

DEVELOPMENT ISSUES DISCUSSION PAPERS

No. 5

May 1994

MONOPOLY REGULATION: SOME ECONOMIC AND INSTITUTIONAL ASPECTS
WITH PARTICULAR REFERENCE TO THE ELECTRICITY SECTOR

BUREAU FOR LATIN AMERICA & THE CARIBBEAN
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

DEVELOPMENT ISSUES DISCUSSION PAPERS

No. 5

May 1994

MONOPOLY REGULATION: SOME ECONOMIC AND INSTITUTIONAL ASPECTS
WITH PARTICULAR REFERENCE TO THE ELECTRICITY SECTOR

by

Juan A. B. Belt
Director, Office of Economic
Planning and Analysis
USAID/El Salvador

BUREAU FOR LATIN AMERICA & THE CARIBBEAN
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

The **Development Issues Discussion Papers** series of the Bureau for Latin America and the Caribbean provides to economists and non-economists within USAID relatively non-technical expositions of important current policy issues. We have dispensed with footnotes and bibliographies (with occasional limited exceptions) to help make these papers easy to read. Most of the papers in this series will be relatively short (fewer than 10 pages), although some may be as long as 20-25 pages. The longer papers will include a brief executive summary.

The opinions expressed in these internal discussion papers are those of the authors and should not be regarded as reflecting the position of the U.S. Agency for International Development or any other part of the U.S. government.

We welcome your comments.

This paper will be presented at a seminar on co-generation of electricity sponsored by the Energy Efficiency Association of El Salvador, the Sugar Producers Association, NRECA, Winrock and the International Center for Economic Growth. It will be the first presentation in a panel at which the electricity regulatory frameworks of Costa Rica, Chile and the United States will be discussed. The target audience for the seminar comprises businesspeople (both users of electric power and sugar mill owners, who are potential suppliers), employees of the state-owned electricity company, and policy-makers. Therefore, the issues are presented in a non-technical manner. The original paper was written in Spanish and translated into English by the author (who is an unregulated economist). Copies of the Spanish version may be obtained from the author at: U.S. Embassy - Unit 3110, APO AA 34023.

INTRODUCTION

Public utilities such as electricity and telecommunications are generally provided by:

A. State-owned enterprises. While this was the principal ownership mode for public utilities in Latin America in the 1980s, a number of these enterprises have been privatized during the past four to five years. It is important to note that originally the electricity companies in Latin America were generally in private hands, and most production was based on thermal plants. When countries decided to develop hydroelectric power, the private sector was considered unable to make the necessary investments because their minimum size was large and their long-term nature may have exceeded the planning horizon for private-sector agents.

B. Private enterprises regulated by the state. Regulation is by specialized commissions or sometimes by the executive branch. In the United States, for example, privately-owned power companies predominate, and these generally are regulated by public utility commissions. These commissions regulate, among other things, rates and quality and safety standards.

The justification for state intervention in public utilities is that they can be considered natural monopolies. Natural monopolies emerge when there are important economies of scale. This occurs generally when the fixed costs of production are quite high in relation to the variable costs of production.

Three essential questions should be answered with respect to public utilities.

1. Is the efficiency of an enterprise affected by the form of ownership, i.e. is the efficiency of private enterprises different from the efficiency of state-owned enterprises?
2. If a monopoly is privately owned, is state regulation necessary?
3. What regulatory framework offers the greatest incentives for economic efficiency?

OWNERSHIP AND EFFICIENCY

First, it is important to define what we mean by efficiency. Two types of efficiency can be considered: internal efficiency and allocative efficiency. Internal efficiency is related to the skill of managers in minimizing costs in the context of a given level of investment, inputs and technology. Examples of measures to improve internal efficiency are organizational changes, the design of incentive systems tied to the productivity of managers and workers, and improved management information systems. The concept of internal efficiency is well known to managers, and is manifested in differences in unit costs of production and/or differences in profitability that two similar firms can have when one is managed by a "better" entrepreneur.

Allocative efficiency, a concept developed by economists, is a function of the relationship between the marginal cost and the selling price of a product.¹ This is an important concept in the case of monopolies, as one can expect that there is a tendency for monopolies to have a level of production and prices that permits them to earn economic profits, i.e. profits that exceed the "normal" returns to capital.

In general one can conclude that privately-owned enterprises have higher internal efficiency than state-owned enterprises. This results, inter alia, from personnel systems in private firms that are more agile than those in the public sector, and that permit incentives for increased productivity, and from more efficient procurement procedures. Nevertheless, it is quite possible that private enterprises could have a lower level of allocative efficiency when there is monopoly power. To ensure a higher level of total efficiency (internal plus allocative) for private firms, it is necessary to have a regulatory framework that gives incentives to private monopolies to behave as if they were operating in a competitive market.

MONOPOLY REGULATION

Regulation alters the manner in which markets operate, and it can contribute to an increase in social welfare if it can provide incentives for monopolies to behave in a manner similar to firms subject to free competition—that is, encouraging them to produce where marginal costs are closer to the selling price. While in theory regulation can increase efficiency, in Latin America there has been an unfortunate tendency to regulate too much, and often the benefits of regulation have been lower than the costs.

¹ Monopolies produce where marginal cost is equal to marginal revenue and not where marginal cost is equal to price, as occurs when numerous firms compete in a market. These concepts are presented in a more technical manner in the Addendum to this paper.

A good regulatory framework for monopolies should have two primary objectives. First, it should protect society from the monopoly power of firms, and second, it should protect private firms from the capricious and sometimes confiscatory behavior of the state. If this last objective is not met, investment incentives would be reduced or even eliminated.

To give incentives to a private firm to invest in an industry regulated by the state, a guarantee must be given on the selling price. This guarantee could face what has been called the problem of time inconsistency of economic policy, a principle used to analyze macroeconomic management issues but that can also be used to look at the main issue of the regulation of monopolies by the state.

It might be easier to explain this concept using an example from our daily lives. Suppose that we have a university-age son, and that we propose to him the following: "If you want my help to pay for your tuition at the university, first you have to work next summer, and I will supplement your earnings so that you are able to meet your university expenses." If the boy accepts, he demonstrates that he is hard working; he will receive a subsidy from his father; and he will obtain a university education.

If the boy is clever, or if he studied economics and learned about the time inconsistency of policies, he could conclude that his best strategy is to spend the summer at the beach during the day and dance the lambada at night, because the father's decision could be reversed after the summer is over. Why would the excellent policy enunciated by the father change at the end of the summer? Why would it be expected that the father will not be consistent through time? If the boy does not work, at the end of the summer the father has two options. First, he can implement the rule he announced at the beginning of the summer, and he will end up with a lazy son, well tanned, a good dancer and without a university education. The second option is to modify the rule and pay the university expenses; then he will have a lazy son, well tanned, a good dancer and with a university education. The decision from the moral point of view is obvious, but it is possible that the father in the end will prefer to have a son with a university education.

In the case of regulation by the state, before a private firm invests, the best strategy for the government would be to offer a price that would give a strong incentive for investment. The optimal policy, however, can change after the investment is made, as the politicians may wish to reduce the price (or let it be eroded by inflation). By reducing the real price, politicians increase their popularity with consumers, who are always more numerous than investors, and they increase the probability of being re-elected, something that they may value more highly than social welfare. It is important, therefore, to design a regulatory framework with credibility.

A regulatory framework with credibility can significantly affect investment decisions. For example, in Argentina the tender for the sale of the telephone company was made before an adequate regulatory framework was in place, and only three offers were made. These offers were considered low by most observers. In Venezuela, on the other hand, the tender was made after a well-designed regulatory framework was in place, and seven relatively high offers were received. After the telephone company was sold in Argentina, the regulatory framework was improved, and the value of the firm increased markedly, thus giving a windfall profit to two foreign firms that had purchased at the low price (Pablo Spiller, Institutions and Regulatory Commitment, Institute for Policy Reform Working Paper 51, 1992; and Sebastian Edwards, Latin America and the Caribbean--A Decade After the Debt Crisis, World Bank, 1993).

Without a doubt, an adequate regulatory framework is essential for protecting consumers and investors. What kind of regulatory framework would give the greatest incentive for private investment in El Salvador and at the same time protect consumers?

We can consider two extremes in the approaches to regulation. In the first, there is strong involvement and discretion by the state; in the second there is more reliance on pre-established rules, and market forces play a greater role.

The framework with a strong role for the state can be based on regulation by a government ministry (such as the Ministry of Economy in El Salvador) or by a more independent commission, such as public utility commissions in the United States or the Servicio Nacional de Electricidad in Costa Rica.

Problems of regulation with a strong role for the state can be analyzed in the context of principal-agent theory. The theory deals with the problem of designing incentive systems to encourage agents to protect the interests of principals (or owners) when there is asymmetry in information, that is, when principals have less information than agents. In the case of a monopoly, where an attempt is made to protect the interests of the citizens (principals), there are numerous agents, each with their own objective functions and interests, which may not coincide with the interests of the society as a whole. These agents can be members of the executive and legislative branches who name the regulators, who are also agents. The regulators have to assure that the managers of the regulated firm work assiduously and competently to maximize the benefits of the citizens, i.e. the principals. Under a scheme where there is a great "distance" between principals and the last agent (the manager of the firm), it is very likely, or even certain, that the interests of the citizens will not be protected fully.

Many things can happen with such a scheme. First, it is possible that the regulators would not seek the public good primarily, and instead would pursue their own welfare, or follow the dictates of politicians whose objective function may not be the

maximization of social welfare. In such cases, there could be incentives, for example, not to adjust prices to reflect increases in costs, even though that policy could reduce investment incentives and would result in diminished welfare in the long run.

Second, even if regulators attempt to protect the interests of society, it is possible that they do not have sufficient information to determine what kind of actions they should demand from the regulated firms. Fairly commonly, regulators adjust rates to reflect full costs of production; but it is difficult for them to determine if the costs reflect the maximum possible level of internal efficiency. This can result in excessive employment by the firm, or in a bias towards capital-intensive production, as was demonstrated in a seminal article by Harvey Averch and Leland L. Johnson ("Behavior of the Firm under Regulatory Constraint," American Economic Review, December 1962).

Third, as has been amply discussed by George Stigler, Nobel Prize laureate in Economics (in "The Theory of Economic Regulation," Bell Journal of Economics, Spring 1971, among other publications), regulators often fall into the hands of the regulated enterprises, promoting the interests of the firms instead of the common good.

To avoid some of the problems associated with the more traditional forms of regulation described above, some countries have designed regulatory frameworks that minimize regulatory discretion and give a greater role to market forces, thereby promoting efficiency. Two examples are Chile and the United Kingdom, countries where competition plays a crucial role in fostering efficiency in the electricity sector. Results in the United Kingdom have been highly favorable, as electricity rates have declined in real terms and reliability has increased ("Privatizing Britain's Post Office," The Economist, April 30, 1994).

Although it is often said that the electricity sector is a natural monopoly, and therefore competition is not possible, this is not true of all components of an electricity system. While electricity distribution and transmission have natural monopoly characteristics, electricity generation does not. Although this has always been the case, technological advances in turbines have essentially eliminated economies of scale in electricity generation. Therefore there is no rationale for government regulation of generation, as it is not a natural monopoly.

A regulatory framework was developed in Chile with the following elements: (1) a foreign consulting firm determined the costs of distributing electricity efficiently in the different regions of Chile, and established a formula to adjust those costs to reflect changes in exogenous factors; (2) on that basis, concessions were given to private distribution companies; (3) a system of tolls (or fees) for using the transmission lines between generation plants and distribution companies was established; and

(4) the private sector was allowed total freedom to establish electricity generation plants and to sell power to distribution companies and large clients.

Although I do not have in-depth knowledge of the Chilean experience, I understand that some problems have arisen because a degree of vertical integration has remained (at least one company generates, transmits and distributes electricity). As a result, competition may have been reduced. In the United Kingdom, vertical integration has not been permitted, and the enterprise transmitting electricity is owned jointly by the distribution companies. It is possible that this scheme reduces some of the problems which may be present in Chile.

A proposal prepared by international consultants suggests a regulatory framework for El Salvador similar to those in Chile and the United Kingdom. It includes a legislative package that transforms the regulatory framework drastically; restructures CEL (the state-owned electricity utility), separating its generating, transmission and distribution components; proposes the formation of two to three distribution companies and their eventual privatization (with the possible exception of a distribution company to provide power to rural areas); and establishes clear rules that would permit the payment of tolls for electricity transmission between the generating firms and the distributors.

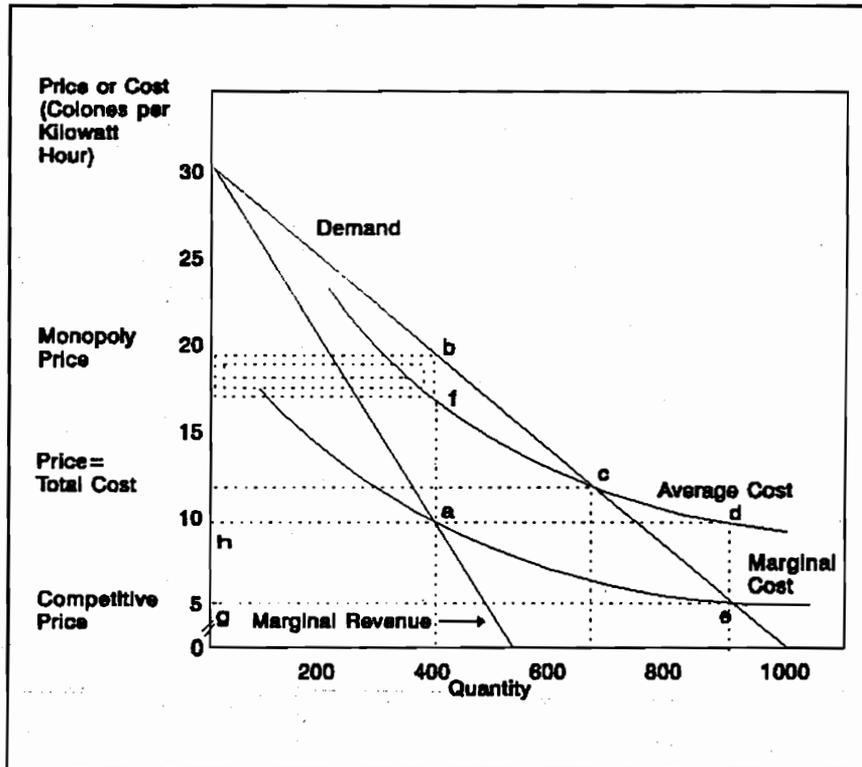
Specifically, the implementation of this proposal requires the approval of the following laws: (1) amendment of the law that created CEL, converting it into a stock company and restructuring it along the lines discussed above; (2) amendment of the Consumer Protection Law in a number of aspects dealing with electricity; (3) enactment of a law creating a National Energy Council (formed by members of the economic cabinet), which will be charged with policy formulation in the sector and the promotion of privatization; (4) creation of a regulatory agency, an independent and technical body charged with setting rates, maintaining quality and safety standards, solving disputes between different participants (including final consumers), and protecting the environment; and (4) enactment of a new Electricity Law, replacing the myriad of laws applicable to the sector. Additionally, the ratification of a Constitutional Amendment (to Article 120) would give greater incentives to private distribution of electricity, as it would eliminate the time limit on concessions for public services. This legislative package, if enacted, would result in a regulatory framework that would be transparent, give an important role to free competition, and be relatively apolitical.

The definition of which regulatory framework is more appropriate for the electricity sector is one of the most important decisions that the Government of El Salvador will take in the immediate future. Given the need to increase the supply of electricity significantly in the next few years, and given fiscal restrictions, it would seem that participation by the private sector in the expansion of supply is absolutely necessary.

Therefore, the regulatory framework that is adopted should provide incentives for private participation in that expansion. Accordingly, it should be transparent and credible, generate low transaction costs for the resolution of disputes, and be as apolitical as possible. From my personal point of view, a framework such as that of Chile or the United Kingdom would be the most appropriate in the Salvadoran context.

ADDENDUM

An explanation of the concept of allocative efficiency can be illustrated better with the use of a graph. The graph below shows a monopoly facing economies of scale, with declining average costs in the relevant range.



If there is no regulation, the firm will produce at point **a**, where marginal cost is equal to marginal revenue; the product would be sold at the "monopoly price"; and the firm would make profits equal to the dotted area. If the regulators established the price where marginal cost equals price (point **e**), optimum from the point of view of resource allocation, the firm would incur losses. A common alternative is to establish a rate equal to total costs (price = total cost), a point (**c**) where economic profit would be zero. However, it is difficult, if not impossible, to determine that price, as in practice the curves are not observed. Additionally, it is not possible to know if the observed costs are the minimum possible with a given level of technology. Generally it is not possible to know if managers are being as efficient as possible, as the necessary information is not available. This falls into the principal-agent problem discussed in the main text of this paper.

