Effectiveness of Regulation: An Investigation of the Turkish Natural Gas Distribution Market

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Abstract

In this chapter, the effectiveness of regulation in the Turkish natural gas distribution sector is investigated by examining EMRA's implementations and the performances of the companies. The analyses were taken into account mainly in the context of the effectiveness of regulation rather than in drawing conclusions with respect to economic paradigms, like market failure. The important regulations with regard to the Turkish natural gas distribution sector were analyzed within the scope of the differences between the various planned and recognized situations. Thus, it was understood that some of the regulations did not produce effective results. Particularly the comparison between private and state-owned companies concerning their performances and R&D expenditures revealed the alienation experienced from the expected benefits of liberalization. The regulations to encourage sector development and cost reduction through R&Ds have not been properly implemented. The obtained results are considered as partially regulatory failure.

Keywords

Natural gas · Distribution · Natural monopoly · Effective regulation · Regulatory failure

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4.1 Introduction

According to today's generally accepted economic approach governments aim to reduce the production function of goods and services, to create multi-player markets for appropriate fields of activity, to increase efficiency and service quality, and to innovate approaches in a positive way. On the other hand, the fact that perfect competition conditions are not fully achieved in practice may lead to "market failure" when the markets are left to themselves. This situation leads to the need for "government intervention." In some fields the most efficient production of goods or services can be carried out by a single company and this makes government intervention necessary from the beginning. These special fields that need to be "regulated" intrinsically are called as "natural monopolies".

In the early periods of the regulatory economy, governments have implemented some kind of interventions with their own bodies. The necessity of establishing independent administrative authorities had appeared over time. These administrations are often expressed as "regulatory authority." The requirement of such an independent body, based on the need for decision-making without political influence, has become even more evident from time to time due to difficult tasks such as taking an intermediary role in public-private disputes. The way in which the regulator's budget is formed from licenses and similar incomes received from market players support financial independence of the authority, while guaranteeing the executives' positions ensures the administrative independence.

In the past years, the ineffectiveness of the economy appeared as a result of government intervention has been identified as "government failure." With the increasing function of independent administrative authorities, "regulatory failure" concept has been included to the literature. The effectiveness of any application of the chosen government should be assessed according to the differences between the planned and the actual implementation. Undoubtedly, the effectiveness of government or in other words government failure is highly subjective and often debated. On the other hand, the detection of regulatory failure can be more evident. The planned situation for the regulatory authority is to reach the targets set by political actors and these targets are written in law. If the objectives of the regulatory authorities, which are governed by laws cannot be achieved within predetermined time interval, there may be a regulatory failure and there may be some reflections on the government success or government failure according to the government's role in that success or failure. "Effectiveness of regulation" has great importance on the success of the regulatory body.

Even though there have been several studies (such as Datta-Chaudhuri 1990; Le Grand 1991; Winston 2007) examining government failure or market failure in different countries, the number of studies regarding to the regulatory failure or effectiveness of regulation is limited since the regulatory authorities have been actively involved in the administration of most of the countries, especially the European ones, in the recent years. Instead of direct investigation or focus on the effectiveness of regulation, most of the researchers analyzed the results of liberalization process which means the combination of market, government and regulatory

failure or effectiveness. For instance, Sant Ana et al. (2009) concluded that possible surplus in the natural gas sector, non-discriminatory open access, information transparency and tariff are the key factors in order to achieve the expected results of the liberalization process in the Brazilian gas industry. Another study found that legal and institutional conditions and the initial market structure of each European Union Member State are also important for the results of the liberalization (Slaba et al. 2013). Capece et al. (2010) focused on the chances in performance in the Italian natural gas retail market by analyzing the profit and financial position of the companies concerned over the first 3 years following the market liberalization and the results of the analysis showed that the majority of companies attained a high level of performance. Andrade (2014) carried out an empirical analysis using a panel data of 11 European countries from 2001 to 2011 in order to measure the performance of the regulated segments such as transmission and distribution. The studies on Turkish electricity market is highly limited. Çetin and Oğuz (2007) focused on the reasons for the slowdown in the Turkish electricity market reforms and concluded that the institutional and political structure had not been ready for creating an efficiently working competition and absence of an independent regulatory agency had been one of the main reasons for this failure. The same authors also evaluated the reforms in the Turkish natural gas market and concluded that reforms had not worked out as expected. On the other hand, Akkemik and Oğuz (2011) focused on the results of the reforms in Turkish electricity market and founded that enhanced efficiency in the electricity sector was achieved and this caused reduced household energy prices, and gains in output and welfare by 0.5–1.1% of GDP. In this studies market, government and regulatory failure or effectiveness were not separated and instead of that the results of liberalization process were evaluated as the combination of all of the elements.

In addition to the above studies, some of the researchers specifically focused on the effectiveness of regulation especially for the US market by differing the regulatory failure from market failure or government failure. As an example, in Moore (1970) the effectiveness of electric utility prices was analyzed for the US market. Some other studies analyzed the impacts of the deregulation process on the US energy market in the context of regulatory failure/effectiveness (Joskow et al. 1989; Dempsey 1989).

The purpose of this study is to examine the regulatory effectiveness of the Turkish natural gas distribution sector, which has been privatized since 2001. In this framework, the hypothesis *"effectiveness of regulation has been achieved in the Turkish natural gas distribution sector"* is tested. To the best of our knowledge, this is the first study to examine the effectiveness of regulation in Turkey. Effectiveness of regulation in the Turkish natural gas distribution sector was investigated via examination of some important regulatory implementations. Negative and positive indications of the regulations were listed by linking the elements of the effectiveness of regulation. In addition to that, impacts of the regulatory applications on the sectoral performances were examined for a comprehensive analysis. Financial and regulatory tables of the distribution companies had been obtained from the

regulatory authority and these data were used together with the legislation and the other information provided by the agency's website.

In the second part of this study, Turkish natural gas distribution sector is introduced briefly. Theoretical background is presented in the third chapter and this information has great importance in terms of evaluating the regulatory implementations in the Turkish natural gas distribution sector and the performances of the companies. Fourth part of the study starts with a brief methodology subsection and continues with the evaluations of the regulations in the Turkish natural gas distribution sector. In this part of the study, the existence of the elements mentioned in the third section has been researched within the scope of the applications towards the Turkish natural gas distribution sector. In addition to that, impacts of the regulatory applications on the sectoral performance has been analyzed. The study has been completed with the summary and conclusion section summarizing the findings obtained in all the data presented in the first four sections.

4.2 Turkish Natural Gas Distribution Sector

The laws enacted in 2001 within the framework of the privatization and liberalization brought major structural changes in the electricity and natural gas sectors of Turkey. In this context, the Energy Market Regulatory Authority (EMRA) has been adopted as an independent administrative authority assigned to "regulate" and "supervise" the energy market. The structural reform has occurred in the Turkish natural gas sector at the beginning of the twenty-first century with the influence of reform in Europe and the guidance of some foreign institutions. The Natural Gas Market Law ("Law"), which was adopted on April 18, 2001, aimed to provide competition in the wholesale market and for this reason to unbundle the market activities, and separate the vertical integrated structure of the state-giant company, BOTAŞ. The law considered natural gas transmission, distribution and storage activities[1] as natural monopoly areas (Law 2001). The similar results produced by the competitive environment can be produced by only through effective regulation in these specific areas. EMRA has played an important role in the restructuring of the natural gas sector. Market activities have been separated, state-owned companies have been unbundled and private companies have been involved in the natural gas sector.

The law aimed to widen the natural gas usage throughout the country. Only seven companies[2] were operating in six provinces before the Law. Six of which were state-owned and only one of them was a private company. The objective set forth by the political authority for the widening of the natural gas usage has been achieved through natural gas distribution tenders. After the Law, 62 tenders were completed and natural gas became widespread throughout the country by the private

[1] If the storage capacity is insufficient.

[2] These companies will be named as 'existing companies' in the following parts of the study.

distribution companies. At present, 69 companies are operating in 77 provinces and 68 of them are private companies.[3] Five of the existing companies were transferred to the private sector so there is no distribution company operating in public ownership other than İGDAŞ.[4]

Natural gas distribution companies in Turkey are "natural monopolies" in the regions where they operate. Natural monopoly is the case when the repetition of the network within the same geographical area is inefficient (Gomez and Rivier 2000). In natural monopolies, fixed costs are quite high compared to variable costs. In this case, which is usually seen in the networking industry, the investment of more than one company may result in the ineffective use of the networks. On the other hand, in natural monopolies, it is only possible to expect companies to behave as if they are in competition with the enforcement of the effective regulation.

In natural monopolies, granting a "concession" to a company can be done in a variety of ways. The Chadwick-Demsetz tender method is adopted in Turkey's natural gas distribution sector. It solves the competition problem of companies that want to operate in the natural monopoly field through tendering/competition. The basis of the approach can be summarized as "competition for the field" instead of "competition within the field" (Chadwick 1859). However, Demsetz (1968, p. 64) considered some problems such as "the problem of windfalls"[5] during the application of the Chadwick's method. He (p. 65) emphasized the necessity of distinguishing the unexpected loss/gain problem with the "problem of forecastable rents" which is a kind of predictability problem because of the investors' proposals. This is a very difficult task for most of the regulatory authorities who performed this kind of auctions for concessions. A study analyzed the possible reasons for extremely high concession fees for the Italian distribution sector and evaluated their possible impact on companies' profitability and a solution was proposed in order to build an effective regulatory framework in which competition for the field could actually lead to the market efficiency (Dorigoni and Portatadino 2009).

In general, companies participating in the tender of the Turkish natural gas distribution sector compete to be able to carry out distribution activities in the cheapest way during the first 8 years and the winners of each tender are obliged to complete the network construction within 5 years. Because competition was intense in tenders, distribution fees have dropped to very low levels and in many regions, sometimes reaching to "zero". Later the companies continued to compete by discounting the Subscriber Fee (aka: Connection Fee), which includes the cost of connecting the subscriber, for a period of 5 years. In a region, this fee was also reduced to "zero" and the company that paid the maximum license fee won the competition.

The number of firms interested in the tenders in the first period (Fig. 4.1) were high and caused a considerable decrease in the distribution fees in the fixed tariff

[3]The companies that have endorsed license by a tender will be named as 'tendered companies' in this study.

[4]Istanbul Natural Gas Distribution Company

[5]According to Demsetz it can be positive windfall or negative windfall.

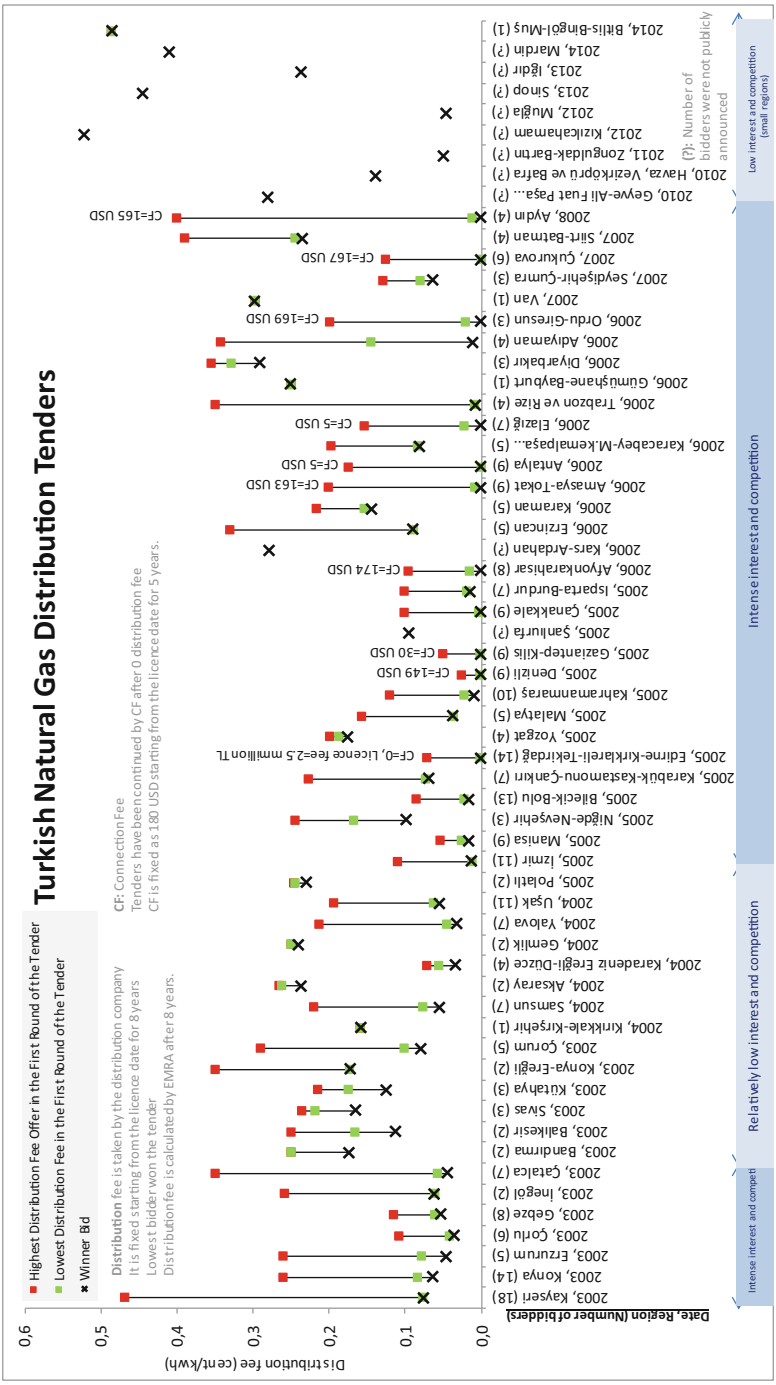

Fig. 4.1 Turkish natural gas distribution tenders (source of data: tender results-EMRA website)

term, 8 years of period. In the second period, relatively low interest and competition were observed. It can be noticed that there was an intense interest and competition for tenders in the third period. Finally, tendered regions were relatively small in the last period.

The tariffs to be implemented by the tendered companies for the first 8 years from the date of obtaining the license were determined during the auction and the tariffs are set by EMRA at the end of 8 years (also named as fixed tariff period in this study). Tariffs are determined by EMRA by using the "price cap" method after 8 years. Determined tariffs will be evaluated in a detail in the fourth section of the study.

4.3 Theoretical Approach to Measure the Effectiveness of Regulations

4.3.1 Background

There are significant differences in the main economic approaches to the fields of "competition" and "regulation." Discussions on these concepts have continued since Adam Smith, founder of the Classical Economics Theory, which is considered to be the beginning of the modern period economics. According to this theory, "state intervention" is not necessary because perfect competition reaches "allocative efficiency" and provides "social welfare" at the highest level (Smith 1776). The "invisible hand" enables the market to find its own truth. The most important criticism to classical economists is that it is not practically possible to achieve perfect competition conditions. It is believed that "Pareto efficiency"[6] cannot be achieved in practice because of the lack of perfect competition. Moreover, it is uncertain how to get ahead of monopolization when there is no perfect competition. If the market cannot produce effective results, "market failure" will appear.

The development of the concepts of "regulation" and "competition" have occurred mainly in the periods when the Keynesian approach and the Neoliberal approach were accepted. Keynes did not accept the Principle of Classical Economy "laissez faire." The Keynesian Theory, which was widely accepted from 1929 to 1980, reveals the need for the state to actively regulate. Keynes suggested a course of action, on the contrary of leaving it "as it is": The state should take more active role, not just in private sector, but in reducing uncertainties outside the economy

[6]The "Pareto efficiency", taken the name from the famous Italian economist Vilfredo Pareto, can be described as the highest level of efficiency where it is not possible to improve the condition of someone else without worsening the condition of any one. Nobel prize-winning economist Joseph Stiglitz explains the "Pareto activity" as follows: "... the 'Pareto activity' is provided only when there is no chance of improving his situation without deteriorating the situation of anyone else" (Stiglitz 2009; p. 11).

(Bernstein 2010; p. 257). Keynesian Theories' greatest innovation has been to put forth the necessity of state intervention called "regulation" because of the lack of a perfect competition environment. It is possible to define regulation in the form of all interventions that change the direction in which the market is behaving (Stiglitz 2009; p. 22).

The petroleum crisis of the 1970s and the subsequent increase in energy prices have resulted in increasing doubts to the Keynesian approach especially in the US and the UK. In the neoliberal approach, there is a stance against Keynesian interventionism in the framework of regulation. For this reason, "liberalization" tendencies have gained more importance in today's accepted market model. The privatization and liberalization tendency, which started in the 1980s, also affected the energy sector and started to break the market dominance of the state-owned companies operating in the energy sector in the UK and in some of the European Union countries in the 1990s. On the other hand, many countries are positioned in the energy field differently due to the strategic importance. Some European countries continue to protect the state-owned energy giants and allow them to operate in all areas of energy within a vertically integrated structure. In recent years, there have been increasing questions about whether economic approaches are feasible for each sector. Energy was at the forefront of these areas.

The concept of "regulatory failure" has emerged in recent years when regulatory authorities have been actively involved in the administration of the state. In the past periods, the failed intervention was called as "state failure". Nowadays it is expressed as "government failure" or "regulatory failure" according to the government's role in the failure. Shortly, regulatory failure can be summarized as the failure of the regulatory authority to reach the political preferences which are specified in the law.

4.3.2 External Factors

In some cases, the political authority directs the regulator to the wrong path. It is not fair to talk about the success of the regulator in these cases since the goal function was drawn wrongly. An important assumption in this framework is that the "liberal market model in the natural gas distribution sector", as set by the political authority, has ability "to provide natural gas to the consumers in a quality, continuous, cheap and environmentally friendly manner".[7] In this study, "government failure" or "market failure" is not addressed in detail.

It is expected that a regulatory authority should be able to decide based on its own authority and responsibilities within the law-drawn area independently. Indeed, this is one of the main purpose of the establishment of the regulatory authorities. In this

[7]This is the goal of the Natural Gas Market Law expressed in the Article 1.

respect, it is important for administrators to be protected by a duty guarantee for not being exposed to political repression, to clarify their positions in the state with a constitutional definition, to provide their budget by market players, and to ensure administrative and financial independence. On the other hand, it can be considered that the full independence of the regulatory authorities is a utopia, similar to "perfect competition environment" in a market model.

In addition to the erroneous determination of the "objective function" for the regulatory authority, the pressure placed on the regulatory authority by the government, incompetent management or some other external factors such as court interventions can be another cause of a regulatory failure.

According to the National Regulatory Research Institution (NRRI) "an effective regulator is necessary for effective regulation" (NRRI 2009; p. 5). NRRI has identified four features of the effective regulator as: purposeful, educated, independent, and determined. The government's long-term irrational behavior, and its focus on election and other short-term events, may lead to a regulatory failure. Regulating in harmony with the political authority should not be prevailed over protecting the interests of the people in the middle and long term. The powers and responsibilities between the political authority and the regulatory authority need to be clearly defined. In addition to ensuring success at the managerial level, it is also important to ensure the best selection and the effective use of the expert staff. Moreover, incomes of the staff should be appropriate for the size/importance of the work done. Another intervention similar to the government intervention that can cause a regulatory failure is the intervention by the courts. It can be seen that all the improvements that regulatory authorities have succeeded can be disrupted by court decisions from time to time (Viscusi et al. 2005; p. 9).

4.3.3 Measurement of the Effectiveness of Regulation

In this study, regulatory success was assessed in the direction of the regulator's own decisions. In this framework, it is thought that the objective function that can be used in measuring the "regulatory effectiveness" is clearly written in the aim part (Article 1) of the Law, which is determined by political authority. Within the scope of regulatory effectiveness, the existence of the following elements has been researched:

(a) One of the preconditions for regulatory effectiveness is a successful **Regulatory Impact Analysis** (RIA). RIA refers to an ex-ante measure of the regulation where measuring the effectiveness of regulation is the ex-post form of it.
(b) An important factor that can lead to "regulatory failure" is "**regulatory capture**". The advantage that the regulated company may obtain by the "regulatory capture" can often be at very high levels. The founder of "capture theory" is

regarded as Stigler because of the article he wrote in 1971 (Stigler 1971; p. 5–6). Stigler's general hypothesis is that all industries or areas with sufficient political power will try to control market entry through the state. In addition, even in industries that have managed to control penetration into the market, price controls will be required through repressive forces. Regulatory capture can constitute a major obstacle to effective regulation. One of the most commonly used tools to dominate the agency is the lobbying activities.[8] Companies' information about the regulation system and their power on the regulatory authority are much more than the consumers. The relationship between capital and politics can be another factor that facilitates the regulatory capture. This problem is more evident in the United Stated especially considering the financing of politics based on direct donations.

(c) There is also an **information asymmetry** between the regulated company and the regulatory authority, and it is not possible to perform effective regulation when the information asymmetry is high. Theoretically it is possible to reduce the information asymmetry to zero but in practice it is not possible to get rid of it completely. Moreover, the regulation costs to reduce information asymmetry should also be assessed critically since these kinds of transaction costs are reducing the social welfare or in other words total surplus.

(d) **The Averch-Johnson effect** (aka A-J effect) implies that firms may use excessive capital to increase their profits and this is one of the indicators of regulatory failure. The most important reason of the A-J effect is the determination of reasonable rate of return highly relative to the real cost of capital (Averch and Johnson 1962; p. 1053). Averch and Johnson also mentioned about the indirect effects of high rate of return to the other markets. Having a significant advantage in the regulated market by a financial support can cause the competitive environment even more disruptive in the unregulated areas because of the predatory price-cutting (Averch and Johnson 1962; p. 1058). In addition to that, the use of high quality/expensive materials, also referred as "**gold-plating**", should be carefully monitored. Gold plating is also seen as one of the most important reasons for the inefficiency of unregulated monopoly structures (Energy Charter Secretariat 2002; p. 24). This term is generally used for material costs, but it also can be used to cover a wide range of inefficiencies including unnecessary staff. In order to avoid this issue, it is very important to establish a tariff structure that works in line with market-based pricing principles.

[8] Assuming that the annual income to be obtained by the company in the framework of the regulation economy is 100 million USD and that company can increase its income to 100 million + B amount by spending A amount of money for lobbying. The company will try to realize all situations where A is smaller than B. This is a rational behavior for a company that only acts to maximize its profit. The regulated company may also try illegal ways as well as the above legal way. Undoubtedly, in such a case, the cost of catching and the risk of catching have to be included in the calculation.

(e) Another factor that could lead to regulatory failure is the creation of "**too big to fail**". The failure of too big companies, due to their sizes, has become a significant risk for the economy in general terms. Stiglitz defines this as "American style socialism" and criticizes the privatization of earnings and the socialization of losses (Stiglitz 2009; p. 19). Regulatory authority may also try to prevent the whole industry from collapsing. In some circumstances sector players may go to cartel formation for this purpose. In its simplest terms, the cartel is an association formed by companies acting in coordination to maximize profit (Carlton and Perloff 2015; p. 32).

(f) The "**free riders problem**", which is defined as consumers' not paying for the cost of the product they use and the cost they create, is another indication of regulatory failure. An example of this is the lack of the habit of using tickets in public transport in some of the Eastern European Countries. Generally, services such as electricity, water, education, health, communication are regarded as universal services and it is expected that the state should deliver these services even if the investment is not feasible. The free riders problem can also arise from subsidies among different consumer groups. Subsidies between different consumer groups can be avoided only through effective regulation. Special regulations should be implemented for "vulnerable consumers" who have difficulty paying the bills.

(g) **Transparency** is important both in terms of productivity growth and justice in resource allocation (aka: allocative efficiency). A consumer should be able to see the costs spent for him/her. In this way, there will be pressure not only on the companies but also on the regulatory authority. This is an important right of the consumer who pays the production costs created by the company and the transaction costs created by the regulatory authority. In some of the countries regulatory agencies announces the comparison of the companies publicly. This kind of applications can create a public pressure on poor operators (Fulwood 2006; s. 25).

(h) Delays due to regulatory actions (aka: **regulatory lag**) may lead to "regulator failure". As an example, in a situation where entry to the market is blocked for any reason, a regulatory authority that has not been aware of it may have created a significant advantage over existing companies on the market for a certain period of time. **Regulatory evasion** (aka: **regulatory arbitrage**) should be avoided.

In this study, the existence of the above-mentioned arguments (a–h) has been researched for the Turkish natural gas distribution sector. Following the evaluations on regulatory practices based on the above elements in Sect. 4.4.2.1. Performances of distribution companies, public-private comparison, R&D expenditures are examined in another Sect. 4.4.2.2, of the study.

4.4 Effectiveness of Regulations in the Turkish Natural Gas Distribution Market

4.4.1 Data and Methodology

In this section, secondary legislation and licensing procedures, privatizations and natural gas distribution license tenders, tariffs and other applications in the Turkish natural gas distribution sector have been dealt in detail in terms of "regulatory effectiveness". Regulatory applications are given in a historically classified way in Sect. 4.4.2.1 and the elements of effectiveness of regulation mentioned in Sect. 4.3.3 are evaluated in parallel with the historical explanation of the applications. In summary, all the findings are listed in a table at the end of the Sect. 4.4.2.1 of the study.

In addition to that, impacts of regulatory applications on the sectoral performances, including sub-topics such as public-private ownership comparison and R&D expenditures have been evaluated in Sect. 4.4.2.2. Moreover, an empirical study on efficiency and service quality has been given in this subsection of the study. These evaluations are used to support the results obtained in Sect. 4.4.2.1 in order to test the hypothesis.

Financial tables, regulatory tables, legislation regarding the Turkish natural gas distribution sector and some other information such as distribution tender results are used for the evaluations. Financial tables and regulatory tables of the distribution companies had been obtained from the regulatory authority whereas the other data/information had been obtained from the agency's website.

4.4.2 Findings

4.4.2.1 Evaluations of the Regulatory Applications

Within the scope of establishing secondary legislation for the natural gas distribution sector, several Regulations, Communiqués and Board Decisions have been issued by EMRA since 2001. Secondary legislation is thought to be appropriate in terms of quantity (it is not evaluated in terms of content/quality here). On the other hand, **RIA** was not observed for the secondary legislation and in this respect ex-ante measurement of the regulations were not implemented effectively.

Regulations and Procedural Principles prepared by EMRA and the amendments in this scope have been opened for consultation on the web page of the agency for at least 1 month and finalized in line with the opinions received from the market. This situation has great importance on "**transparency**". Meetings and workshops with the sector were helpful for the legislative arrangements. On the other hand, consumers' contributions or evaluations have not been adequately received. In operation, this inequality has been tried to be balanced by the staff of the agency. Along with these evaluations, it is thought that increasing the **transparency** of the Board meetings by live broadcasting and sharing the opposing votes and reasons against the decisions in detail with the public can provide some improvements.

Establishment of important standards in the technical aspects of the natural gas distribution sector has been completed generally by the secondary legislation. On the other hand, it is thought that explanatory regulations for a number of critical areas could not be completed in time. The fact that detailed arrangements for some issues that need to be determined before "distribution tenders" could not be realized have caused major problems and can be expressed as **regulatory lag**.

EMRA, in general, has successfully implemented licensing processes in the natural gas sector. The problems experienced in the oil or electricity sectors are not seen in the natural gas sector with regard to the licensing issue.

In the processes for the privatization of the existing distribution companies, EMRA performed a number of regulations. In this kind of transactions, it is important to clarify some critical issues before privatization. In this context, it is possible to talk about the regulatory effectiveness especially for the last distribution privatization, BAŞKENTGAZ.[9] On the other hand, some uncertainties during the previous share transfer and privatization processes led to various court actions.

The objective set forth by the political authority for the dissemination of natural gas has been achieved through natural gas distribution tenders. Chadwick—Demsetz method that was mentioned in the previous sections has been applied in the Turkish natural gas distribution sector. At this point, it is useful to underline that the issue is handled within the framework of "regulatory failure" rather than "market failure" or "government failure". As it was mentioned before, it is possible to talk about an effective regulation for the dissemination of natural gas, while not considering the goal function is right or wrong.

The first 8-year period in which the low prices applied because of the competition in the tender is the period that purest form of price cap method is applied. Starting from 2012, companies are moving one by one to the tariff implementation period under the tariff methodology of EMRA. The biggest criticism of the natural gas distribution tender that it is not clarified sufficiently as to how to determine the distribution prices at the end of the 8 year before the auctions.

When the tariff applications are examined at the end of the 8th year:

- it is found that the tariff period determined as 5 years and this period is reasonable;
- the period of depreciation considered as 22 years is not so short as to cause a significant problem and
- the Reasonable Rate of Return which was determined as 11.83% for the period of 2012–2016 and 12.85% for the period of 2017–2021 are high and can cause "**A-J effect**".

In the level of creating the "Regulated Asset Base", it is seen that in the tariff methodology, many incentives are taking place in order to provide sustainability of a sector that has taken great "risks" during the tender. Regulations and incentives for

[9] A distribution company that operates in the capital city of Turkey, Ankara.

ensuring the sustainability of the sector show that the problem of "**too big to fail**" in the natural gas distribution sector has occurred. Regulatory authorities sometimes experience this problem on a sector basis rather than on a company basis. Extra incentives to the sector can be seen in order to prevent the collapse of a sector that may affect the general economic situation. The fact that a majority of the regulations are against consumers can also lead to the problem of "**regulatory capture**".

It is seen that the tariffs have been increased significantly compared to the auction period. Ratchet effect[10] is seen in the market after tender period, 8 years fixed term (Fig. 4.2).

As it is seen in Fig. 4.2, distribution fees for household consumers were increased notably. It increased to a level even higher than the highest tender offer (Fig. 4.1) in the first round of the tender. Changes of distribution fees for all consumer groups are shown in Table 4.1 in a detail.

Single fee that had been applied during the tender period (first 8 years) are listed in the last column. The **free riders problem** arisen from subsidies among different consumer groups.[11] As it was mentioned before, distribution fees were determined by EMRA, according to the consumption level of the consumers, after the 8 years of the license date. Yellow marks show the increase of the tariff after 8 years. Tariffs have been increased in all distribution regions for the household consumers and in most of the distribution regions for the other consumer groups. The subsidization continues in most of the distribution regions after 8 years period. On the other hand, number/amount of unpaid bills were not very high.

There has been no significant **regulatory lag** in setting tariffs. Nevertheless, an effective study on "vulnerable consumers" in the natural gas sector has not been carried out yet.

The regulatory account plan published by EMRA is particularly important at the point where the tariff design can be made smoothly and this is very important in terms of **information asymmetry**.

It is seen that EMRA is trying to bring certain standards to the service quality in the natural gas distribution sector with the legislation. On the other hand, detailed studies should be carried out in order to reduce the number of complaints, terminate the complaint within a certain period of time, shorten the deadlines for invoice appeals, eliminate the troubles experienced in the reimbursement of the guarantee amount, increase online transaction capability, decrease gas opening-closing times. **Information asymmetry** is a big concern since the data are generally obtained from distribution companies for the service quality studies.

[10]Ratchet effect has a broader meaning as an instance of the restrained ability of human processes to be reversed once a specific thing has happened such as a tendency of people to be influenced by the previous highest level of a factor. In the economics of regulation context, it means hiding or abolishing the efficiency increase by the regulated company in order to survive a disadvantage in the future tariff implementation period.

[11]In a negative way for big consumers in all distribution regions during 8-year period, fixed term. See Table 4.1 for detail.

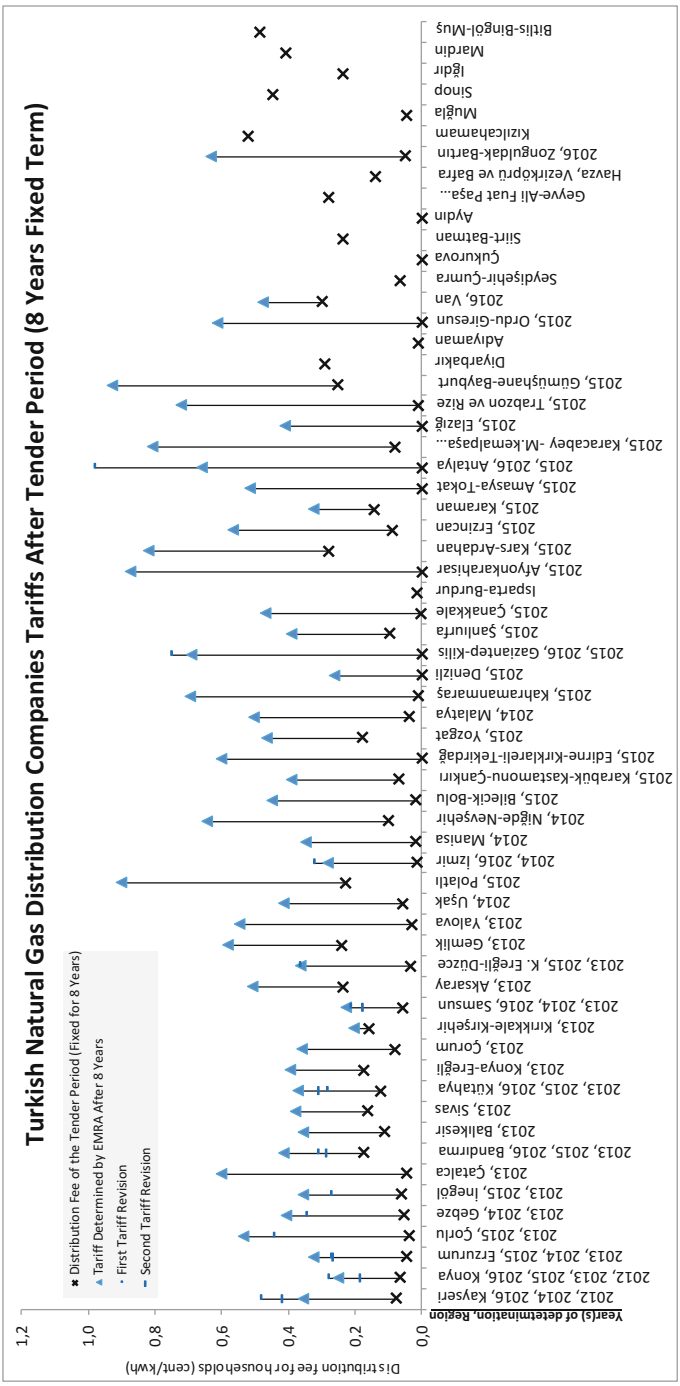

Fig. 4.2 Increase of the Turkish natural gas distribution tariffs after tender period (source of data: board decisions-EMRA website)

Table 4.1 Changes of distribution fees for all consumer groups (source of data: board decisions-EMRA website)

2015, September	Distribution Fee Determined By EMRA After 8 Years						Tender Fee
Name of the Distribution Company	0 -10.000 metercube (households)	10.000 - 100.000 metercube	100.000 - 1.000.000 metercube	1.000.000 - 10.000.000 metercube	10.000.000 - 100.000.000 metercube	Above 100.000.000 metercube	Single Fee TL/metercube
2012, 2014, Kayseri	0.116147	0.116147	0.053764	0.042229	0.028119	0.028119	0.022385
2012, 2013, 2015, Konya	0.054532	0.054532	0.027570	0.024163	0.024163	0.024163	0.018850
2013, 2014, Erzurum	0.069141	0.069141	0.069141	0.069141	0.069141	0.069141	0.013549
2013, 2015, Çorlu	0.126886	0.126886	0.067717	0.067717	0.048296	0.048296	0.010603
2013, 2014, Gebze	0.088048	0.088048	0.032377	0.032377	0.025052	0.005055	0.015316
2013, 2015, İnegöl	0.076800	0.076800	0.022838	0.022838	0.022838	0.022838	0.017967
2013, Çatalca	0.137845	0.137845	0.040414	0.040414	0.040414	0.040414	0.012960
2013, 2015, Bandırma	0.088923	0.088923	0.039606	0.039606	0.039606	0.001066	0.051249
2013, Balıkesir	0.081598	0.081598	0.039457	0.025871	0.025871	0.025871	0.032988
2013, Sivas	0.086605	0.086605	0.063371	0.038474	0.029884	0.029884	0.048304
2013, 2015, Kütahya	0.079707	0.079707	0.024506	0.024506	0.024506	0.024506	0.036523
2013, Konya-Ereğli	0.094587	0.094587	0.029181	0.029181	0.048209	0.048209	0.050660
2013, Çorum	0.082085	0.082085	0.028151	0.028151	0.016584	0.016584	0.023268
2013, Kırıkkale-Kırşehir	0.050106	0.050106	0.024068	0.024068	0.015369	0.015369	0.046537
2013, 2014, Samsun	0.053662	0.053662	0.018922	0.018922	0.012443	0.012443	0.016200
2013, Aksaray	0.121977	0.121977	0.065696	0.065696	0.017317	0.017317	0.069511
Düzce	0.103653	0.103653	0.035261	0.023580	0.023580	0.023580	0.010014
2013, Gemlik	0.133993	0.030999	0.030999	0.012976	0.012976	0.002502	0.070394
2013, Yalova	0.131066	0.040385	0.040385	0.040385	0.042653	0.042653	0.009131
2014, Uşak	0.100746	0.100746	0.054793	0.054793	0.054793	0.054793	0.016200
2015, Polatlı	0.259830	0.259830	0.073313	0.073313	0.073313	0.073313	0.067743
2014, İzmir	0.071656	0.071656	0.033220	0.033220	0.020549	0.020549	0.003534
2014, Manisa	0.084557	0.084557	0.023010	0.023010	0.023010	0.023010	0.004713
2014, Niğde-Nevşehir	0.159459	0.159459	0.067282	0.067282	0.067282	0.067282	0.028865
2015, Bilecik-Bolu	0.117051	0.117051	0.030168	0.030168	0.030168	0.030168	0.004713
2015, Karabük-Kastamonu-Çankırı	0.101209	0.101209	0.045665	0.045665	0.045665	0.045665	0.020323
Tekirdağ	0.162833	0.162833	0.037508	0.037508	0.037508	0.037508	0.000000
2015, Yozgat	0.121267	0.121267	0.058457	0.058457	0.058457	0.058457	0.051838
2014, Malatya	0.123265	0.123265	0.080955	0.043847	0.043847	0.043847	0.010898
2015, Kahramanmaraş	0.181269	0.181269	0.068859	0.068859	0.055437	0.055437	0.002651
2015, Denizli	0.070420	0.070420	0.022160	0.022160	0.022160	0.022160	0.000000
2015, Gaziantep-Kilis	0.188166	0.188166	0.076490	0.062123	0.062123	0.062123	0.000000
2015, Şanlıurfa	0.105546	0.105546	0.038501	0.024283	0.024283	0.024283	0.027981
2015, Çanakkale	0.126750	0.126750	0.042728	0.042728	0.042728	0.042728	0.000295
2015, Afyonkarahisar	0.237247	0.237247	0.109516	0.109516	0.109516	0.109516	0.000000
2015, Erzincan	0.153589	0.153589	0.055342	0.055342	0.055342	0.055342	0.026214
2015, Karaman	0.087545	0.087545	0.042717	0.042717	0.042717	0.042717	0.042413
2015, Amasya-Tokat	0.140083	0.140083	0.055530	0.055530	0.055530	0.055530	0.000000
2015, Antalya	0.194815	0.194815	0.194815	0.096690	0.096690	0.012116	0.000000
2015, Karacabey-M.kemalpaşa...	0.219302	0.219302	0.062915	0.062915	0.062915	0.062915	0.023857
AVERAGE	**0.119599**	**0.114757**	**0.050684**	**0.044511**	**0.041276**	**0.037437**	**0.022716**

Despite the fact that distribution companies' license extension period has been linked to service quality, a comprehensive road map for the end of the 30-year licensing period has not been drawn yet. There is an important **regulatory lag** in this area.

To avoid the abuse of the natural monopoly situation, regulations regarding the distribution companies' gas purchases should be carried out sensitively. In this context, it is important to implement a number of additional regulations by taking the definition of "public service" in the legislation and considering the "public service" qualification without removing the dynamic structure of the private sector.

The failure of the distribution companies to fulfill their obligations under the "shipment control center" also negatively affects the wholesale segment. Explanatory regulations for this kind of critical areas should be completed in time.

On the other hand, EMRA is carrying out important works in order to reduce **information asymmetry**. The functioning of the Electronic Information System, the regulatory account plan, and the request of the Certified Public Accountant approval for the financial tables are effective arrangements to reduce the **"information asymmetry".**

Evaluations of the Regulatory Applications in the Turkish Natural Gas Distribution Sector based on the elements mentioned in section three are summarized in Table 4.2.

4.4.2.2 Impacts of Regulatory Applications on the Sectoral Performance of the Turkish Natural Gas Distribution Sector

In addition to the above evaluations, the performance of the Turkish natural gas distribution sector and distribution companies have also been examined.

In this framework, it is seen that the Operating Expenditures (OPEX) of the tendered companies have been increased rapidly after 2011 (Figs. 4.3 and 4.4). It is possible to say that the function of consumers' benefiting from the productivity achieved by the tendered companies during the tender period is rapidly disappearing due to the increase in OPEXs at various ratios. The auctioneers have made significant cuts in OPEXs over the 8-year period in which tariffs are fixed, and the "price cap" method had been influential in real terms. On the other hand, in the years when tariff methodology was adopted, OPEXs has been increased rapidly due to the approach in methodology. In this context, average OPEX of the tender companies is converging to the average OPEX of the existing companies (Fig. 4.3).

In order to ensure a **public-private ownership comparison**, the last tariffs in public ownership have been brought up on a daily basis and compared with the private sector tariffs (Fig. 4.5). It is seen that some of the tender companies, along with the methodology, are carrying out distribution activity at a much higher cost than the public period costs. In the 8-year fixed tariff period, the service had been offered to consumers with a huge price advantage compared to the public period, on the other hand, it has been increased rapidly after the fixed tariff period, and in some regions, it has been exceeded the prices of the public ownership. These kind of excessive increases lead us to think about the regulatory capture, information asymmetry, gold plating, transparency and too big to fail problem.

Table 4.2 Evaluations of the regulatory applications in the Turkish natural gas distribution sector

Elements to measure regulatory effectiveness/regulatory failure	Negative indications	Positive indications
(a) Regulatory impact analysis	RIAs were not observed for the secondary legislation drawn by EMRA. Ex-ante measurement of the regulations were not implemented effectively.	–
(b) Regulatory capture	The fact that a majority of the regulations were against consumers could be interpreted as a problem of "regulatory capture". In the level of creating the "Regulated Asset Base", it is seen that in the tariff methodology, many incentives are taking place in order to provide sustainability of a sector that has taken great "risks" during the tender.	–
(c) Information asymmetry	Ratchet effect was observed in the market after tender period, 8 years fixed term. Information asymmetry is a big concern since the data are generally obtained from distribution companies for the service quality studies.	EMRA has successfully implemented licensing processes. The functioning of the Electronic Information System, the regulatory account plan, and the request of the Certified Public Accountant approval for the financial tables were effective arrangements to reduce the "information asymmetry".
(d) The Averch-Johnson effect/ Gold Plating	The Reasonable Rate of Return which was determined as 11.83% for the period of 2012–2016 and 12.85% for the period of 2017–2021 were high and caused "A-J effect".	–
(e) "Too Big to Fail" problem	Regulatory authority prevented the whole industry from collapse, however this application caused too big to fail problem. Regulations and incentives for ensuring the sustainability of the sector show that the problem of "too big to fail" in the natural gas distribution sector has been occurred.	–
(f) "Free Riders" problem	The free riders problem arisen from subsidies among different consumer groups (in a negative way for big consumers in all distribution regions during the 8 years period, fixed term—see Table 4.1 for detail). This subsidization continues in most of the distribution regions after 8 years of period. An effective study on "vulnarable consumers" in the natural gas sector has not been carried out yet.	Number/amount of unpaid bills were not very high.

(g) Transparency	Consumers' contributions or evaluations have not been adequately received during the tariff settings and secondary legislation processes. A consumer cannot be able to see the costs spent for him/her. Regulatory agency don't announce the comparison of the companies publicly. Board meetings were not broadcasting. Opposing votes and reasons against the decisions were not sharing with the public.	Regulations and Procedural Principles prepared by EMRA and the amendments in this scope have been opened for consultation on the web page of the agency for at least 1 month and finalized in line with the opinions received from the market. Meetings and workshops with the sector have also worked on the legislative arrangements.
(h) Regulatory Lag/Regulatory Evasion	It is thought that explanatory regulations for a number of critical areas could not be completed in time. The fact that detailed arrangements for some issues that need to be determined before "distribution tenders" could not be realized have caused major problems. Determination of the distribution prices at the end of the 8 year had not been clarified sufficiently before the auctions. Some of the critical issues had not been clarified before privatization processes of some companies. Despite the fact that distribution companies' license extension period has been linked to service quality, a comprehensive road map for the end of the 30-year licensing period has not been drawn yet. Regulations regarding the distribution companies' gas purchases should be carried out sensitively. It is important to implement a number of additional regulations by taking the definition of "public service" in the legislation. These studies have not been carried out yet. The failure of the distribution companies to fulfill their obligations under the "shipment control center" also negatively affects the wholesale segment.	The objective set forth by the political authority for the dissemination of natural gas has been achieved through natural gas distribution tenders. There has been no significant regulatory lag in setting tariffs. EMRA clarified some critical issues before privatization of BAŞKENTGAZ.

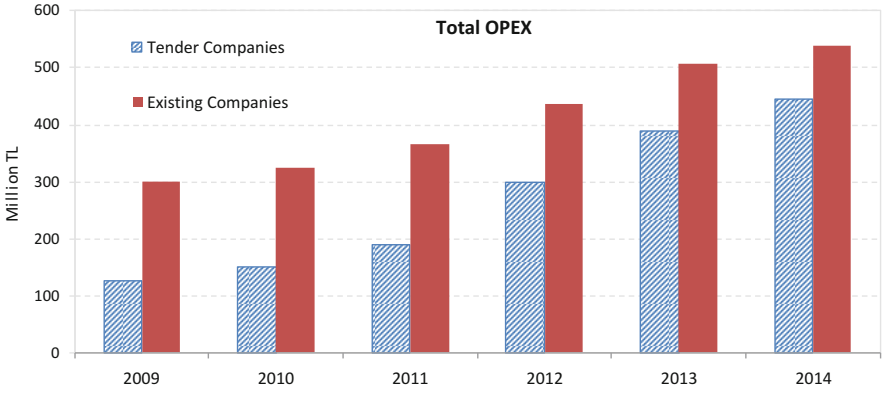

Fig. 4.3 Total OPEX—Comparison of existing companies/tendered companies (data of the figure was derived from EMRA and used by Institution's permission)

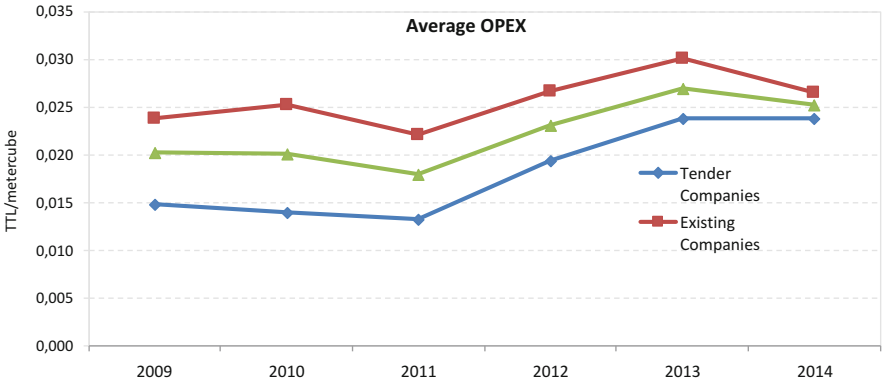

Fig. 4.4 Average OPEX (TL/metercube)—Comparison of existing companies/tendered companies (data of the figure was derived from EMRA and used by Institution's permission)

Although an incentive has been introduced in tariff methodology for **R&D spending**, it is observed that there is a decrease in the ratio of R&D expenditures of distribution companies and the investments are not at the desired level due to the vagueness of implementation (Table 4.3). On the other hand, another reason of decreasing of R&Ds share in operating expenses of the tender companies (Table 4.3a) is the rapid increase in operating expenses. As it was mentioned before, OPEXs were determined by EMRA after 8 years and this caused a sharp decrease in R&D ratios from 2011 to 2012 (Table 4.3a and c).

R&D investments are very important for dynamic efficiency and companies may be able to lose their motivations for innovation and R&D investments in a monopole area. On the other hand, the regulatory authority should evaluate the kind of R&D needs in the distribution sector sensitively in order to prevent waste of resources. RIA is an important necessity to implement effective regulations regarding R&D.

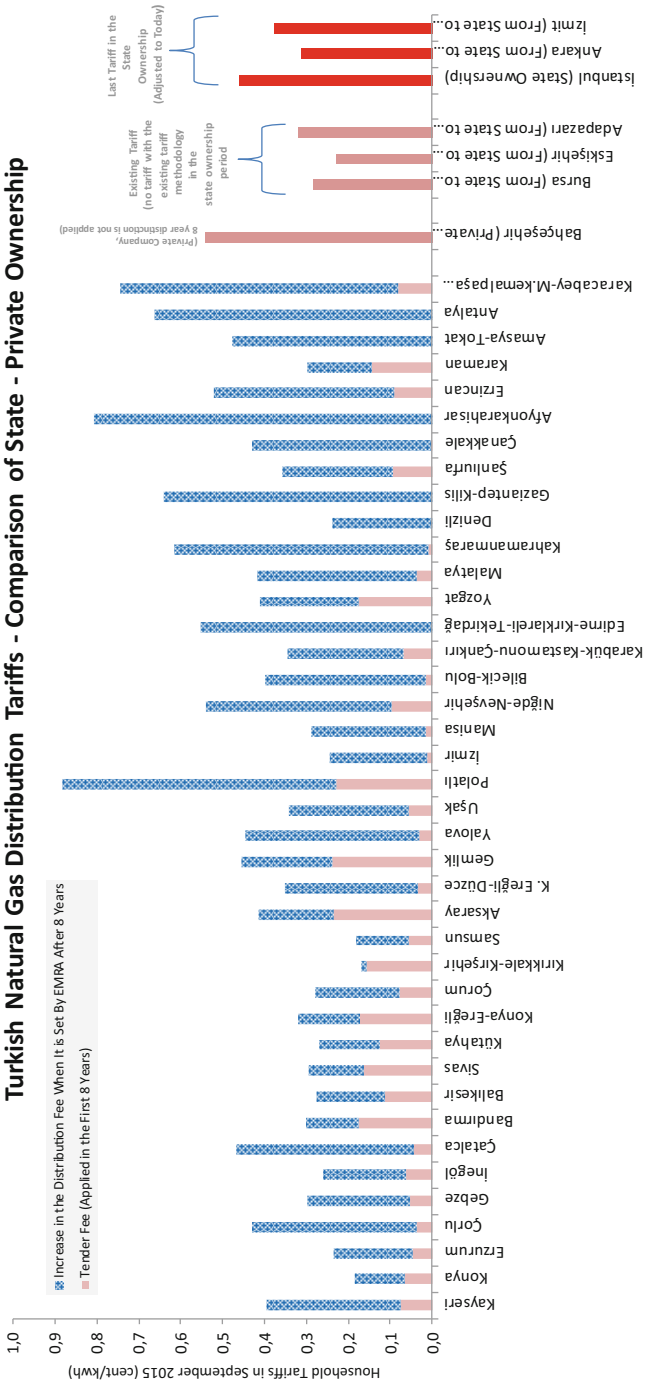

Fig. 4.5 Comparison of state—private ownership (source of data: board decisions-EMRA website)

Table 4.3 R&D expenditures (data of the table was derived from EMRA and used by Institution's permission)

Years	(a) Total of tendered companies		(b) Total of existing companies		(c) Whole sector	
	R&D expenditures (TL)	R&D expenditures/ OPEX	R&D expenditures (TL)	R&D expenditures/ OPEX	R&D expenditures (TL)	R&D expenditures/ OPEX
2009	1,166,834	0.92%	1,074,948	0.36%	2,241,782	0.53%
2010	1,722,085	1.14%	1,160,141	0.36%	2,882,226	0.61%
2011	2,049,575	1.08%	1,323,059	0.36%	3,372,634	0.61%
2012	1,294,085	0.43%	1,206,324	0.28%	2,500,408	0.34%
2013	1,553,303	0.40%	1,728,822	0.34%	3,282,125	0.37%
2014	1,689,724	0.38%	1,902,365	0.35%	3,592,089	0.37%

Finally, an empirical study on "efficiency" and "quality of service" in the natural gas distribution sector of Turkey was carried out. We examined the Yardımcı and Karan's (2015) conclusion that "distribution companies that are providing efficiency in operating expenses have been shortened from service quality." "Efficiency scores" have been calculated by the Data Envelopment Analysis and the Stochastic Frontier Analysis. A significant distinction is observed between the "efficiency scores" and "service quality scores" that obtained from the comparison of the data provided by the companies, at 95% confidence level in 2010 and 2011. In this framework, it is considered that the tariff applications for the quality of service and the introduction of reward/punishment systems are required. It is therefore suggested that the service quality scores may be included as a variable in the efficiency calculations. By this way effectiveness may be important instead of efficiency during the tariff calculations. The regulator's objectives for effectiveness can only be achieved if quality service is provided along with efficiency gains. Careful analysis of this issue is also crucial in testing the success of liberalization or privatization policies. State-owned companies operating before the liberalization period should be evaluated by the technology and conditions of that period not in today's conditions. These kinds of manipulative results lead us to think about the information asymmetry and transparency problem.

As a result, evaluations on sectoral performances, including public-private ownership comparison and R&D expenditures and an empirical study on efficiency and service quality have been supported the results obtained in Sect. 4.4.2.1.

4.5 Summary and Conclusion

The Turkish Natural Gas Market Law, which was enacted under the influence of the structural reforms carried out in Europe, aimed at establishing a liberal gas market in Turkey. It was initially planned to create a competitive market or achieve a competitive environment by a series of regulations for the natural monopoly activities. Turkey restructured its natural gas market in parallel with the aim of the Law and

market activities have been separated, state-owned companies have been unbundled and private companies have been involved in the natural gas sector.

In this chapter, the regulatory effectiveness of the Turkish natural gas distribution sector, which has gone from state ownership to private sector ownership was analyzed. The hypothesis "*effectiveness of regulation has been achieved in the Turkish natural gas distribution sector*" was tested. In this context, regulatory practices and performances of distribution companies were examined.

The law aimed to widen the natural gas usage throughout the country. The basic objective set forth by the political authority for the widening of the natural gas usage has been achieved through the regulations in the Turkish natural gas distribution sector. EMRA established secondary legislation for the natural gas distribution sector by several Regulations, Communiqués and Board Decisions. There was not any significant regulatory lag for the tariff settings. On the other hand, consumers' contributions or evaluations have not been adequately received during the regulatory studies. Reasonable Rate of Returns were determined high by the regulatory authority and this caused A-J effect for the investments. Regulations and incentives for ensuring the sustainability of the sector showed that the problem of "too big to fail" in the natural gas distribution sector has been occurred. The fact that a majority of the regulations were against consumers could be interpreted as a problem of "regulatory capture".

As a result of this study, it is seen that consumers are exposed to high costs or low service quality. It is understood that applications for reducing the costs through the development of the sector and especially through investments in R&D have not been carried out effectively. The results obtained in this context are partially considered as regulatory failure.

It may be useful to extend the study by some comparisons with the European countries in the further studies. It is hoped that the results of the work could be useful for the relevant institutions and organizations, as well as to assess regulation success or regulatory failure in the other segments of the Turkish energy market. It is also possible to utilize the results of this work for the studies on "market failure" or "government failure". It is thought that it will be useful to repeat and improve the work at certain time periods.

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