

COMMISSION AUTHORIZED

Comment of the Staff of the Bureau of Economics
of the Federal Trade Commission*

to

The South Carolina Legislative Audit Council

on

The Statutes and Regulations Covering the
South Carolina Public Service Commission

February 28, 1994

* This comment represents the views of the staff of the Bureau of Economics of the Federal Trade Commission. They are not necessarily the views of the Commission or any individual Commissioner. Inquiries regarding this comment should be directed to John C. Hilke (electric power) at (202) 326-3483, Richard Shin (telecommunications) at 202-326-3495, or Timothy Daniel (motor carriers) at 202-326-3520.

Contents

I.	Introduction.	1
II.	Expertise of the Staff of the Federal Trade Commission.	2
III.	Motor Carriers	4
	A. Introduction.	4
	B. Regulation of trucking.	4
	1. Arguments advanced in support of regulation.	4
	a. Predatory pricing.	4
	b. Destructive competition.	6
	c. Safety.	7
	d. Preserving service to small communities.	7
	2. Effects of regulation.	8
	C. South Carolina's motor carrier laws and regulations.	10
	1. Entry regulations.	10
	2. Rate regulation.	11
	D. Comments on South Carolina's statutes and regulations concerning motor carriers.	12
	E. Conclusion.	13
	F. References.	14
IV.	Telecommunications.	16
	A. Introduction and summary.	16
	B. Changes in the telephone industry.	17
	C. Regulation of telephone utilities.	20
	1. Natural monopoly justification.	20
	2. Regulatory alternatives.	21
	3. Entry and pricing regulation.	24
	D. Suggestions to the South Carolina Legislative Audit Council.	25
	1. Consider allowing the PSC to use alternative forms of regulation for providers of telephone services.	25
	2. Consider authorizing the PSC to give pricing flexibility to LECs for services where they face competitive entry.	26
	E. Conclusion.	28
	F. References.	29
V.	Electric power	32
	A. Introduction	32
	B. Erosion of the "natural monopoly" justification for regulating electric supply	32
	C. Regulatory changes	36
	1. United States experience	36
	2. Foreign experience	41

3.	Relevance of the U.S. and foreign experience to South Carolina .	42
D.	Comments on South Carolina's statutes and regulations concerning electric power	43
E.	Conclusion	44
	Appendix A	46
	Appendix B	52
F.	References	58
VI.	Conclusion	63

I. Introduction.

The South Carolina Legislative Audit Council ("Council") has requested comments on the possible restrictive or anti-competitive practices contained in the statutes and regulations of the South Carolina Public Service Commission ("PSC").¹ The staff of the Bureau of Economics ("staff") of the Federal Trade Commission ("FTC" or "Commission") appreciates this opportunity to submit the following comment, which will discuss three industries regulated by the PSC: motor carriers, telecommunications, and electric power.

After an introductory description of the staff's experience and expertise in these three areas, each industry is discussed in turn. Each of the industry sections discusses the underlying rationales for regulating the industry's prices and entry conditions and examines the effects of economic regulation on industry performance and on consumers. Each section includes suggestions for how South Carolina's laws and regulations could be modified to promote economic efficiency.

Experience shows that competitive forces promote economic efficiency and provide tangible benefits to consumers, even in markets that have traditionally been regulated. Some aspects of electric power and telecommunications retain "natural monopoly" characteristics, and so will continue to require some form of economic regulation.² We believe, though, that consumers could benefit if the form of regulation in these industries were altered to rely more on market forces. In the trucking industry, which is not, by any measure, a natural monopoly, we believe that South Carolina may wish to rely to an even greater extent on competitive forces, to create an environment that rewards sellers that provide lower prices and improved services to consumers.

¹ The Council's letter of August 12, 1993 also requested comments about the Manufactured Housing Board, Real Estate Commission, Residential Home Builders Commission, Licensing Board for Contractors, Board of Registration for Professional Engineers and Land Surveyors, Board of Certification of Environmental Systems Operators, Board of Geologists, Board of Nursing Home Examiners, and Real Estate Appraisers Board. The staff of the FTC responded concerning that portion of the Council's request on November 16, 1993.

² Here, "economic regulation" means regulations dealing with the prices charged by regulated firms and the conditions under which new firms can enter or existing firms can expand their presence in the industry. This comment addresses issues relating to economic efficiency and competition. It does not take a position on other policy considerations.

II. Expertise of the Staff of the Federal Trade Commission.

The FTC is an independent administrative agency responsible for maintaining competition and safeguarding the interests of consumers.³ The staff of the FTC, upon request, often analyzes regulatory or legislative proposals that may affect competition or the efficiency of the economy. In the course of this work, as well as in antitrust and consumer protection research and litigation, the staff applies established principles and recent developments in economic theory to competition and consumer protection issues, including efficiency rationales for rate and entry regulation.⁴

The staff of the FTC has submitted comments at both the state and federal levels on many regulated industries. The staff submitted comments to the Council in 1987 in response to a request similar to this one. In the 1987 comment, the staff examined a number of regulated industries, including electric utilities and motor carriers.⁵ Since then, the staff has submitted a number of comments to state and federal agencies dealing with the telecommunications industry,⁶ and has studied the effects of price and entry regulations on long distance telephone service.⁷ The staff of the FTC has commented on the deregulation of trucking and

³ 15 U.S.C. §41 *et seq.*

⁴ For example, the staff of the FTC submitted comments to the Postal Rate Commission concerning recent advances in the economic theory of regulated monopolies. *See* Comments of the Staff of the Bureau of Economics of the Federal Trade Commission, Before the United States of America Postal Rate Commission, Monopoly Theory Inquiry, Docket No. RM89-4 (September 1, 1989).

⁵ Comments of the Federal Trade Commission Staff to The Legislative Audit Council of the State of South Carolina on Possible Restrictive or Anticompetitive Practices in South Carolina's Public Service Commission Statutes (September 29, 1987).

⁶ *See* Comments of the Staff of the Bureau of Economics and the Chicago Regional Office of the Federal Trade Commission, Before the Illinois Commerce Commission, In the matter of The Blue Ribbon Telecommunications Task Force Outline of Purpose and Request for Assistance (October 19, 1990). At the federal level, *see* Comment of the Staff of the Bureau of Economics of the Federal Trade Commission, In the matter of Expanded Interconnection with Local Telephone Company Facilities, FCC Docket CC 91-141, (March 5, 1993); Reply Comment of the Staff of the Bureau of Economics of the Federal Trade Commission, In the matter of Revisions to Price Cap Rules for AT&T, FCC Docket CC 93-197 (October 21, 1993).

⁷ *See* Alan D. Mathios and Robert P. Rogers, The Impact of State Price and Entry Regulation on Intra-State Long Distance Telephone Rates, FTC Bureau of Economics Staff Report (November 1988).

the benefits resulting from an increased reliance on market forces at both the federal⁸ and state⁹ levels. The Bureau of Economics of the FTC has published a report on trucking deregulation, including the relaxation of entry restrictions and rate regulation.^{10 11} Through these activities, the staff of the FTC has accumulated considerable experience in analyzing the effects of trucking regulation.

⁸ See Comments of the Staff of the FTC on Pricing Practices of Motor Common Carriers of Property Since the Motor Carrier Act of 1980, Interstate Commerce Commission, Ex Parte No. MC-166 (January 1983); Exemption of Motor Contract Carriers from Tariff Filing Requirements, Interstate Commerce Commission, Ex Parte No. MC-165 (1983); see also D. Breen, Bureau of Economics, FTC, Regulatory Reform and the Trucking Industry: An Evaluation of the Motor Carrier Act of 1980, submitted to the Motor Carrier Ratemaking Study Commission (March 1982).

⁹ See Comments and Testimony before the Michigan Public Service Commission (likely effects from entry restrictions) (November 5, 1992); Illinois Commerce Commission (likely effects from entry restrictions) (March 18, 1991); Tennessee Comptroller of the Treasury (June 28, 1990); Director, Transportation/Gas Utilities Division, Railroad Commission of Texas (October 2, 1989); Texas House of Representatives (tow truck regulation) (April 18, 1989); California Public Utilities Commission (impact of deregulation) (October 27, 1988); Ohio House of Representatives (contract carrier motor freight rates) (February 16, 1988); California Senate (contract motor carrier rates) (December 31, 1987); and Washington State Legislature (March 7, 1985).

¹⁰ Diane S. Owen, Deregulation in the Trucking Industry, FTC Bureau of Economics Staff Report (May 1988).

¹¹ In addition, the Commission has taken law enforcement action against trucking rate bureaus for fixing the rates of their members. New England Motor Rate Bureau, Inc., 112 F.T.C. 200 (1989), rev'd, 1990-2 Trade Cas. (CCH) ¶69,108 (1st Cir. 1990) (Commission's order finding violation dismissed with regard to Massachusetts, on grounds that price fixing actions were actively supervised by state agency), modified as to New Hampshire, September 4, 1991; see also Motor Transport Association of Connecticut, 112 F.T.C. 309 (1989) (price fixing found, but complaint dismissed because action was actively supervised by state agency).

III. Motor Carriers.

A. Introduction.

The staff of the FTC believes that relaxing restrictions on entry into motor carrier markets and permitting motor carriers to adjust their prices with a minimum of regulatory oversight benefits consumers and competition by increasing choices, improving service, and reducing prices for the transportation of goods. Studies of motor carrier regulation, both state and federal, show that consumers benefit most when operating authorities are broad and when carriers can flexibly modify their schedules and rates. We recommend, therefore, that the Council consider these principles in suggesting changes in the state's laws and regulations concerning the motor carrier industry.

B. Regulation of trucking.

Several states have recently deregulated some segments of their motor carrier industry, and eight states have deregulated their intrastate trucking industries completely. At the federal level, motor carriers have been substantially deregulated since 1980 to permit much greater competition on rates and much easier entry of new carriers.¹² The reasons for retreating from pervasive economic regulation, that is, control over rates and entry into the industry, are clarified by examining the arguments concerning deregulation and the experiences where economic regulation has been relaxed. Studies have found that the usual rationales for motor carrier regulation are unpersuasive and the economic consequences of rate and entry regulation have been undesirable. (Winston *et al.* (1990); Diane S. Owen (1988))

1. Arguments advanced in support of regulation.

Originally, regulation of motor carrier rates and new entry was intended, at least in part, both to protect the regulated railroads from competition and to support the trucking industry during the depression of the 1930's. (Nelson (1975)) The arguments usually advanced now for continuing this regulation assert four goals: preventing predatory pricing, forestalling destructive competition, maintaining safety, and ensuring service to small communities.

a. Predatory pricing.

It is sometimes argued that rate and entry regulation is necessary to prevent predatory pricing. According to this line of argument, larger, better financed companies will attempt to drive out competitors by selling their product or service at a loss.¹³ After the competitors are

¹² Motor Carrier Act of 1980, P.L. 96-296, 94 Stat. 793 (1980).

¹³ Whether a sale is predatory would be determined by comparing the price to cost. Under
(continued...)

driven out, the surviving “predators” would raise their prices above the competitive level, eventually recouping their losses and increasing their profits.

The practical difficulty of this strategy, of losing money now in the hope of making more later, is that when the “predators” try to raise prices to noncompetitive levels, other firms may enter, or re-enter, the market. Their entry should take business away from the “predator” and force prices back to competitive levels. Unless that entry can be blocked, predatory pricing is likely to fail. The Supreme Court has concurred in this analysis, observing that “predatory pricing schemes are rarely tried, and even more rarely successful.”¹⁴ Another deterrent to trying this strategy, in addition to its risk of failure, is that it could be attacked by public and private antitrust enforcement actions.

The ability to deter entry successfully might apply most plausibly to industries with high “sunk costs.”¹⁵ But entry into trucking is not difficult, except for the problem of obtaining regulatory approval, and sunk costs appear to be relatively low. In the truckload (“TL”) segment of the trucking industry, shipments usually go from shipper to consignee without intermediate handling; the truck itself is the only equipment needed. Trucks are highly mobile and can be transferred quickly to alternative uses, either by shifting them to more profitable geographic markets or by selling or leasing them to other operators. Thus, sunk costs are probably minimal in the TL segment. (Keeler (1989)) In the less-than-truckload (“LTL”) segment, involving shipments of less than 10,000 pounds, shipments often are transported to break-bulk facilities before reaching their destinations, so assets such as warehouses and terminals are also employed. But, like trucks, warehouses and terminals can easily be put to other uses. An entrant can often lease, rather than buy, warehouse and terminal space, and even when it must be purchased, it can be resold or leased to others for alternative uses.

¹³(...continued)

the test that the FTC has applied, sales at a price below average variable cost for a significant period of time are presumed to be illegal, but the presumption can be rebutted. See International Telephone & Telegraph Corp., 104 F.T.C. 280, 403-04 (1984); General Foods Corp., 103 F.T.C. 204, 344-45 (1984).

¹⁴ Matshushita Electrical Industrial Co. v. Zenith Radio Corp., 475 U.S. 574, at 589-590 (1986), citing R. Bork, *The Antitrust Paradox* (1978) pp. 149-56. The Supreme Court recently reiterated that establishing predation remains difficult. See Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., ___ U.S. ___ (June 21, 1993).

¹⁵ See text at n. 111, infra. Sunk costs are those that, once incurred, cannot be recovered should the firm choose to exit the industry. Expenditures on assets that cannot be redeployed easily to alternative uses would be considered sunk costs. An example of this kind of asset might be gas pipelines.

Since predation is unlikely to be profitable or successful, motor carriers are not likely to attempt it. So long as entry by new carriers is not impeded by regulation, predatory pricing in the trucking industry appears to be little more than a theoretical possibility.¹⁶ Others who have concluded that predation in the trucking industry is unlikely in a deregulated environment include the General Accounting Office (GAO), the Interstate Commerce Commission (ICC), the Motor Carrier Ratemaking Study Commission (MCRSC), and the Department of Justice (DOJ).¹⁷

b. Destructive competition.

It is also argued that, without regulation, motor carriers will engage in “destructive competition.” The setting for the “destructive competition” scenario is typically an industry with fluctuating demand, high sunk costs, and a high ratio of fixed costs to total costs. These conditions could lead to excess capacity and considerable pressure to cut prices when demand falls. According to this argument, if firms compete on the basis of price, prices may fall below the average total cost of providing services, and firms trying to reduce costs may diminish the quality and reliability of service, to the detriment of customers.

The critical feature of this scenario is that, because so many costs are fixed or sunk, adjusting capacity in the face of (unpredictably) falling demand is difficult. But these conditions conducive to destructive competition, of relatively high fixed and sunk costs, are unlikely to characterize the trucking industry. Not only are few, if any, capital costs “sunk,” but also fixed costs are not a large percentage of total costs. Rather, the major portion of total costs, such as labor and fuel expenses, would generally be treated as variable. Because the usual preconditions appear to be absent in the trucking industry, removing rate and entry regulation would be unlikely to lead to destructive competition.¹⁸

c. Safety.

Next, it is argued that economic regulation must be retained to maintain safety standards. It is feared that carriers facing stiff competition in rates or service would neglect maintenance, postpone replacing vehicles, and overwork drivers. (Because safety is a dimension

¹⁶ For a review of the modern theoretical literature on predatory pricing, see Milgrom and Roberts (1990).

¹⁷ U.S. Gen. Acct. Off. (1987) pp. 8-10 discusses the positions of the ICC, MCRSC, and DOJ. The GAO report discusses entry barriers in LTL trucking, the most significant of which might be sunk costs involved in providing terminals, financial capital requirements for effective entry, and impediments to entry imposed by state regulation, and concludes that these are “moderate.” Id. at 18; Diane S. Owen, supra note 10, at 13.

¹⁸ See Kahn (1971) p. 178: “[D]oes trucking have the economic attributes of an industry subject to destructive competition? It would be difficult to find one less qualified.”

of service quality, this concern could be an element of the "destructive competition" argument too.)

Studies of the safety effects of removing economic regulation are, at best, inconclusive; figures are cited apparently showing that deregulation led to more older trucks on the road and more reported accidents involving truckers, but other literature suggests that deregulation has not compromised safety. (Diane S. Owen (1988) pp. 18-21; Alexander (1992)) For example, a California legislative study was "unable to prove the hypothesis that the California Public Utilities Commission (CPUC) economic regulation of trucking is significantly and positively linked to improved highway safety." (Calif. Joint Legislative Report (1987) p. 3) At the federal level, a recent report by the staff of the ICC concluded that economic deregulation did not compromise safety, citing, among other things, 1990 DOT figures showing that the fatal accident rate per million miles driven by large combination trucks had fallen by one-third since the 1978-79 period. (Office of Economics of the ICC (1992) pp. 60-67).

There is no necessary relationship between economic regulation and safety. Regulating rates and entry would not ensure that profits are spent on safe operations, nor would removing economic regulation necessarily reduce expenditures on safety. Addressing safety concerns directly, through enforcement of safety regulations, would promote safety more effectively than addressing those concerns indirectly through economic regulation.

d. Preserving service to small communities.

Finally, maintaining economic regulation is sometimes said to be required to preserve service to small communities. According to this argument, motor carriers will find it unprofitable to serve small markets, unless they are guaranteed, by rate and entry regulation, a fair return on investment. The argument presumes that serving small markets is inherently so unprofitable that carriers would not provide it, unless they were required to do so by regulation and compensated for it by high profits earned in other larger markets. These profits can be guaranteed only by protecting carriers from competition there.

In general, an unregulated trucking market can be expected to meet efficiently the demands of shippers, whether they be in large or small markets. Studies of the actual effects of deregulation have not revealed significant deterioration in service to small communities. Surveys by DOT found that a large majority of shippers in rural areas reported either no change, or an improvement, in the quality of service after interstate trucking was partially deregulated. (U.S. DOT (1986a, 1986b)) A 1982 ICC study found that federal deregulation had resulted in lower prices, less damage, and often more service options for shippers in small communities. (ICC (1982)) In a survey following deregulation of intrastate trucking in Florida, 65 percent of respondents in small communities expressed a preference for deregulation, while 30 percent expressed no preference. (Beilock and Freeman (1983)) Thus experience suggests that deregulation does not impair service to small communities.

2. Effects of regulation.

A comprehensive study by DOT of the impact of state trucking regulation found that state trucking regulations impose annual costs on the nation's economy, in the form of higher trucking rates, of approximately \$2.8 billion (1988 dollars). (Allen *et al.* (1990) p. 294) This study allows some comparison between states that have retained economic regulation and states that have relaxed or eliminated it. The study estimates the costs that result from state trucking regulations by comparing deregulated interstate rates with regulated intrastate rates. The study's methods estimated those costs for many states individually, but not for South Carolina, which was included in a group with Tennessee, North Carolina, and Florida; for those four together, the annual economic costs of state trucking regulation were estimated to be \$99 million.

Several states have reduced or eliminated economic regulation. Their experiences attest to the benefits to consumers that can follow. California, for example, experimented with partial economic deregulation of trucking from 1980 to 1986. During that time entry was virtually free, and rates, though regulated, were flexible.¹⁹ According to one study, the result was lower rates with no loss in service.²⁰ In April 1986, the CPUC reinstated significant economic regulation.²¹ But in April 1990, the CPUC reversed course again, implementing significant deregulatory measures.²² According to a 1991 assessment of these two regimes conducted by the Transportation Division of the CPUC, "The rules governing price changes prior to the (1990) Decision prevented carriers from responding to changing market conditions." The PUC also concluded that, in the year following the 1990 decision, prices in the truckload sector fell by 10.3 percent (in real terms) while prices in the less-than-truckload sector rose only 0.3 percent. Further, the assessment reported that a shipper survey conducted several months after the 1990 decision "... indicated that the vast majority of shippers are 'happy' with their for hire trucking service (91 percent) and can get such service anytime they ask for it (94 percent)."

¹⁹ Carriers were permitted to change rates, after a short waiting period, without having to show the change was cost-justified. There was no waiting period to match a competitor's rate.

²⁰ Simmerson, Analysis of The Impact of Deregulation of the General Freight Trucking Industry, at 20-21, Cal. Pub. Util. Comm'n, Investigation No. 84-05-048 (Aug. 10, 1984) (based upon survey by CPUC of 239 general freight carriers and survey by California State University, Hayward, Institute of Research & Business Development of 596 shippers.)

²¹ Carriers had to cost justify proposed changes in rates (particularly rate reductions) and carriers were required to increase some rates by 10 percent.

²² Common carriers were permitted to alter their rates within a "zone of reasonableness" and contract carriage was largely deregulated.

In New Jersey, a study concluded that deregulation worked well. (Allen, Lonergan, and Plane (1979)) Shippers were satisfied with the available service, rates were about 10 percent lower than they would have been under regulation, and intrastate carriers prospered.²³

In Florida, one study found that, a year after deregulation, 88 percent of shippers supported it, with most finding that service levels remained constant and that rate fluctuations had posed no difficulties; indeed, even 49 percent of truckers supported deregulation. (Freeman (1982) p. 51) A DOT study²⁴ found that 90 percent of Florida shippers believed that post-deregulation service was at least as good as service before deregulation and 30 percent reported improvements. A majority (58 percent) perceived that deregulation had held rates down. And an economic study found that deregulation led to a 15 percent average reduction in motor carrier rates. (Blair, Kaserman, and McClave (1986))²⁵

At the federal level, a recent study of federal deregulation of surface freight transportation (trucking and railroads) estimated that deregulation benefits shippers, and ultimately consumers, approximately \$20 billion annually through reduced rates and improved service. (Winston *et al.* (1990)) The net welfare gain to the economy as a whole is somewhat less—\$16 billion annually—because deregulation reduces the profits of some carriers and reduces the wages of some workers. Still, the overwhelming conclusion is that deregulation provides substantial, ongoing benefits. The effect of interstate deregulation on prices of trucking services is equally striking. A recent study concluded that “deregulation has reduced rates from the very beginning and that the effect has grown over time. By 1983 reductions are conservatively in the 15 to 20 percent range and in the 25 to 35 percent range by 1985.” (Ying and Keeler (1991))

In sum, deregulation of trucking appears not to have had the adverse impact on competition or consumers that many critics of deregulation predicted. In fact, deregulation has fostered lower shipping rates and improved service. Lower shipping rates and the reduced costs from more efficient service would, in many instances, be passed through to consumers in lower prices for final goods.

²³ Allen, Statement Before the National Commission for the Review of Anti-Trust Laws and Procedures (January 22, 1979).

²⁴ Statement of Matthew V. Scocozza, Assistant Secretary for Policy and International Affairs, U.S. Dept. of Transportation, Before the Subcommittee on Surface Transportation, U.S. House of Representatives (June 20, 1984).

²⁵ A related finding comes from Maryland, for a period (1973-74) when interstate household goods movers were regulated but intrastate movers were not. The regulated household goods carriers charged 27 percent to 67 percent more than unregulated carriers for comparable moves. (Breen (1978)).

C. South Carolina's motor carrier laws and regulations.²⁶

South Carolina's motor carrier statutes and regulations cover a number of areas. This comment will focus on two: entry requirements and rate regulation. Many economic studies have concluded that federal and state deregulation of trucking has yielded sizable benefits to shippers—and ultimately to consumers of final goods—through lower shipping rates and improved service quality. We believe that South Carolina's consumers would benefit similarly were the state to deregulate its motor carrier industry.

1. Entry regulations.

Before beginning operations, motor carriers are required by law to obtain a valid operating certificate from the PSC.²⁷ A request for a new or modified operating certificate may be approved if the PSC determines that the applicant is “fit, willing, and able to perform appropriately the proposed service.”²⁸ This section of the statute, which became effective in 1984, continues, “If an intervenor shows or if the commission determines that the public convenience and necessity is being served already, the commission may deny the application.” But an intervenor seeking to show that the “public convenience and necessity is being served already” bears the burden of proving its case; the law does not require that the applicant prove the negative.²⁹

Another part of the statute, §58-23-1020, prevents certain motor vehicle carriers (including freight common carriers) from changing their routes or schedules without the PSC's express approval.

The PSC's regulations on entry requirements track closely the language contained in the statutes. Some changes have been implemented as recently as 1990.³⁰

²⁶ Some additional detail on these laws and regulations is provided in the specific recommendations discussed in section D. below.

²⁷ S.C. Code Ann. §58-23-40.

²⁸ S.C. Code Ann. §58-23-330.

²⁹ Anderson Armored Car Service, Inc. v. South Carolina Public Service Commission (1988, App) 295 S.C. 148, 367 SE2d 444. By contrast, the previous regulation placed the burden in the opposite direction, requiring a showing that the public convenience and necessity were not being served in order to obtain the license. S.C. Code Regs. §103-134(1)(A). Other rules (§§(B), (C)) that made it harder for an applicant to establish public convenience and necessity have also been repealed.

³⁰ S.C. Code Regs. §103-130 - 141.

2. Rate regulation.

Trucking rates are regulated. According to statute,

The [public service] commission shall supervise and regulate every motor carrier in this State and fix or approve the rates, fares, charges, classifications, and regulations pertaining to each motor carrier ... The rates once established remain in effect until such time when, pursuant to complaint and proper hearing, the commission determines that rates are unreasonable.³¹

Under the regulations, the approved rates must be “just and reasonable” and the PSC may give due consideration in approving rates to the “need of such carriers for revenues sufficient to enable them, under economical and efficient management, to provide such service.”³² Further, motor carriers are required to charge only those rates that have been approved by the PSC; rebates and discounts not approved by the PSC are forbidden.³³ Finally, the PSC can, if it chooses, hold public hearings prior to approving requests to change existing rates.³⁴

D. Comments on South Carolina’s statutes and regulations concerning motor carriers.

The motor carrier industry’s characteristics—numerous potential providers, relatively low economies of scale, and minimal impediments to entry (except those resulting from regulation)—are those that typically yield well-functioning, competitive markets. Consequently, we believe that the Council should consider recommending that the South Carolina Legislature take steps to deregulate further the entry restrictions and rate regulations that now apply to the state’s motor carrier industry.

Important steps to facilitate entry have already been taken. The legislative changes that went into effect ten years ago,³⁵ and the companion regulations that were modified as

³¹ S.C. Code Ann. §58-23-1010. The statute further provides that “the commission may approve joint rates, local rates, and rate agreements between two or more motor carriers relating to rates, classifications, allowances, and charges agreed to and published by individuals, firms, corporations, or the Motor Truck Rate Bureau, Inc.”, and that agreements so approved are not in violation of a South Carolina antitrust statute, S.C. Code Ann. §39-3-10.

³² S.C. Code Regs. 103-191, 194.

³³ S.C. Code Regs. 103-200.

³⁴ S.C. Code Regs. 103-193.

³⁵ S.C. Code Ann. §58-23-330.

recently as 1990,³⁶ could allow the PSC to approve new and modified operating certificates relatively quickly, so that motor carriers could respond to new profit opportunities. But their ability to respond to market changes is still inhibited by the requirement that motor common carriers obtain the approval of the PSC prior to altering their routes or schedules.³⁷ At the federal level, operating certificates are now broad and schedules can be easily modified. Several states also have loosened or removed restrictions on motor carriers' ability to alter their operations. Studies of experience with motor carrier deregulation have concluded that shippers and consumers benefit when carriers can modify their operations with a minimum of regulatory oversight and delay. In an unregulated market, public demand for a particular service is shown through consumers' willingness to pay for the service, and producers are rewarded with higher sales and greater profits when they meet these demands more efficiently. Motor carriers could meet them better if they were relatively free to respond in particular circumstances. We recommend, therefore, that the Council consider recommending that §58-23-1020 be deleted.

Rates continue to be regulated. Rate regulation diminishes the benefits that accrue from relaxing entry regulation. When rates in a competitive industry like trucking are kept above the level that would emerge in an unregulated market, but entry or other aspects of service remain unregulated, firms will compete away any supra-competitive profits on other margins, such as frequency of service.³⁸ Achieving the efficient combination of price and quality requires that both entry requirements and rates be deregulated. Experience at both the state and federal levels indicates that eliminating rate regulation tends to reduce, not increase, trucking rates, without compromising service quality. We suggest, therefore, that the Council recommend substantial changes to the laws and statutes that impose significant rate regulation.³⁹ Specifically, we suggest that the Council recommend that §58-23-1010 be deleted.⁴⁰ The findings discussed in this section suggest that deregulating trucking rates is a logical and appropriate step.

³⁶ S.C. Code Regs. 103-130 - 141.

³⁷ S.C. Code Ann. §58-23-1020. The regulations are more flexible with regard to which commodities a licensed motor carrier can transport. S.C. Code Regs. 103-210, 211 permit the PSC to approve operating certificates that allow carriers to transport a relatively wide variety of commodities.

³⁸ Douglas and Miller (1974) discuss this inefficient result in the context of the regulated airline industry.

³⁹ South Carolina has already deregulated rates for bus service. S.C. Code Ann. §58-23-20.

⁴⁰ Should this statutory section be deleted, a number of the regulations would also need to be modified or deleted.

E. Conclusion.

Certain aspects of the trucking industry have been deregulated at the federal level and in many states. Arguments typically advanced against trucking deregulation appear largely unfounded. Instead, deregulation has brought lower prices and often better service to shippers. In particular, relaxing regulations that impede market entry and that limit rate flexibility has benefited consumers and competition. We suggest that the Council take these experiences into account when formulating its recommendations concerning the motor carrier industry.

F. References.

- Alexander, Motor Carrier Deregulation and Highway Safety: An Empirical Analysis, 59 *Jo. Econ. J.* 28 (1992).
- Allen et al., The Impact of State Economic Regulation of Motor Carriage on Intrastate and Interstate Commerce, U.S. Dept. of Transportation (May 1990).
- Allen, Lonergan & Plane, Examination of the Unregulated Trucking Experience in New Jersey, U.S. Dept. of Transportation (July 1979).
- Beilock & Freeman, Motor Carrier Deregulation in Florida, 14 *Growth and Change* 31 (1983).
- Blair, Kaserman & McClave, Motor Carrier Deregulation: The Florida Experiment, 68 *Rev. Econ. & Stat.* 159 (1986).
- Breen, Regulation and Household Moving Costs, *Regulation*, 53 (Sept.- Oct. 1978).
- California Public Utilities Commission & California Highway Patrol, AB 2678 Final Report on Truck Safety, Joint Legislative Report (Nov. 1987).
- Douglas and Miller, Economic Regulation of Domestic Air Transport: Theory and Policy. Washington: The Brookings Institution (1974).
- Freeman, A Survey of Motor Carrier Deregulation in Florida: One Year's Experience, *ICC Practitioners Journal* (Nov.-Dec. 1982).
- Interstate Commerce Commission, Small Community Service Study (1982).
- Kahn, The Economics of Regulation 2, Cambridge: MIT Press (1971).
- Keeler, Deregulation and Scale Economies in the U.S. Trucking Industry: An Econometric Extension of the Survivor Principle, 32 *J. L. & Econ.* (1989).
- Milgrom and Roberts, New Theories of Predatory Pricing in Bonanno and Brandolini eds., Industrial Structure in the New Industrial Economics, Oxford: Clarendon Press (1990).
- Nelson, The Changing Economic Case for Surface Transport Regulation, in Perspectives on Federal Transportation Policy, James C. Miller III, ed. (1975).
- Office of Economics of the ICC, The U.S. Motor Carrier Industry Long After Deregulation (March 1992).

Diane S. Owen, Deregulation in the Trucking Industry, FTC Bureau of Economics Staff Report (May 1988).

U.S. Dept. of Transportation, Third Follow-Up Study of Shipper-Receiver Mode Choice in Selected Rural Communities, 1982-3 (1986a).

U.S. Dept. of Transportation, Fourth Follow-Up Study of Shipper-Receiver Mode Choice in Selected Rural Communities, 1984-5 (1986b).

U.S. Gen. Acct. Off., Trucking Regulation: Price Competition and Market Structure in the Trucking Industry (Feb. 1987).

Winston et al., The Economic Effects of Surface Freight Deregulation, Washington: The Brookings Institution (1990).

Ying and Keeler, Pricing in a Deregulated Environment: The Motor Carrier Experience, 22 RAND Journal of Economics 264 (Summer 1991)

IV. Telecommunications.

A. Introduction and summary.

In the decade since the breakup of AT&T in 1984, there has been rapid and substantial technological progress in telecommunications. As a result, in many states traditional regulatory policies have been replaced by policies that attempt to account for this progress. Our comment will discuss two areas where amendments to the existing South Carolina statutes and regulations could benefit consumers. These are: (1) pursuing alternatives to rate-of-return ("ROR") regulation for telephone utilities⁴¹; and (2) permitting incumbent telephone utilities more flexibility to adjust prices in response to new competition.

We believe that the changes we recommend would promote economic efficiency. Regulatory approaches, such as price cap regulation, that encourage firms to minimize costs may help induce telephone companies to provide telephone services more efficiently and lead to reduced prices for telephone services. Studies have shown that states with price cap regulation had lower prices for long distance service. Adopting similar types of regulations for the services provided by local phone companies (called "local exchange carriers" or "LECs") would likely promote efficient input usage at the local level, reducing further the overall cost of providing telephone service.

With some exceptions, permitting entry in markets for services traditionally provided by LECs would likely promote economic efficiency. When competition is introduced for services supplied by a LEC, the incumbent LEC should be given pricing flexibility for these services, to minimize instances of entry by firms whose costs are higher than the incumbent's. The LECs' prices for some services are set significantly above costs, so allowing competition for these services could result in lower prices. Some services now provided by LECs are protected by law from competition, so that they can be priced above cost. The resulting profits are used, in part, to keep local residential rates low. The subsidy scheme will be difficult to maintain in the long run, however, if entry occurs into services currently priced above cost and if telephone service suppliers and end users devise alternatives to the services traditionally supplied by the LEC.

This portion of our comment begins with a brief review of the competitive changes that have occurred in the telephone industry since 1984. We then discuss the regulation of telephone utilities, examining first the natural monopoly justification for regulating telephone utilities, and discussing second the alternative "incentive" regulations now being adopted by regulatory agencies at both the federal and state levels in response to changes in market

⁴¹ For our purposes, telephone utilities include all local exchange carriers ("LECs"), interexchange carriers ("IXCs"), competitive access providers ("CAPs"), and any other telephone service providers in South Carolina. For exact definitions, we refer to those used in S.C. Code Ann. §58-9-10.

structure. Entry and pricing issues are also discussed. This will be followed by specific observations about South Carolina's regulations and statutes that affect the provision of local and long distance telephone services. We conclude with a discussion of possible revisions to South Carolina's statutes and regulations.

B. Changes in the telephone industry.

The market for telephone services has become more competitive, especially after the breakup of AT&T in 1984. Because non-AT&T long distance carriers have improved their networks and gained "equal access" to LECs' local networks,⁴² quality differences between AT&T and other long distance carriers (or "IXCs," standing for "interexchange carrier") virtually disappeared by the late 1980s. As a result, competition for interstate long distance services (known technically as interLATA-interstate long distance services) has intensified.⁴³ About 500 firms now provide interstate long distance service.⁴⁴ AT&T's revenue share of the interstate long distance market declined from 90 percent in 1984 to 62 percent in 1991. In that same period, MCI's revenue share increased from less than 5 percent to 15 percent, and Sprint's share increased from less than 1 percent to 10 percent. The competition in long distance telephone service has lowered real prices and increased the number of long distance calls.⁴⁵

While the Federal Communications Commission regulates interstate-interLATA long distance service, the individual states regulate intrastate service. Every state, except Utah, allows competition for the provision of long distance service within the state (technically, intrastate-interLATA service).⁴⁶ Many states also now allow long distance carriers and other firms to compete with the local phone companies for intraLATA toll service. The extent of

⁴² See *infra* n. 47 and associated text for description of "equal access."

⁴³ A LATA is a Local Access Transport Area. The 1984 divestiture of AT&T established approximately 164 such geographic regions. LATA boundaries do not necessarily correspond with state boundaries.

⁴⁴ According to FCC's Statistics of Communications Common Carrier, 1991-1992, there were 489 long distance telephone carriers in September 1992, of which 379 were using equal access.

⁴⁵ According to the FCC's Statistics of Communications Common Carriers, long-distance toll prices have dropped about 50 percent in real terms between 1984 and 1992, and total interstate switched access minutes increased from 37.5 billion in the third quarter, 1984, to 87.9 billion in the third quarter, 1992.

⁴⁶ The 1984 consent decree that split up the Bell system prohibits the seven Regional Bell Operating Companies (RBOCs) from providing interLATA toll service and AT&T from providing intraLATA local service.

intrastate-intraLATA toll competition is still limited, however, because carriers other than the local phone company (collectively, the non-LEC suppliers) are not granted "equal access" to intraLATA subscribers; instead, subscribers must dial a five digit access code (referred to as "10XXX") to use their services.⁴⁷ In 1992, 34 states allowed intraLATA toll competition on this limited basis.

The LECs also are facing more competition in the provision of some local services. For example, connecting long distance subscribers to long distance carriers has become more competitive. New firms, called "Competitive Access Providers" ("CAPs"), offer some end users the option to connect directly with their long distance carriers, allowing those end users to place long distance calls without using the local telephone network. In addition, the FCC has made interstate "access" markets more competitive by requiring local phone companies to interconnect third parties, such as CAPs and long distance providers, with the local network. Such interconnections permit firms other than the local phone company (such as CAPs) to provide services previously supplied solely by the local phone company.⁴⁸ These competitive forces are expected to lead to lower costs for IXCs and subsequent reductions in long distance charges.

A competitive environment is becoming more likely even in the provision of local "dialtone" service. According to the FCC, CAPs have dramatically increased the size of their fiber optic networks and may soon compete in some dense urban areas to provide local telephone service to large business users.⁴⁹ Potential competitors, such as cable television companies, already have in place wired networks that could be used to provide local telephone

⁴⁷ Thus, the non-LEC suppliers are said to compete only on a "10XXX" basis. To use a non-LEC supplier to complete an intraLATA call, subscribers have to dial the supplier's access code before dialing the regular telephone number. These access codes are in the form of "10XXX", where XXX represents a three digit number.

⁴⁸ Expanded Interconnection with Local Telephone Company Facilities, Federal Communications Commission Docket No. CC 91-141, Report and Order and Notice of Proposed Rulemaking (released October 19, 1992) and Second Report and Order (released September 2, 1993). For an explanation of why economic efficiency would seem to require LECs to provide interconnection to third parties, as opposed to relying on voluntary arrangements, see Comment of the Staff of the Bureau of Economics of the FTC, FCC Docket No. CC 91-141 (filed March 5, 1993) pp. 13-17. A copy of this comment is included with this submission.

⁴⁹ In 1987 CAPs had installed about 133 route miles of fiber; by the end of 1992, CAPs had installed 3,320 route miles of fiber. Route miles of fiber refer to the total number of miles of fiber routes as would be seen on a network map. For more detail, see Kraushaar, Federal Communications Commission, Fiber Deployment Update (1992). CAPs have petitioned to provide local telephone service in Illinois and New York. (See Wall Street Journal, August 24, 1993).

service.⁵⁰ With many homes already wired into cable networks, cable companies can quickly begin providing local telephone service if granted authority to enter the local telephone market.⁵¹

Another set of potential competitors to the local telephone monopolies is the providers of cellular telephone service. Cellular telephone networks, which were once thought to be complements to wired local telephone service, might, in time, compete cost-effectively with LECs' wireline telephone networks.⁵² Already over 13 million cellular phones are in use in the United States. (Economist, October 23, 1993) In addition, a new generation of mobile telephone services known as "personal communications service", or "PCS," is being tested in cities around the United States. PCS might compete with the wireline telephone service in densely populated urban areas, as well as with existing cellular telephone providers.

Competition for local telephone service will not develop uniformly. States with very few potential subscribers may end up with very little competition, while states with large urban centers may end up with substantial competition. Still, competitive forces will in many instances reshape local telephone markets, and states can benefit from laws and regulations that are sufficiently flexible to facilitate effective and smooth transitions in the local telephone market.

C. Regulation of telephone utilities.

1. Natural monopoly justification.

The LECs are regulated under the premise that the provision of local telephone service is a natural monopoly, *i.e.*, that telephone services are provided most efficiently when a single firm supplies the market. The basis for believing that telephone service is a natural monopoly has been eroding. The underlying economic rationale for the 1984 divestiture of AT&T was that the pre-divestiture Bell System was not a natural monopoly. This expectation has been borne out, as the long distance market has become increasingly competitive. Although local telephone service retains some natural monopoly characteristics, even this situation is changing.

⁵⁰ The Cable Television Consumer Protection and Competition Act of 1992 continued a prohibition on cable television companies having cross-ownership of telephone companies in areas where the cable television company provides service. 47 U.S.C. §531. In England, the cable television company is the leading competitor to British Telecom in providing dialtone for local telephone service.

⁵¹ Recent developments in technology may even allow electrical lines to provide telephone service.

⁵² In fact, an entirely wireless digital telephone system has recently replaced the standard wireline system in Quitaque, Texas (population: 500). (Economist, October 23, 1993, and Wall Street Journal, February 11, 1994)

The FCC's 1992 decision to require local telephone companies to interconnect CAPs and other firms with the local telephone companies is predicated on the notion that LEC-provided services may not be a natural monopoly.⁵³

A natural monopoly exists if having one firm supply the market (or markets) results in lower total costs than having several suppliers produce the same level of output.⁵⁴ Where there is only a single product, the existence of economies of scale is sufficient for a natural monopoly to exist. Where there are many products involved, economies of scale alone are not sufficient; instead, economies of scope are also required.⁵⁵ Economies of scope exist if producing two products jointly is less costly than producing the two products separately. If scale economies exist for each of two products, but scope economies are absent, then having a monopoly in each product market might be more efficient than having a single firm produce them both. Because of these complexities, it will often be a formidable task to determine if a multiproduct firm is a genuine natural monopoly. (Evans and Heckman (1983) and Shin and Ying (1992))

Recent empirical analysis of LEC cost conditions casts doubt on the proposition that LECs, as configured, are natural monopolies. Using LEC-level data, Shin and Ying (1992) found that, prior to the 1984 divestiture, LECs may have had monopoly status in some geographic markets, but they were not classic natural monopolies. That is, their results suggested that, in many instances, the same output could have been produced at lower total cost by two smaller LECs. To understand LEC cost conditions better, Shin (1988) estimated the cost structure at the level of the LECs' central offices.⁵⁶ At that level, he found scale economies for three outputs: the number of end users connected, the volume of local calls, and the volume of toll calls.⁵⁷ As expected, the results suggested there were economies of scope between access to the local network and the volumes of local calls and toll calls; however, they suggested diseconomies of scope between local calls and toll calls. Those findings imply it could be efficient to permit non-LEC firms to provide some services that central offices

⁵³ Expanded Interconnection with Local Telephone Company Facilities, Report and Order and Notice of Proposed Rulemaking, supra n. 48, at 1.

⁵⁴ In this section, we provide only a brief discussion of the cost and demand conditions that are needed for an industry to be a natural monopoly. For a more complete discussion of this issue, see Section V, Appendix A.

⁵⁵ This is only a necessary condition (Sharkey 1982).

⁵⁶ A central office aggregates the calls in a relatively small area, and is the first (last) place where outgoing (incoming) calls are switched. Local exchange carriers operate many central offices. In both Shin and Ying (1992) and Ying and Shin (1993) the unit of observation is the local exchange company and not the individual central office.

⁵⁷ Toll calls include only the LEC portion of a toll call.

provide for toll calls, such as switching and local transport. But designing how to do this is complicated by the finding of economies of scope between local network access and toll calls. If those economies of scope stem from switching services rather than local transport services, then permitting entry into local transport for toll calls could enhance economic efficiency.⁵⁸

2. Regulatory alternatives.

Generally, states have regulated local exchange carriers using traditional rate-of-return (“ROR”) regulation. Under this approach, a state public utility commission (“PUC”) reviews LEC costs to determine whether they are all justified. Then, the PUC establishes an allowed rate of return for the rate base (capital stock minus depreciation) using “fair” rate of return as the basis. Finally, the PUC sets prices to generate revenues sufficient to cover costs and provide the LEC this “fair” rate of return. These tasks require the regulator to estimate the cost and demand conditions facing the firm. In some cases, a PUC may have discretion to allow the LEC to earn a rate of return greater than the fair rate of return, but may also set prices that prevent the LEC from actually realizing that greater rate.⁵⁹

Traditional ROR regulation can give rise to inefficiencies.⁶⁰ First, when profits are directly linked to firms’ rate bases (or net capital stock), the firm’s incentive to minimize variable costs diminishes. If the firm’s earned profits are at the authorized rate of return, any increases in profits from lowering the variable costs would be taken away by requiring the firm to reduce its prices to restore its rate of return to the authorized level. Second, a firm subject to ROR regulation may have an incentive to increase its rate base by distorting the input and technology mix. Averch and Johnson (1962) showed that a profit-maximizing regulated monopoly tends to invest in more capital than is socially desirable when its allowed rate of return exceeds its cost of capital. Third, the informational requirements to implement ROR regulation are substantial and impose costs both on the firm and on the regulators.

Given the problems associated with traditional rate-of-return regulation, economists and regulators have examined alternatives such as “price cap” regulation. Under price cap regulation, prices, rather than profits, are the focus of the regulation. Firms may charge any

⁵⁸ The recent decisions by the FCC compelling local phone companies to interconnect with other providers of telecommunications services are consistent with this presumption. See Expanded Interconnection with Local Telephone Company Facilities, Report and Order and Notice of Proposed Rulemaking, *supra* n. 48, at 11; Second Report and Order, *supra* n. 48, at 3.

⁵⁹ Utah, for example, follows this approach. State regulatory agencies also decide what to include in a rate base. By excluding certain assets from the rate base, the effective rate-of-return to the telephone company can be lower than the allowed rate.

⁶⁰ For a detailed discussion of problems with ROR regulation, see, e.g., Berg and Tschirhart (1988).

price below the "cap." The justification for price cap regulation is that, unlike ROR regulation, it provides firms with an incentive to minimize costs, because they can retain a portion of their cost reductions. In addition, the informational requirements may be lower than under ROR regulation, and the possibilities for inefficient cross-subsidization may be significantly attenuated.⁶¹

As a response to changes in the competitive environment and theoretical concerns about ROR regulation, federal and state regulatory agencies have experimented with alternative forms of regulation. In 1989, the FCC applied a form of price cap regulation to AT&T to facilitate the transition toward full competition in the long distance toll market.⁶² In a July 1993 report, the FCC concluded that "price cap regulation represents an improvement over rate-of-return regulation, combining lower rates with effective incentives for improved efficiency and innovative services."⁶³ In 1992, to provide LECs with incentives to become more efficient, the FCC imposed price cap regulation on the interstate services provided by the LECs controlled by the seven regional Bell companies and GTE. Six other large LECs have chosen to be under price cap regulation for their interstate services. By 1993, over 90 percent of the interstate portion of LECs' operations in the United States were subjected to price cap regulation.⁶⁴ Because the FCC's jurisdiction extends only to the interstate services provided by LECs and because the price cap regulation was imposed in 1992 and 1993, it is too early to assess the impacts of price cap regulation on LEC performance.

State regulatory agencies also have adopted alternative forms of regulations for LECs. Nebraska essentially deregulated all telecommunications services in 1986. Since October 1989, the California PUC has applied to Pacific Bell and GTE California an incentive regulation that includes a price cap component and a revenue-sharing component that shares earnings above the allowed rate of return with the ratepayers. According to the National Association of

⁶¹ For a detailed discussion of possible advantages and disadvantages of price cap regulation relative to ROR regulation, see, e.g., Braeutigam and Panzar (1989), Lewis and Sappington (1989), Sibley (1989), Pint (1992), Sappington and Sibley (1992), Braeutigam and Panzar (1993), and Liston (1993).

⁶² When British Telecom was privatized in 1984, the British government adopted price cap regulation for British Telecom. The British experience with price cap regulation is well documented by Beesley and Littlechild (1989). They concluded that price cap regulation is preferred to ROR regulation in industries, such as telecommunications, where rapid technological changes can contribute to significant productivity improvements.

⁶³ Price Cap Performance Review For AT&T, Federal Communications Commission Docket CC 92-134, Report (released July 23, 1993) p. 1.

⁶⁴ See, Regulatory Reform for Local Exchange Carriers Subject to Price Cap Regulation, Federal Communications Commission Docket No. 92-135, Notice of Proposed Rulemaking (released July 17, 1992) p. 3.

Regulatory Utility Commissioners, by 1992, 11 states had permanently adopted some forms of incentive regulation; 20 states had adopted alternative forms of regulation on a trial basis; and 6 states were reviewing alternative forms of regulation.⁶⁵ These regulatory changes involve classifying services by the level of competition, allowing pricing flexibility, using price caps, and sharing earnings above the benchmark rate of return with the ratepayer.

Evidence on the impact of incentive regulation adopted by federal and state regulatory agencies suggests that price cap regulation leads to lower prices than does ROR regulation. Mathios and Rogers (1989) found that AT&T's long distance prices in states that used price cap regulation were significantly lower than in states that used traditional ROR regulation. For example, the cost of a five-minute call during the day was estimated to be approximately seven percent lower in states that allowed some form of pricing flexibility.⁶⁶

3. Entry and pricing regulation.

One issue facing state regulators is whether to permit non-LEC firms to provide services that LECs supply. Restricting entry into services now supplied only by the incumbent LECs might be justified if the result of that entry would be to increase the LEC's costs of providing service. Specifically, if the incumbent LEC could not set prices that would clear all relevant markets, deter entry, and cover all costs, then barring competitors from its service offerings might be justified. On the other hand, though, the full net effect of the proposed entry, which must be considered in determining whether entry should be permitted, could also include gains from lower prices that result from competition.

Competitive entry into previously monopolistic services typically provides powerful incentives for the creation of an efficiently operating market.⁶⁷ In the short run, the threat of losing a customer to a competitor provides incentives for the incumbent firm to maintain prices close to costs. In the long run, competition provides incentives to become more productive. Firms that use inputs more efficiently and continue to develop more efficient production techniques can expect to be rewarded with greater profits.

The introduction of competition into a market tends to result in prices that closely reflect costs. That tendency will be dampened, however, unless an incumbent whose (regulated) prices are above its costs is allowed to reduce its prices in response to entry. Unless it can set prices closer to the actual cost of service, a LEC may provide a pricing "umbrella"

⁶⁵ NARUC Report on the Status of Competition in Intrastate Telecommunications, National Association of Regulatory Utility Commissioners (August 26, 1992).

⁶⁶ Kaestner and Kahn (1990) showed that AT&T charged lower intrastate toll prices in states with longer histories of departures from ROR regulation.

⁶⁷ For discussion of the technical conditions under which entry is and is not efficient, see Section V, Appendix A.

under which firms, such as CAPs and IXC's, could bypass the local network even though their costs substantially exceed the LEC's costs. Giving the LECs pricing flexibility would allow them to respond to entry by pricing services closer to costs, which would help to ensure that entry would be undertaken only when the entrant is at least as efficient as the LEC.^{68,69}

Regulators have traditionally set rates for business customers and long distance service above their costs in order to keep local residential rates low.⁷⁰ Thus, in many states local residential customers are subsidized by business customers and local telephone service is subsidized by long distance telephone service. Maintaining such subsidies will be made more difficult by the entry of alternatives to the high-margin services. In the face of entry, the regulated firm will have difficulty maintaining prices above costs. As prices and/or calling volume fall, the source of the subsidy erodes. Because maintaining subsidies may not be viable in the long run, the mechanisms that promote low residential rates may need to be reexamined.

⁶⁸ Palmer (1992) addresses the issue of efficient entry in local telephone service by assessing the magnitude of the cross-subsidies that flow from low-cost high-priced local business service to high-cost low-price local residential service. If entry were to occur, it would be isolated to the business service where the divergence between prices and costs is large enough to induce (potentially) inefficient entry. She concludes that if prices better reflected costs, entry would occur only were the entrant had lower costs.

⁶⁹ Even if the price umbrella is not eliminated, the social cost of inefficient entry must be weighed against the social cost of price distortion. An inefficient entrant will produce at a cost greater than the potential minimum, a difference that represents a social cost; however, the entrant will also sell at a price below the LEC's, a difference that represents a social gain. Depending on the actual market and cost conditions, entry by a firm less efficient than the incumbent into a market with a regulated price umbrella could be welfare increasing.

⁷⁰ The subsidy from toll service to local service is maintained by charging high access charges to long distance telephone companies. In the comment filed with the FCC in March 1993, the staff of the Bureau of Economics at the FTC concluded that the price of local service was less than half its marginal cost while the "switched access" price was approximately four times its marginal cost.

D. Suggestions to the South Carolina Legislative Audit Council.

1. Consider allowing the PSC to use alternative forms of regulation for providers of telephone services.

South Carolina has replaced traditional ROR regulation with price cap regulation for interexchange carriers.⁷¹ In addition, the PSC authorized an Earning Sharing Plan ("ESP") for LECs in 1990. Earnings above a threshold but below a ceiling were to be shared equally with the LEC's ratepayers. Any earnings above the ceiling were to be fully refunded or credited to the ratepayers. LECs were given the choice of remaining under traditional rate of return regulation or participating in the ESP. Bell South and GTE chose to come under the ESP, which was originally due to expire in 1994.

On August 9, 1993, the South Carolina Supreme Court struck down the PSC's order, holding that the statute required LECs to be regulated under a fair rate-of-return regulation.⁷² The decision would permit setting a range on the fair rate-of-return, but ruled that applying the same range for every LEC is "an abdication of the PSC's responsibility to set appropriate rates."⁷³ The ruling terminated all incentive plans for LECs in South Carolina and may threaten the basis for the price cap regulation of South Carolina's interexchange carriers.

As a consequence of the ruling, the PSC must apply traditional ROR regulation, at least to LECs. We recommend that the Council consider recommending amendments to the PSC's authorizing statutes, to give the PSC the flexibility needed to apply alternative or incentive-based regulation to all telephone companies (as long as there are no efficiency grounds for disallowing such regulatory changes). Specifically, §58-9-570 could be amended so the PSC could implement alternative (non-ROR) forms of regulation for interexchange carriers and LECs.

We believe that incentive-based regulation, such as price cap regulation, could benefit South Carolina consumers. Such regulation could lead to lower prices and induce telephone companies to adapt more efficiently to a rapidly changing environment. As the telephone industry becomes more competitive, regulated LECs and other telephone service providers must become efficient in order to compete effectively. An incentive-based regulation approach would reward efficient providers and help consumers realize the benefits generated by a more competitive environment.

⁷¹ In South Carolina, interexchange carriers provide interLATA-intrastate toll service or intraLATA toll service, or both.

⁷² S.C. Code Ann. §58-9-570. *South Carolina Cable Television Ass'n v. Public Service Commission*, No. 23,917 (S.C. Sup. Ct., Aug. 9, 1993).

⁷³ *Id.*

2. Consider authorizing the PSC to give pricing flexibility to LECs for services where they face competitive entry.

We believe that allowing entry into many LEC-provided services would likely benefit South Carolina consumers.⁷⁴ Once entry is allowed in the provision of these telephone services, we recommend that incumbent providers be given pricing flexibility in these services, to foster healthy competition with the entrants. While the PSC has allowed pricing flexibility for some services, we believe that even more pricing flexibility, particularly for services for which competition is feasible or already exists, would be efficient.

The PSC has detariffed only one such competitive service, Yellow Pages. Other competitive services, such as intraLATA toll service provided by non-LECs,⁷⁵ interLATA toll service, wide area toll service (WATS), 800 service, and intrastate 900 service, are still tariffed, but are regulated under a form of price cap regulation.⁷⁶

Some services provided by the LEC that are not subject to direct competition (called noncompetitive enhanced services), such as custom calling, call waiting, and call forwarding, also are allowed some pricing flexibility under price cap regulation. The prices for these services can be changed, within an approved band, on 14 days' notice. Any proposed change to the price band or the price cap is treated as a general rate case, which can be filed once every twelve months.

Long distance carriers can change their tariffs on 14 days' notice, provided that the new rates are below the maximum allowed under the price cap regulation. Changing the price cap itself requires a rate hearing process, which can take up to six months and five days. With regard to intraLATA toll service, the PSC recently has allowed resellers and facility-based carriers to provide service on a 10XXX basis, but has not allowed "equal access" competition with the LECs. These non-LEC carriers are also under a price cap regulation, with similar pricing flexibility.

⁷⁴ To the extent that the recommendations stated below may conflict with the decision in *South Carolina Cable Television Ass'n v. Public Service Comm.*, No. 23,917 (S.C. Sup. Ct., August 9, 1993), we respectfully recommend that the legislature enact the necessary legislation consistent with our recommendations.

⁷⁵ IntraLATA toll service provided by LECs is not under price cap regulation. Any price change to these rates is treated as a general rate case, thereby limiting the LECs' pricing flexibility on these services.

⁷⁶ The PSC has granted some pricing flexibility by allowing prices to move freely within the approved price band or under the price cap. Interexchange carriers, LECs, and other service providers can effectively change their rates on some services with a 14-day notice.

Where LECs face no direct competition—in local telephone service and intraLATA toll service—they have very little pricing flexibility. Any proposed changes in rates for service that affect the general body of subscribers, such as business and residential local telephone services and intraLATA toll service provided by LECs, are considered under a general rate case that can be filed only once in a twelve month period and may take up to six months and five days to decide.

We suggest that the Council consider recommending that the statutes and regulations be modified to permit the PSC to give LECs additional pricing flexibility. Pricing flexibility would enhance economic efficiency most if applied to services that affect the general body of ratepayers and for which there is competition. For example, consumers likely would benefit if direct competition were permitted for intraLATA toll service, with the LEC's toll rates being subject to price cap regulation. For other services, the Council might wish to recommend that the PSC be given the authority to determine the appropriate pricing flexibility.

E. Conclusion.

In view of the technological changes in this industry, LECs are likely to face increasing competition in local telephone markets. This trend suggests that the natural monopoly justification for regulating the LECs has been eroding over time and that applying incentive regulation, which allows LECs to respond more effectively to new competition, would benefit telephone subscribers. Allowing competitive entry into many services now provided by LECs appears desirable, provided that the LECs are given pricing flexibility to move their prices closer to costs.

Based on these conclusions, we have two recommendations for the Council. First, we suggest that the Council consider recommending that the PSC be given the authority to apply more flexible regulatory approaches, such as incentive regulation, to telephone utilities. Second, we suggest that the Council consider recommending that the PSC be permitted to allow entry into traditionally protected markets, and that the PSC should be given more authority to permit pricing flexibility for services that face competition.

We believe that these changes likely would benefit South Carolina consumers. Prices that more closely reflect costs would minimize allocative inefficiency, and allowing entry in LEC-provided services and giving pricing flexibility to LECs would promote economically efficient entry.

F. References.

- Averch and Johnson, Behavior of the Firm under Regulatory Constraint, 52 American Economic Review 1052-69 (December 1962).
- Beesley and Littlechild, The Regulation of Privatized Monopolies in the United Kingdom, 20 RAND Journal of Economics 454-472 (1989).
- Berg and Tschirhart, Natural Monopoly Regulation, Cambridge: Cambridge University Press (1988).
- Bradley and Hausman (ed.), Future Competition in Telecommunications, Boston: Harvard Business School Press (1989).
- Braeutigam and Panzar, Diversification Incentives under 'Priced-Based' and 'Cost-Based' Regulation, 20 RAND Journal of Economics 373-391 (1989).
- Braeutigam and Panzar, The Effects of the Change from Rate-of-Return Regulation to Price cap Regulation, 83 American Economic Review 191-198 (1993).
- Brock, The Telecommunications Industry: The Dynamics of Market Structure, Cambridge: Harvard University Press (1981).
- Brock, Bypass and the Local Exchange: A Quantitative Assessment, Federal Communications Commission, Office of Plans and Policy, Working Paper Series No. 12, Washington, DC (September 1984).
- Cain and MacDonald, Telephone Pricing Structures: The Effects on Universal Service, 3 Journal of Regulatory Economics 293-308 (1991).
- Crandall, After the Breakup, Washington, DC: Brookings Institution (1991).
- Evans and Heckman, Multiproduct Cost Functions Estimates and Natural Monopoly Tests for the Bell System, in D. S. Evans, ed., Breaking Up Bell, Amsterdam: North-Holland (1983).
- Faulhaber, Telecommunications in Turmoil, Cambridge, MA: Ballinger Publishing Co. (1987).
- Griffin, The Welfare Implications of Externalities and Price Elasticities for Telecommunications Pricing, 64 Review of Economics and Statistics 59-66 (1982).
- Griffin and Mayor, The Welfare Gain from Efficient Pricing of Local Telephone Services, 30 Journal of Law and Economics 465-496 (1987).

- Johnson, Competition and Cross-Subsidization in the Telephone Industry, Santa Monica, CA: The RAND Corporation (1982).
- Kaserman, Mayo, and Flynn, Cross-Substitution in Telecommunications: Beyond the Universal Service Fairy Tale, 2 *Journal of Regulatory Economics* 231-249 (1990).
- Kahn and Shew, Current Issues in Telecommunications Regulation: Pricing, 4 *Yale Journal on Regulation* 191-256 (1987).
- Kwoka, The Effects of Divestiture, Privatization and Competition on Productivity in U.S. and U.K. Telecommunications, 8 *Review of Industrial Organization* 49-61 (1993).
- Landes and Posner, Market Power in Antitrust Cases, 94 *Harvard Law Review* 937-996 (1981).
- Larson, Markarewicz, and Monson, The Effect of Subscriber Line Charges on Residential Telephone Bills, 13 *Telecommunications Policy* 337-354 (1989).
- Larson and Mudd, Collocation and Telecommunications Policy: A Fostering of Competition on the Merits, 28 *California Western Law Review* 263-313 (1992).
- Lewis and Sappington, Regulatory Options and Price cap Regulation, 20 *RAND Journal of Economics* 405-416 (1989).
- Liston, Price cap versus Rate-of-Return Regulation, 5 *Journal of Regulatory Economics* 25-48 (1993).
- Mathios and Rogers, The Impact of Alternative Forms of State Regulation of AT&T on Direct Dial Long Distance Telephone Rates, 20 *RAND Journal of Economics* 437-453 (1989).
- Mathios and Rogers, The Impact and Politics of Entry Regulation on Intrastate Telephone Rates, 2 *Journal of Regulatory Economics* 53-68 (1990).
- Mitchell, Incremental Costs of Telephone Access and Local Use, Santa Monica, CA: RAND Corporation (1990).
- National Association of Regulatory Utility Commissioners, NARUC Report on the Status of Competition in Intrastate Telecommunications, Washington, DC: NARUC (August 1993).
- National Association of Regulatory Utility Commissioners, Update to the Maine and Missouri Reports on Alternative Regulation Plans in Telecommunications, Washington, DC: NARUC (June 1993).
- Palmer, A Test for Cross-Subsidies in Local Telephone Rates: Do Business Customers Subsidize Residential Customers?, 23 *RAND Journal of Economics* 415-431 (1992).

Pint, Price cap Versus Rate-of-Return Regulation in a Stochastic Cost Model, 23 RAND Journal of Economics 564-578 (1992).

Sharkey, The Theory of Natural Monopoly, New York, NY: Cambridge University Press (1982).

Shin, Econometric Estimation of Telephone Costs for Local Exchange Companies, Ph.D. dissertation, University of California, Berkeley (1988).

Shin and Ying, Unnatural Monopolies in Local Telephones, 23 RAND Journal of Economics 171-183 (1992).

Sappington and Sibley, Strategic Nonlinear Pricing under Price cap Regulation, 23 RAND Journal of Economics 1-19 (1992).

Sibley, Asymmetric Information, Incentives, and Price cap Regulation, 20 RAND Journal of Economics 392-404 (1989).

U.S. Federal Communications Commission, Statistics of Communications Common Carriers, Washington, DC: U.S. Government Publishing Office (various years).

U.S. Federal-State Joint Board, Monitoring Report, Washington, DC (July 1992).

Ward, Market Power in Long Distance Telecommunications, Bureau of Economics, Federal Trade Commission (submitted to the Federal Communications Commission on FCC Docket No. 93-197, In the matter of Revisions to Price Cap Rules for AT&T, filed October 21, 1993).

Ying and Shin, Costly Gains to Breaking Up: LECs and the Baby Bells, 75 Review of Economics and Statistics 357-361 (1993).

V. Electric power

A. Introduction

This is an ideal time for South Carolina to be reviewing the regulation of electrical utilities. The 1992 Energy Policy Act (EPAct) and FERC regulations have altered the context of electrical utility regulation, presenting new challenges and new options.⁷⁷ These institutional changes respond to technological developments that have increased the role of competition in this industry, which has traditionally been treated as a natural monopoly. The changes in the technology and economics of generating electric power are particularly important,⁷⁸ but the subsequent stages, of power transmission and local distribution, may also be affected. Our 1987 comment⁷⁹ predicted that new technologies and institutions could soon require reexamining the natural monopoly justification for rate-of-return and entry regulation. By 1994, the electric power industry's technologies and institutions have indeed evolved considerably, and changes that facilitate increased competition continue. Several states, including Virginia and Florida in the southern region, have taken steps to significantly increase the role of competition in electricity generation.

The Council may wish to recommend changes in the statutes governing the PSC that would enable the PSC to incorporate, as it or the legislature sees fit, the recent technological and institutional developments in its regulation of electric utilities in South Carolina. This comment will recommend such changes, after reviewing the technical and institutional developments and the experiences of other jurisdictions.

B. Erosion of the "natural monopoly" justification for regulating electric supply

Industries that are natural monopolies have historically been subject to economic regulation, that is, to controls on entry and rates of return (or, more recently, prices). A market is said to be a "natural monopoly" when it is less costly for the market to be served by one firm than by several competing firms. When a market is thought to be a natural monopoly, economic efficiency may be enhanced by regulating the price that the monopolist may charge to guard against the exercise of monopoly power. It sometimes may also be efficient to restrict entry into that market to preserve the benefits associated with monopoly produc-

⁷⁷ For a review of utility regulation leading up to the EPAct, see Costello (1992) pp. 1-15.

⁷⁸ Generation accounts for about two-thirds of the price that final customers pay in the U.S. (Federal Energy Regulatory Commission Staff (1993) p. 21) Generation accounts for approximately 40 percent of capital investment in electrical utilities. (U.S. Congress Office of Technology Assessment (1989) p. 47)

⁷⁹ Supra n. 5, at 28.

tion.⁸⁰ When these conditions do not (or no longer) apply to an industry, however, economic efficiency and consumer welfare will be enhanced by introducing competition through new entry and expansion of the geographic range of competition.

Natural monopoly conditions do not appear to exist in power generation. For transmission and distribution, however, economies of scale continue to be an important consideration. However, the sunk nature of transmission and distribution investments may reduce the need for restrictions on entry, and implementing new approaches designed to introduce competition even where economies of scale exist may diminish the efficiency rationale for rate (or price) regulation.

The historical treatment of generation as a natural monopoly has rested on two primary considerations. First, generators were investments that exhibited significant economies of scale relative to local demand. Second, because transmission losses increased to such a great extent with distance, utilizing generators at distant locations involved higher costs and lower reliability. Such distant generators were thus poor substitutes for local generators, causing the geographic range of competition to be localized. Both of these factors have been weakened by technological and organizational changes.

Generators still exhibit economies of scale, but it is common now for these scale economies to be exhausted far short of local demand in major load centers. Generating plants now routinely contain more than one generating unit. Further, demand in major load centers now often exceeds the capacity of a single generating plant, and such areas may be (or could be) served by several plants. (Smith (1993) pp. 132-33; Schmalensee and Golub (1983))⁸¹ Other developments have reduced the size criterion for an efficient generating unit or increased the number of potential suppliers. Slower growth in electricity demand⁸² (Costello (1992) p. 18; South Carolina Public Service Commission (1992) pp. 67, 69), increased interest in alternative energy sources and energy conservation (institutionalized in the 1978 Public Utilities Regulatory Policy Act (PURPA) and integrated resource planning (IRP) processes (Costello (1993) p. 11-18)), and introduction of alternative generation technologies with smaller economies of scale than nuclear or coal units (Costello (1993) p. 37, Costello (1992) p. 17) have

⁸⁰ The conditions under which it is efficient to impose legal restrictions on entry are discussed in Appendix A.

⁸¹ To be sure, there may be economies of owning multiple generating plants, resulting primarily from coordination of investment, maintenance, and fuel inventory decisions, replication of management and contracting costs, and borrowing costs. (New Zealand Electricity Task Force (1989) pp. 82-87)

⁸² Capacity is installed in anticipation of future demand; however, because of economies of scale, investment is lumpy. When demand growth is slow, there are increased costs because excess capacity must be held longer before demand grows enough to fill the capacity. This creates incentives to make smaller generator investments, e.g., less lumpy investments.

reduced the average size of incremental capacity expansions. Slower demand growth and continued scale economies in nuclear and coal units have led to joint ownership of new generating plants, which increases the number of potential sellers, although not the number of generating locations.⁸³

Transmission losses remain a factor in electrical supply costs, but technical improvements have reduced their impact, both by extending the range of economical supply relationships and improving the measurement of transmission services. (Einhorn (1990) p. 173; FERC Staff (1993) p. 1.; U.S. Congress Office of Technological Assessment (1989) pp. 117-121) Computerized dispatching technology has reduced transmission losses and capacity reserve requirements, through improved modeling of demand and transmission conditions within single utilities, within regional pools, and across pools.⁸⁴ (U.S. Congress Office of Technology Assessment (1989) p. 119) Significant additional technological improvements in this area are anticipated. (Hingorani and Stahlkopf (1993)) Moreover, growth in the density of power plant sites makes more alternative generators competitive in serving individual load centers.⁸⁵

⁸³ See Smith (1993) and Braman (1992) for further discussion of joint ventures to promote competition in the face of economies of scale. For example, joint venture partners in a generating facility could potentially compete for the same wholesale customers with their respective shares of the output of the joint venture.

⁸⁴ Regional reliability councils spanning areas broader than single pools were established after the 1965 Northeast Power Failure. (FERC (1980) p. 12) Pools take various forms, from tight mandatory central dispatch to loose bilateral arrangements for bulk power sales. Pools allow some operating efficiencies and savings in investment in reserves; however, even voluntary transmission contracting arrangements are already fairly effective in using existing generating investment. (Gilbert, Kahn, and White (1993))

Improvements in computerized dispatching technology have been going on for a considerable period of time. For a discussion of pooling technology, see FERC (1980) Chapter 4, "Technical Characteristics of Coordination." See also Smith (1993) pp. 133-34. The Carolinas-Virginia pool (CAR-VA), which applied to most of South Carolina, North Carolina, and Virginia, originated in 1961, but was replaced in 1970 by VACAR, a subgroup of the Southeastern Electric Reliability Council (SERC). (FERC (1980) Chapter 10) FERC's 1980 assessment suggested that additional economies could be obtained by closer coordination of construction and transmission within the VACAR pool. (FERC (1980) pp. 184-85) Tighter power pools or power broker systems may be able to provide such coordination, particularly if they can operate with the cooperation of the relevant state authorities. (FERC Transmission Task Force (1989) pp. 10-26)

⁸⁵ The number of potential suppliers is an important competitive indicator. If several suppliers are available, anticompetitive behavior is less likely to occur, persist, or avoid detection.

In electric power generation, technological changes are producing conditions more like those in competitive markets than in a natural monopoly. By contrast, transmission and local distribution still involve extensive economies of scale and large sunk costs. For example, illustrative figures developed by Oak Ridge National Laboratory show that a 765 kV transmission line costs at least 30 percent less than a 500 kV line and at least 85 percent less than a 138 kV line, on a cost per MW-mile basis. (FERC Transmission Task Force (1989) pp. 215-216) In the face of cost differences this large, complete parallel networks of transmission and distribution lines are unlikely.⁸⁶ (New Zealand Electricity Task Force (1989) pp. 39, 55, 93) Institutional arrangements are being developed to permit vigorous competition in these services without actually duplicating transmission and distribution lines. (Braman (1992), Smith (1993))

If generation no longer fits the natural monopoly model, but transmission and distribution retain natural monopoly elements, then unbundling generation from transmission and distribution becomes a policy option. Unbundling might lead to benefits of increased competition within the individual unbundled segments, but those benefits must be balanced against the potential loss of economies of vertical integration. Concerns about preserving economies from vertical integration have focused on transaction costs and coordination of investment decisions. (New Zealand Electricity Task Force (1989) pp. 105-107; Gilbert, Kahn, and White (1993)) Unbundling of generation from transmission and distribution is most likely to reduce overall costs if it permits a substantial increase in competition in the generation market. (Gilbert, Kahn, and White (1993)) Institutional arrangements that can help to reduce costs of unbundling include long-term contracting and cooperative planning programs.⁸⁷

⁸⁶ Even here, though, in some transmission corridors, individual utilities have parallel lines. (Smith (1993) pp. 132-33) While the number of localities in the U.S. with parallel distribution systems has fallen over time, some of this decline may be due to regulation rather than economic and financial considerations. (Primeaux (1985); Nelson and Primeaux (1988))

⁸⁷ Econometric work by Kaserman and Mayo (1991), using a cross sectional sample from 1981, suggests economies from vertical integration between generation and transmission-distribution of more than 10 percent. They included some extreme values in their sample (average fuel costs for sampled utilities range from \$3.14 to \$88.83 per mwh and average prices of purchased power range from \$8.97 to \$273.25 per mwh) and used very restrictive sample selection criteria (only 74 firms qualified out of several hundred private utility firms); thus, the results should be generalized only with caution. Actual experience with mandatory vertical unbundling has not disclosed evidence of substantial efficiency losses. Unbundling generation in the U.K. has been associated with lower prices for larger customers and stable prices for smaller customers, although this could simply mean that efficiency gains from competition exceed efficiency losses from unbundling. Voluntary unbundling undertaken by several vertically integrated electrical utilities in the U.S. is consistent with the hypothesis that sophisticated contracting can be an effective substitute, in at least some instances, for vertical integration into generation.

C. Regulatory changes

Major legislation to facilitate separation of generation from transmission and distribution was enacted by Congress in 1992. Other countries also have instituted steps to increase competition in the generation stage of electrical supply.⁸⁸

1. United States experience

The 1992 Energy Policy Act made major changes in interstate electrical power regulation.⁸⁹ Two changes deal directly with the separation of generation from transmission and distribution, by making it easier for certain users of electricity to obtain wholesale electric power from independent generating capacity.

First, FERC can now certify independent electrical generation wholesalers that use conventional generating technologies.⁹⁰ Certification of these "exempt wholesale generators," or EWGs, significantly reduces the risk, cost, and time required for independents to enter the power generation business. EWGs are not required to enter simultaneously into transmission and distribution stages, nor to displace or duplicate incumbent vertically integrated utilities. Relieved of unique regulatory risks and lags to building generating plants, independent EWGs are then in position to compete with integrated utilities on an equal footing with regard to cost, price, reliability, promptness of construction, and other critical elements of supply.

Second, FERC now has increased authority to order "wheeling" to promote open access for wholesale electricity. Wheeling is high voltage transmission, most commonly by one utility for another. Wheeling is common. In 1985, over one-third of retail power sales had been sold previously at wholesale, although only about 14 percent originated outside the same control area. (FERC Transmission Task Force (1989), p. 18)⁹¹ FERC's stronger mandate to issue

⁸⁸ The World Bank is actively advocating privatization and competitive institutions for electricity production in developing countries. Among industrialized nations, Great Britain and New Zealand have been particularly active in electricity reorganization.

⁸⁹ Our discussion of the EPAct relies primarily on Costello (1993).

⁹⁰ Prior to the 1992 EPAct, FERC certification of independent generators was limited to facilities using unconventional generating technologies as defined in the 1978 PURPA legislation.

⁹¹ Some utilities may provide transmission facilities to enhance wheeling because of requirements in Nuclear Regulatory Commission (NRC) licenses. The NRC conducts an antitrust review before granting a license to operate a nuclear plant. FERC has also required enhanced wheeling as a condition to allowing utility mergers. (FERC Transmission Task Force (1989) pp. 36, 174, 197-198)

(continued...)

wheeling orders is intended to provide easier and more certain access to the transmission grid,⁹² to facilitate the entry of EWGs as viable, efficient suppliers of wholesale electricity.

⁹¹(...continued)

In Wisconsin, the Public Service Commission has required utilities to coordinate use of the transmission grid in the state, and in some other states regulations or agreements deal with access to the transmission grid. (FERC Transmission Task Force (1989) pp. 129-130, 201-206)

⁹² For a review of non-technical impediments to bulk transmission of electric power, see Kelly (1987), especially Chapter 6, on legal issues. The FERC Transmission Task Force (1989) concluded:

... Two observations, however, must be a base on which FERC policy is built. (1) Current transmission policies are not likely to be able to accommodate the options needed by the industry to make efficient investment in generation assets and probably not in transmission assets. One particular option, the emergence of a competitive generation sector, may be frustrated by the lack of a coherent and consistent transmission pricing and access policy. (2) The current market power of transmission incumbents is so pervasive that independent power producers are unlikely to be willing to take substantial financial risks in the absence of assured access to the grid at reasonable prices. Without transmission reform, the potential efficiencies of a competitive generation sector will not be fairly tested.

In the leading antitrust case concerning wheeling, Otter Tail Power Co. V. United States, (410 U.S. 366 (1972)), a utility's refusal to wheel wholesale power to a municipal power system inside the utility's franchise territory was held to be an illegal exercise of the market power that resulted from its control of an essential facility, namely the only available transmission capacity. The Supreme Court based its decision on the antitrust laws and noted that the Federal Power Commission (the predecessor agency of FERC) could not issue its own wheeling orders. (Kelly (1987) pp. 81-89; Einhorn (1990) p. 175) The practical significance of the antitrust laws in wheeling cases has been substantially limited by the state action exemption. (Kelly (1987) pp. 88-89) In 1978, PURPA gave FERC the authority to order wheeling; however, some observers have noted that FERC has interpreted its power to issue such orders narrowly. A 1988 GAO report indicated that of 57 requests for wheeling orders, FERC granted eight. (FERC Transmission Task Force (1992) p. 36) The 1992 EPAct was designed in part to clarify and strengthen FERC's mandate to issue wheeling orders with nondiscriminatory rates. (U.S. House of Representatives (1992); Costello (1992) p. 49) The 1992 EPAct also explicitly preserves the role of antitrust precedent in litigation involving wheeling issues. (U.S. House of Representatives (1992), No. 102-474(VII) pp. 6-8; Costello (1993) pp. 34-35)

If economies of scale in transmission are great enough, an EWG needs access to the transmission system controlled by the surrounding franchised electric utility. Further, as explained below, access prices may need to be regulated when a vertically integrated electrical utility contains a "captive" EWG within its franchise territory.⁹³

When an EWG is a "captive" of one franchised utility, the utility could wheel the EWG's output to the EWG's wholesale customer(s), buy the power itself, or even refuse to deal with the EWG. With a monopoly position in transmission or a monopsony position in purchasing the EWG's output, the utility may have the ability to charge a monopoly price for transmission services or pay only a monopsony price in buying the EWG's output. Both pricing policies would entail social welfare losses (lower output) compared to competitive pricing and may also discourage other investments in EWG projects that would be attractive under more open transmission conditions.

One remedy to the captive EWG problem may be to require the surrounding utility to wheel the captive power for a regulated transmission price. The objective of this regulatory system would be to avoid monopsony power in wholesale power sales by providing the EWG with additional potential customers and simultaneously to avoid monopoly power in transmission services by regulating the rate of return or price of this natural monopoly service.

Mandatory wheeling may not be the only way to ensure economical access to alternative customers for independent EWGs. Other potential solutions to the access problem include voluntary pre-entry contracting for wheeling services between the independent EWG and the franchised utility and vertical unbundling of transmission facilities of the franchised utility.⁹⁴ Mandatory wheeling orders presumably would be unnecessary if the vertically

⁹³ FERC is now considering whether its pricing regulations for interstate transmission should consider distance as well as quantity. FERC's transmission pricing follows the model of first class postage rates, setting one price regardless of distance. (FERC Staff (1993) p. 2) FERC transmission rates have also used the concept of the "contractual path" of transmission which may not reflect the actual path that the transmitted electricity follows. Texas has tried to account for actual current flows in rates for intrastate transmission. (FERC Staff (1993) p. 3) The importance of transmission rate making policies has increased with the rising volume of transmission, particularly of power from unintegrated generation sources. (FERC Staff (1993) p. 4) FERC pricing policies have permitted higher rates (based on incremental costs) for transmission requests that require incremental transmission facilities. (FERC Staff (1993) pp. 10-12)

⁹⁴ For discussions of these alternatives, see Smith (1993(a) and 1993(b)), Costello (1992) pp. 47-49, Houston (1992), Joskow (1989), and Kelly (1987).

(continued...)

integrated utility were required to unbundle generation from transmission. Unbundling is the basis of the economic reforms in Great Britain and New Zealand discussed in Appendix B. Similarly, voluntary, long-run, pre-entry contracting between EWGs and the franchised utility could eliminate or reduce the need for mandatory wheeling orders.

States have fostered competition in generation, from both EWGs and traditional vertically integrated electrical utilities, by opening new generating capacity (to serve a franchised distribution area) to competitive bidding.⁹⁵ At least twenty states have done this. A recent example is Wisconsin, where the state commission initiated a bidding requirement for incremental generating capacity in 1992.⁹⁶ Wisconsin's system allows bids from both the franchised utility and alternative suppliers, including utilities from other states. The state commission sets detailed rules for evaluating the cost estimates of all bids on an equal footing.⁹⁷ Bidders are invited to critique other bidders' cost estimates, and the state

⁹⁴(...continued)

Unbundling would provide the EWG with at least two independent outlets for its power. This increased competition should reduce the monopoly power of the owner of the transmission grid and the monopsony power of the owner of the franchise distribution system.

⁹⁵ The discussion of competitive bidding for new generation projects is derived primarily from Edison Electric Institute (1992a, 1992b, 1990).

⁹⁶ The U.S. Congress Office of Technological Assessment (1989) report contains a description of the competitive bidding systems in Virginia (pp. 137-138), California (pp. 139-140), Maine (p. 141), and Massachusetts (pp. 221-222).

⁹⁷ The other states with bidding systems are evenly split on whether the franchised utility may bid for the capacity additions that are put out for bid. Sponsoring utilities are reportedly excluded in eleven of the twenty-one states with competitive bidding, but these projects have largely been limited to qualifying facilities (QFs) (generation projects involving unconventional generation techniques under the 1978 PURPA) or projects that focus on demand-side management (DSM) rather than on additional supply. For a discussion of DSM regulatory incentives, see Anderson (1993).

Wisconsin focuses its bid process on minimizing costs for the sponsoring utility's whole system over a twenty-year period. Its system, and those of other states, may also take into consideration other factors such as fuel supply diversity, environmental impact, and the bidder's financial strength. Some states give specific weight to these additional factors. Several states include bidding for new capacity as an element in their integrated resource planning (IRP) programs, which many states require. These plans include load forecasts and proposed means to meet load requirements. Planning and evaluation in IRP programs are often based on a fifteen to twenty-year time horizon. (EEI (1990) p. 63) Having initiated consideration of IRP in 1987 (Public Service Commission of South Carolina (1992), South Carolina has recently implemented IRP requirements for its major franchised utilities. (Ryhne (1993))

commission reserves the right to review the utility's selection of the winning bid.⁹⁸ If an independent supplier or utility from another area wins the bid, then the utility is obligated to buy power at the bid price from the independent, essentially under long-term contract.

When an independent wins, it becomes a new alternative source of supply for wholesale customers from other areas and displaces some of the investment that the franchised utility would otherwise have made in generation. To the extent that an independent wins with a lower bid, generating costs are reduced from what the franchised utility would have provided and customers will face lower prices since the franchised utility faces lower costs and must pass such cost savings on to its customers.

Bidding out capacity additions is no longer unusual. A recent survey by the Edison Electric Institute found 174 such generation projects,⁹⁹ most of which drew multiple bids.¹⁰⁰ Competitively bid generation facilities are expected to provide at least 10 percent of the generating capacity for more than twenty investor-owned electric utilities in the near future. (EEI (1992b), Table 2.32) In the southeast, Florida and Virginia use competitively bid capacity additions extensively.

Major issues in establishing a bidding system that were identified in the Edison Electric Institute survey include:

⁹⁸ Interview with Susan Stratton from the Wisconsin Public Service Commission, November 29, 1993.

Although state commissions have been imposing bidding requirements, the modern era of independent generation sources was initiated voluntarily, by a privately held utility in Maine, Central Maine Power, which sought bids in 1984 to supply its incremental power demands.

⁹⁹ Often, independent generating firms provide power to franchised utilities without going through a bid process. Utilities were commonly required to purchase power from QFs under the Public Utilities Regulatory Policies Act legislation of 1978.

Projects involving competitive bidding rely less on coal than do most utility capacity additions. Coal accounts for approximately 20 percent of bid projects, but nearly 100 percent of major generation additions of traditional vertically integrated electric utilities.

¹⁰⁰ Since the mid 1980s, competitive bids have been requested for approximately 15,000 MW of capacity. Bids have been received entailing more than 115,000 MW of capacity. Bids have been selected for approximately 9,000 MW of capacity (EEI (1992) pp. 25-26), approximately 7 percent of total U.S. capacity additions over the period. (Costello, Jennings, and Viezer (1992) p. 17)

- 1) determining criteria for allowing firms to bid, including whether the franchised utility can bid and whether to require prior electric generation experience;
- 2) determining factors to be considered in selecting the winning bid, such as environmental effect, fuel diversification, and financial strength, and how these factors should be weighted;
- 3) integrating the IRP process with decisions to put capacity increases up for bid;
- 4) establishing the basis for including contracted capacity in the utility's rate base, that is, whether the utility is allowed a profit margin on contracted capacity; and
- 5) setting a time horizon for evaluating load increases and cost and revenue projections, a decision that can materially affect the choice of projects by cutting off the income stream of long-lived projects.

2. Foreign experience

Even more far-reaching reforms have occurred abroad, particularly in the United Kingdom and in New Zealand. In both nations, generation has been unbundled from transmission and distribution, and transmission has been made an independent joint venture. In both nations, distribution has initially been organized as several localized monopolies; however, elements of competition in localized distribution have been introduced by allowing larger customers to contract directly with generators or distributors from other areas (UK) or by separating line charges from electricity marketing in local distribution and encouraging power merchants to compete with the local distribution company for sales to consumers. More details of the reforms in the United Kingdom and New Zealand are contained in Appendix B.

3. Relevance of the U.S. and foreign experience to South Carolina

South Carolina's situation is substantially like that of many other states. Unlike Britain or New Zealand, South Carolina can take advantage of the potentially lower cost alternative sources of wholesale power available through the transmission pooling system that reaches far beyond its borders.

South Carolina has three major utilities with multiple generating plants serving the area (South Carolina Public Service Commission (1992) pp. 12, 59-60) and interconnections with other states provide additional potential sources of supply. (South Carolina Public Service Commission (1992) p. 55) Planning requirements for franchised utilities already provide opportunities for South Carolina to foresee demands for additional capacity (South Carolina Public Service Commission (1992) pp. 56-58), which could be subject to bidding procedures. As described above, opening entry to independent generators and distant franchised utilities may reduce generation costs. With respect to transmission, franchised utilities in South Carolina's SERC area maintain extensive transmission systems that already accommodate a

considerable volume of wheeling (FERC Transmission Task Force (1989) p. 19), including wheeling to municipal power distribution systems under long-term contract arrangements. (South Carolina Public Service Commission (1992) p. 61) With respect to local distribution, South Carolina already has regulations that govern the separation of local distribution from transmission and generation for municipal systems (§58-27-410 to 430, §58-27-1330 to 1360).¹⁰¹ Unlike states that share jurisdiction over a major load center with another state, South Carolina need not delay reforms until it can coordinate local distribution policies with those of other states.

D. Comments on South Carolina's statutes and regulations concerning electric power

This review of the PSC statutes and regulations comes at a turning point in the history of electrical utility regulation. Technical and institutional changes have created an opportunity to introduce significant elements of competition to lower prices in one or more stages of the electrical utility business. South Carolina may wish to join other states and nations such as New Zealand and the United Kingdom in revising its public service commission statutes and regulations to recognize these opportunities. Four elements appear to be of particular significance.

1) Recognition of increased competition as consistent with the goals of electric utility regulation: To provide a clear orientation toward opportunities for increased competition, South Carolina may wish to state explicitly, in §58-5-210 or elsewhere, that a goal of electric utility regulation is to provide consumers with the benefits of competition to the maximum extent feasible. The PSC statutes now do not include competition as an organizing principle for electric utility regulation.

2) Provision for reducing or eliminating regulation for competitive stages of electrical utilities. To implement a competitive statement of purpose, South Carolina may wish to create a specific avenue for deregulation of different segments of the electrical utility business as technology and institutional developments permit effective competition. One such alternative may be to add a provision to §58-5-35 indicating that upon a finding by the PSC that a segment of the electrical supply industry could be sufficiently competitive, that segment may price under alternative, more flexible constraints, such as price cap regulation.¹⁰² Another

¹⁰¹ The FERC Transmission Task Force (1989) notes (pp. 37-38) that municipalization is one form of wholesale wheeling that can be a close approximation to retail wheeling, citing a municipalization effort in which a small number of industrial users accounted for the bulk of electricity demand in the jurisdiction.

¹⁰² Rate regulation would continue to be relevant for the portions of the industry where effective competition is not present. Otherwise, for example, the gains from more competitive (continued...)

alternative would be to allow the PSC to redefine "electric utility" under §58-27-10 to exempt from rate-of-return regulation, in whole or in part, segments of the industry where effective competition is present.

Similarly, to avoid a regulatory block to entry of independent generators, South Carolina may wish to state explicitly that §58-27-640, providing for the assignment of suppliers to service areas, does not necessarily apply to such facilities as generators, but rather is limited to facilities directly involved with local distribution.

To recognize further the principle of promoting competition, South Carolina may wish to state that the PSC encourages franchised utilities to seek bids from EWGs or other franchised utilities for additions to supply/capacity because they may offer lower costs, greater reliability, or other advantages. This encouragement also could be expressed by eliminating, for competitive segments, the public convenience and necessity provisions of certification to construct major utility facilities (§58-33-110), to the extent that these provisions permit actual or potential competitors to object on the basis of their own economic self-interest.

3) Authorization to coordinate regulatory policies with other states. To facilitate efficient solutions to electric utility issues such as generating plant siting decisions, transmission line expansions, and retail wheeling issues that cross state borders, South Carolina may wish to provide statutory authority for the PSC to coordinate its siting, IRP schedules and time horizons, wheeling, transmission access, transmission siting and expansion, and bid criteria with those of other states, particularly states with utilities in the same pooling and reliability council areas.¹⁰³

4) Recognition that even where natural monopoly exists, there may be attractive methods of providing increased competition. To assure that the PSC provides the benefits of competition to consumers as early as practicable, South Carolina may wish to direct its PSC to examine (in conjunction with other states) the generation, transmission, and local distribution aspects of electrical utility regulation on a regular basis to determine if additional

¹⁰²(...continued)

generation could be captured through market power exercised at the transmission or distribution levels and no net price decreases would be experienced by consumers.

¹⁰³ For a discussion of this issue, see Jones (1992), Kelly (1987) pp. 90-92, 150-155, and National Governors' Association Task Force on Electricity Transmission (1987) pp. 16-23. FERC encourages utilities to form Regional Transmission Groups that FERC anticipates will obviate the need for FERC transmission orders. (FERC 1993) Contract path pricing of transmission, in particular, may distort transmission and generation siting decisions if these decisions are not coordinated. (FERC Staff, 1993, pp. 15-16)

deregulatory steps can reasonably be taken based on the experience of other states and countries.¹⁰⁴

E. Conclusion

Technology and institutions in the electric power industry are changing rapidly. These changes could open the electrical power industry to the cost minimizing, quality enhancing, and product diversifying incentives of competitive markets. Experience, both in the United States and abroad, supports the proposition that it may no longer be accurate to treat the electrical power industry as a vertically integrated natural monopoly in which rate-of-return regulation is uniformly essential to prevent monopoly pricing and other manifestations of market power. New technology and institutions are providing significant opportunities to introduce the benefits of competition in electric generation. Institutional innovations may also permit effective competition in transmission and distribution of electric power. South Carolina may wish to revise its PSC statutes to advance competition in generation and prepare for adoption of techniques for advancing effective competition in transmission and distribution as they prove reliable.

¹⁰⁴ Requiring the PSC to conduct such a periodic audit of its own could provide an assurance that the general directive to increase competition is being carried out. The "sunset" review process, focusing on problems with the statutes themselves, rather than on implementation, might not detect such difficulties.

Appendix A

The economic theory of entry protection

The traditional economic justification for regulating an industry with rate-of-return limits and restrictions on entry derives from the assumption that the industry is a natural monopoly.

If the costs of providing electrical services are minimized when these services are provided by a single firm, then it could be efficient to allow the continuation of a monopoly. However, even if costs are minimized by the existence of a monopoly, it does not necessarily follow that the monopolist should enjoy statutory protection from entry. In this appendix we review the cost conditions under which production by a single firm will minimize total production costs, and the conditions under which it would be efficient to protect the monopolist from entry.

Entry protection when the firm produces only one type of output.

Recent developments in economic theory have revised and, in important respects, narrowed the range of cost conditions that can justify protecting a monopolist from entry through regulation. Up through the mid-1970s, it was commonly believed that a protected monopoly could be justified if and only if the supply of such a product was subject to "economies of scale" over the relevant range of production.¹⁰⁵ An economy of scale exists when a proportionate increase in all of a firm's inputs leads to a more than proportionate increase in its output. Economies of scale imply that the per unit cost of providing a single good decreases as the output of that good increases.

More recent theoretical work shows, however, that monopoly may be the least-cost industry structure even when scale economies (or decreasing unit costs) do not extend over the entire range of likely output levels.¹⁰⁶ It is now recognized that monopoly is the least-cost industry structure when the cost function has the property of "subadditivity." Costs are said to be subadditive at some level of output if one firm producing efficiently can always produce that level of output at lower cost than can two or more firms.

¹⁰⁵ See Schmalensee (1979) pp. 3-7. For example, economies of scale may exist in providing electric dispatching services. If the cost of installing and maintaining computer equipment used for dispatching is the same, regardless of the amount of energy being dispatched (within some range), then the dispatching cost per KW hour will fall as the quantity increases.

¹⁰⁶ This body of work is summarized in Baumol, Panzar, and Willig (1982) and Sharkey (1982).

In a single product setting, continuously decreasing unit costs up to a particular level of output are sufficient (but not necessary) to imply that costs are subadditive at that output. In figure 1, for example, unit costs continue to fall until output Q^1 is reached. It can therefore be concluded that costs are subadditive at any output level between 0 and Q^1 . What is not immediately apparent, however, is that costs continue to be subadditive (up to a point) even for outputs exceeding Q^1 , notwithstanding that average costs begin to rise once Q^1 is exceeded. Monopoly therefore may be the cost-minimizing industry structure even when per-unit costs do not fall continuously over the entire range of possible output levels.

This is an important principle, especially in its implications for the issue of entry protection. Legal protection from entry is not necessary to ensure least-cost production when scale economies exist over the entire range of possible output levels. For then, as one observer has noted, “[l]arger firms always have lower costs than smaller competitors [when there are scale economies]. The largest firm at any instant is thus in the best position to compete for sales. If the largest firm is sufficiently aggressive, it will drive all rivals from the field and still earn substantial excess profits.” (Schmalensee (1979) p. 4) In this instance, the monopoly is said to be “sustainable.” Sustainability means that the market demand and cost functions make available to the monopolist a price such that (1) the market clears (*i.e.*, the monopolist produces all that is demanded at that price); (2) the monopolist at least breaks even; and (3) entry is unprofitable. When the existence of a monopoly rests entirely upon scale economies (or decreasing unit costs), there is no need for a legal prohibition on entry to ensure lowest cost production.¹⁰⁷

The case for legal protection from entry is more compelling when monopoly is the least-cost industry structure, and when scale economies (or decreasing unit costs) do not exist over the entire range of possible

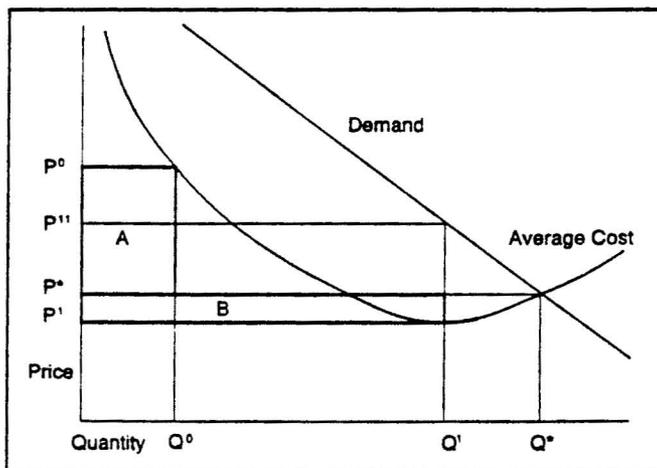


Figure 1

¹⁰⁷ Regulation may be necessary to ensure that such a monopolist charges a competitive price. The literature on sustainability (see Tirole (1988) pp. 18-21; Baumol, Panzar, and Willig (1982, 1986); and Sharkey (1982)) describes conditions under which the threat of entry will provide a monopolist with an incentive to charge a competitive price.

production levels. For example (see figure 1),¹⁰⁸ suppose that the firm's long-run average cost function has a "U" shape (i.e., average costs fall until they reach some minimum point, beyond which they begin to rise). Suppose further that the market demand curve intersects this cost function to the right of its minimum point (but not far enough to its right to accommodate two firms producing at minimum average cost.) As drawn, the cost function in figure 1 is subadditive at output Q^* . This set of circumstances will result in an unsustainable natural monopoly. That is, given the market demand, total production costs would be minimized if a single firm produces Q^* . However, such a monopolist would not be able to charge a price that both covers its costs and deters entry.

To see why, suppose this monopolist selects a price and output (denoted as P^* and Q^*) that allow it to cover exactly its average cost at the level of output where demand intersects the cost function (i.e., it chooses a price exactly equal to average cost at output Q^*). The monopolist is vulnerable to an entrant that produces less than Q^* (e.g., output level Q^1 , the level of output at which average cost is lowest) and sells it at a price less than P^* , such as P^1 . Thus, if an entrant were to produce Q^1 , selling at P^1 , what would remain for the monopolist to produce is $Q^* - Q^1 (= Q^0)$. The latter could be produced only at a cost of P^0 , which is above P^* . In fact, if an entrant produced Q^1 , the monopolist would not have available to it any output between $Q^* - Q^1$ that it could produce and cover costs, whereas the total output Q^* could be produced if the monopoly is protected from entry. We note that if Q^* is produced and priced at P^* by a protected monopoly, then Q^* may be produced at lower cost than if Q^* is produced by more than one firm. If Q^1 is produced by an entrant and Q^0 is produced by the incumbent, the total cost of Q^* is $(P^1 \times Q^1) + (P^0 \times Q^0)$. With the market protected from entry, the total cost of producing Q^* is $P^* \times Q^*$. The total cost of producing Q^* will be higher with entry if (as is the case in figure 1) shaded area (A) exceeds shaded area (B). Absent entry restrictions, an excessive number of firms may exist along with a consequent waste of resources.

If the monopolist initially charges a price below P^* , say P^1 , and supplies the whole of the amount demanded so as to deter entry, then total output would exceed Q^* , and price would fall below cost, causing losses to be incurred. If, on the other hand, the monopoly initially produces less than Q^* , charging a price above P^* , it will face a higher risk of entry than if it had charged P^* . If, for example, the monopolist were initially to produce Q^1 and charge P^{11} , it would be vulnerable to entry by a firm producing Q^1 and selling at P^1 . If the entrant charges P^1 and produces Q^1 , there is no output that the monopolist could produce and sell profitably, as noted before.

¹⁰⁸ This example was first presented in Baumol, Panzar, and Willig (1982) pp. 29-32; and Sharkey (1982) pp. 88-9; and is discussed in greater detail in Brock and Evans (1983) pp. 69-76.

As Baumol *et al.* argue,¹⁰⁹ the case for entry restrictions outlined above holds with full force only when there are no sunk costs associated with entry into a market.¹¹⁰ Otherwise, as they point out, the nonsustainability of the natural monopoly may only mean that the incumbent cannot fully exploit the advantages conferred on it (relative to the entrant) by the existence of the sunk costs. The incumbent may still be able to set a price that allows it to cover its costs and deter entry; this price may well be substantially below the price the monopolist would charge if it enjoyed regulatory protection from entry.

This point can be better explained with the aid of an example taken from Baumol *et al.* (1982, pp. 221-2). In figure 2, AC_m and AC_e are the respective average costs of the incumbent and entrant, and D is the market demand curve.¹¹¹ The market-clearing price that allows the monopolist to exploit fully its cost advantage (relative to the entrant) is P_m . This price is not sustainable. However, a somewhat lower price, such as P_e , is sustainable. At this price, the monopolist could still satisfy total market demand and cover its costs; the entrant, however, would not be able to cover its costs. This price is well below the unconstrained monopoly price, P^* .

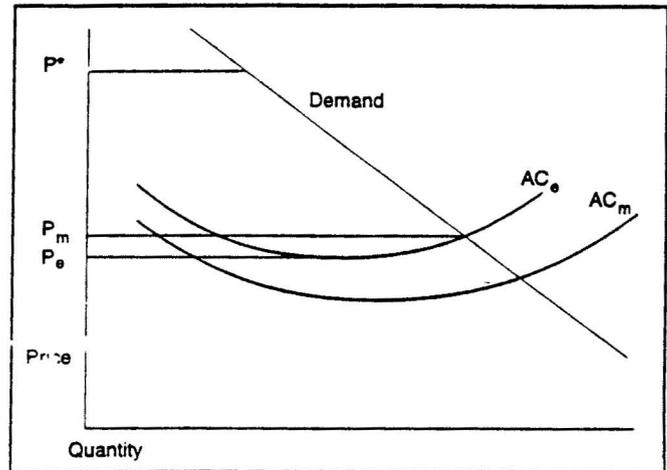


Figure 2

Baumol *et al.*'s argument would seem to carry considerable weight when applied to markets for electrical generation and transmission. Entry into these markets is characterized by substantial sunk costs. Thus, even if electric utilities in some markets were nonsustainable natural monopolies, it may make little sense to provide these firms with statutory protection from entry, since the existence of substantial sunk costs may provide them with the ability to deter inefficient entry.

¹⁰⁹ See Baumol *et al.* (1982) pp. 221-4.

¹¹⁰ Sunk costs are costs that cannot be recovered if a firm elects to exit a market.

¹¹¹ When an entrant must invest in industry-specific capital (*i.e.*, incur sunk costs) to enter an industry, it becomes more vulnerable to credible retaliation (*e.g.*, post-entry price cuts) by the incumbent. If capital were not industry-specific, such responses could not harm the entrant, as the equipment could be costlessly diverted to another use. As Baumol *et al.* show (pp. 296-301), the threat of credible post-entry retaliation is economically equivalent to raising the entrant's cost of capital, which shifts the entrant's cost function upward. The magnitude of this shift will be determined, in part, by the amount of industry-specific capital required for entry.

Entry protection when the firm produces many types of output.

The analysis of entry protection becomes more complicated when a firm produces more than one output. Prior to the mid-1970s, there was relatively little formal analysis of the implications of multiple product production for industry structure and entry regulation. Subsequent work has shown that, as in the case of single output firms, the existence of a multiproduct natural monopoly rests upon the notion of subadditivity. Subadditivity has the same meaning in a multiproduct setting as in the single output case—*i.e.*, costs are subadditive when the cost of producing some set of products is lower when it is produced by a single firm than when the same set is produced by more than one firm. However, when a firm produces several products, it becomes difficult to determine whether the firm is a natural monopoly, and if so, whether the monopoly is sustainable. This difficulty arises because multiproduct production makes costs dependent upon the mix, as well as the quantities, of the different products produced.

A full discussion of the conditions under which a multiproduct natural monopoly exists, and when it is sustainable, extends far beyond the scope of these comments. There are numerous excellent discussions of this issue available in the literature.¹¹² The chief implication of this literature can, however, be succinctly summarized: as in the case of a single product firm, there is no efficiency basis for protecting a monopolist from entry unless there is a good reason to believe that the industry is an unsustainable natural monopoly. Unless the monopoly is unsustainable, market forces will induce and sustain the monopoly as the least-cost industry structure.

To determine whether any particular industry, such as electrical supply, possibly merits (on efficiency grounds) protection from entry, some empirical evidence should be brought to bear on the subadditivity and sustainability issues. The theoretical literature on multiproduct natural monopoly has developed a set of necessary conditions and sufficient conditions¹¹³ that must be satisfied if it is to be concluded that an industry is a natural monopoly. There is also a set of necessary conditions and sufficient conditions to establish whether a natural monopoly is sustainable. Whether the necessary conditions and sufficient conditions for the existence of a natural monopoly are satisfied in any given industry can, in principle, be assessed empirically

¹¹² See Baumol, Panzar, and Willig (1982, 1986), Bailey and Friedlaender (1982), and Sharkey (1982).

¹¹³ There are unfortunately no analytically tractable conditions that are both necessary and sufficient for determining whether an industry is a multiproduct natural monopoly. See Baumol, Panzar, and Willig (1982) p. 170.

via the estimation of cost functions. However, the data requirements for conclusively determining whether an industry is a sustainable natural monopoly are formidable.¹¹⁴

Fortunately, one can often derive information of enormous practical significance to policy makers without answering the sustainability question by focusing instead on the conditions necessary for natural monopoly, *i.e.*, the conditions for subadditivity. If cost, output, and input price data are available for the various services provided by the electrical utility, it should be possible to assess whether the necessary conditions for subadditivity are met.¹¹⁵ If these conditions are not satisfied, the sustainability issue need never be addressed, and a strong case can be made for allowing free entry. Conversely, if scale economies exist over the whole range of output, no entry protection is necessary. If the conditions for subadditivity do exist, but economies of scale do not cover the relevant range of output, then the case for entry prohibition is strengthened, though not definitively established.

As discussed in the text, neither subadditivity nor economies of scale appear to be critical considerations in generation. Still, economies of scale do appear to exist for the relevant range of output for most elements of the transmission and distribution systems and, as discussed in the text, there may be economies of vertical integration between generation and transmission/distribution to consider in determining whether entry restrictions would promote economic efficiency.

¹¹⁴ Specifically, to establish subadditivity of the cost function, a researcher would require enough data to estimate the properties of a cost function at all possible levels of the different outputs. In practice, the investigator will only have data on the output levels that the firm has actually produced.

¹¹⁵ See Evans and Heckman (1983) for an example of this procedure.

Appendix B

Electrical utility reform in the United Kingdom and New Zealand

United Kingdom¹¹⁶: In the late 1980s, the United Kingdom unbundled the vertically integrated nationalized monopoly into generation, transmission, and distribution tiers and introduced competition into generation and distribution.¹¹⁷ At the generation level, two large, private generating entities were created, along with a government-owned entity controlling all nuclear power generating stations.¹¹⁸ The national transmission grid has been maintained as a single entity separate from the generating organizations.¹¹⁹ The grid is owned as a joint venture by the twelve local distribution companies and is managed independently. Local distribution continues to be a franchised monopoly for all customers with respect to physical facilities, but larger customers are authorized to contract for power directly from suppliers other than the franchise holder. Eventually, all customers will be able to “shop” for power in this manner.

The heart of the British system is half-hourly competitive bidding from the generating firms.¹²⁰ Generating firms submit a schedule of output and price combinations for each production facility. The national grid then selects which offers to accept, starting with the lowest priced capacity available. The grid pays generators the price of the most costly generation bid that it accepts for that half-hour. Prices also include a payment meant to assure an incentive to add capacity as demand grows.¹²¹ Next, the grid sells to the distributors and

¹¹⁶ This section is based in part on conversations with and written materials from J. Mark Hammond, First Secretary Environment, Energy and Telecommunications at the British Embassy.

¹¹⁷ The system that has emerged bears considerable resemblance to the system in the U.K. between World War I and World War II. For a discussion see, Hammond (1992) pp. 538-53.

¹¹⁸ The government has retained ownership of all nuclear power plants and sells this output under a separate set of arrangements with the grid.

¹¹⁹ The grid retains ownership of pump storage capacity projects.

¹²⁰ The grid must give access to licensed generating firms with capacity greater than 10 MW and all generating plants over 100 MW must operate under the grid's schedule and dispatch orders. (Sas (1990) p. 486; Green and Newberry (1992) p. 930) Graphs of the time-of-day peaks and load durations for the British grid are shown in Green and Newberry (1992) at p. 935.

¹²¹ Legislators were initially concerned that prices would not cover the fixed costs of the generating firms and therefore might result in lags in investment in new capacity. There is some speculation that the charge has been set too high and may be inducing more entry than is economically appropriate. (Smith (1993) pp. 15, 17)

other retail and wholesale customers at a markup above what it pays to generators, with the markup paying for maintenance of the grid. Increases in the grid's mark-up are capped by the rise in the retail price index minus an adjustment for technological improvements.¹²² (Lambert (1989) p. 16)

Each regional distribution company at first had a monopoly on retail sales in a specific geographic area, but the statutory obligation to provide service to all customers applies only if the customers are willing to pay the incremental cost of providing such service. Retail customers with demand of over one MW have the option of contracting for power from any generator or distributor and accessing this power by connecting to the national grid through the franchised distributor's lines.¹²³ Non-discriminatory rates are levied for use of the national grid and for the local distribution lines that the retail customer uses to connect to the grid. (Sas (1990) p. 487) The rate of increase in these grid and connection charges is capped by the general inflation index.¹²⁴ (Smith (1993) p. 16) The distribution companies and large retail users are free to arrange to buy power through direct contracts with generators, or constructing their own generating capacity. In addition, they may buy electricity futures on the London futures market.¹²⁵ When the power is actually supplied, parties to the contract settle by paying or receiving the difference between the pool price (charged by the grid) and the contract price. (Sas (1990) p. 487)

Increases in prices of power for low volume customers (those who buy power from the local distributor, rather than just connect through the distributor) are restricted by price caps

¹²² The combination of price caps on some elements of demand and pricing flexibility on others has potentially advantageous efficiency effects and may permit regulators to avoid difficult measurement and detection problems. For a discussion, see Einhorn (1990).

¹²³ A higher threshold was applied initially.

¹²⁴ The cap is also reduced each year by a technological improvement factor that is used to make a downward adjustment in the allowed price related to productivity improvements. The idea is to provide incentives for efficiency improvements that go beyond the norm. (Smith (1993) p. 16)

¹²⁵ Distribution companies are allowed to produce up to 15 percent of their own needs. (Sas (1990) p. 486) Decisions of retail customers to by-pass the franchised distributor are limited to a pre-established, but increasing, proportion of the distribution company's load prior to the reforms. By the end of the decade, no restriction will be in place in this regard. (Sas (1990) p. 487)

that are also tied to the retail price index minus an adjustment for technological improvements.¹²⁶

The reformed electricity system began operation in March of 1990. Three significant observations have been made to date. First, electricity prices for low volume users have increased by less than the rate of inflation (which was treated as a price cap for increases in franchised electricity prices). Second, prices of wholesale power have fluctuated substantially, by season, time of day, and year, with peaks exceeding average price by as much as 20 times.¹²⁷ Third, electricity prices for large retail customers have fallen, on average, by 10 percent in real terms as more such customers have opted to seek electricity directly from generating firms, distributors outside their local area, or directly from the national pool. (British Embassy (1993))

Evaluators of the British system have emphasized one major drawback in the manner the reforms have been implemented. Although there are ten generator firms, the structure of the generating industry is essentially a duopoly because the government's non-nuclear generation capacity was divided into only two entities.¹²⁸ Consequently, these two firms may be in a position to affect the market clearing price substantially, by withholding even a small portion of their capacity. In an effort to discourage strategic capacity withholding, new franchising rules require an operationally capable plant to offer a bid and require the major

¹²⁶ In addition to price caps, the British system provides for a Director General with potentially sweeping powers to alter rates and institutional arrangements. These powers have not been employed to date. (Smith (1993) p. 15)

¹²⁷ Such peaks should lead to incentives to develop metering systems capable of varying prices by the time of day, season, etc.

¹²⁸ This structure is apparently an accident of history. The government originally intended to sell its nuclear power plants along with the conventional units. By combining the nuclear plants with a large proportion of conventional plants, the government hoped to make both commercially viable. Shortly before the legislation was introduced, publicity about additional risks associated with owning the nuclear plants caused the government to retain the nuclear plants. This occurred, however, too late in the process to restructure the offering of conventional plants. (Chessire (1992))

At present, power from the nuclear units is treated as a base load and all local distributors are required to purchase a proportion of their power from the nuclear units (or from other non-fossil fuel generating sources). (Chessire (1992))

generating companies to offer for sale any plants that they are going to close or “moth ball.”¹²⁹

New Zealand¹³⁰: The electric power reforms in New Zealand entail a three way dissolution of the government’s electric power monopoly. As in the U.K., the grid is the intermediary between generators and retail distributors in the spot market for electricity. In New Zealand, the grid is jointly owned by distributors and generators. Generators provide a bid schedule of price and output options for each generating facility and the grid equilibrates supply with demand and then pays generators the price of the highest accepted bid for all supply that is accepted. The spot market functions in tandem with longer-term contracts for power between generators and power retailers.¹³¹ All grid charges are publicly disclosed and explained.

Privatization of the local distribution system is still in process, but the plan calls for elimination of the “exclusive franchise” provisions that were previously in place.¹³² New

¹²⁹ The Director General undertook to add this restriction to generating licenses because he perceived that peaks in wholesale electricity prices were higher than they would have been with such rules in place. (British Embassy (1993)) Such a rule seems unlikely to curtail other potential strategies of the major generating firms, such as submitting bids far above costs for a portion of plants with the expectation that the plant at the margin will be one with a significant price/cost margin. The reform act provides the Director General with authority to take further steps if this licensing provision is deemed insufficient.

¹³⁰ This section is based in part on conversations with and materials supplied by Len Muir, Executive Officer, Embassy of New Zealand and discussions with Susan Braman, FTC staff economist, who participated in formulation of the reforms in New Zealand.

¹³¹ The government anticipates that long-term contracts will be the primary mechanism through which incentives for new capacity will take place. New Zealand’s system has no “uplift” charge on spot market prices to provide incentives for new capacity.

New Zealand’s electricity generation system differs from that in most other developed countries, because previously completed large hydro-electric projects are expected to meet New Zealand’s electricity demands through the end of the century without additions to capacity. Hydro is by far the dominant source of generation in New Zealand (80 percent). (New Zealand Electricity Task Force (1989) pp. 78-79) In contrast, SERC, the regional council that includes South Carolina, generates approximately 60 percent of its power from coal and approximately 27 percent from nuclear energy. (U.S. Congress Office of Technology Assessment (1989) p. 158)

¹³² Historically, New Zealand did not regulate local electrical service rates because local distribution was almost universally comprised of municipal systems. These municipal
(continued...)

Zealand anticipates that local distribution will continue to be largely a single facility operation, but leaves open the possibility of duplicate lines if prices get too far from the competitive level.¹³³ Moreover, New Zealand is moving to foster competition within the context of a natural monopoly facility. Plans anticipate that the local distributing company will implement separate charges for the use of lines, for connections to the distribution system, and for power usage. Customers with high cost connections will be paying higher connection prices than under the current system and vice versa. A potentially significant impact of separating line charges from power use charges is that it opens the market to entry of independent electric power retailers. A firm with no generating capacity and no distribution system could nonetheless become an active distributor by contracting for power from a generating company and paying the line use charges of the local distribution company in order to supply retail customers. It is anticipated that different power retailers will compete, for example, by offering different types of time-of-day metering and pricing, various types of interruption guarantees, and different seasonal price premiums. (Smith 1993b) pp. 143-44)

New Zealand's efforts to provide competition in retail marketing of electric power take the British reforms one step further by seeking to bring additional competition to all customers. In designing its retail distribution system, New Zealand has had to face a number of important issues. With respect to the traditional requirement to supply power to customers who ask for it, the New Zealand task force observed that there is no need for a separate requirement if all customers are paying the full costs of connecting to the distribution system. New Zealand has elected to start charging full connection costs to the customers (with some allowance for an explicit subsidy provided by a rural electrification fund). (New Zealand Electricity Task Force (1989) p. 93) With respect to exclusive franchises, New Zealand's task force observes that for many natural monopoly settings, no exclusive franchise right is necessary to preclude entry. Given the high sunk costs of the distribution system, New Zealand considers it unlikely that inefficient double wiring will be prevalent. There is less certainty, however, about across the board economies of scale covering the merchandising of electricity apart from the physical wiring investments.

With respect to merchandising of electricity, New Zealand's task force found no basis for granting an exclusive franchise since there need be few sunk cost investments. Rather, it envisioned extensive and rapid entry of power merchants whenever electricity prices charged by the owner of the physical distribution system exceeded the competitive level. New Zealand's task force envisioned uninhibited (mandatory) retail wheeling to any customers with time and demand metering and with separate connect and electricity use charges. For other

¹³²(...continued)

distribution systems, as in South Carolina, have not been subject to ratemaking at the state or national level.

¹³³ As discussed in Section B, if local distribution is a natural monopoly with sunk costs there is probably no need to protect the natural monopoly with legal entry barriers.

customers unable to participate in retail wheeling, the Task Force recommended "yardstick regulation" with rate caps for connection charges based on mean connection charges of similarly situated distribution firms.¹³⁴ (New Zealand Electricity Task Force (1989) pp. 96-98) Charges for electricity use would be unregulated, depending on existing by-pass options, improvements in metering technology, decreasing metering costs to extend the range of by-pass options to more and more consumers, and the threat of subsequent regulation to hold prices to competitive levels.¹³⁵ (New Zealand Electricity Task Force (1989) pp. 98-99)

As in the U.K., New Zealand is experiencing difficulty in dividing the government's generating assets into enough segments to provide a less concentrated market structure for generation.¹³⁶ Even within the current structure, though, significant productivity gains and lower costs have been achieved.¹³⁷

¹³⁴ Yardstick regulation in this context depends critically on the existence of competitive conditions in geographic areas other than the one being examined. Such regulation would be unlikely to be effective against a coordinated increase in prices by the several dozen local distributors.

¹³⁵ There are numerous significant issues if cross-subsidization is required under remaining regulations. For a discussion of the major issues see, for example, Edison Electric Institute (1992).

¹³⁶ Because of New Zealand's heavy reliance on hydroelectric power, coordination of water use decisions is an unusually important element in New Zealand's electricity supply costs.

¹³⁷ Operating expenses per kwh declined by 17.7 percent during the first three years after the initial reorganization of the generation element of New Zealand's electrical system while sales per employee increased by 14.7 percent and average price declined by 9.8 percent (all in real terms). For several years prior to the reorganization, costs and prices had been stable or rising in real terms. Output per worker had been increasing, but at a much slower rate. (Spicer, Bowman, Emanuel, and Hunt (1991) p. 169)

F. References

- Anderson, Incentive Regulation and Demand-Side Management, Working Paper #22, National Economic Research Associates, Inc. (1993).
- Bailey and Friedlaender, Market Structure and Multiproduct Industries, 20 Journal of Economic Literature 1024-48 (1982).
- Baumol, Panzar, and Willig, Contestable Markets and the Theory of Industry Structure, New York: Harcourt, Brace and Jovanovich (1982).
- Baumol, Panzar, and Willig, On the Theory of Perfectly-Contestable Markets, in New Developments in the Analysis of Market Structure, Stiglitz and Mathewson (eds.), Cambridge: MIT Press (1986).
- Braman, Application to Electricity Transmission, The Case of the New Zealand National Grid, in Theory and Application of Competitive Joint Ventures Ph.D. dissertation, Georgetown University (1992).
- British Embassy, various documentary excerpts provided by (1993).
- Brock and Evans, Creamskimming, in Breaking up Bell: Essays in Industrial Organization and Regulation, Evans (ed.), New York: North-Holland (1983).
- Bunn and Larsen, Sensitivity of Reserve Margin to Factors Influencing Investment Behavior in the Electricity Market of England and Wales, 20 Energy Policy 420-29 (May 1992).
- Burns, Comments in Response to the Federal Energy Regulatory Commission's Request for Comments in Its Inquiry Concerning the Commission's Pricing Policy for Transmission Services Provided by Public Utilities Under the Federal Power Act, Docket No. RM93-19-000, National Regulatory Research Institute of the National Association of Regulatory Utility Commissioners (1993).
- Case Against Retail Wheeling, The, Washington, D.C.: Edison Electric Institute (1992).
- Chessire, Why Nuclear Power Failed the Market Test in the UK, 20 Energy Policy 744-754 (August 1992).
- Competitive Bidding in the Investor-Owned Electric Utility Industry, Vol. III, Washington, D.C.: Edison Electric Institute (1992).
- Costello et al., A Synopsis of the Energy Policy Act of 1992: New Tasks for State Public Utility Commissions, Columbus, Ohio: National Regulatory Research Institute (1993).

Costello, Jennings, and Viezer, Implications of a New PUHCA for the Electric Industry and Regulators, Columbus, Ohio: National Regulatory Research Institute (1992).

de Oliveira and MacKerron, Is the World Bank Approach to Structural Reform Supported by Experience of Electricity Privatization in the UK?, 20 Energy Policy 153-162 (February 1992).

Economic Reform, Corporatisation and Privatization, Wellington, New Zealand: Government of New Zealand (1992).

Edison Electric Institute, Competitive Bidding in the Investor-Owned Electric Utility Industry, Vol 3, Washington, D.C.: Edison Electric Institute (1992(a)).

Edison Electric Institute, State Regulation of Non-Utility Generation, Vol. 1, Washington, D.C.: Edison Electric Institute (1992(b)).

Edison Electric Institute, Competitive Bidding in the Investor-Owned Electric Utility Industry, Washington, D.C.: Edison Electric Institute (1990).

Einhorn, Electricity Wheeling and Incentive Regulation, 2 Journal of Regulatory Economics 173-89 (1990).

Electricity Privatization in England and Wales: A Note on the Electricity Bill, London: Government of the United Kingdom (1989).

Elliott, Renewables and the Privatization of the UK ESI, 20 Energy Policy 257-268 (March 1992).

Energy Sector, Wellington, New Zealand: Government of New Zealand (1991).

Evans and Heckman, Multiproduct Cost Function Estimates and Natural Monopoly Tests for the Bell System, in Breaking up Bell: Essays in Industrial Organization and Regulation, Evans (ed.), New York: North-Holland (1983).

Exelby and Lucas, Competition in the UK Market for Electricity Generating Capacity: A Game Theory Analysis, 21 Energy Policy 348-354 (April 1993).

Federal Energy Regulatory Commission, Policy Statement Regarding Regional Transmission Groups; Policy Statement, 58:149 Federal Register 41626-33 (August 5, 1993).

Federal Energy Regulatory Commission, Inquiry Concerning the Commission's Pricing Policy for Transmission Services Provided by Public Utilities Under the Federal Energy Act, Federal Energy Regulatory Commission (1993).

Federal Energy Regulatory Commission Staff, Staff Discussion Paper: Transmission Pricing Issues, Federal Energy Regulatory Commission (1993).

Federal Energy Regulatory Commission, Power Pooling in the United States, Washington, D.C.: Federal Energy Regulatory Commission (1980).

Gilbert, Kahn, and White, The Efficiency of Market Coordination: Evidence from Wholesale Electric Power Pools, paper #PWP-012, Program on Workable Energy Regulation, University of California Energy Research Group (1993).

Green and Newberry, Competition in the British Electricity Spot Market, 100 Journal of Political Economy 929-953 (October 1992).

Hammond, Privatization and the Efficiency of Decentralized Electricity Generation: Some Evidence from Inter-War Britain, 102 Economic Journal 538-553 (May 1992).

Hingorani and Stahlkopf, High Power Electronics: A New Generation of Silicon Switches Enable Power Grids to Meet the Needs of Utility Customers with High Efficiency and Reliability, 269:5 Scientific American 78-85 (November 1993).

Houston, User-Ownership of Electric Transmission Grids, Regulation 48-57 (Winter 1992).

Jones et al., Regional Regulation of Public Utilities: Opportunities and Obstacles, Columbus Ohio: National Regulatory Research Institute (1992).

Joskow, Regulatory Failure, Regulatory Reform, and Structural Change in the Electric Power Industry, Brookings Papers on Economic Activity: Microeconomics, 125-199 (1989).

Kaserman, The Measurement of Vertical Economies and the Efficient Structure of the Electrical Utility Industry, 39 Journal of Industrial Organization 483-502 (September 1991).

Kelly (ed.), Non-Technical Impediments to Power Transfers, Columbus, Ohio: National Regulatory Research Institute (1987).

Lambert, Privatizing Electricity in Britain: The Role of the National Grid, 122 Public Utilities Fortnightly 14-18 (March 30, 1989).

National Governors' Association Task Force on Electricity Transmission, Moving Power: Flexibility for the Future, Washington, D.C.: National Governors' Association (1987).

Nelson, and Primeaux, Jr., The Effects of Competition on Transmission and Distribution Costs in the Municipal Electric Industry, 64 Land Economics 338-346 (November 1988).

New Zealand Economic and Financial Overview 1992, Wellington, New Zealand: New Zealand Debt Management Office. (1993).

New Zealand Electricity Task Force, Structure, Regulation and Ownership of the Electricity Industry: Report of the Electricity Task Force, Wellington, New Zealand: Government of New Zealand (1989).

Primeaux, Total Deregulation of Electric Utilities: A Viable Policy Choice, in Unnatural Monopolies: The Case for Deregulating Public Utilities, Poole (ed.), Lexington, Mass.: Lexington Books (1985).

Rhyne, interview, Director of Research, South Carolina Public Service Commission (November 17, 1993).

Ruff, interview, Putnam Hayes, and Bartlett (electric utility regulation consultants, London) (November 17, 1993).

Sas, Regulation and the Privatized Electricity Supply Industry, 53 *Modern Law Review* 485-98 (July 1990).

Schmalensee and Golub, Estimating Effective Concentration in Deregulated Wholesale Electricity Markets, 15 *RAND Journal of Economics* 12-26 (Spring 1984).

Schmalensee, The Control of Natural Monopolies, Lexington, MA: Heath (1979).

Sharkey, The Theory of Natural Monopoly, New York: Cambridge University Press (1982).

Smith, Regulatory Reform in the Electric Power Industry, Goldwater Institute (1993(a)).

Smith, Can Electric Power—A 'Natural Monopoly'—Be Deregulated? in Landsberg, Making National Energy Policy, Washington, D.C.: Resources for the Future (1993(b)).

Smith, Electric Power Deregulation: Background and Prospects, 6 *Contemporary Policy Issues* 14-24 (July 1988).

Smith and Rassenti, Seminar on Market Simulation and Energy Trading (1993).

South Carolina Public Service Commission, Annual Report 1991-1992, Columbia, South Carolina: State of South Carolina.

Spicer, Bowman, Emanuel, and Hunt, The Power to Manage: Restructuring the New Zealand Electricity Department as a State-Owned Enterprise—The Electricorp Experience, Auckland, N.Z.: Oxford University Press (1991).

State Regulation of Non-Utility Generation, Vol. 1., Washington, D.C.: Edison Electric Institute (1990).

Tirole, The Theory of Industrial Organization, Cambridge, Mass.: MIT Press (1988).

U.S. Congress, Office of Technology Assessment, Electric Power Wheeling and Dealing: Technological Considerations for Increasing Competition, Washington, D.C.: U.S. Congress, Office of Technology Assessment (1989).

U.S. House of Representatives, Committee on the Judiciary, House Conference Report No. 102-474(I); House Conference Report No. 102-1018; and House Conference Report No 102-474(VII) (1992).