

RESTRUCTURING OF NATURAL MONOPOLIES AS A FACTOR IN IMPROVING THE COMPETITIVENESS OF NATIONAL ECONOMIES: THEORETICAL ASPECTS

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Abstract. The article focuses on the problems of restructuring natural monopolies. The development of modern methods of natural monopolies regulating is an important factor of increasing competitiveness of the Russian economy. The article analyses the development of the concept of natural monopolies, their characteristic features, traditional and modern methods of regulation.

Keywords: natural monopoly, traditional and modern methods of regulation of natural monopolies, price limits, two-component tariff.

JEL codes: D18, D24, D42

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Introduction

There are many discussions of the problems of regulating natural monopolies in the economic and legal literature (Vasev, 2021; Krasnova, 2021; Zugumova & Isakova, 2019; Fine & Repetyuk, 2021; Kurochkin et al., 2021; Loktionov, 2021). This is related both to the permanent rise of prices for their services and the raw material orientation of our country.

Meanwhile, the problem of natural monopoly was highlighted in 1848 by John Stuart Mill in «Fundamentals of Political Economy with Some Applications to Social Philosophy». He identified the problem of unnecessary duplication of transmission networks that could occur in public sectors. Leon Walras wrote about the relationship between natural monopoly and regulation in terms of application to the construction and function of railways. Recently, a neo-institutional approach to the regulation of natural monopolies emerged as a critique of neoclassics. Ronald Coase is one of its founders. But he focuses on radio broadcasting, the postal monopoly and courier companies.

Coase published a number of articles on the analysis of natural monopolies: in 1950, his article «British Radio Broadcasting: A Study of Monopoly», in 1955, «Postal Monopoly in Great Britain: A Historical Review», and in 1959, «The Federal Communications Commission: A Study of Monopoly» and in 1961, «The British Post Office and Courier Companies». Coase focused on the idea that state monopolies were imposing their own standards to society and infringing on press freedom. This was particularly evident in British broadcasting, where the frequency range is not subject to the price mechanism. Coase dealt with the problem of externalities and the creation of an efficient system of property rights. However, by the influence of state monopolies criticism, mechanism for regulating natural monopolies was criticised. The cycle is completed by «Lighthouse of Economic Theory», published in 1974.

Results and discussion

Definition of a natural monopoly and the conditions for its existence

Monopoly cannot be avoided in a number of sectors. You cannot have two gas pipelines from two competing companies, multiple heat transmission lines, alternative sources of electricity, etc. in one flat. In most infrastructure sectors, the monopolies occur naturally and the government has to regulate them directly or indirectly.

Examples of natural monopolies are pipeline gas transportation; electricity and heat transmission services; railway transportation; transportation terminal services, ports, airports and public electric postal services.

In the 1930s and 1940s, the question of price levels under natural monopoly conditions was hotly debated in the US (Coase, 1990). In perfect competition, $P = MS$; this price (P_b) is optimal from society's point of view because it ensures the most efficient allocation of resources (Figure 1). However, in terms of this price, production may be unprofitable for a number of producers. As costs varied from producer to producer, so did prices.

Under these conditions, the consumer is unprotected from the blackmailing of the producer, who can inflate the price under a variety of (real or far-fetched) pretexts to the level of R_s . As the government aims to moderate the «appetite» of the natural monopolies, it sets an equal price for all at the average cost level (R_a).

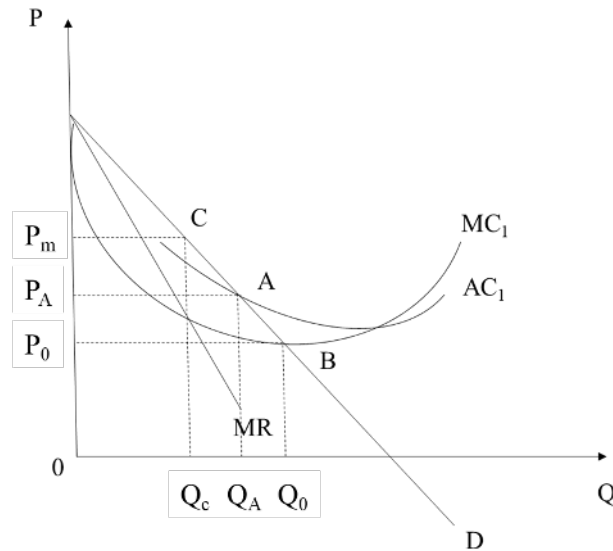


Figure 1. Regulated natural monopoly

Source: composed by the author

Although this price leads to a reduction in the quantity of goods provided compared to the optimal case ($Q_a < Q_c$), consumers still receive more compared in the case of an unregulated natural monopoly ($Q_a > Q_c$). A price set at average cost is called a «fair profit price».

The technological reason for natural monopoly is positive economies of scale and global subadditivity of production costs (Vouros & Rozanova, 2000).

The decision in favour of a natural monopoly often arises when there are high transaction costs, which can be eliminated with the development of technology and social institutions. In addition, if demand increases, more firms may be needed to expand their production.

The following assumptions are used in defining a natural monopoly:

- a) We know the firm cost functions;
- b) fixed supply and constant demand.

In real, there may not be such prerequisites. Thus the greater efficiency of one firm than of several is in doubt.

Thus, natural monopolies are characterised by:

- Strong vertical integration

- Demand inelasticity for goods (services) in the absence of substitute goods.
- High industry entry barriers and high non-refundable costs
- A long return of the investment.
- Environmental physical constraints limiting the number of companies at the same area.

Regulatory mechanisms for natural monopolies

The history of natural monopoly regulation is divided into two phases. From the beginning of the 20th century until the 1960s, natural monopolies, especially those in transport, communications and energy, were widespread and quite effectively regulated by the government.

In the 1960s and 1970s the natural monopoly conditions in some industries began to decline, and in the following decades a process of new concepts emerged.

A wide variety of options are used. These can be Ramsey's prices (Ramsey, 1927) or regulatory mechanisms to achieve the optimal tariff by I. Vogelsang and J. Finsinger (Vogelsang & Finsinger, 1979) or subsidies in the amount of consumer surplus or growth by D. Sappington and D. Sibley (Sappington & Sibley, 1988) and subsidies for firms with limited capacity under conditions of limited demand, etc. (Korolkova, 2000a)

We consider the traditional and modern mechanisms for regulating natural monopolies in details.

Traditional regulatory mechanisms. They are:

1. Rate of return on equity:

$$f \geq \frac{PQ - wL}{K}; \quad \pi = PQ - wL - rK$$

$$\pi \leq (f - r)K$$

where P - price, Q - quantity, π - profit, L - labour, K - capital, w - wage rate, r - interest rate on capital. if $f=10\%$ and $r=8\%$, the firm is allowed to receive no more than 2% of the value of its capital.

2. Profit margin as a function of output: $\pi \leq kQ$,

where k is the monetary income allowed per unit of production.

3. profit margin as a function of sales (income): $\pi < kPQ$,

where k is the share of income allowed to be converted into profit.

4. Rate of profits as a function of costs: $\pi < k(wL+rK)$,

where k is the share of income allowed to be converted into profit.

These controls are aimed to obtain a fair profit on the capital invested by the enterprise. The main problem with this kind of regulation is the absence of incentives to reduce costs (Cambral, 2003). On the contrary, they lead to an increase of the capital intensity of production. As a rule, regulated natural monopolies have no incentive to improve the quality of the product or service provided. This makes it necessary to set quality standards, or to establish a system of regular inspections.

Within the framework of legislative and legal control, the following can be taken:

- direct regulation of prices, services provided and profitability levels;
- indirect regulation through an excess profits tax.

An excess profits tax leaves profits, price and production unchanged and tax revenues are used by the government, while direct regulation allows direct benefits to the monopolist's consumers through the consumption of more output at lower prices (Thompson & Formby, 1998).

Modern regulatory mechanisms. Traditional methods are significantly disadvantaged as they do not contribute to cost reduction. On the contrary, they objectively lead to an increase of the cost of capital and the capital intensity of production. Therefore, models of incentive regulation were developed extensively in the 1970s and 1980s.

The aims of incentive regulation are:

1. Minimise the costs associated with the regulatory process.
2. Give the regulated firm an incentive to reduce costs:

- Effective use of resources;
- Available capacity;
- To interest in innovation;

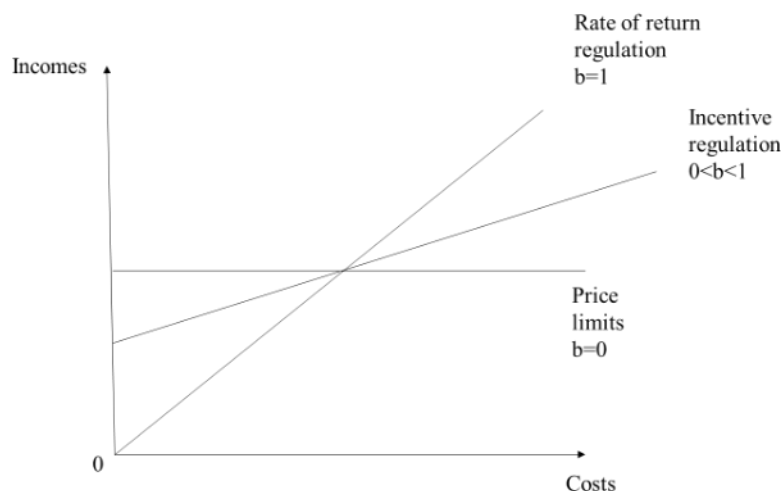


Figure 2. Forms of incentive regulation

Source: composed by the author

$$R=a+bC$$

where R is income; C is cost; a, b are coefficients

$0 < b < 1$ (see Fig. 2)

3. Expand the introduction of competition as a means of increasing efficiency

Models of incentive regulation include:

1. Price limits. They set a fixed price for the regulated firm. The aim of this operation is to get the firm to reduce costs ($b=0$). For example, The American Telephone and Telegraph Company (AT&T) is an example of price caps. AT&T establishes three service packs: one for individual consumers and two for companies and businesses. The price cap is indexed according to the growth rate of GNP, minus 3% (which is the average growth rate of productivity in the USA).

2. «Yardstick» competition. This method organises water and electricity regulation in England, where such companies are regional monopolies. The constraint is an estimate based on the level of costs of other firms operating in similar conditions. However, the problem of comparability arises.

3. Profit sharing schemes. This method makes it interesting for companies to improve their profit margins. However, it is in the government's interest that the rate of return does not exceed certain limits. For example, Indiana's electricity sector. If the company's revenues do not exceed 10.6%, the company receives them. If the rate of return is above 12.3%, the company must reduce prices, and the benefits accrue to consumers. Revenues in the range (10.6% to 12.3%) are shared between the company and the consumers.

4. Rates are optional. The firm must provide a defined set of services at regulated prices. However, it can itself offer the consumer an alternative tariff structure.

5. Hybrid mechanisms. They can use the previous forms in some combination. An example of a hybrid mechanism is the regulation of telecommunications and gas transportation in the US in the early 1990s. The company sets an aggregate income limit, indexes rates and provides a cost-based rate review. The advantage of hybrid mechanisms is greater price flexibility.

Particular features of pricing in natural monopolies

Ramsey's prices Frank Ramsey expressed this idea in his paper «Contribution to the theory of taxation» in 1927 (Ramsey, 1927). For a single-product firm, the price is equal to the average cost ($P=AC$) (see Figure 3).

For a two-product firm, profit maximisation is possible at different prices ($P_1 \uparrow$, $P_2 \downarrow$). The price can be increased for products for which demand is less elastic and decreased for those for which demand is more elastic, so that the total profit is unchanged (see Figure 4). In 1970 W. Baumol and D. Bradford: applied this

concept to multi-product natural monopolies (Baumol & Bradford, 1970).

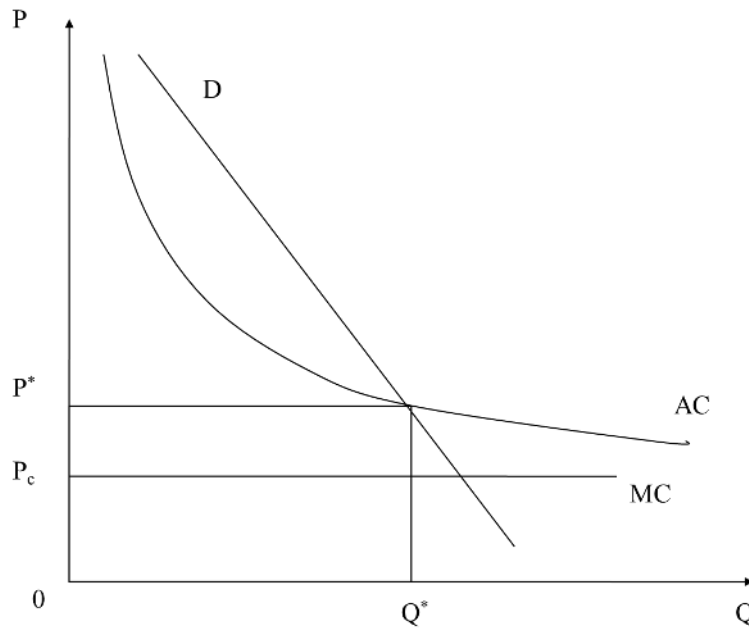


Figure 3. Ramsay's pricing in a natural monopoly

Source: composed by the author

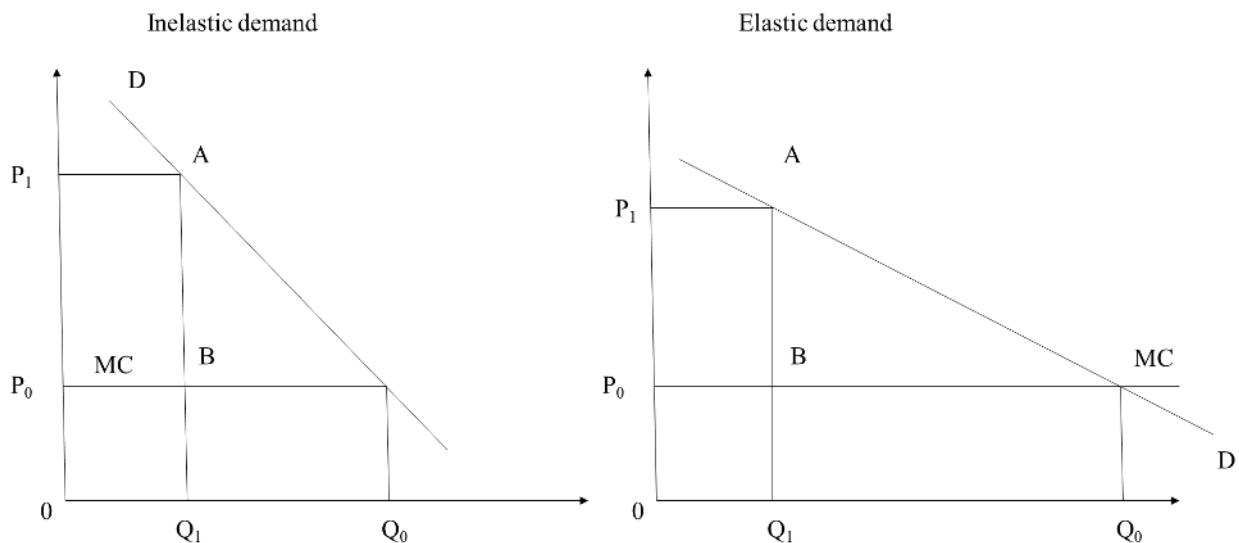


Figure 4. Inverse elasticity rule

Source: composed by the author

At Ramsay prices, the production volume decreases in each market in the same proportion (compared

to the production volume at $P=MC$) $\frac{\Delta Q_1}{Q_1} = \frac{\Delta Q_2}{Q_{12}}$

The «inverse elasticity rule» applies: the percentage excess of price over marginal cost is greater for products with less elastic demand.

$$\frac{P_1 - MC_1}{P_1} \cdot e_1 = \frac{P_2 - MC_2}{P_2} \cdot e_2$$

where $\frac{dQ}{dP} \cdot \frac{Q}{P} = \frac{1}{m} \cdot \frac{Q}{P}$; where m is the angle of inclination of the demand curve.

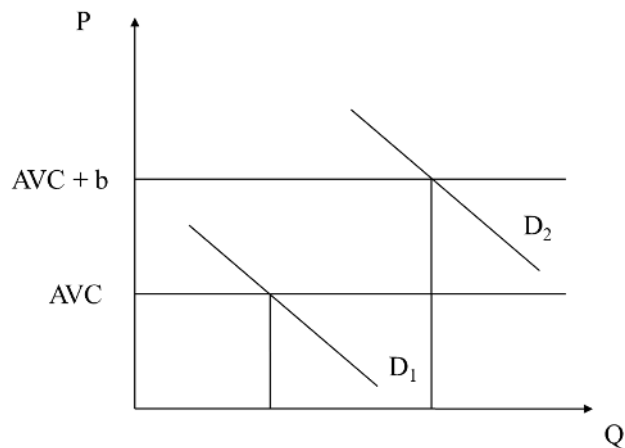


Figure 5. Peak-load pricing

Source: composed by the author

Ramsey's prices provide a maximum aggregate consumer surplus, but its distribution is not regulated. The one of the assumptions of the model is that we know the demand and the cost function, so Ramsey's prices are rarely applied in practice

Peak pricing. This method of pricing applies under the following:

- a) There are strong fluctuations in demand over time in the market, and
- b) it is not possible to store the output of a product (usually for services).

When there is no peak load, consumers pay $P=AVC$ and fixed costs (b) are surcharged during the peak period, i.e. $P=AVC+b$. This way, price discrimination is also carried out simultaneously against those consumers who increase demand at this time (see Figure 5).

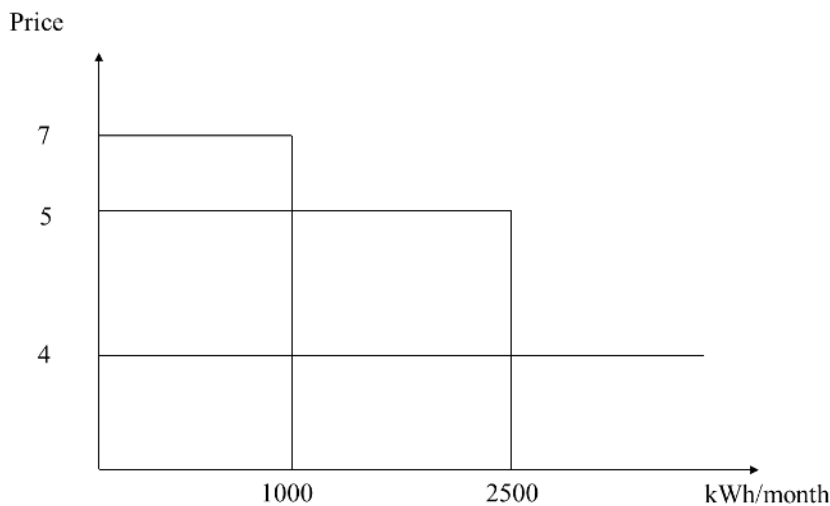


Figure 6. Decreasing block tariff for electricity

Source: composed by the author

Tariffs. In the 1980s and 1990s, a variety of tariffs, primarily two-part tariffs and block tariffs, were more widely used.

The access/use tariff - a two-part tariff - consists of: a fixed charge (access charge), the amount of which does not depend on the level of consumption, and a user charge per unit of output (service).

Block tariffs are structured so the unit price of a product or service varies according to the volume of consumption. Rates can both increase and decrease depending on consumption. Figure 6 illustrates an example of a decreasing block tariff. Figure 7 illustrates an example of an increasing block tariff.

Conclusion

Natural monopolies are a specific type of monopoly characterised by high barriers to entry and high non-recovery costs. The effects of production scale mean that all of society's needs can be met by single company. The problem is the company taking advantage of its monopoly position can raise prices for its services substantially, passing the costs onto customers. Therefore, state regulation of monopolists in such industries has been in place for a relatively long time.

The traditional forms of regulation of natural monopolies, in addition to having well-known disadvantages, do not solve the main problem of their activities and can not reduce production costs. Along with a renaissance of neoclassical thinking, a new stage of reform in the activities of these industries began in the 1970s and 1980s. The main goal of these reforms was to minimise the costs associated with the regulatory process, encourage firms to use available capacity efficiently, increase interest in innovation and increase competition as a means of increasing efficiency.

The second part of this study considers the principles and mechanisms have been implemented in Russian regulation of natural monopolies.

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