A Historical Perspective on Electric Utility Regulation

R. Richard Geddes

The traditional approach to regulating electric utilities, involving exclusive geographic franchises and state commission approval of rate changes and capacity additions, is increasingly coming under pressure brought about by several important economic forces. From the inception of regulation until the late 1960s, economic forces enhanced the workability of traditional regulation and created an age during which rate-of-return regulation worked smoothly. As a result of demand-side, technological and cost changes beginning in the late 1970s, however, the traditional framework was dealt several serious blows. That resulted in a reexamination of both the origins of that regulation and its underlying economic justification. In particular, the "natural monopoly" argument behind extensive price and entry regulation is undergoing reassessment.

The History of Regulation in the Electric Utility Industry

The relationship between the electric utility industry and state and local governments has been closer than that of other industries since its founding in 1879. In the earliest years that was due to the nature of electricity transmission, which required extensive use of public streets to distribute power to homes and businesses. In particular, U.S. law requires special permits or franchises, granted by state governments, to use public streets. By 1880 most states had conferred substantial powers on municipalities regarding the control of city streets. Therefore, in addition to state incorporation, all electric utilities required a special franchise from the affected city to operate. Cities often issued multiple franchises and allowed market forces to determine prices, outputs, capacity requirements, and firm survival. That is known as the period of "municipal regulation" of electric utilities, and it was radically different from the current system.

Municipal Regulation of Utilities. Municipal governments viewed franchises as a method of regulation via competition between utilities and often issued overlapping franchises. The consensus is that such a practice created vigorous competition. That practice was not limited to a few cities or to the electric utility industry. Competition through overlapping franchise granting was practiced in the telephone and gas industries as well. The period of

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municipal regulation by competitive franchises is generally considered to run from 1879 to 1907. It is generally acknowledged that 1907 was a landmark year for municipal regulation as a result of the passing of laws in Wisconsin and New York, which created powerful state commissions. The Wisconsin law, a model used by other states, gave its commission the power to convert existing franchises to "indeterminate franchises," whereby a municipality could terminate a franchise by buying the assets of the utility, to establish entry control through a "certificate of public convenience and necessity," to fix rates, and to regulate capacity additions and the issuance of securities by the utility. The passing of those two state laws was followed by a flurry of legislative activity between 1907 and 1914, in which twenty-seven other states passed similar laws. Subsequently, almost all states passed such laws. The passing of those laws signalled the end of municipal regulation, as local ordinances and municipal authority to grant franchises were superseded by state regulatory commission authority.

The Change to State Regulation. There are two conflicting views of the period of municipal regulation by competitive franchises and the following move to state regulation. The first view is that the period was, alternately, one of destructive competition and abuse of consumers through unrestrained monopoly power—the result of the way municipal governments granted franchises. Some cities granted an excessive number of franchises, which resulted in torn-up streets, unused wires and poles, and bankrupt companies. Those municipalities may have protected consumers, but at the expense of wasteful competition. In contrast, other cities used franchises to protect producers from competition. That was often the charge in cities where utility mergers created large companies. The city officials, presumably captured by powerful utility interests, were bribed and corrupted in the free-wheeling environment of local politics. Thus, consumers were easily exploited by consolidating monopolies as local officials sat idly by, content with favors and graft. Some cities were guilty of both excesses at different times during the period. According to that view, municipalities were not up to the task of regulating utilities. Therefore, state regulation was necessary to distance the regulator from the local, corruption-prone level and to enforce uniform regulation throughout the jurisdiction.

As a result of demand-size, technological, and cost changes in the electric utility industry beginning in the late 1970s, the traditional rate-of-return regulatory framework was dealt several serious blows that resulted in a reexamination of both the origins of that regulation and its underlying economic justification.

That view holds that the move to state regulation was in the public interest because of the "natural monopoly" character of the electric utility industry—one firm can serve the market more cheaply than two or more firms and can keep out rival firms by expanding output and lowering price when threatened. That single, dominant firm is able to earn monopoly profits even while prohibiting entry. The most efficient market structure is one in which the firm is given a regional monopoly by the government with prices set so that the firm earns a "fair rate of return" on the "fair value" of the property used by the utility. Because all demand must be met at that price, the utility has the legal status of a common carrier. Such is the approach embodied in the Wisconsin legislation.

The public-interest theory implies that the move to state regulation was in the public interest. That is, state regulation made consumers better off and producers worse off by increasing the output of utilities and decreasing both prices and profits.

The second view of the period of municipal regulation holds that municipalities could effectively control the monopoly power of utilities through the threat of competition implied by duplicative franchises. Rivalry among firms for customers resulted in a highly competitive market for electricity, in which it was difficult to extract monopoly rents without inviting unwanted competitors, who quickly undercut exploitative prices. According to that view, state regulation was instituted not to correct private market failures and to increase social welfare, but to provide firms with a way to insulate themselves from the discipline of competition.

That view is consistent with the "positive theory of regulation." Its main tenet is that economic regulation serves not the public interest but the private interests of the most politically effective pressure group or groups. Different groups demand regulation to obtain wealth transfers. Regulators use economic regulation to redistribute wealth to maximize political support. That theory relies on the fact that small pressure groups with large per

capita stakes in the regulatory process are most effective in gaining political support for policies that enhance their wealth. The theory therefore predicts that electricity producers will be more effective in gaining support for policies that distribute wealth in their favor than will be consumers. If that is the case, the move to state regulation should have increased the prices and profits enjoyed by producers. Also, the demand by producers for state regulation should have been higher in those states that had the most competitive conditions under municipal regulation. Therefore, the positive theory predicts that regulation should have occurred first in states with intense competition. That is contrary to the prediction of the public-interest theory of regulation, which implies that state regulation should have been established earliest in cities where natural monopolies were most powerful, with state regulation's resulting in lower prices and profits.

Gregg A. Jarrell empirically tested those two propositions. He divided states into two groups—those that adopted state regulation during the early wave, between 1912 and 1917, and those that adopted state regulation after 1917. He found that the states that adopted regulation early had, on average, 45 percent lower prices, 30 percent lower profits, and 25 percent higher per capita output *before regulation* than the states that adopted regulation later. That was the case even after correcting for a number of demand and cost differences. Jarrell attributed those large differences in prices and profits to the effect of different municipal practices on market structure. His evidence contradicts the proposition of the public-interest theory that regulation should have been established first in states where electric utilities were most successful in exploiting their monopoly power. His evidence is, however, consistent with the positive theory of regulation. Municipal regulation through competition kept prices and profits low and caused producers to demand state regulation.

To further test those propositions, Jarrell examined how prices and profits changed after the move to state regulation in the early regulated states. He found that the change to state regulation was associated with a 25 percent increase in average price and a 40 percent increase in average profit. The public-interest theory predicts that both prices and profits should have fallen. There is thus substantial evidence that imposing state price and entry regulation was a proproducer move to insulate electric utilities from the competition fostered by the municipal regulation through competitive franchises. It appears that consumers pay more for electricity under a rate-of-return regime as a result of the absence of competition. Municipal regulation may not have been uniform, but it appears to have been more effective than state regulation in properly controlling utilities.

Recent Economic Changes and Their Consequences for Regulation

State and federal regulation of electricity has never been under more intense scrutiny than it now is. Regulation worked smoothly for fifty years because of relatively stable or improving cost conditions for utilities, coupled with steadily rising demand. Economic upheavals over the past two decades confronted the regulatory structure governing the electric utility industry with new challenges. Largely as a result of the increased politicization of the process under state regulation, it is now widely acknowledged that regulation failed to deal adequately with those changes.

Economic Change and Industry Costs. The 1950s and 1960s were relatively uneventful for the electric utility industry. The industry benefitted from technological progress and economies of scale in generation, which led to falling nominal and real prices for electricity. According to the Edison Electric Institute, nominal electricity prices declined continuously from about 1925—roughly the end of the wave of state commission regulation—until 1970. Demand for electricity grew rapidly throughout that period. Utilities performed well financially and rarely filed for rate increases, but instead often voluntarily decreased their rates. Therefore, the regulatory system of extensive price and entry control worked smoothly during that period. The regulatory system often worked in favor of utilities, since costs decreased before regulators decreased rates. The resulting "regulatory lag" allowed utilities to earn returns on investment greater than their cost of capital, while customers were heartened by falling real prices. Public involvement in the regulatory process was minimal.

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"We programmed it to simulate regulatory conditions in the year 2000, and it's become hysterical."

Several factors worked in concert during the early 1970s to change that placid situation. First, productivity gains slowed as a result of the exhaustion of scale economies in electricity generation and a slowdown in technological innovation. At the same time, coordination economies among different utility systems were fully exhausted. Second, the cost of inputs increased sharply owing to fossil-fuel price shocks in 1974 and 1975 and again in 1979 and 1980. Third, more extensive environmental regulation of electric generating plants, which began in the late 1960s, further intensified in the 1970s and markedly raised construction costs and increased construction times. At the same time, the rise of nominal interest rates increased the cost of capital and further raised construction costs. Both the real and the nominal costs of supplying electricity increased dramatically in a relatively short period of time. Demand growth slowed in response to the price increases that had occurred and further injured the financial health of utilities.

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The Political Nature of the Regulatory Process. In response to those cost changes, utilities filed more frequently for larger rate increases. Initially, the regulatory systems accommodated those cost increases by allowing the requested rate hikes. Regulatory lag, however, began to work against utilities as costs increased faster than rates. Consumer groups, correctly viewing rate determination as the result of a political process, did not acquiesce to those hikes. Consumers soon formed effective pressure groups and attempted to insulate themselves from increases in the cost of supplying electricity. They used their elected representatives and the political forums created by regulation to vigorously oppose rate increases. Environmental groups provided additional opposition.

New ratepayer activism and the political nature of the process transformed the regulatory system. It became clear that the system was not so simple as the dispassionate "fair rate of return" or "cost-plus" criteria suggest. Commissions began to resist rate increases, although the proposed rates accurately reflected cost conditions and thus would have given utilities a constant rate of return. The old regulatory system was not able to deal with such dramatic economic change. As a result, many utilities came under increasing financial stress. Some new regulatory mechanisms were created to deal with the cost increases, such as the fuel adjustment mechanism, which automatically passed on higher fuel prices to consumers. By 1978, all but five states instituted some type of fuel adjustment mechanism. In general, however, rates were not keeping up with costs during that period.

Significant resistance by regulators also came in the form of opposition to new coal and nuclear generating plants' coming on line to replace inefficient oil and gas-turbine plants. Those plants were built under the assumption that the rapid demand growth of the 1950s and 1960s would continue. More important, demand slowed in response to the rate increases that had occurred. Electricity demand grew at a 7.3 percent annual rate from 1960 to 1973, but slowed to 2.5 percent a year from 1973 to 1985. Consequently, construction projects undertaken with the expectation of rapid increases in demand created excess capacity. Many regulatory commissions responded to those pressures by creating new procedures that never had a place in the traditional "regulatory compact" or by greatly expanding old

ones. Utility plants were subjected to "prudence reviews" under which the commission could disallow all or part of the plant from inclusion in the rate base if it was deemed an imprudent investment.

The financial impact of price inflexibility in the face of cost increases and disallowed capital investments was profound. After 1975, electric utility common stocks fell below their book values. Before 1968, earned rates of return on equity were consistently higher than the average cost of new debt. After approximate equality between 1968 and 1973, earned rates of return fell far below interests costs—reaching −3.91 percentage points by 1981. Utilities generally failed to earn their allowed rates of return. The financial performance of utilities did not improve until 1985, when fuel prices and interest rates declined.

The lesson of that experience was not lost on electric utility managers. They now fear that the cost of large (and efficient) new generating capacity might not be recovered through the regulatory process. New capacity might be disallowed from the rate base although its costs were justified and prudently incurred. The expected return on investment in new capacity must compensate for this "regulatory risk," and given the current low rate of investment in new capacity, that return is apparently perceived to be below the cost of capital. Even in areas where there is a clear demand for additional capacity, utilities that are building plants are building much smaller ones. Although there is great hope that third-party nonutility generators, made up of independent power producers and cogenerators, will be able to fill the gap, they still face some regulatory barriers. Unless the system is changed, investment behavior will result in higher prices and less reliable power in the future.

The experience of the past twenty years has shown that the concept of a mutually beneficial regulatory compact between utilities and regulators is illusory. Such a compact would have kept utilities' earned rates of return constant at the allowed level throughout periods of economic turmoil, as long as utilities continued to meet the needs of their customers. It became clear that the political nature of the process profoundly affected its response to changing economic conditions. Only the relatively stable economic environment from the 1920s to the early 1970s that provided growing demand coupled with consistent technological and scale improvements allowed the system to work smoothly for so long. When economic conditions did change, the regulatory process often resisted politically unpopular price increases by changing the rules of the game. That regulatory resistance resulted in huge losses for electric utilities and drove the industry to its current point, where future reliability is in question.

Therefore, one of the fundamental questions about reform of electric utility regulation lies with the degree of politicization inherent in the process. An efficient reform would allow a less politicized, more market-oriented determination of prices and capacity investment. Such a reform would diminish the opportunities to distort pricing through the political control of rates and investment. In addition, consumers would view price increases as the result of changes in underlying economic conditions rather than as a product of some political process.

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The Natural Monopoly Model of Regulation

The failures of the regulatory system to deal with economic change led to increasing discontent with the tradition regulatory approach and the natural monopoly theory of market structure that underlies it. Many researchers have reexamined natural monopoly theory and have found fault with both the theoretical approach and the resulting policy prescriptions.

To recap, traditional natural monopoly theory focuses on the static cost structure of the industry—how per unit costs change as the firm's scale of operation increases when the technology of production is held constant. If the technology is such that larger operations result in more efficient production, then the industry is said to be characterized by economies of scale. Such a technology allows one firm to produce at lower cost than any combination of two or more firms. Thus, the "natural" form of market organization is monopoly.

More recent studies of natural monopoly have recognized the multiproduct nature of a firm's outputs. While the traditional model viewed the firm as producing a single output, electric utilities in reality have outputs that differ according to time of day, interruptability, and so forth. Thus, recent studies have defined an industry as a natural

monopoly if a particular output combination can be produced more cheaply by a single firm than by any number of individual plants or firms.

Critiques of Natural Monopoly Theory. One of the most telling critiques of natural monopoly theory was presented by Harold Demsetz in 1968. He pointed out that although one firm may be the most efficient producer owing to economies of scale in a particular market, monopoly pricing does not necessarily result. The classical natural monopoly model focuses on "competition within the field" to the exclusion of "competition for the field." Pricing will depend on the number of rival bidders for the market as well as on the cost and demand conditions in the market. If contracting costs are relatively low and there are no legal barriers to entry, competition from potential rivals for the customer base will drive prices down to competitive levels. If the incumbent firm tries to earn monopoly profits by increasing price, a rival firm will be able to bid customers away with more attractive long-term contracts. The cost structure of the industry need not determine the number of rival bidders, so that highly competitive prices may result.

If the market size grows over time, as electricity demand always has, or if firms grow large enough that they fully exploit available economies of scale, it may be equally efficient for two or more firms to serve the same market. If that occurs, the justification for state entry barriers is greatly weakened.

A 1971 study of the market for municipal bond sales provides some evidence on the number of rival bidders required to bring prices down. In that market competing brokerage houses bid for the right to sell municipal bonds. Firms price their bids according to the "spread"—the dollars of profit they will take per $1,000 of bonds sold. The study showed that with only three rival bidders, the resulting price was two-thirds of the way to what could be characterized as a competitive price. Although the municipal bond market differs vastly from that for electric power, achieving a competitive price through bidding in electricity markets may not require the large number of bidders often assumed in simple models of competitive markets. Important advances in the use of competitive bidding in wholesale power markets have already been made by using the power grid to facilitate transactions—often over the lines of third parties, the so-called wheeling of power—and by purchasing more power from nonutility generators.

An important addendum to the Demsetz critique addresses the issue of the "wasteful duplication of facilities" that opponents claim is brought on by competition. Demsetz points out that such duplication stems not from competition, but from the mispricing of public lands and thoroughfares. Once a utility has been granted access to streets, the marginal cost of using that land is very low and leads to overutilization of the resource. The land's value in alternative uses, if properly priced in a market, would be higher. That is therefore not an argument for prohibiting competition but for properly pricing the use of public property—forcing firms to undertake a socially optimal amount of investment.

Natural Monopoly and Barriers to Entry. The Demsetz critique leads naturally to a question that has haunted natural monopoly theory for years. If a single dominant firm is the natural outcome in a market with those characteristics, why is it necessary to eliminate potential competition by granting a government-enforced monopoly to a firm? That question is crucial since the benefits of rivalry are stamped out by a legal prohibition against it. Incentives to minimize costs, to develop cost-saving technological improvements, or to implement those improvements are eliminated or greatly reduced.

The standard answer is that since costs are forever falling with firm size, one big firm will always be more efficient than two or more smaller ones. That result depends crucially on the fact that larger firm size always results in greater economies of scale—lower unit costs. If the market size grows over time, as electricity demand always has, or if firms grow large enough that they fully exploit available economies of scale, it may be equally efficient for two or more firms to serve the same market. If that occurs, the justification for state entry barriers is greatly weakened. Paul Joskow and Richard Schmalensee suggest that cost savings through scale economies at the plant, or generation, level were virtually exhausted by 1970. Thus, the justification for prohibiting competition at the plant level may have been rendered obsolete by industry growth since that time.

Important economies in transmission and the coordination of power production, which could be achieved by a smaller number of large, vertically integrated utilities, may still exist. The exploitation of those economies, however, is actually restricted by

regulation. Granting exclusive monopoly territories does not assure that firms can operate at their optimal size. Firms might grow larger under a less restrictive regulatory framework and thus reap greater benefits from scale factors in both coordination of power production and transmission. Therefore, alternative regulatory arrangements would afford benefits of optimal firm size, while bringing prices closer to costs through bidding.

Regulation restricts the exploitation of important economies in transmission and the coordination of power production that may still exist and that could be achieved by a smaller number of large, vertically integrated utilities.

One important area of research examines the cost of entry barriers in the electric power industry. There are many potential effects of entry barriers on firm behavior, such as on the rate of innovation and the adoption of new technology. I focus on the effect of entry barriers on internal firm efficiency. Natural monopoly theory ignores those factors, which could shift a firm's cost curve down under competition, by focusing on the static cost curve.

Work by Walter J. Primeaux suggests that the costs of entry barriers associated with internal inefficiency are substantial. Primeaux examined the effect of direct rivalry on both the costs and prices of electricity. Although such direct competition is often overlooked by economists, Primeaux used data from 1963 to 1968 on forty-nine cities in which two electric utilities serve the same customer base. Customers in those cities were able to choose which utility they preferred. Since investor-owned utilities often operate in many cities and it is difficult to allocate costs to specific cities, his sample included only municipal utilities.

The crucial question for the assessment of costs is whether the scale benefits of having a single firm serve the market outweigh efficiency losses due to the lack of competition. After correcting for a number of economic variables that could affect costs, Primeaux compared the costs of firms subject to competition with those of regulated monopolists. He found that average costs were lower for small firms facing competition and calculated that competition lowered average costs by 10.75 percent. Those efficiency gains outweighed the scale losses of having two firms serve the market up to an annual output level of 222 million kilowatt-hours. That result implies that, in 1962, approximately 92 percent of all publicly owned systems would have operated at lower average costs if they had been subject to competition.

Primeaux conducted a similar study on the prices actually paid by customers of competing versus monopoly firms. He found that the impact of competition on prices was even more profound than that on costs. He attributed that difference to lower profit rates under competition. He found that competition lowered prices by 16 or 19 percent, depending on the quantity of electricity used. The average price (total sales revenue divided by quantity sold) decreased by 33 percent. Thus, the potential gains to consumers from competition, through greater internal efficiency and more favorable profit rates, appear to be substantial.

Conclusions

Demsetz's competitive-bidding approach to electric utility regulation may have been approximated under the period of municipal regulation through competitive franchises. Jarrell suggests that the institution of state rate and entry regulation was due not to the failure of competition to protect consumers, but to firms' seeking protection from competition.

The recent widespread failure of traditional regulation to deal with economic change in the 1970s and early 1980s led to several revelations. First, it became clear that the success of state regulation was due to historical accident, with politically palatable price decreases occurring as a result of exploiting economies of scale and consistent technological improvement. Second, the process was exposed as much different from what the textbook cost-plus approach suggests. Important political forces operate through the process to create regulatory resistance to price increases, even when they are justified by costs. The political nature of the process led to actual changes in procedure, such as the creation of "used and useful" and "prudent investment" tests for new plants, which resulted in

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the unexpected disallowance of many investments. Many firms now balk at adding capacity because they face political or regulatory risk. Commentators have suggested that one of the advantages of a Demsetz-style approach lies in the diminished role played by politics. Third, a critical assessment of the theory of natural monopoly underlying traditional forms of regulation has led to a reexamination of the role of competition in regulating the price, output, and investment decisions of utilities.

How far competition can go in improving on the traditional structure is currently the subject of widespread and vigorous debate. Any changes forthcoming are likely to represent important departures from the traditional electric utility regulation of the past seventy years.

Selected Readings

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