

Chapter 3

Emerging Market Structures and Options for Regulatory Reform in Public Utility Industries

Harry M. Trebing

1.0 Introduction

Public utilities are complex systems of supply that are an integral part of national and global infrastructures. There are major social gains associated with the proper employment of these systems of supply since they provide platforms for promoting growth in national productivity and, as a consequence, increases in real income.

Success in achieving these goals involves a high degree of coordination between a capital intensive supply network and complex and diverse patterns of consumer usage. Effective coordination between changing consumer requirements and the planning and operation of the network enhances the prospect that all the inherent network economies (economies of scale, scope, joint production, and pooled reserves) will be realised.

Historically, coordination was achieved through a centralised system of governance in which the matching of demand and supply was entrusted either to public enterprises or to private monopolies that were subject to price and earnings regulation. In the United States, this system worked remarkably well during the period 1946-1968, when a stable growth in post-war demand was matched with steady technological advance and the attainment of most associated network economies. As a result, total factor productivity (in real terms) increased at an average annual rate of 4.07 percent for the telephone and telegraph industry and 4.71 percent for electricity and gas utilities, but only 2.98 percent for US manufacturing. Over approximately the same period, the median real family income came close to doubling.

After 1968, however, a series of external shocks and cumulative evidence of poor management led to increased public dissatisfaction. In telecom, new technology arising outside the industry led to new consumer demands for greater flexibility in the provision and pricing of communication services. AT&T was severely criticised for failing to innovate in response to these changes, and for its draconian response to new entrants that proposed to do so. For electricity, fuel cost increases, cost overruns for new generating capacity, and poor nuclear plant reliability placed much of the industry in the status of a high-cost supplier. For natural gas, periods of undersupply led to shortages, curtailment, and rationing, while a subsequent period of oversupply led to price concessions for large users and price increases for basic service customers. Basic service (primarily residential and commercial space heating) faced the incongruous situation of a retail price increase

accompanying an oversupply of gas and a simultaneous decline in demand because of efforts at conservation.

US public policymakers attempted to remedy these problems by shifting from a monopolistic to a pluralistic system of supply. Pluralism took the form of promoting nonutility generation, open access to electricity and pipeline transmission networks, the introduction of wholesale trading of gas and electricity, and, most recently, a move toward granting retail customers the option of selecting among rival suppliers of electricity and gas.

The most comprehensive movement toward pluralism came in telecom. In the US, entry into leased line and terminal equipment markets (1968/69) was followed by open entry into message toll telephone markets (1977), and eventually by AT&T divestiture (1984). Canada followed a similar pattern about a decade later with the leased line (1979), terminal equipment (1982), and long distance (1992) markets opened to competition. There was, of course, no divestiture of the dominant carrier in Canada.

Public enterprises in other nations have come under similar pressures to loosen monopoly control. At the same time, there has been a belief that privatisation of these enterprises will yield significant benefits in terms of entrepreneurial innovation and efficiency gains in corporate planning and operations. The shift to pluralism and privatisation has been most evident in Great Britain and New Zealand, less evident in Japan and Europe (although open access has been targeted by the European Union for January 1, 1998), and least apparent in the developing nations. The World Bank has aggressively promoted privatisation in the latter countries, and has urged the introduction of regulation to negate private monopoly while promoting entry and competition. (It should be noted that the type of infrastructure that will emerge from these efforts has yet to be determined.) Privatisation creates a strong incentive on the part of carriers and suppliers in industrialised nations to acquire and upgrade foreign telephone properties. By 1993, the nine largest US telephone carriers (excluding AT&T and MCI) had 265 programs in 52 different foreign nations. Much of this activity was directed toward developing countries.

2.0 Will Effective Competition Emerge?

The principal unanswered question in the move toward pluralism is whether some form of effective or workable competition will emerge as the roles of monopoly regulation and public enterprise are redefined and either narrowed or eliminated.

An argument can be made that there has been a major change in the behaviour of firms in an environment of growing deregulation. A new generation of managers has emerged, particularly in the US, which is much more profit oriented than their predecessors. As a consequence, they are more aggressive in reducing costs and their decisions are more market-driven, particularly in terms of responding to the demands of large customers. Furthermore, they are much more willing to go outside the confines of the firm to search for new market opportunities, new approaches to problems, and new technologies. There is also no longer a single industry position on major issues; rather, diversity and intra-industry confrontations are more common.

Proponents of competition will applaud these new behaviour patterns as evidence of a shift to competition reinforced by a relaxation or removal of traditional rate-base, rate of return regulation. However, this conclusion is both superficial and deceptive. The

new management is keenly aware of the actions of a limited number of close rivals. This sense of strategic inter-dependence extends to marketing, pricing, and corporate expansion. This contrasts sharply with the classical behaviour of the competitive firm, which accepts market-determined prices and adjusts its output accordingly to maximise profits. Interdependence among a few rivals is a fundamental characteristic of a tight oligopoly market structure.

Effective competition exists where there are at least five or six comparable rivals with no significant barriers to entry and no single firm exercises dominance (defined as controlling more than 40 percent of the market). In addition, demand conditions are assumed to be essentially elastic across the board. However, none of the retail utility markets in the US currently satisfies these conditions. In contrast, tight oligopoly appears to be much more characteristic of such markets. Tight oligopoly is defined as a structure where the leading four firms control 60-100 percent of the market and significant barriers to entry prevail. These concepts can be measured by four or eight firm concentration ratios, the Herfindahl-Hirschman Index, or the Landes-Posner Index. The Landes-Posner Index is the preferred measure since it incorporates market share, demand elasticity, and entry conditions. (See Appendix 1.)

3.0 Structure and Behaviour Under Tight Oligopoly

Four fundamental factors support and reinforce tight oligopoly in electricity, natural gas, and telecom. These are:

- (1) inherent network economies that promote concentration and discretionary behaviour,¹
- (2) industry-specific barriers to entry (e.g., a long gestation period and substantial sunk costs that preclude hit-and-run entry, etc.);
- (3) common corporate control over a range of differentiated markets (which facilitates price discrimination and cross subsidisation in allocating common costs); and
- (4) control over monopoly focal points such as the local loop, the pipeline transmission network, or the power grid.

Tight oligopoly establishes definite behaviour patterns in pricing, corporate expansion, and bilateral dealings that build upon these four characteristics to make oligopoly (typified by high concentration) a self-reinforcing force.

Pricing behaviour embodies two sets of strategies. The first is protection of the market position of the firm through (1) limit entry pricing, (2) high access charges for new entrants, and (3) tie-in sales to write off old plant or stranded investment against captive customers. Limit entry pricing involves setting low prices in highly elastic markets to attract or retain large customers with monopsonistic buying power, while maintaining high prices in inelastic markets. High access charges to preclude entry are demonstrated by New Zealand Telecom's enthusiastic adoption of the Efficient Component Pricing Rule (ECPR) for pricing interconnection with new entrants. Under ECPR, Clear Communications as the new entrant would have to pay both the incremental cost of access and the opportunity costs or profits foregone by New Zealand Telecom when it does not serve the market. This could result in a requirement that the new entrant

pay an access fee that includes payment of quasi-monopolist profits earned by the incumbent. Tie-in sales are demonstrated by the efforts of Entergy to assess the costs of potentially stranded generating plant against the utility's transmission customers. Thus, if a customer purchased power from a nonutility generator (a competitor of Entergy) it would still have to pay to write off Entergy's excessive generation costs through a surcharge on the transmission rate (*Cajun Electric Power Coop v. FERC, 1994*).

A second pricing strategy involves the employment of interdependence to achieve conscious parallelism in pricing. This practice is particularly evident in basic service or tariffed markets. There is evidence of sustained price leadership in the intrastate competitive long distance markets. For example, the Virginia regulatory commission files quarterly pricing reports for the three carriers in the intrastate long distance markets (AT&T, MCI, and Sprint). Between 1988-1993, the prices of all three remained the same. In August 1993 AT&T raised prices, and was followed by MCI in November 1993 and Sprint in December 1993. After these increases, intrastate long distance prices are again virtually identical. At the national level, the seven Regional Bell Holding Companies (RBHCs) reduced access charges three times from 1990-1994, while AT&T, MCI, and Sprint raised interstate toll rates in lock step over the same period. Access charges, it should be noted, account for about 40 percent of a long distance carrier's costs.

Price leadership patterns among a few rivals will be reinforced by the need to maintain levels of profitability, high market concentration, fear of retaliation, and the ready availability of information about the actions of rivals. It will be eroded by cheating, secret dealings, and monopsony power on the part of big users. Interestingly, a price set by conscious parallelism may be sustained by the perception among rivals that conditions approximating the "kinked" demand curve prevail. This involves the belief that a price increase by one firm will not be matched by others, while a price decrease will be matched by everyone.

On balance, price leadership will culminate in price rigidity over time. This will have an adverse impact on basic service customers. It will deny them price reductions associated with technological advance and it will raise the real prices of necessities (e.g., electricity, gas, and telecom) during a recession.

Oligopolistic interdependence also figures significantly in corporate expansion programs. It may emulate the strategies of rivals, or it may take the form of collaborative action involving mergers, joint ventures, or alliances in response to the actions of others. As an example of emulation one may cite Sprint's decision to join forces with TCI, Comcast, and Cox in an effort to provide a nation-wide wireless system to match AT&T's acquisition of McCaw Cellular, which permits AT&T to achieve direct access to the end user. Sprint's action is directed toward the same objective. An example of emulation in electricity occurred when a number of the investor-owned electric utilities entered the exempt wholesale generating field to follow the precedent established by Southern California Edison's creation of Mission Energy. As a result, more than half of the exempt wholesale generators EWGs are now utility affiliates. Emulation in Great Britain is evidenced by aggressive moves on the part of the two largest power generators to acquire retail power distributors after the British Government lifted the ban on utility mergers in March 1995. National Power moved to acquire Southern Electric, and PowerGen moved to acquire Midlands Electric. At present, five of the 12 electric

distribution companies are in play as candidates for take-over so that vertical integration can be re-established before the British residential/ retail market is opened to competition.

Interdependence also drives firms toward collaborative efforts designed to reduce uncertainty, broaden market participation, and/or protect new technology. This form of collaborative response is best illustrated by the proliferation of alliances and joint ventures in global telecom. Initially, AT&T formed World Partners as an alliance between its global network and major PTTs in the Pacific Rim (Singapore, Hong Kong, KDD, and NTT) and in Europe through Unisource (PTTs in Holland, Sweden, Switzerland, and Spain). This elicited a different form of collaborative action on the part of British Telecom (which first bought 20 percent and then all of MCI) and France Telecom/German Telekom (which bought 20 percent of Sprint). In the US electric utility industry, collaborative action appears to be taking the form of mergers. In each case collaboration appears to be an effective way of extending control over a broader network, expanding market coverage, and coping with the consequences of mandatory unbundling. In natural gas, an example of collaborative action is shown by the seven large local distribution companies (LDCs) that joined to form the East Coast Natural Gas Cooperative to consolidate purchasing practices. While such action may serve as a partial countervailing force to the market power of the producers, there is no assurance that the gains from such collaborative efforts will be distributed among retail customers in a fashion that could be construed as equitable or efficient.

The emergence of bilateral oligopoly (a few large buyers confronting a few large sellers) will also affect industry behaviour and performance. Of course, the argument can be made at the outset that large buyers will nullify the market power of large sellers, and that by acting as a countervailing force they will hold down retail prices for all classes of customers. However, this assumes across-the-board pervasive pressure to shift all savings forward to the ultimate customer. It also assumes that no distinction will be made between readily differentiated retail markets in this shifting process. Both assumptions are unrealistic under conditions of oligopoly. A more likely scenario is that one player (e.g., the incumbent firm) may employ delaying strategies to extract special concessions from the other player (the new entrant). This is a short-term strategy and it is evident in the efforts of Ameritech and the RBHCs to block entry by AT&T, MCI, and Sprint into the local market. It is also evident in the strategy of New Zealand Telecom to block Clear Communications. The longer-term consequences of bilateral oligopoly will involve a tendency for buyers and sellers to split a joint maximising profit in a particular market. Siegel and Fouraker (1960) found that such splitting of joint maximising profits increases as the rivals gain more and more information about each other. This type of bilateral behaviour will certainly have a significant impact on the outcome of negotiations between AT&T and the RBHCs, since the former is the major player in domestic and global interexchange markets while the latter control the local loop and local switch. As a consequence, when a small number of parties have full information about rivals and no regulatory intervention is feared, the result will be high access charges that restrict third generation entry while sustaining oligopoly profits.

4.0 Adverse Effects of Tight Oligopoly

There are at least six major consequences that appear to stem from tight oligopoly. First, the net effect of interdependent strategies pertaining to acquisitions, mergers, and

collaboration will be to increase aggregate industry concentration and to reinforce oligopoly behaviour. Second, prices will not track costs. There will be a strong incentive to engage in cross subsidisation and price discrimination, especially in the face of pressures for price concessions from large buyers of electricity, gas, and telecom. Furthermore, rate rebalancing programs, far from correcting such practices, may actually tend to reinforce them. It is reasonable to assume that patterns of conscious parallelism and price leadership that are in evidence in interexchange telecom in the US will be easily replicated in other nations, and in electricity and gas as bifurcated markets become more and more commonplace. Third, profit levels will be higher over time than those that would be expected to prevail under effective competition or stringent rate base regulation. Market-to-book financial ratios, case studies in individual states, and reviews of privatisation programs in New Zealand and elsewhere demonstrate such patterns of profit.² Fourth, the technology of the network, particularly in telecom, will be driven by the requirements of the largest multinational corporations at the expense of a universal network designed to serve all classes of customers. As Mansell notes, “The public network is not being designed in light of the many technical conditions for a universal network...” (Mansell 1993, p. 226). Fifth, the cost savings inherent in network operation and coordination will not necessarily be distributed in a manner that reflects either equity considerations or the costs incurred in serving particular users. Sixth, network denigration and service deterioration are distinct possibilities under tight oligopoly. While evidence to date is far from conclusive, initial reports suggest that there may have been a deterioration in quality of telephone service,³ a propensity toward network disinvestment among four of the seven RBHCs,⁴ and a decline in new telephone investment as a percentage of revenues in selected nations.⁵

5.0 Adequacy of Remedial Policies

If effective competition does not exist, then attention must focus on public policies directed toward assuring that systems of supply will perform in a fashion consistent with public interest objectives. The oldest system of regulation in the US and Canada is rate base/rate of return (RB/ROR) regulation. The logic of the RB/ROR model is simple. It consists of three steps. First, the firm’s annual revenue requirement is estimated. This involves a calculation of operating expenses, annual depreciation charges, and taxes, together with an estimation of the investment or rate base and the allowed return on that rate base. These components are then added together to arrive at a total revenue requirement. Second, the revenue requirement is allocated among different classes of customers to determine each class’s relative revenue contribution. Third, prices or rates are designed which, when applied to each class of customer, will yield the relevant revenue contribution.

Under the RB/ROR model the movement is clearly from revenue requirement to prices. Prices are assumed to be directly connected to underlying costs as incurred in supplying service. Revenue requirements can be calculated on a historic or forecasted test year basis, and regulators have the ability to disallow costs which they believe should not be borne by consumers by simply disallowing them – i.e., charging them off below the line. All costs would be scrutinised by having to pass the used-and-useful and prudence tests. Data for these calculations would come from the uniform system of accounts. Typically, the firm would have to seek regulatory approval for new investment, new

service, or abandonment of service. Regulators would also have the option of conducting management efficiency audits.

During the post-1968 period, the RB/ROR model came under increasing attack. It was criticised as too cumbersome and too complex, unresponsive to inflationary pressures, and indifferent to economic costs as opposed to accounting costs. But perhaps most important, it was criticised for embodying perverse incentives that would culminate in over-investment, gold plating, lacklustre innovation, and no motivation to reduce expenses. While a number of these charges had merit, one of the basic shortcomings of the RB/ROR model was the reluctance of state and federal regulators to expand the treatment of revenue requirement by class of service to encompass more sophisticated costing methodologies. Despite efforts to derive investment, expenses, and earnings by class of service in the Seven Way Cost Study (1964) and the Multischedule Private Line Case (1979), the Federal Communications Commission eventually did little more than allocate costs between regulated and nonregulated services through its Part 64 Cost Allocation Manual (CAM). Yet even the CAM came under criticism by utilities and carriers who wanted to be freed of such restrictions. Not surprisingly, a joint FCC/state commission audit revealed in 1995 that at least four of the RBHCs were not in compliance with CAM requirements.

The RB/ROR model came under increasing attack from three sources. Partially deregulated oligopolies wanted greater freedom to set price, offer services, and establish market positions. They also wanted to eliminate the oversight of profits inherent in fully distributed costs and RB/ROR. Large buyers wanted greater opportunity to extract special price concessions from supplying utilities, and consumer activists lost faith in the ability of regulators to constrain price increases when applying any cost-plus model. Under these circumstances, a shift to direct “price regulation” as opposed to “earnings regulation” had great appeal.

6.0 Price Cap Regulation

Price cap regulation (PCR) was initiated in Great Britain in 1984 and was applied to AT&T in 1989 and to the RBHCs in 1991. PCR was alleged to be superior because it severed: (1) the tie between price and regulatory determined costs; (2) the tie between profits and the rate base; and (3) the tie between revenue requirements and price. Severing these connections would create a new set of incentives to increase profits by reducing costs, negate perverse incentives to inflate the rate base, and open new opportunities to develop and market new services. It was also assumed that PCR would impose a smaller administrative burden on government and require far less detailed data for implementation. The ceiling price on monopoly services was also assumed to serve as a constraint on predation in competitive markets. It should be noted that early proponents of PCR, such as Stephen Littlechild, viewed the concept as an interim step on the way to competition. PCR was not envisioned as a permanent method for controlling monopoly.

Essentially, PCR took the form of an indexed price change minus a productivity offset designed to provide a stimulus for efficiency. Thus, a four percent inflation increase and a three percent productivity offset would result in a net ceiling price increase of one percent. This price would be applied to service baskets containing different functions or service offerings. Two forms of PCR were introduced. Pure price caps consisted only of price indexing, adjustments for exogenous institutional changes, and the

productivity offset or X factor. Modified price caps confined earnings within a range and typically made provision for sharing earnings above that range. Modified price caps also implied an adjustment in the X factor for poor service, excessive levels of earnings, and target levels of performance.

PCR has become widespread. However, a number of major deficiencies have emerged that cast serious doubt on the initial claims made on behalf of the concept. At least seven deserve attention. First, PCR provides no incentive to experiment with price reductions in demand-inelastic markets, since a price reduction is assumed to result in a total revenue reduction. Second, index driven price patterns must be trued up or reviewed on a periodic basis to avoid becoming completely out of touch with reality or the actual cost of service. Third, PCR will not constrain cross subsidisation when monopoly and competitive services are combined within a given service basket, when the monopoly service index price increases faster than actual costs, or when the productivity offset is less than actual productivity. Fourth, computational problems remain to be resolved. Should national or industry-specific indices be used in calculating inflation and productivity? Industry-specific indices are more appropriate but are more strongly resisted by the firm. Fifth, the recontracting dilemma remains. If profits are excessive there is a temptation for regulators to recontract and tighten the limits, but this destroys the incentive inherent in PCR. At the same time, persistent oligopoly profits will reintroduce incentives to pad expenses or inflate investment to camouflage such profits. The regulator is left with only the X factor as a surrogate for earnings regulation and none of the empirical support associated with the RB/ROR model. Sixth, the definition of the productivity offset is unclear. Should it be a performance target or an estimate of a national or an industry standard? Finally, and perhaps most important, PCR has great difficulty handling the oligopoly problem. It cannot come to grips with price leadership, limit entry pricing, tie-in sales, or most of the other strategies employed by oligopolistic rivals.

In his 1994 survey of PCR for the OECD, Patrick Xavier draws four significant conclusions. (1) PCR has limited price increases. Xavier notes that where prices were increased, these increases were usually close to the maximum allowed. "Indeed, the provision of such protection to vulnerable groups ... for equity reasons ... turns out to be the most clearly distinguishable effect of price cap regulation" (Xavier 1994, p. 19). (2) PCR has become more complicated and less transparent than originally intended. (3) PCR has become a game between industry and the regulator since there is no fixed set of rules. (4) Since it is a transitional regime, it is important to define specific criteria for identifying competition.

7.0 The Neoclassical Prescription

A second option for public policymakers is adoption of the neoclassical solution, which involves establishing minimum and maximum standards for a permissible range of price flexibility within which no cross subsidisation would theoretically take place. This would be augmented by the ECPR for intermediate services such as access to the network. The assumption is that prices that cover incremental cost but do not exceed the stand-alone cost of a single service are acceptable. However, the calculation of incremental cost is highly vulnerable to manipulative strategies. The "difference" method for calculating the incremental cost for service X involves subtracting the stand-alone cost of Y from the

total cost of X and Y. The problem lies in estimating the stand-alone cost of Y. If one selects the most expensive technology that yields a high cost estimate, then a lower incremental cost for X will follow. The converse is also true. The “capacity cost” method for estimating incremental cost simply builds up an estimate on the basis of the cost of equipment, reserve capacity, and associated capital, depreciation, and maintenance costs for service X. But the classification of plant updating or modernisation as a sunk cost will grossly understate the resulting incremental cost estimate. The stand-alone ceiling price for a single service would have the net effect of denying that service all the benefits of joint production. Finally, these lower and upper price limits require a degree of regulatory oversight that is completely missing in PCR and would exist primarily under the RB/ROR model.

The process of estimating ECPR is also beset by problems. ECPR is assumed to include both the incremental cost of providing access and the opportunity cost incurred by the incumbent for allowing a rival to enter the market. The latter component represents the profit foregone when the incumbent does not provide the service. Proponents of ECPR argue that the incumbent must be indifferent to the new entrant. Otherwise, the incumbent is involuntarily subsidising the new entrant. Again, the estimation of incremental cost poses a problem when Ramsey-type mark-ups are employed to cover common costs. This will result in higher access charges where the final demand is inelastic, and lower access charges where the final demand is more elastic. Yet all such adjustments are purely arbitrary since demand itself is indeterminate under tight oligopoly. The biggest problem with ECPR is the measurement of opportunity costs. This could easily involve the payment of a quasi monopoly profit to the incumbent by the new entrant in order to participate in the market. The consequences of such a practice for achieving optimal network development and coordination are alarming.

8.0 Integrating Structural Separations and Cost-based Regulation

A third option involves integrating structural separations and cost-based regulation. For those segments of the supply process where network economies and industry-specific barriers to entry promote high concentration, structural separations could be applied. This would involve a broad definition of the network function (including transmission and local distribution) that would capture all inherent economies while at the same time minimising transaction costs for all classes of users. The management of the network would be free to constrain individual contracts by users that would have the effect of fragmenting the network or of reducing its overall capacity to serve everyone. Least cost supply would be a major criterion for expansion of the network. In telecom, where established carriers provide duplicative and parallel service, mandatory interconnection between different systems would yield both improved reliability and greater customer access to complementary forms of service.

The Rochester Telephone Company implemented an innovative plan on January 1, 1995, incorporating much of a structural separations approach. The network remains under regulation by the New York Public Service Commission, while the marketing and pricing of services (except basic service) are handled through a deregulated affiliate. The network must provide comparable service to all buyers on equal terms. It also has an obligation to provide basic service to everyone who requests it. The network is interconnected with the cable company and customers are free to switch between the two

carriers because full number portability is provided. Since the network remains under regulation, the Commission can impose full reporting requirements to assure that investment and quality of service will be maintained. The network has its own debt capital and board of directors. If the Commission detects manipulative behaviour by the parent holding company it can suspend dividend payments. Finally, the network is subject to pressure to innovate and operate efficiently since all buyers (including Rochester's own deregulated affiliate) are free to bypass the network. With structural separation of the network or strict separation within a holding company framework, one of the major sources of oligopoly power can be constrained. That is, the firm would no longer have common corporate control over a diverse range of markets of differing degrees of demand elasticity.

However, structural separations still leave a number of issues to be resolved. For example, where are the boundaries of the network? Should they include wireless, landline, and cable systems? What oversight responsibilities should the network have with respect to monitoring suppliers and buyers, and what role should it have in promoting new services and new roles for brokers and resellers? Equally important is the question of proper costing and pricing of the network.

Assuming that network economies result in increasing returns to scale, there will be a strong incentive to engage in market-based pricing, which is another term for price discrimination. Those who control the network will find an entirely new set of opportunities to shift overhead costs and distribute favours among different classes of users under the guise of promoting full utilisation. The only constraint on such practices will be a system of cost-based pricing guidelines. Two examples of cost-based pricing have significant limitations. The first involves assigning all fixed costs on the basis of peak responsibility. While this may serve to force consumers to utilise off-peak capacity, it penalises the firm requirements customer by failing to recognise that all users benefit from the network system. The second involves splitting the rate base (both assets and expenses) between monopoly customers and all other customers. There will be a strong incentive to allocate as much of the cost as possible to monopoly users while expanding service to others. In addition, splitting the rate base gives little insight into cost causation and benefits received as a basis for setting future rates.

Application of the Glaeser model would appear to make a major step toward resolving these problems. Explained in detail elsewhere,⁶ it is sufficient to note that each class of user would pay its direct network costs plus a share of overhead costs based on the relative benefit derived from use of the network (based on a service's stand-alone cost minus its direct cost). Where the relative benefit was small (stand-alone cost approximates direct cost), its share would be small. Conversely, where the benefit was large (stand-alone cost substantially in excess of direct cost), its share would be large. With this approach there would be no uneconomic bypass of the network. Given the relative revenue contribution of each class of user (based upon direct and shared joint and common costs), the actual prices for network usage could be designed to reflect both identifiable costs and benefits.

9.0 Conclusion

In the present political environment in the United States it is doubtful that anything other than light regulation built around price caps and open access can be expected to prevail at

the federal level. This is regrettable since there are significant opportunities to innovate in possible combinations of structural separations and cost-based ratemaking. New York's Rochester Plan is a case in point. Concern with these issues may encourage other states to experiment. Unless effective regulatory mechanisms can be developed for the new environment, it will only be a matter of time before market failure requires a new wave of ad hoc regulation to address the long term adverse consequences of tight oligopoly.

Appendix 1

1) *Herfindahl-Hirschman Index*

- a) Sum of the squares of the respective shares of the firms in the market.
- b) Decimal basis: 1.0 pure monopoly
0 pure competition
- c) Example: Two firms of unequal size (75% and 25% of market)
 $(0.75)^2 + (0.25)^2 = .63$
 No. of effective suppliers: $\frac{1}{HHI} = 1.6$
- d) US Department of Justice uses .18 for merger evaluation

2) *Landes-Posner Index*

a)
$$LP = \frac{\text{Firm's Market Share}}{\text{Elasticity of Market Demand} + \text{Elasticity of Competitive Supply (Entry Conditions)} \times (1 - \text{Firm's Market Share})}$$

b) Example:
$$\frac{50\% \text{ (i.e. .5)}}{.4 + .3 \times (1-.5)} = \frac{.5}{.55} = .91$$

c) Any index above .50 = lack of effective competition⁷

Endnotes

¹ For a detailed discussion of the interrelationship between network economies, concentration, and profitability, see Trebing 1994b, pp. 379-389.
² For reviews of profitability, see Trebing, *op cit.*, at pp. 384 and 388. The privatized New Zealand Telecom became one of the most profitable telecom carriers and it is exempt from economic regulation. Telecom's return on shareholder equity went from 10 percent in 1989 to 30.1 percent in 1995.
³ For evidence of deteriorating quality of service, note that the index measuring repeat trouble reports increased from 12 percent in 1991 to 33 percent in late 1993. See FCC, Automated Report. Management Information System Report 4305 for 1991, 1992, 1993, and 1994.
⁴ Economics and Technology Research Report 1993: such measures are complicated by software which is a fixed-cost expense.
⁵ See Xavier 1994. Xavier measures public telecommunication investment as a percentage of revenue over 1983/85 to 1992. US, UK, Australia, and France declined. Canada, Germany, and Japan increased (p. 41).
⁶ For a description of the Glaeser model, see Trebing 1989, pp. 121-122. See also the Michigan Bell Study described in Chapter 17 which is based on the same principle of cost sharing.
⁷ See: Landes and Posner 1981.

