Private and Public Responses to Market Failure in the U.S. Electric Power Industry: 1882-1942

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The electric utility industry, long viewed as one of the nation's most stable and predictable business sectors, has been characterized by increasing uncertainty and controversy since the cost and rate increases of the early 1970s. In terms of industry structure, questions have been raised regarding the costs and benefits of wider competition in an industry typified by vertically integrated monopolists. The relative impact of holding company structures on the industry as well as the relative merits of public ownership and management have been major areas of contention. Finally, the effects and proper role of federal, state, and local regulation with respect to the electric utility industry continue to be debated widely.

Although such controversies may appear to be relatively new, they were in fact commonplace during the first half century of the electric utility industry's existence in the United States. Technological advances in the generation and transmission of electricity led to rapid growth and consolidation of the industry from 1882 to 1930. Over time, the industry came to be dominated by monopoly, privately owned operating companies controlled by interstate public utility holding companies and regulated by state public utility commissions. However, competition, public ownership, independent ownership, and (exclusive) local regulation each continued to exist in some markets.

The onset of the Great Depression and the financial collapse of several major public utility holding company systems prompted a fundamental re-evaluation of government policy toward the electric utility industry. As in the current debate, some observers attributed the industry's problems to excessive government interference, while others proposed increased government regulation and ownership as the solution. Some saw holding companies and monopoly operating companies as the fundamental culprits, while others believed such structures to be a *sine qua non* for the efficient operation of the electric utility sector.

The responses to the crisis included the following: (i) tightening of federal electricity rate regulation powers; (ii) passage of the highly restrictive Public Utility Holding Company Act; (iii) establishment of major federal power generation projects including the Tennessee Valley Authority and the Bonneville Power Administration; and (iv) low-cost federal funding of municipal power companies and rural electric cooperatives through the Public Works Administration and the Rural Electrification Act. All of these

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responses were debated fiercely and most were opposed by both the electric industry in particular and the private sector in general.

The objectives of the dissertation were two-fold. The first was to analyze the evolution of industry structure and institutional relationships in the U.S. electric utility industry over the period 1882-1942 in terms of private and public responses to market failure. The second objective was to evaluate the impact of alternative structural and institutional arrangements on electricity cost and price, both prior to and subsequent to New Deal reforms affecting the sector.

Through a detailed examination of the historical record and the theoretical literature, I developed hypotheses with respect to the impact of alternative structural and institutional configurations in the electric utility industry on costs and prices charged for electric service. In particular, hypotheses were developed both for the year 1930 (pre-New Deal) and 1942 (post-New Deal) with respect to the impact of state rate of return regulation, holding company affiliation, public ownership, and competition.

State rate of return regulation had been established by reform-minded politicians in the early 1900s as a means of allowing electric utilities to take advantage of scale economies via exclusive franchises while limiting these firms to earning "fair" profits. However, a number of factors seemed to mitigate against the latter. Specifically, judicial constraints, inadequate resources, "capture" of the regulators by the regulated firms, and consumer complacency in the face of falling real electricity rates, all appeared to weaken the effectiveness of state commissions in their attempts to deny monopoly rents to electric utilities.

As for holding company affiliation, proponents argued that holding company subsidiaries enjoyed lower costs than comparable independents as a result of scale economies from services provided by the parent company; however, such economies were probably less significant for the larger operating companies, especially by 1930. Holding company opponents claimed that the complex structures of interstate holding company systems allowed firms to evade state rate of return regulation and hence charge monopoly rates. Given the weaknesses of state regulation, however, it is likely that non-holding company affiliates had little problem evading these same regulators.

According to private utility executives, public ownership in the electric utility industry led to higher costs due to inefficiencies in public sector management. Support for this argument also can be found in property rights theory [1]. On the other hand, municipal electric companies enjoyed a capital cost advantage due to the lower cost of debt enjoyed by the municipality relative to private corporations and the ability of the municipality to exclude equity from the firm's capital structure. In addition, prices charged by municipal electric companies may have been substantially lower than those of private utilities if one assumes that only the rates of the latter included monopoly profits.

Finally, the trade-offs associated with competition were relatively clear. To the extent that competition for electric service involved duplication of fixed costs, inefficiencies may have led to higher prices in these markets. However, the historical record suggests that competition in

these markets generally took place for new service areas and at the borders of existing service areas, thus minimizing duplication costs in distribution. Loss of scale economies related to electricity generation also may have been relatively small, especially in the larger cities, given that even competitive markets typically included only two electric utility companies. Therefore, one could hypothesize that the primary effect of competition was to eliminate monopoly rents in these markets, leading to lower rates charged than in non-competitive markets.

Although extensive federal regulation had been introduced in the electric utility industry by 1942, little had been done to make state regulation itself more effective. Since most of the large holding company systems had initiated a process of dis-integration by the early 1940s, their larger subsidiaries were unlikely to enjoy significant cost economies from continued affiliation.

Public ownership and competition, although presumably still effective means of dissipating monopoly rents in 1942, were unlikely to lead to price discounts relative to private monopolists as great in percentage terms as was the case in 1930. This hypothesis is consistent with the assumption that, by 1942, electricity markets had become more "contestable" (subject to potential competition) and individual firms had become more accountable as a result of the extensive federal intervention during the New Deal.

Methodology and Econometric Analysis

An econometric model of pricing behavior in the electric utility industry was developed to test hypotheses relating to the impact of state regulation, holding company affiliation, public ownership, and competition, both before and after the implementation of New Deal reforms. The basic approach entailed the separation of the average price charged by firms for electricity into its cost and monopoly rent components. By including dummy variables for each of the structural/institutional factors, the impact of these factors on cost and price could be isolated.

The methodology differed in several key respects from that of other electricity rate and cost studies in the literature. In contrast to Stigler and Friedland [5] and Jarrell [3], this study used the firm as the unit of analysis as opposed to aggregating cost and rate data to the state level. In contrast to a range of cost studies from Komiya [4] to Christensen and Green [2], the dissertation included as independent variables unit input prices, output level, technology type, and certain characteristics of the market area served, as opposed to physical measures of capacity, book values of assets, and reported levels of costs, etc., which may incorporate monopoly rents and inefficiency costs.

The present study also differed from previous studies in that it treated both price and output as endogenous and, therefore, employed a two stage least squares estimation technique to derive estimates for demand and supply equations simultaneously. Finally, while several previous studies had sought to evaluate the impact of individual structural and institutional variables, none had attempted to analyze concurrently the impact of state

regulation, holding company affiliation, public ownership, and competition in the U.S. electric utility industry.

Data were collected for firms providing electric service in cities of 50,000 or more in the United States. The 1930 sample included 145 firms, while the 1942 sample included 152 firms. Data sources included publications of the U.S. Federal Power Commission, the U.S. Bureau of the Census, Moody's Corporation, and annual reports from individual companies.

The results of the econometric analysis for 1930 were largely consistent with the hypotheses outlined above. State rate of return regulation, as well as holding company affiliation, appeared to have had a negligible impact on the price charged for electricity.[2] However, publicly owned firms charged about 28% less for electricity, on average, than did privately owned firms. Although approximately 11-14% of this amount could be attributed to capital cost advantages, the remaining 14-17% would appear to reflect the absence of monopoly rents in these markets. If publicly owned firms were more inefficient that private firms, as private firms suggested, this result would imply that the prices charged by privately owned firms included monopoly profits exceeding 14-17% of revenues.

Although competition appeared to have no effect on the rates charged by publicly owned firms in cities with population over 50,000 in 1930, it seems to have reduced the rates of privately owned firms on the order of 12.5%. The difference between 12.5% and the estimate of 14-17% obtained above for average monopoly rents could be attributable either to costs of duplication incurred in the competitive market or to the imperfect nature of competition in these markets.

With respect to the 1942 sample, the results were also generally consistent with my hypotheses. The presence of state regulation or holding company affiliation did not appear to have any impact on electric rates, as was the case for the 1930 sample. Public ownership was associated with price discounts of about 15%; however, this figure falls to 5% when one eliminates the benefits of lower capital costs. This price differential is considerably lower than the 11-14% figure estimated for 1930. However, it is consistent with the hypothesis that a major effect of the New Deal reforms was to dissipate significant monopoly rents from privately owned monopoly electric companies.

Direct competition between electric companies in 1942 did not appear to reduce price below the level charged by private monopolists. In essence, the pressures of "yardstick" and potential competition seem to have been as effective at reducing monopoly rents as actual competition.

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[2]However, the subsidiaries of several holding company systems were found to charge rates that deviated substantially from the average. These deviations were attributed largely to differences in management between the various holding company systems.

Conclusions

The results suggest that concerns of New Deal reformers in the early 1930s with the capability of state utility regulation to constrain the profits of private monopoly electric utilities was justified. By awarding exclusive franchises to electric utilities, state regulators accepted the entire burden of controlling monopoly rents. Unfortunately, the hubris of such regulatory bodies was not matched by an ability to carry out their mission. Furthermore, the lower rates charged by publicly owned and by competing electric companies challenge the notion of the superiority of private ownership and "natural monopoly" markets, at least in cities of over 50,000 in population.

The results of the 1942 analysis suggest that structural and institutional reforms implemented during the New Deal exerted significant downward pressure on monopoly profits throughout the U.S. electric utility industry. However, we must be careful not to assume that by the early 1940s the federal government had solved for all time the problem of monopoly rents in the industry. In fact, some of the most significant changes, in particular those relating to potential competition, were only temporary in nature.

Although tremendous changes have taken place in the U.S. electric utility industry since the period covered by this study, some of its lessons may have enduring relevance nonetheless. First of all, public ownership and competition should not be dismissed out-of-hand as inefficient responses to the problem of controlling monopoly rents in the industry. Secondly, the assumption that the re-emergence of the holding company device will lead to the extraction of higher monopoly rents in the U.S. electric utility industry may not be correct. Finally, state rate of return regulation should not automatically be regarded as a productive use of society's resources in dealing with the problem of allocative efficiency in the nation's public utility sector.

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