume of empirical studies on the effects of economic regulation is increasing, yet the application of results to different environments is limited due to very context-based nature of regulatory instruments and interactions. In order to support more active analysis of local circumstances, this paper systematises and presents the institutional framework and practices of economic regulation of network industries in Estonia in a comprehensive manner. The authors analyse the composition of relevant industry sectors, the evolution of legislation and sector-specific regulators. Individual regulated services in different network industries are identified, detailed regulatory practices elaborated on, and volume of regulatory decisions is compiled accordingly.

Keywords: economic regulation, access to market regulation, price regulation, natural monopoly, network industry

DOI: 10.3176/tr.2014.3.02

1. Introduction

Modern society is a regulated system where governments actively intervene in how various spheres of human life are organised. Regulations are put in place to shape and develop markets in a way society deems just and favourable. It is widely accepted that we live in an age of the ‘regulatory state’ and the R-word has penetrated ever more domains across countries (Baldwin et al. 2012:2).

The economics of regulation is a wide and diverse topic as government intervention in markets has been subject to extensive scholarly research and debate. The fundamental basis of such work is traditionally associated with the

dichotomy between public interest theory and public choice theory, and handling of the concept of market failure.

Public interest and public choice constitute two alternative explanations of how human behaviour and motivation impact the objectives and outcomes of regulation. Both theories have attracted a lot of scholarly attention. The idea that particular circumstances systematically cause price-market institutions to produce sub-optimal productive or allocative outcomes (i.e. the markets 'fail') was first introduced in regulatory economics by Bator (1958). A very comprehensive academic account about different types of market failures and corresponding regulation is provided in Breyer (1981). An outstanding discussion of public interest principles is available in Posner (1974), Hantke-Domas (2003) explains recent developments of the theory. Contradictory relationship between individual preferences and aggregated public values is explained in the seminal work of Arrow (1970). Stigler (1971) and Mueller (1976) both give an excellent overview on the earlier public choice literature; Light (2010) provides a good contemporary account.

Although different schools are at odds on a number of phenomena, Shepherd argues that the core of the scholarly debate on regulation comes down to the meaning of *effective competition*. Effective competition is the prime factor of efficiency, innovation and fairness of markets but its nature is debatable, and its concepts are frequently criticised by those who hold market power but wish to deny it (Shepherd 1990:454). It can be said that, as of the modern day, regulation has reached a state of maturity both in an intellectual and in a practical sense. Intellectually, theoretical perspectives have developed into an impressive body of scholarship and, in practice, a distinct and expanding 'regulatory community' has developed that shares similar languages, concepts and concerns (Baldwin et al. 2012:2)

The development of regulatory 'microcosm' has been ambiguous in the context of economic regulation. Economic regulation attracted more attention in the Anglo-Saxon tradition than in continental Europe because it was in the former where previously untested economic policy tools were pioneered on public utilities. Developments in continental European countries were slower and received gradually more focus due to economic regulatory initiatives taken by the European Union.

The evolution of economic regulation has produced a large variety of approaches and regulatory institutions in different countries, making it therefore critical to fully understand how regulation actually works. For that reason, empirical evaluation of economic regulation has become the mainstream of academic work during the last decade. Coglianesi notes that recent years have also evidenced a number of governments establishing formal procedures to analyse new regulatory proposals before they are adopted. Nevertheless, there is still a relative lack of attention to analysing regulations after adopting or evaluating the impact of the whole regulatory process (Coglianesi 2012:7).

One reason for that could be that the evaluation of the effects of a regulation is a complicated exercise due to complex interactions that are involved in regulatory processes. Rose argues that the impact of economic regulation depends critically upon its particular institutional form and the characteristics of the industry under evaluation. Measuring the impact of regulation requires as much attention to the details of how regulators operate as to the prescribed legal form of the regulation (Rose 2001:12957). An opportunity to apply same research designs or compare results of researches completed in different institutional and legal environments is therefore limited.

In Estonia, specific regulatory institutions emerged relatively recently and the lack of evaluation of regulatory development is obvious both on administrative and academic level. There are few authors who have addressed elements of economic regulation in Estonia. For example, Eerma and Sepp (2006) discuss the relationship between and complementarity of competition policy and sector-specific regulation with regard to market entry. Eerma (2013) takes that further by elaborating on different institutional arrangements of sector-specific regulation and competition regulation using certain industry examples in Estonia. Sepp and Eerma (2011) describe economic policy choices and developments in a bundle of Estonian industries that exhibit natural monopoly characteristics or universal service obligations, and Sepp and Ernits (2012) address liberalisation and promotion of competition in postal sector. A common characteristic of that research, however, is its attention to more general economic policy tools in monopolistic industries. Competition law and sector liberalisation (i.e deregulation) is the particular focus of the research, whereas economic regulation aspects get very limited attention both across different industries and regulatory practices. Moreover, the authors of this paper note that empirical evaluation of the effects of economic regulation in Estonia has been completely absent.

Thus, the objective of this paper is to open scholarly discussion on economic regulation in Estonia, systematise the existing knowledge on the topic, and prepare the ground for *ex post* analysis of the effects of economic regulation. The authors seek to explain institutional, legal and procedural interactions of economic regulation across different network industries in Estonia in a comprehensive manner. The analysis would serve as a robust cross-sectorial framework and support further studies of regulatory outcomes between time periods and more detailed subsets of legislative rules. The following objectives have been set:

- Firstly, the authors identify, conceptualise and explain institutional environment where economic regulation is delivered, and how relevant authorities and legislation of different network industries in Estonia have evolved to their current form.
- Secondly, the authors systematise individual regulatory processes and the output of regulatory decisions the institutional framework of economic regulation in Estonia has produced over the period of its existence.

The applied research methodology consists of periodisation, systematisation and analysis of relevant legal acts and documents (laws, decrees, administrative

guidelines, administrative directives etc.) accompanied by appropriate generalisations, discussion and conclusions. Archives of the Estonian Technical Regulatory Authority, the Estonian Competition Authority, and their preceding government authorities, government section of State Archives and Riigi Teataja database are the main sources of document material for the analysis.

2. Overview of literature on economic regulation of natural monopolies

2.1 The objectives and tools of economic regulation

The scope of regulations in a modern society is broad and delivered via a number of enforcement frameworks. This paper focuses on economic regulation that deals with regulating access to and prices in a naturally monopolistic industry or sector. The authors apply traditional distinction between economic and social regulation where the latter addresses issues such as protecting environment and human health, enhancing safety etc. Rose puts that economic regulation constitutes the most extreme form of government intervention in the markets. Competition, tax and trade policies, as well as most other regulations, shape but do not replace the market. In industries subject to economic regulation, government agencies exercise considerable control over firms' access, pricing, investment and product choice decisions. Market outcomes are replaced by administrative decisions (Rose: 12957).

Economic regulation framework is set by a combination of direct legislation and administrative rules, and it is imposed by certain sector-specific institutional arrangement (i.e. a 'regulator'). It should be noted that, contrary to some authors, for example Ogus (2004), this paper does not treat governance and ownership choices as economic regulation tools. Although such ideas usually imply that government or public administration can more easily impose certain thinking patterns on publicly owned companies, the authors believe that this is not necessarily true. Anti-competitive behaviour is not attributable to a particular form of ownership, be that public or private, but rather is driven by the ability to do so. Our observations from the Estonian publicly owned natural monopolies in several sectors do not suggest different behaviour patterns compared to privately owned ones.

Academic study offers a number of positive and normative theories by different schools in economics and political economy on whether economic regulation is justifiable and how it changes the market outcomes. Primary objectives of regulation are to promote competition and to enhance social welfare (Armstrong and Sappington 2006:4). Nevertheless, whether regulation is able to deliver such benefits in real life has always been heavily contested because phenomena such as vague property rights, regulatory capture and collusion, principal-agent problem etc. can substantially change the outcome of regulation. Although it is currently widely accepted by academic discourse that natural monopolies require regulatory oversight, normative theoretical aspects focusing solely on static efficiency argu-

ment are of little practical interest to this paper. Regulation indeed is a political act (Braeutigam 1989:1299), and is, therefore, implemented for reasons that appeal to those in power, be that the existence of natural monopoly or something else. It is our practical observation that governments in Europe extensively regulate non-competitive markets and Estonia is no exception to that pattern.

2.2. 'Natural monopoly' considerations in network industries

The need for economic regulation is primarily associated with the market failure of non-competitive markets where effective competition is by definition the scarcest. Gellhorn and Pierce explain that in theory such environment leads to socially sub-optimal prices, production volumes and income redistribution (Gellhorn and Pierce 1999:36–37). Non-competitive markets are, however, a wide category that includes market structures with different levels of market power consolidation. It should, therefore, be noted that a 'monopoly' is a rather generalised concept for describing evolution and outcomes of substantially different market processes that can last for different time periods. For example, a monopoly can be granted by legislation, be acquired through competitive or anti-competitive behaviour etc.

Baumol (1977) defines the so-called natural monopolies where, in contrast to an ordinary monopoly, competition would result in wasteful duplication of resources and higher costs. A natural monopoly involves an operation that requires a substantial infrastructure component with respective economies of scale and decreasing average costs, making it less costly for a society to have such market served by a single firm instead of many.

Economies of scale, however, do not satisfactorily describe natural monopoly in a multi-product environment. For this reason, Baumol, Panzar and Willig have proposed the concept of cost subadditivity. Subadditivity characterises industries where a single firm can supply the whole market with lower cost per production unit than any other combination of several companies (Baumol et al. 1977:352). Strict cost subadditivity requires both economies of scale and economies of joint production in a multi-product situation. The latter represents a situation where the total cost of producing individual products by separate firms is greater than the total cost of having them all produced by the same firm (Tirole 1988, in: Shughart 2003:15). Therefore, a natural monopoly relates to complexity of technology of supply in a particular industry and not to the actual number of companies in a market (Posner 1999, in Shughart 2003:14).

It is important that provision of goods and services through a naturally monopolistic technology may involve parts that are inherently competitive as the economies of scale phenomenon may only affect one part of a given process (Ogus 2004:31). For example, in the context of network industries, a transmission network is needed for enabling a service or a good to be consumed by connecting the point of production to the point of consumption. Such industries like electricity and gas transmission and distribution, water supply and sewage services, and district heating, especially satisfy the economic criteria for a natural monopoly.

Cogman argues that most transmission networks are natural monopolies due to the technical complexity of their operation (Cogman 2001:2). A production part of the same service or good, however, may inherently be competitive (e.g. generation of heat or electricity).

3. Institutional framework of economic regulation in network industries in Estonia

3.1 Establishment of institutionalised economic regulation in Estonia

The following chapter presents the evolution of legal norms and institutions of economic regulation in Estonian network industries as a single framework. For that purpose, the authors briefly discuss natural monopoly considerations of network utility's technology and then provide an overview of circumstances that existed before the economic regulation was introduced. Further, the authors elaborate on the key legislation and institutional setup in all network industries.

The authors consider the establishment of a sector-specific regulation, specifically a regulator, as being the primary factor for the coherent delivery of economic regulation that can be studied via scientific methods. Therefore, the following considerations must be noted. First, some sectors had institutional outside-the-company pricing mechanisms also during the period that the authors define as pre-regulation. The pricing principles during of the mentioned time, however, were of arbitrary and political nature, and often lacked substance of economic regulation. Arbitrarily and politically delivered economic regulation is out of scope for this study. Second, competition law includes general provisions that prohibit market dominating companies engaging in predatory pricing. Although such clauses in principle support similar objectives as sector-specific legislation on price regulation, its delivery mechanism and tools are completely different from an active implementation of economic regulation, and not included in this analysis.

Estonia chose the path of liberal economic and industrial policy soon after regaining independence in 1991, and established market forces in several network industries. State-owned enterprises were formed and many of them later privatised at a pace that was unprecedented in continental Europe. Infrastructure monopolies at a local scale (e.g. district heating and water utilities) were mostly transferred to municipal ownership.

Economic regulation in Estonia was introduced almost simultaneously in a number of different sectors by the start of accession negotiations with the European Union in 1997. The need to harmonise the Estonian legislation with the European Union directives was obvious for railway, gas and electricity sector where the European Union had adopted an active intervention policy. The European Union's requirements in railway, gas and energy sector were transposed in Estonia with Energy Act (1998) and Railway Act (1999).

In contrast, services of localised nature such as district heating and water and sewage do not have industry specific legislation established at the European Union level. Regulation in those sectors has always been a domestic matter and, as a result, development path and the level of regulation vary largely in different countries. Nonetheless, Estonia established economic regulation in district heating and water and sewage sector at the same time and in the same manner as in the utility sector where the European Union directives apply. District heating economic regulation was included in the Energy Act and water and sewage sector economic regulation was passed with the Water and Sewage Act (1999).

In the following sections the authors outline and provide commentary on the three distinct development patterns of legislation and institutions of economic regulation in Estonian network industries. The results are summarised in Appendix 1.

3.2. District heating, electricity and gas

The technology of electricity, gas and district heating transmission and distribution grids has obvious natural monopoly characteristics as a substantial infrastructure component is required that is unreasonable and costly to duplicate. Power generation or gas supply to the network has viable alternatives and is therefore competitive.

It should be noted that there is a significant difference between electricity, gas and district heating market characteristics. The potential to increase the size of interconnected European electricity and gas market by integrating additional areas is theoretically limited only by the total consumer base, whereas the size of district heating market is always very local. Heat generation in a district heating system can in principle be also competitive whereby alternative heating sources are utilised to supply the network. Therefore, the argument depends on whether a sufficient scale of a single district heating supply network is achieved that would justify such competition in heat generation.

Incumbent monopolies such as Eesti Energia (Estonian Energy) and Eesti Gaas (Estonian Gas) are the most important companies in this segment. Most of the network operated in electricity and gas sectors is either directly controlled or spun off from these monopolies during several phases of restructuring. Both Eesti Energia and Eesti Gaas were established as vertically integrated state-owned enterprises in 1992, however, their organisational structure changed in different ways during the subsequent years.

Eesti Energia, among the biggest companies in Estonia, has always been under the control of the state. Its organisational development from 1997 tracks closely the evolution of the European Union's regulation in the energy sector. Eesti Energia transmission and distribution businesses, as well as oil shale mining were separated from power generation into different group entities. The gradual separation of organisational structure and management responsibilities within Eesti Energia group of companies continued until the transmission network operator, now called Elering, became a fully independent business under different owner-

ship in 2010. Eesti Energia distribution network subsidiary, Elektrilevi, has a distribution monopoly in most of Estonia with a market share of 87% (Eesti Konkurentsiamet 2013:17). Both Elektrilevi and Eesti Energia's oil shale company, Eesti Energia Kaevandused, are organisationally separate but are part of the Eesti Energia group of companies.

In contrast to Eesti Energia, the privatisation of Eesti Gaas was gradually implemented during several phases between 1993 and 1999. The company became 100% privately owned in 1999. Its transmission and distribution networks were vertically integrated within the Eesti Gaas group until 2012, and later reorganised into separate independent limited companies. Eesti Gaas retains a monopoly of gas transmission network in Estonia but faces intermodal competition from alternative providers of energy sources.

From 1991 to 1998, the price setting system in district heating, electricity and gas sectors was mixed and prices were authorised by governmental or municipal decisions. There were no specific regulations on how such price setting should be conducted and no coherent economic regulation practices emerged. Decisions were based on incoherent grounds and considerations, and were often politically motivated. The authors characterise the period between 1991 and 1998 in those sectors as without economic regulation, because it is retrospectively impossible to study the argumentative basis of those pricing decisions in a systematic manner.

Economic regulations in district heating, electricity and gas sectors were introduced in 1998 with passing the Energy Act and the creation of Energy Market Inspectorate, the first sector-specific economic regulator in Estonia. The regulation was divided into the following subsector-specific laws in 2003: District Heating Act (2003), Electricity Market Act (2003) and Natural Gas Act (2003), and has been amended afterwards to incorporate the requirements of the European Union. The Estonian Energy Market Inspectorate was reorganised to form the Estonian Competition Authority later in 2008 but the framework of economic regulation and its implementation has remained essentially the same. Legislative provisions in district heating, electricity and gas address both the principles of entry to naturally monopolistic infrastructure market as well as price regulation.

3.3. Railway infrastructure

Railway infrastructure management has the textbook character of a naturally monopolistic network as it involves substantial capital investment and moderate variable cost resulting in decreasing average cost as output increases. Moreover, the management of important railway infrastructure in European countries has traditionally been publicly organised with considerations of public service provision, national security etc. often taking priority over pure economic performance. It is an institutionally conservative sector where change happens slowly and, although the provision of railway transport services is inherently a competitive sector, a substantial part of railway infrastructure and railway traffic operations is still controlled by incumbent state monopolies.

State-owned company Eesti Raudtee (Estonian Railways) was formed from a public agency at the beginning of 1992. It was reorganised to a company under full state ownership in 1997 and underwent several phases of restructure after that. As a result, Eesti Raudtee was transformed to a vertically integrated railway infrastructure and freight transportation business with the main economic focus on freight transit to Estonian ports. Other parts of the business that did not fit to that operating model were spun off and sold. South-west part of the railway infrastructure, approximately 25% of the total length of railway lines, was transferred to a separate railway company Edelaraudtee (South-West Railways), and privatised in 1999. About two-thirds of Eesti Raudtee was privatised in 2001. However, after years of disputes between the state and private investors over priorities and strategy of the company, the stake was bought back by the state in 2007. Both railway infrastructure companies have now achieved full organisational separation between the railway infrastructure management and railway transport operations.

As noted earlier, the start of Estonia's accession discussions with the European Union and gradual privatisation of Eesti Raudtee in 1997 triggered the establishment of economic regulation in Estonian railway sector. The first Railway Act that included provisions of economic regulation was passed in 1999. According to that, allocation of railway capacity and pricing was the responsibility of the railway infrastructure managers. The Estonian Railway Administration, the first independent regulator for railway sector in Estonia, was responsible for establishing a methodology for pricing the use of railway infrastructure and acted as a body of appeal in case of disputes. New economic regulation framework in this sector, however, did not change the *status quo* in the railway transport market. Pricing and access rules were vague and left railway infrastructure managers a lot of space for different interpretations of the rules. Incumbent monopolies *de facto* controlled the market and no access contracts were granted to new railway operators for a number of years.

A major change was introduced by the next version of the Railway Act effective from 2004. The principles of economic regulation remained largely similar, however, implementation and enforcement framework was substantially changed. Since then the railway infrastructure manager was no longer allowed to allocate capacity and determine pricing for the use of infrastructure if it had invested interest the traffic operations of the railway network. As stipulated in Railway Act (2004) article 63, capacity and pricing were determined by the regulator in these instances. Therefore, the new Estonian Railway Inspectorate received fully-fledged and active duties to implement economic regulation. The regulator did not follow the practices of how infrastructure managers had determined market access and pricing issues before and adopted a fundamentally different approach that resulted in years of legal disputes. Although the railway regulator was reorganised in 2008 and became part of the newly established Estonian Technical Regulatory Authority, and the Railway Act has been amended several times since it was introduced, economic regulation framework in Estonian

railway sector and the main provisions established by the Railway Act in 2004 have remained the same and remain in force today.

3.4. Water and sewage services

Water and sewage networks are closed supply systems with no technical interconnections between different infrastructures. The size of these markets is limited and natural monopoly aspects are similar to those in district heating sector. Distribution network of water and sewage industry is naturally monopolistic with decreasing average costs irrespective of the service area due to capital intensity of such infrastructure. The treatment of water and sewage could theoretically be set up as a competitive market if sufficient scale of service and consumer intensity is achieved on a network. This, however, is not the case in Estonia. Water and sewage is a 'local service' and most of the operating companies are owned by municipalities of respective service areas.

The evolution of economic regulation in Estonian water and sewage sector has been somewhat different from other network industries. General provisions of economic regulation in the form of authorising municipality councils to manage market access restrictions were first introduced with the Water and Sewage Act (1999) article 4. In contrast with other utility sectors outlined above, the Water and Sewage Act has been amended a number of times but never substituted with a comprehensive new piece of legislation since its inception.

Price regulation in the water and sewage sector attracts political meddling as it concerns most members of a community. Vague regulatory environment established with the first Water and Sewage Act in 1999 created a number of conflicts of interest in relation to the implementation of the framework. Pricing in water and sewage sector was particularly open to lobby and manipulation. Municipality councils were tasked to develop price setting methods and local governments were authorised to set prices based on these methods in their jurisdictions. This led to a myriad of different regulations and price setting practices in water and sewage sector throughout Estonia. Some municipal authorities kept the prices lower than the cost of providing these services to appeal to their electorate. This, however, undermined economic sustainability of water companies. Price regulation practices in water and sewage sector from 1999 to 2010 have large variations in terms of economic regulation merit with a lot of the weight on arbitrary agreements. For this reason, this paper classifies that period as a period without any economic regulation and excludes it from further review.

A big qualitative leap from the price regulation perspective occurred in 2010 when a comprehensive package of legislation amendments was passed. The Monopoly Price Restrictions Act amended laws on district heating, electricity market, water and sewage, and the penal code. It changed rules in many network industries, increased the authority of regulator and introduced new penalties for breaches. Water and sewage sector was influenced the most as the Estonian Competition Authority was given new sector-specific regulatory powers. The law limited that municipalities set prices only to water and sewage companies below

the threshold of 2,000 human equivalents and all operators above the threshold were to be regulated by the Estonian Competition Authority. As of 2014, the provision effectively means that approximately 60% of water and sewage companies in Estonia are regulated by municipalities and 40% by the Estonian Competition Authority.

4. Implementation of economic regulation in Estonian network industries

4.1 Access to market restrictions

The following systematises the implementation of economic regulation practices in Estonian network industries within the framework that was identified in the previous chapter. To provide for that, the authors analysed regulatory provisions of all relevant legislative and semi-legislative rules, identified individual regulated services and grouped corresponding regulatory decisions.

Theory prescribes that an entry to a naturally monopolistic market should be restricted to avoid the cost of infrastructure duplication. Restricting access to naturally monopolistic markets in Estonia is mostly implemented through standard provisions in sectorial legislation or municipal planning decisions without additional considerations or dynamic regulatory input from the regulator. For example, the District Heating Act (2003) articles 5 and 13 give municipality councils the authority to define district heating areas and assign monopolistic service providers. The Electricity Market Act (2003) article 26 section 4 and article 60 respectively allow to provide licence only to one electricity transmission network operator and give all distribution network operators a monopoly status in the service area of their infrastructure on the level of law. In the same manner, the Natural Gas Act (2003) article 301 section 2 allows to provide license only to one transmission network operator. In railway sector, Eesti Raudtee and Edelaraudtee railway networks were declared “public use railway infrastructures” by law already in 1999. The provision effectively refers to the infrastructure of national importance and covers approximately 2/3 of the total length of railways in Estonia. No additions or removals have been made in that category afterwards.

Consequently, the practices of access to market regulation in the sectors of interest have effectively been very static, and as a result lack necessary volume and variety of decisions that would warrant further analysis. Therefore, specific attention will be given to comparing price regulation practices.

4.2. Legal structure and economic principles of price regulation rules

The authors of this paper identified and analysed 10 individual services that have been subject to systematic price regulation in Estonia. The overview of the results is presented in Appendix 2. Those services are the following: access to public railway infrastructure, provision of heat to customers, provision of cogenerated heat to network, generation of electricity, production of oil shale,

provision of electricity to customers, electricity transmission and distribution, gas transmission and distribution, gas provision to residential customers (setting of sales margin only), provision of water and sewage services. The Estonian Competition Authority regulates prices of 9 of those services and the Estonian Technical Regulatory Authority is responsible for regulating prices of railway infrastructure service.

Fundamental framework of price regulation is stated on the level of law in all of the natural monopoly sectors. The Acts of Railway, District Heating, Electricity Market, Natural Gas, Water and Sewage articulate varying level of detail but the approach is essentially the same. Therefore, the reason for different use of terminology and wording in the above mentioned legal provisions remains unclear.

The laws set general principles that prices consist of allowable costs of production, depreciation costs and reasonable profit. This approach complies with what is referred to in academic literature as rate-of return type of price regulation. A more specific break-down of detailed rules on cost components are established by individual price setting methodologies.

Distinct differences between the sectors and services emerge on the legal status of price setting methodologies that vary from ministerial decree to administrative guideline. The overview of regulated services and corresponding rules is compiled in Appendix 2. The methodology for railway infrastructure pricing carries the highest level of legal standing as it is given by a decree of the minister of economic affairs and communications. Price methodologies for provision of electricity, electricity transmission and distribution, gas transmission and distribution, gas provision to residential customers, and provision of water and sewage services are set by a decree of the director general of the Estonian Competition Authority. Prices for provision of heat to customers, provision of cogenerated heat to network, generation of electricity and production of oil shale are based on administrative guidelines issued by the director general of the Estonian Competition Authority. Such a variety of legal tools can only be explained by the fact that price regulation of individual services in Estonia has been introduced during several phases over time. Furthermore, certain correlation can be noted between the legal status of a methodology and the level of authority the regulator has for intervention in the matters of a regulated enterprise.

Our review of ministerial decrees and sub-legislative acts on price setting methodologies also somewhat modifies what the authors defined in the previous chapter as the period of coherent price regulation in Estonia. Although price regulation framework was set up and regulator nominated on the level of law already in 1998, specific rules for district heating, electricity and gas services were introduced no earlier than 2002. Therefore, price setting decisions before 2002 were arbitrary according to our categorisation, and have been excluded from the scope of study. In the railway sector, similar treatment applies to the period before 2004 because it was then when the first ministerial decree on the price regulation

methodology was passed and no price setting decisions by the regulator had been made before that.

4.3. Implementation of price setting process

Both sector-specific regulators base their analysis and price setting decisions on the data provided by regulated companies but also have the authority to deviate from that if appropriate. The implementation of price setting process and its final result, however, exhibits two fundamentally different patterns. The Estonian Technical Regulatory Authority is responsible for actively setting the tariff of railway infrastructure services before a certain deadline once a year. The decision must be taken in any case, irrespective whether the regulator and a regulated company agree on the estimates or not. The outcome essentially fixes the budget of a regulated company for the following yearly period as it is not sensitive to fluctuations in the company's service volumes. Unit price of the service is only given as an indication.

In contrast to that, the Estonian Competition Authority normally launches a price regulation procedure upon receiving an application from a regulated company to change prices. There are no legal provisions on timing and frequency of such routine, therefore submission of applications for price review essentially happens *ad hoc* based on strategic and tactical considerations of a regulated company.

Although the principles that govern the economics of a regulated price are the same, the Estonian Competition Authority is strictly tied to the scope of price application and does not have legal authority or responsibility to set a new price by itself. After completing the review, the regulator in this case can agree and authorise a new price, demand amendments to the application or disapprove the application. A regulated company can modify service prices only after authorised by the Estonian Competition Authority and set prices always remain effective until changed.

4. Conclusions

The economic regulation of natural monopolies is a widely used tool of government intervention and various sophisticated systems have emerged both in the United States and Europe. Great emphasis is nowadays placed on evaluating and accounting for the effects of such regulation. Although there is plenty of empirical analysis being conducted on economic regulations in a number of countries, research designs are context based and enable only limited generalisation and comparison of results to other environments.

The objective of this paper was to systematise the existing knowledge on economic regulation in Estonia and, in a comprehensive manner, explain institutional, legal and procedural interactions of economic regulation across the Estonian network industries. To provide that, the authors analysed legal acts and

administrative documents on economic regulation from Riigi Teataja database, State archives and archives of sector-specific regulators. The following tasks were set and achieved:

- To conceptualise and explain the evolution and current state of affairs of the institutional environment of economic regulation in Estonia.

It was revealed that economic regulation in Estonia was introduced immediately after the start of accession negotiations with the European Union in 1997. The inception was quick and simultaneous in all network industries, provisions regarding access to market and price regulation were included in relevant laws and sector-specific regulators were formed. The Estonian approach of economic regulation in some network industries proved to be rather unique in Europe as it exceeded the relevant requirements of the European Union significantly. It appears, however, that a systematic and coherent implementation was delayed in all the sectors. Detailed sector-specific regulatory rules were not introduced until 2002 and sector-specific regulator in water and sewage sector was established as late as 2010. Over the recent years, institutional framework seems to have reached the phase of maturity and is expected to continue in a similar form. As of 2014, approximately 335 network infrastructure companies in Estonia are subject to economic regulation by two sector-specific regulators the Estonian Technical Regulatory Authority and the Estonian Competition Authority.

- To systematise individual regulatory processes and implications of regulatory decisions that the institutional framework of economic regulation in Estonia has produced over the period of its existence.

The analysis of the implementation of economic regulation in Estonia indicates that the interest for competitive entry to naturally monopolistic sectors has been low and has therefore not required sophisticated mechanisms of regulation. The emergence of such a static environment is understandable considering the capital intensive nature of naturally monopolistic network infrastructure and the low population density in Estonia.

In contrast, price regulation of network industries is an active segment in Estonia. There are a number of individual services which are regulated based on essentially identical principles, and the framework has accumulated more than 600 detailed price setting decisions combined. Regulatory routines, however, display an interesting dual approach to implementation by the Estonian Competition Authority and the Estonian Technical Regulatory Authority that is a rich environment for detailed comparative analysis in the future.

On a final note, it appears that coherent framework of economic regulation with a voluminous regulatory output has been in place in Estonia for more than a decade. Nevertheless, the implementation has drastically outpaced academic and administrative evaluation, and close to nothing is known about the actual impact economic regulation has had on Estonian network industries. The authors hope this paper will open scholarly discussion in this field and provide the basis for further studies on the effects of economic regulation of network industries in Estonia.

APPENDIX 1

Institutional system of economic regulation of network industries in Estonia

Industry	Industry technology	Pre-regulation in the industry	Economic regulation of the industry	Legal framework	Regulator	Subjects
Railways	Natural monopoly in infrastructure, competitive in transport services	1991–1999. State-owned vertically integrated monopoly Estonian Railways and gradual privatisation of spin-offs. No rules or oversight on prices and entry	1999 onwards. Price regulation of railway infrastructure service. General restrictions on entry	Railway Act and charging methodology	Railway Administration (2000–2004); Railway Inspectorate (2004–2007); Estonian Technical Regulatory Authority (2008–present)	2 railway infrastructure managers
District heating	Natural monopoly in transmission infrastructure, natural monopoly in heat generation when localised service	1991–1998. State-owned and municipal monopolies. Price setting by governmental/municipal decisions. No rules	1998 onwards. Price regulation of service; restriction of entry by establishing administrative regional/district monopolies	Energy Act, substituted by District Heating Act and charging methodology	Energy Market Inspectorate (1998–2007); Competition Authority (2008–present)	Approx. 200 district heating companies
Electricity	Natural monopoly in transmission and distribution, competitive in power generation	1991–1998. State-owned vertically integrated monopoly Eesti Energia. Price setting by governmental decisions. No rules	1998 onwards. Price regulation of service; restriction of market entry by establishing administrative regional/district monopolies	Energy Act, substituted by Electricity Market Act and charging methodology	Energy Market Inspectorate (1998–2007); Competition Authority (2008–present)	Approx. 25 distribution network companies and one transmission company

Industry	Industry technology	Pre-regulation in the industry	Economic regulation of the industry	Legal framework	Regulator	Subjects
Gas	Natural monopoly in transmission and distribution infrastructure, competitive in gas supply	1991–1998. State-owned vertically integrated monopoly Eesti Gaas was gradually privatised between 1993–1998. Price setting by governmental decisions. No rules	1998 onwards. Price regulation of service	Energy Act, substituted by Natural Gas Act and charging methodology	Energy Market Inspectorate (1998–2007); Competition Authority (2008–present)	Approx. 35 gas distribution companies and one transmission company
Water and sewage	Natural monopoly in transmission and distribution infrastructure, natural monopoly in water and sewage treatment	1991–1998. State-owned and municipal monopolies. Price setting by governmental/municipal decisions. No rules	Rules from 1999, regulator from 2010. Price regulation of service; restriction of market entry by establishing administrative regional/district monopolies	Water and Sewage Act, amended by Monopoly Price Restrictions Act and charging methodology	Competition Authority (2010–present)	Approx. 70 water and sewage companies

Source: compiled by the authors

APPENDIX 2

Price regulation of network industries in Estonia

Industry	Regulated services	Status of regulation	Effective period	Main principles	Scope of decision	Approx. number of decisions
Railways	Access to public railway infrastructure	Ministerial decree based on Railway Act art. 59	2004–present	Allowable operating costs, depreciation, reasonable business profit based on weighted average cost of capital	Regulator sets the fee for the next year	22
District heating	1. Provision of heat to customers 2. Provision of cogenerated heat to district heating network	Administrative guidelines by director general of the regulator	1. 2002–present 2. 2007–present	Same as above	Regulator authorises company's price application which can be filed at any time. No specific period, authorisation in force until changed.	1. 200 2. 20
Electricity	1. Generation of electricity 2. Production of oil shale 3. Provision of electricity to customers 4. Electricity transmission and distribution	1. Administrative guidelines as above 2. Administrative guidelines as above 3. Methodology by director general of the regulator based on Electricity Market Act art. 81 s. 3 4. Methodology as above based on Electricity Market Act art. 72 s. 4	1. 2002–2012 2. 2002–2012 3. 2002–2012 4. 2002–present	Same as above	Same as above	1. 2 2. 1 3. 120 4. 140

Industry	Regulated services	Status of regulation	Effective period	Main principles	Scope of decision	Approx. number of decisions
Gas	1. Gas transmission and distribution 2. Gas sales margin for residential customers	1. Natural Gas Act art. 23 and 23 ² . In addition methodology as above based on Natural Gas Act art. 23 s. 41 and 42. 2. Methodology as above based on Natural Gas Act art. 10 s. 4	1. 2002–present 2. 2009–present	Same as above	Same as above	1. 55 2. 1
Water and sewage	Provision of water and sewage services	Methodology as above based on Water and Sewage Act art. 14 s. 9	2011–present	Same as above	Same as above	45

Source: compiled by the authors

Addresses:

Raigo Uukkivi
 Department of Logistics and Transport
 Tallinn University of Technology
 Ehitajate tee 5, Tallinn 19086, Estonia

E-mail: raigo.uukkivi@tja.ee

Tel. +372 5048 988,

Märt Ots
 Department of Electrical Power Engineering
 Tallinn University of Technology
 Ehitajate tee 5, Tallinn 19086, Estonia

E-mail: mart.ots@konkurentsiamet.ee

Ott Koppel
 Department of Logistics and Transport
 Tallinn University of Technology
 Ehitajate tee 5, Tallinn 19086, Estonia

E-mail: ott.koppel@ttu.ee

References

- Armstrong, Mark and David E. M. Sappington (2006) "Recent developments in the theory of regulation". In *Handbook of industrial organization*. Vol. 3. Mark Armstrong and Robert H. Porter, eds. Amsterdam: North Holland.
- Arrow, Kenneth J. (1970) *Social choice and individual values*. Yale University Press: New Haven.
- Baldwin, Robert, Martin Cave, and Martin Lodge (2012) *Understanding regulation: theory, strategy, and practice*. 2nd ed. Oxford University Press.
- Bator, Francis M. (1958) "The anatomy of market failure". *Quarterly Journal of Economics* 72, 3, 351–379.
- Baumol, William J. (1977) "On the proper cost test for natural monopoly in a multiproduct industry". *American Economic Review* 67, 809–822.
- Baumol, William J., Elizabeth E. Bailey, and Robert D. Willig (1977) "Weak invisible hand theorems on the sustainability of multiproduct natural monopoly". *The American Economic Review* 67, 3, 350–365.
- Braeutigam, Ronald R. (1989) "Optimal policies for natural monopolies". In *Handbook of industrial organization*. Vol. 2. Richard Schmalensee and Robert D. Willig, eds. Elsevier Science Publishers B.V.
- Breyer, Stephen (1982) *Regulation and its reform*. Cambridge, Mass.: Harvard University Press.
- Coglianese, Cary (2012) *Measuring regulatory performance: evaluating the impact of regulation and regulatory policy*. (Expert Paper, 1.) OECD.
- Cogman, David (2001) "Allocation of access rights to rail network infrastructure". *Research Paper* (Graduate School of Business, Stanford University) 1690, 1–48. Available online at <<https://gsbapps.stanford.edu/researchpapers/library/RP1690.pdf>>. Accessed on 29.07.2014.
- Demsetz, Harold (1968) "Why regulate utilities?". *Journal of Law and Economics* 11, 1, 55–65.
- Eerma, Diana (2013) *Possibilities of economic policy for regulation of sector-specific markets in small country: the case of Baltic countries*. Saarbrücken, Germany: LAP LAMBERT Academic Publishing.
- Eerma, Diana and Jüri Sepp (2006) "Competition Creation and Regulation in Case of Estonian Competition Policy". In *14th scientific conference on economic policy: reports-papers of the XIV scientific and educational conference: Tartu-Värska, 29 June – 1 July 2006*, 410–426. Berlin, Tallinn: BWV Berliner Wissenschaftsverlag GmbH; Mattimar OÜ.

- Eesti Konkurentsiamet (2013) *Aruanne elektri- ja gaasiturust Eestis 2012*. [Report on the electricity and gas market in Estonia in 2012.] Available online at <<http://www.konkurentsiamet.ee/file.php?24368>>. Accessed on 29.07.2014.
- Hantke-Domas, Michael (2003) “The public-interest theory of regulation: non-existence or misinterpretation?”. *European Journal of Law and Economics* 15, 2, 165–194.
- Light, Jessica (2010) “Public choice: a critical reassessment”. In Edward J. Balleisen and David A. Moss, eds. *Government and Markets*. Cambridge.
- Mueller, Dennis C. (1976) “Public choice: a survey”. *Journal of Economic Literature* 14, 2, 395–433.
- Ogus, Anthony I. (2004) *Regulation: legal form and economic theory*. Hart Publishing.
- Pierce, Richard J. and Ernest Gellhorn (1999) *Regulated industries*. West Group.
- Posner, Richard A. (1974) “Theories of economic regulation”. *The Bell Journal of Economics and Management Science* 5, 2, 335–358.
- Posner, Richard A. [1969] (1999) *Natural monopoly and its regulation*. Washington, DC: Cato Institute.
- Rose, Nancy L. (2001) “Regulation, empirical analysis”. In Neil J. Smelser and Paul B. Baltes, eds. *International encyclopedia of the social and behavioral sciences* 19, 12957–12963. Oxford: Pergamon.
- Sepp, Jüri and Diana Eerma (2011) “Competition policy in infrastructure specific sectors in the Estonian case: entwining of natural monopoly and universal service”. *Discussions on Estonian Economic Policy* 2, 170 – 189.
- Sepp, Jüri and Raigo Ernits (2012) “The liberalisation of the postal service market in Estonia and its effect on competition”. *Discussions on Estonian Economic Policy* 2, 293–305.
- Shepherd, William G. (1990) “Mainstreams industrial organization and ‘new’ schools”. *Revue economique* 41, 3, 453–480.
- Shughart, William F. II. (2003) “Regulation and antitrust”. In *The encyclopedia of public choice*, 1–56. Springer US.
- Stigler, George (1971) “The economic theory of regulation”. *Bell Journal of Economics* 2, 3–21.
- Tirole, Jean (1988) *The theory of industrial organization*. Cambridge and London: MIT Press.

Legal acts and methodologies

- Competition Act (Konkurentsiseadus); 05.06.2001; RT I, 05.07.2013, 9. Available online at <<https://www.riigiteataja.ee/akt/782641>>. Accessed on 29.07.2014.
- District Heating Act (Kaugkütteseadus); 11.02.2003; RT I 2003, 25, 154. Available online at <<https://www.riigiteataja.ee/akt/13349182>>. Accessed on 29.07.2014.
- Electricity Market Act (Elektriturseadus); 11.02.2003; RT I, 28.06.2012, 25. Available online at <<https://www.riigiteataja.ee/akt/128062012025>>. Accessed on 29.07.2014.
- Energy Act (Energiaseadus); 11.06.1997; RT I 1997, 52, 833. Available online at <<https://www.riigiteataja.ee/akt/73724>>. Accessed on 29.07.2014.
- Natural Gas Act (Maagaasiseadus); 29.01.2003; RT I, 22.12.2013, 26. Available online at <<https://www.riigiteataja.ee/akt/261477>>. Accessed on 29.07.2014.
- Monopoly Price Restrictions Act (Monopolidele hinnapiirangute kehtestamise seadus); 03.08.2010; RT I 2010, 56, 363. Available online at <<https://www.riigiteataja.ee/akt/13348610>>. Accessed on 29.07.2014.
- Railway Act (Raudteeseadus); 23.02.1999; RT I 1999, 29, 405. Available online at <<https://www.riigiteataja.ee/akt/77324>>. Accessed on 29.07.2014.
- Railway Act (Raudteeseadus); 19.11.2003; RT I, 20.12.2011, 16. Available online at <<https://www.riigiteataja.ee/akt/683416>>. Accessed on 29.07.2014.
- Water and Sewage Act (Ühisveevärgi ja –kanalisatsiooni seadus); 10.02.1999; RT I, 05.07.2013, 6. Available online at <<https://www.riigiteataja.ee/akt/105072013006>>. Accessed on 29.07.2014.

- Railway infrastructure charging methodology; decree of the minister of economic affairs and communications 01.06.2004 nr. 144; RTL 2004, 74, 1213. Available online at <<https://www.riigiteataja.ee/akt/767103>>. Accessed on 29.07.2014.
- Railway infrastructure charging methodology; decree of the minister of economic affairs and communications 28.04.2008 nr.32; RTL 2008, 36, 522. Available online at <<https://www.riigiteataja.ee/akt/13304518>>. Accessed on 29.07.2014.
- Electricity network charging methodology; decree of the director general of Estonian Competition Authority 29.04.2013 nr 1.1-2/13-011.
- Principles of authorization of heating prices; decree of the director general of Estonian Competition Authority 03.05.2013 nr 1.1-2/13-012.
- Principles of cost division in the case of cogeneration of heating and electricity; decree of the director general of Estonian Competition Authority 22.04.2013 nr 1.1-2/13-010.
- Gas network charging methodology; decree of the director general of Estonian Competition Authority 17.01.2014 nr 1.1-2/14-001.
- Gas sales margin setting methodology; decree of the director general of Estonian Competition Authority 28.08.2009 nr 1.1-2/09-0018.
- Recommended principles of water and sewage prices; decree of the director general of Estonian Competition Authority 09.11.2010 nr 9.1-5/10-027.

