The Logic of Natural Monopoly Regulation

Robert D. Tollison and Richard E. Wagner

THE MONOPOLISTIC LOGIC OF NATURAL MONOPOLY REGULATION

It is commonplace for economists to note that there are three options for dealing with a natural monopoly: (1) leave it alone and accept the monopoly outcome, (2) regulate it to bring about the competitive outcome, or (3) bring it under public ownership as an alternative way of attaining the competitive outcome. To be sure, there is much dispute among economists as to how applicable the concept of natural monopoly is in the real world. Where some see the supply of such services as electricity, natural gas, cable television, railroads, and the like as being natural monopolies, others argue that much of what is called natural monopoly is really an unnatural monopoly created by government restrictions on entry. 1

There is also considerable dispute about the adequacy of the familiar three-fold set of options. For one thing, as Harold Demsetz (1968) argues, the right to operate a natural monopoly can be subjected to competitive bidding, which potentially can bring about the competitive outcome without either regulation or public ownership. 2 Furthermore, principles from the theory of public choice would surely suggest that it is far from automatic that bringing a monopoly under public ownership will bring about a competitive outcome. For instance, Pettinone (1971) shows that the pricing policies of publicly owned electric utilities conform nicely to the principles of monopoly pricing.

We do not take any position here over whether natural monopoly is a relatively easy or a comparatively difficult analytical category. We seek only to explore some central features of the theory of natural monopoly and its regulation, leaving unexamined just how extensively the concept actually applies to the real world. In particular, we wish to explain why public regulation may have little, if any, ability to yield competitive-like outcomes, because option (2) effectively reduces to option (1). In so doing, we reframe from a somewhat different perspective, the "nothing" answer that Stigler and Friedland (1962) gave to their question: "What can regulation regulate?"

We first explain why the elementary logic of rate-of-return regulation generates not the competitive outcome but the monopoly outcome. Within the framework of the "passive regulator" that this logic entails, public regulation cannot alter the monopoly outcome, but can only change the form in which the monopoly rent is captured. The cost-plus structure of rate-of-return regulation will lead the monopolist to increase his observed expenses to the level that yields the monopoly price as the regulated outcome. We then explain why it is essentially no different even if the regulator is an "active regulator," who does not passively allow an output that the monopolist declares to be costs. While we offer no impossibility theorem about an active regulator, we do offer a rational basis for advocating, at best, modest claims about the impact of regulation on price.

We should perhaps note briefly here that our point is different from, though surely related to, some interesting recent literature that seeks to model regulatory processes under conditions that allow for strategic behavior by the managers of the regulated firm owing to incomplete information and limited observability by the regulator. Baron (1989) provides an elegant and detailed summary of this literature, much of which was written by Baron. Of related interest are also papers by Braeutigam (1989) and Sobel and Roe (1989).

These papers use formal models to characterize the difficulties faced by an active regulator, fully recognizing...
that a passive regulator will acquiesce in the establishment of the monopoly price. We do not dispute the contributions those papers make, but rather wish to suggest that the problem of regulation is even more intricate than those papers would seem to suggest. This intricacy has two sources: (1) an incorporation of rent-seeking or transfer-seeking behavior (Tullock 1967) into the analysis of regulatory processes, and (2) a recognition of the ultimate subjectivity of cost and the presence of a tacit dimension to knowledge (Buchanan 1969; Buchanan and Tullock 1973). In consequence, we are able to argue from the perspective of simple price theory that the regulators of a natural monopoly have little if any ability to control price and output.

The Elementary Logic of Natural Monopoly Regulation

The central issue we wish to explore can be expressed in reference to Figure 1, which we use to illustrate the logic of natural monopoly and its regulation. The assumption of constant marginal cost in Figure 1 does, of course, clash a bit with the logic of natural monopoly regulation, rooted as it is in declining average cost over the relevant range of output. But our assumption of constant cost is merely a device to simplify the exposition, allowing us to avoid the numerous issues that arise concerning the form of pricing to use when average cost declines. The point we wish to develop here neither contributes to this "marginal cost controversy" (Coase 1946) nor is affected by any particular resolution of it. Our point holds if this controversy is resolved in favor of marginal cost pricing, with taxes being collected to finance the firm's loss. It also holds if the controversy is resolved through some form of multi-part pricing, say as illustrated by Buchanan's (1968) application of club principles to marginal cost pricing. So too would our point hold if the controversy were resolved in favor of average cost pricing. Since our point holds regardless of the method taken to resolve the gap between average cost and marginal cost, our exposition will be greatly simplified by assuming that this gap does not exist.

As represented by Figure 1, the natural monopoly outcome would yield a price of \( P_m \) and an output of \( Q_m \). This contrasts with the competitive outcome, where price would be \( P_c \) and output would be \( Q_c \). In this straightforward comparison of monopoly and competition, a regulatory agency that made the natural monopoly set as if it were a competitive industry would produce both a gain in consumer surplus of \( s \) and secure an income transfer from the owners of the monopoly to the consumers of the monopoly's output of \( P_m - P_c \).

The problem of regulation, of course, is one of how to secure that potential gain. Rate-of-return regulation would seem to be a relatively straightforward way of doing this. The regulator allows the firm a price that it expects will yield revenues sufficient to enable it to earn a competitive or "reasonable" return on its capital stock. The regulator's problem is to select a price that it estimates will generate revenues sufficient to cover accounting costs plus the allowable return on the capital stock required to produce that output. A regulatory agency faced initially with the monopoly outcome described in Figure 1 would not approve price \( P_m \) because the rate of return that would be received on the capital stock required to produce \( Q_m \) would be higher than allowed, by virtue of the monopoly rem. The regulator would continue to put downward pressure on price until the monopoly was earning only the permissible rate of return, in which case the price would be \( P_c \), the monopoly would be producing \( Q_c \), and would also have acquired the larger capital stock required to produce that larger output. So long as the allowable rate of return is correct, rate-of-return regulation would seem to yield the competitive outcome. In so doing, the regulatory agency would transfer \( s \) from the monopolist to consumers, as well as creating a welfare gain of \( H \) for consumers.

There are numerous complexities that we have glossed over here, mainly because they are extraneous to the line of argument we seek to pursue. One has to do with the selection of an allowable rate of return. Another has to do with the necessity to estimate the amount of the service demanded at different prices. In neither of these cases is there some objectively correct source to consult or magnitude to choose. And the same holds for the measure of the capital stock to which the rate of return is applied. Furthermore, utility regulation typically pertains to a structure of prices and not a single price, often because cross-subsidization is a component of public regulation. But the simple point we wish to develop here holds independently of these complexities. Therefore, it does no damage to our line of argument to simplify it by assuming a single price, accurate estimation of demand, knowledge of what constitutes a reasonable or competitive rate of return, and an unambiguous measure of the firm's capital stock.

Rate-of-return regulation would seem to be a relatively low cost, comparatively straightforward way of bringing about the competitive outcome, using the monopoly's own self-interest as an important driving force in the process. For a monopoly who faces given costs of \( M \), the presence of a regulator who pushes prices down in response to an observed return in excess of the allowable return will induce the firm to expand.
its capital stock and output. The eventual outcome, as noted above, is the competitive outcome. With respect to Figure 1, the price $P_N$ allows the firm to cover its cost of production and to earn a normal rate of return on the capital stock required to generate the output $Q_N$. The monopoly, of course, would have a smaller capital stock because he would produce only $Q_M$ and would be earning a higher-than-normal rate of return by virtue of his receipt of monopoly rents of $T$. The premise of a rate-of-return regulation is that it sets a price ceiling that allows the monopolist to cover cost and earn only a normal rate of return. This ceiling price would be $P_R$ under the assumption that the cost of production were unchanged by the regulation of profit.

The Monopolistic Regulation of Natural Monopoly

The ability of rate of return regulation to generate the competitive outcome requires passivity on the part of the monopolist, which in turn renders the regulator's job easy. The monopolist does nothing to hinder the regulator's efforts. The presence or absence of regulation has no influence over the way the monopolist operates his business. We have a poker game where all the cards are dealt face up.

Such a passivity is unsuitable conduct for the monopolist, as the recent literature inspired particularly by Baron (1989) has explored largely from within a game-theoretic frame of reference. To be sure, the literature on monopoly optimization has long recognized the implausibility of such a presumption, at least along some dimensions of firm behavior. There is, for instance, a vast literature on matters such as possible incentives to padded the capital base, as illustrated by the Averch-Johnson (1962) effect, which can result in the extent the rate of return allowed by a regulatory commission exceeds the cost of capital to the regulated firm. In this case the regulated firm is presumed to be active, in that it seeks to exploit the profit opportunities that a regulatory regime offers. If it happens that the regulator allows the firm a 12 percent rate of return when it can acquire capital for 10 percent, the firm will expand its capital base, thereby shifting to a more capital-intensive combination of inputs.

But our thesis holds even if some Averch-Johnson type of effects are absent. To illustrate our thesis, we presume there is some true or objective rate of return. We do this not because we think this is so, but because setting aside the Averch-Johnson type of issues allow us to focus on some fundamental problems with the basic logic of rate-of-return regulation that arise even if it is acknowledged that a monopolist will exploit whatever profit opportunities a regulatory regime offers. One form that such exploitation would take would surely be an increase in the monopolist's actual cost of production, as Alchian and Kessel (1962) explain. Rate-of-return regulation is a 100 percent tax on monopoly profits. But when faced with a 100 percent tax, the monopolist would be strongly encouraged to convert those potential tax revenues into expenditures that yield something of value to the monopolist. In doing so, the observed cost of production would rise, as Alchian and Kessel argued.

But by how much would the regulated monopolist's cost rise above what it would be if the monopoly were unregulated? As cost rises above $P_N$, output falls in the short run, and so would the monopolist's capital stock in the long run. But since the firm was earning only a competitive rate of return, a return that is still available throughout the economy, its shareholders would not be harmed by this reduction in capital stock.

Rather, shareholders merely reallocate their portfolios. Shareholders will receive a competitive return on the smaller capital stock that remains invested in providing the regulated service, and they get the same competitive return on the equivalent cash that is now invested elsewhere in the economy. And to the extent that the increased cost of production provides any value to either shareholders or managers, that increased cost will provide benefit to the monopolist, as envisioned by Alchian and Kessel. Cost will be allowed to rise as long as the monopolist's benefit to the monopolist from allowing observed cost to rise exceeds the marginal cost of doing so. The marginal benefit will be some percentage of the increase in observed cost, because such in-kind returns are less valuable than fully appropriate returns. The marginal cost of allowing observed cost to rise will be zero, as long as observed cost is less than $MC$. But an increase in cost above $P_N$ will reduce the in-kind gain to the monopolist.

We get a starkly simple result: the regulated monopoly will charge the same price and will produce the same output as the unregulated monopoly. The only difference between the two settings is that with the unregulated monopoly the rents are received directly by the owners, whereas with the regulated monopoly those rents are received indirectly by managers and owners as they are dissipated through in-kind expenditures that have some positive value. The basic logic of rate-of-return regulation would seem to be that it does nothing except cause monopoly profits to be captured in a wasteful form. Those profits are not transferred to consumers and output is not increased. Observed cost of production rises, thereby increasing to the monopoly level the price that is consistent with the allowed rate of return.

The Problem of the Activist Regulator

While it might be acknowledged that the simple logic of rate-of-return regulation leads to the monopoly outcome when the regulator is passive and does nothing more than adjust prices to attain the allowable rate of return, it could also be objected that regulators are active people who are to some extent engaged in holding costs down. In the face of such an objection, it could be maintained that we have not so much told a story of the inescapability of monopoly outcomes whenever natural monopoly exists, as we have issued a warning of what might transpire if regulators were not appropriately active.

According to this interpretation, we will have provided support for a regulator who is not content merely to announce some allowable rate of return, but who is also actively engaged in monitoring and dissecting the monopolist's actual expenses. The monopolist might claim a $50 expense for dinner of broiled swordfish accompanied by a bottle of Corinna-Chardonnay. But the regulator might argue that only $12 should be allowed, which would cover a dinner of fried muller accompanied by a bottle of bulk Chablis. If so, we will have shown why it is important that the regulator get involved in the details of cost as to keep observed cost in the vicinity of the lowest possible cost. Indeed, such an interpretation is consistent with our basic framework, as well as that of the game - theoretic literature on regulatory processes: cost regulation must be combined with rate-of-return regulation if it is to replicate the monopoly outcome with the competitive outcome.

While we acknowledge the essential function of cost regulation in avoiding the monopoly outcome in formal models of interactions between monopolists and regulators, we are deeply skeptical that the substance of regulation can be so simple as the formal models imply. In the Baron-related literature, cost regulation deals with what Hayek (1967) characterizes as a simple and not a complex phenomenon. Disputes over cost take place essentially over alternative locations in Euclidian space. Our response is that this simple formalization is useful for organizing thought, but it should also be recognized that in the world of practice cost itself is a complex, multi-dimensional phenomenon. What is called "cost" in the formal literature is, in the world of practice, an aggregation over a large number of accounting categories, each of which itself is an aggregation over an immense variety of activities, the expenses associated with each of which is a matter of individual choice. For instance, among the numerous accounting categories that aggregate to "cost" might be "meals," "office supplies," and "automotive." These three elements would represent but a minuscule share in the total pattern that comprises cost, but consider some of the myriad margins of choice, and monitoring, that exist even here. Observed expenses for "meals" will depend on choices about what is eaten at business lunches, as well as how frequently to hold such lunches, where to hold them, and how many guests to invite. Observed expenses for "office supplies" will vary with choices over whether to copy memoranda on both sides of the paper or only on one, over whether to use recycled paper or 20-lb bond for general office work, and over what kind of business cards to use and who gets to use them. Observed expenses for "automotive" will vary with decisions about how many executives get company cars and over the kinds of cars to lease, not to mention decisions concerning such things as how frequently company cars will be washed and the type of insurance coverage that will be carried.
The aggregate entity referred to as "cost" is that—aggregate. It is not itself directly subject to choice, but rather the result of a complex network of choices involving many people and activities, and any of which could have been made differently, in either a more expensive or a less expensive manner. A claim that expenses for office supplies are too high must, thus, involve some discretion over such particular details of office operation as the quality of paper used for stationery, policies and procedures regarding photocopying, and the design of business cards. We do not deny that such discretion can be undertaken, for it clearly is.

In the face of monitoring costs, the regulatory commission will be likely to emphasize those cost components that can be monitored at relatively low cost, as Lindsey (1976) notes. This might mean in turn that expense items that are relatively close substitutes for income will receive closer monitoring than items that are not. For instance, mail expenses might be more closely monitored than office furniture. If the, the monopolist will have less leeway and will have more painstakingly furnished office. While an office might not be dissimilar in any event, its value equivalent to the monopolist will be less because of the tighter monitoring. As monitoring becomes more intensive, the expansion of T through cost increases would not, however, so much be prevented as it would be shrunk into expense items that are valued less highly by the regulators. In trying to push costs downward, the regulator must get involved in various ways in trying to compare actual costs with projections about least possible costs—and in an environment in which there rarely is ease contemporaneously available observations of such comparisons, how much effort does the regulator to transfer the monopoly rent to consumers will require the regulator to incur regulatory costs. And once a regulatory process has been created in which questions and disputes about proper and allowable expenses are injected into the proceedings, the monopolist will also incur regulatory costs. The monopolist will incur costs to document and support his arguments that what he claims as costs are reasonable expenses of doing business. The regulator similarly has to incur costs to counter the monopolist’s claims.

The regulator’s effort to capture the monopoly rent for consumers will no longer be costly. The monopolist’s cost of compliance will become part of its cost of production. And the regulator’s costs can conceivably be incorporated into the cost of production as well, even though those costs might initially be financed through budgetary appropriations. Indeed, and similar to some of the rent-seeking models of exorbitant discretion, it is possible to imagine a setting in which the costs of regulation are equal to the monopoly rents. If the potential gain from the perspective of the utility amount of proportion of T = T + H, regulation would offer a net gain to the regulator if the regulator were certain of success. For the monopolist, any expenditure up to T would be warranted in an effort to restrict the regulator’s effort to reduce allowable costs to P. While making the particular motive of the monopolist will likewise displace the gains from regulating the monopolist, if natural monopoly exists, public regulation may have little if any ability to make consumers better off, for consumers may still pay monopoly prices or their equivalents in taxation. The monopolist either still captures rent, though in a less valuable form than he was unregulated, or else discharges rent through the process of cost reduction. If there are people who gain through this process, the prime candidates might perhaps be the suppliers of whatever specialized inputs are engaged in the regulatory process, who thereby earn increased rents because of the increased supply of regulatory activity.

NOTES

1. We are grateful to the Lynne and Harry Bradley Foundation for financial support.
2. In a related vein, Foster (1975) argues that public regulation is very likely a larger source of social cost than private monopoly.
3. How likely this potential is to be realized depends on such things as the incentives of government officials to seek competitive bids and the difficulties in specifying contractual terms. On this latter point, see Williamson (1976).
4. In some of the exposition below, we will denote the former as H, representing Hartberger-costs, and the latter as T, representing Tuckwell-costs. For the basic references, see Hartberger (1955) and Tuckwell (1967).
5. Save for the extent that shareholders bear some transaction cost of portfolio reorganization.
6. Or as Akerlof (1970) warned about the possible existence of a market for used cars.
Determinants of LDC Devaluation Decisions: An Exploratory Investigation of Devaluation In Brazil

Parviz Ashlaghi*, William G. Foote ** Reza Salej***

INTRODUCTION

Despite the rich body of literature on the subject of devaluation, there has been no systematic study to determine the economic variables that have significant impact on the devaluation decision.

The existing theoretical work on devaluation is enriched with the elasticity approach initiated by Bikridik (1920); the "absorption approach" launched by Alexander (1968); and the "monetary approach" developed by Hahm (1959), Johnson (1976), and Modell (1966), and recently by the writings of Domestico (1973), Anderson and Takayama (1977), and Giffen and Schmitt (1985), among many others.

The present empirical studies in the area of devaluation can be divided into two groups. The first group of studies supports the view that devaluation is successful in improving the balance of payments deficit [Ashlaghi (1985) on the LDC; Ashlaghi (1988)], and Aschlaghi and Foote (1988) on advanced countries and less developed countries; Connolly and Taylor (1976) on developing countries; and Connolly and Taylor (1979) on mixed sample of developed and developing countries.

These studies use a monetary model and provide positive findings with regard to devaluation. The second group of studies reach conclusions that do not lend support to the effectiveness of devaluation in resolving the balance of payments problems of countries under consideration [Cooper (1971a, 1971b), Krugman and Taylor (1978), Taylor (1981), and Schmidt (1982)].

All of the above studies have analyzed the impact of devaluation on the balance of payments. However some studies have tried to measure the possibility that certain economic variables are more significant in determining devaluation decisions as compared to others, given the balance of payments objective. There are two stages in a country's devaluation decision. The first is the commitment to perform a devaluation. Having decided to devalue, the country then focuses on the amount and direction of devaluation. This paper analyzes the country's discrete choice problem that stems from its announcement to devalue in the context of a monetary approach to the effects of devaluation on economic performance.

A Model of Devaluation Policy Adoption

A country faces certain outcomes either from the adoption of a devaluation policy. The country is assumed to decide, or not, based upon the maximization of a social welfare objective function. The following discussion closely parallels the developments in Chow (1983, Ch. 9) and Amemiya (1985, Ch. 9). Denote a policy index p = 0, for no-devaluation policy, and p = 1, for a policy to devalue.

Let U(G), be the country's utility function that cardinally meta preferences for policy p at date t: maximising goal G. A linear relationship between the utility of goal, U(G), a vector of economic conditions X, and error, u_t, is postulated:

- California State University. ** Le Moyne College. *** The Catholic University

491