EX PARTE OR LATE FILED

GTE

RECEIVED

FEB 15 1995

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Whitney Hatch
Assistant Vice President
Regulatory Affairs

GTE Service Corporation
1850 M Street, N.W., Suite 1200
Washington, D.C. 20036
202 463-5290

February 14, 1995

Mr. William F. Caton, Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

EX PARTE: CC Docket No. 94-1

Dear Mr. Caton:

DOCKET FILE COPY ORIGINAL

On February 14, 1995 representatives of GTE Service Corporation and GTE Telephone Operations met with Commissioner Rachelle Chong and Richard Welch to discuss GTE's position in the above-captioned proceeding. The discussion covered issues raised in this proceeding by GTE in its filings and in materials submitted previously to the record in ex parte filings. The attached documents, which had been previously filed in the record of this proceeding, were left with the Commissioner.

Please call me if you have any questions.

Sincerely,

Whitney Hatch

Attachment

c: Commissioner Chong
R. Welch

No. of Copies rec'd 0+1
List ABCDE

RECEIVED

FEB 15 1995

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Symmetric Regulation for a Competitive Era[1]

Mark Schankerman
London School of Economics

Telecommunications regulation is at a critical juncture. The recent adoption of price cap regulation around the world has been a major improvement because it streamlines regulatory procedures and introduces incentives for efficient firm behaviour in place of regulatory micromanagement. However, technological developments and the associated rapid growth of competition in many jurisdictions have outgrown even these regulatory frameworks. More comprehensive regulatory reform that is needed in order to enable the full social gains from these developments to be realised. To accomplish this, regulatory reform must be based on a longer range vision of market competition in provision of facilities and services, and must be designed to promote development and efficient utilisation of a modern and flexible telecommunications infrastructure at minimum cost. Above all else, this requires that the regulatory framework support the market in providing appropriate price signals to induce efficient investment in this infrastructure.

In this paper I review some key principles that should guide this wider reform effort. There are two main conclusions in the paper. The first is that reform should be based on the principle of regulatory symmetry, and that deviations from symmetry should only be adopted in special cases where there is a demonstrated ability of incumbents to deter entry strategically (in ways that do not reflect their relative efficiency levels), and there is no less costly way (in terms of efficiency) to

---

[1] Prepared for the Twenty-Sixth Annual Conference Institute of Public Utilities in Williamsburg, Virginia (December 1994). Earlier versions of this paper were submitted as part of GTE's formal comments in the Federal Communications Commission LEC price cap review (CC Docket No. 94-1, May 1994), and delivered as the keynote address at the International Telecommunications Society Conference in Sydney, Australia (July 1994). I thank James Alleman and Dennis Weller for comments on earlier versions of the paper.

redress the imbalance. The second conclusion is that the regulators need to formulate the rules governing competition early in the transition to competition in order to ensure an efficient pattern of entry and investment.

The paper is organised as follows. Section 1 emphasises the importance of adopting regulatory symmetry as the benchmark for regulatory reform, with focus on socially inefficient (uneconomic) entry and the associated technical efficiency losses. Section 2 discusses possible strategies that incumbent firms can use to deter entry and analyses whether they warrant countervailing asymmetric regulatory treatment. The focus is on the design of regulatory instruments that minimise efficiency losses. Section 3 argues that the regulatory framework for transition to full competition should be tackled at this time, and not postponed until competitive incursion expands. Section 4 develops principles for price cap reform from the perspective of regulatory symmetry. In Section 5, I briefly discuss the design of mechanisms to fund universal service obligations which are consistent with regulatory symmetry.

1. Why Symmetric Regulation?

In general terms symmetric regulation means providing all suppliers, incumbents and new entrants alike, a level playing field on which to compete - the same price signals, the same restrictions, and the same obligations. I emphasise that symmetric regulation is perfectly compatible with situations in which an incumbent controls an essential intermediate input, or "bottleneck" facility. In that case the symmetry principle requires that all firms have access to this facility on identical terms as the incumbent ("nondiscriminatory access").[2] Full regulatory symmetry must encompass all stages of market participation: entry, post-entry competition, and exit. The most important regulations in this regard are those which restrict or raise the cost of entry into new geographic areas and product

[2] One point needs to be emphasised. From an economic perspective, "nondiscriminatory access" does *not* require that the price for access to the "bottleneck" facility must be uniform or strictly cost-based. Nonlinear price schedules and pricing that reflects both demand and cost characteristics (Ramsey prices) are "nondiscriminatory" as long as they are applied identically to the entrant and the incumbent. For more discussion see Section 2 and the reference in note 9.

markets (including introduction of new services), rules that limit downward pricing flexibility, and the mechanisms for funding universal service obligations. Symmetric regulation should apply both to competition *within* traditional exchange markets, and *between* the exchange and other markets which are linked by high cross elasticity of supply, including cable television and personal communications systems. The principle should be applied equally to cases where local exchange carriers are incumbents and where they are potential entrants. The technological convergence between local exchange services and these other markets requires adoption of an integrated and symmetric regulatory framework. Unfortunately, in the United States and elsewhere regulation in these markets has developed independently. There needs to be a much more coordinated and integrated regulatory policy toward local exchange, video and other service providers.

The basic economic rationale for symmetric regulation is that it maximises technical efficiency in the provision of telecommunications services. For economists, technical efficiency refers to production of a given set of services at the minimum feasible cost.[3] Here I use the term in the broader sense to encompass other important dimensions of economic performance, such as effectiveness in satisfying specialised and evolving customer needs, selection of appropriate technologies, development and commercialisation of new services, and service quality. In this broader sense, technical efficiency must be a central regulatory objective, in my view the primary one. Otherwise, very substantial social resources will be wasted in the design, construction, and operation of the information infrastructure.

The plain fact is that some firms are more "efficient" than others, but there is very imperfect information about this heterogeneity. Firms differ in their unit production cost, service quality, choice of technology, mix of services, managerial capacity, and a host of other variables that determine their current "efficiency" level and their adaptability to evolving technology and demand. The regulator

[3] Technical efficiency losses are called "first order" losses because the elevated production cost applies to all units of output. Allocative efficiency refers to prices that reflect the marginal resource cost of supplying the good. Allocative distortions (e.g., monopoly pricing) are of "second order" importance because they induce loss of consumer and producer surplus only on the marginal units of output.

cannot distinguish between more and less efficient suppliers, and must therefore not be in the position of "picking winners" either at the stage of entry or post-entry competition. *But all forms of asymmetric regulation contain an intrinsic bias toward some firms or technologies and therefore create the potential for very large technical efficiency losses.* In principle this holds both for regulations that favour incumbents and entrants.

Once uneconomic entry is induced by asymmetric regulation, it creates political constituencies that make subsequent reform more difficult. This is especially true if the original investment costs were sunk. Furthermore, the technology used by entrants may induce large users and secondary suppliers to make complementary, sunk investments. Examples include the purchase of PBX equipment to provide the end-office switching function, installation of fiber cable and terminals to link end-user facilities and the interexchange carrier office, and human capital investments in the design, purchase and management of the customer's network. To the extent that such downstream, complementary investments are dedicated, they represent additional technical efficiency losses associated with the original uneconomic entry.[4] Further, they extend the constituency interested in the maintenance of the status quo, and intensify the political pressure to preserve existing competitors rather than the competitive process. These dynamic costs of maintaining regulatory asymmetry should not be underestimated.

In my view, these are compelling reasons to establish symmetric regulation. Indeed, the central message in this paper is that *regulatory symmetry should be the benchmark for regulatory reform.* Regulatory agencies should only apply asymmetric treatment of incumbents and competing facility or service providers if two conditions are satisfied. First, there must be a demonstrated capacity of the incumbent to deter entry strategically (in ways unrelated to efficiency advantage). Otherwise, competition will generate a technically efficient outcome and no intervention is warranted.

---

[4] Uneconomic entry can also induce subsequent "localised technical change" directed at improving the technology used by the entrant. If the original choice of technology was distorted by asymmetric regulation, these resources are misdirected and represent additional social costs.

This condition is not sufficient, however, because there may be regulatory mechanisms that can redress the imbalance effectively without introducing asymmetric treatment and its associated economic costs. The second requirement is that asymmetric regulatory treatment must be the least costly way (in terms of efficiency) to resolve the potential problem. The next section discusses the most important strategies an incumbent firm might use to deter entry and argues that they can be effectively redressed without resorting to asymmetric regulation.

2. Strategic Entry Deterrence

This section analyses four practices with the potential to deter entry or induce exit: (i) preemptive investment, (ii) vertical price squeeze, (iii) predatory pricing, and (iv) cross subsidisation. In each case two issues must be addressed: first, whether these practices are likely to deter entry effectively; and second, whether asymmetric regulation is the appropriate policy response.

Preemptive investment refers to a strategy where entry by one firm makes subsequent entry by others unprofitable and thereby forecloses the market.[5] Effective preemption requires a number of preconditions. First, there must be an indivisible sunk entry cost (threshold scale). If this condition is not met, the initial entry commitment is not credible, subsequent entry can occur at a smaller scale (lower sunk cost), and preemption will be ineffective. The second condition is that the market must be too small to support more than one incumbent profitably at the threshold scale. Thus, the preemption hypothesis fits rather uncomfortably with the basic presumption underlying much of the reform process, namely that markets can sustain multiple suppliers ("network of networks"). The third condition, which applies to multiproduct incumbents (typical in this industry), is that there must be a sunk cost to exit. To understand why this condition is required, suppose a multiproduct incumbent could withdraw from a product market (say the first) without incurring any exit cost. Entry

[5] Models of preemption are analysed in sequential, or dynamic, games. Preemption has been studied in various contexts including patent races, product proliferation, and capacity investment. See Jean Tirole, *The Theory of Industrial Organisation* (Cambridge: MIT Press, 1989), especially Chapter 8.

by a second firm into the first product market will create price competition that reduces the incumbent's prices and profits for that product *and* for any substitutable products supplied by the incumbent as well. Because of these cross-product spillovers, it can be more profitable for the incumbent to withdraw from the first market in the face of competitive entry rather than to compete. In that case preemptive investment will not be a credible entry-deterring strategy.[6]

In addition to these conditions, preemption is generally more difficult where the incumbent does not possess the entrant's (superior) technology or has incomplete information about the entrant's characteristics. In short, markets characterised by evolving and diverse demands and technologies and large uncertainty are less likely candidates for preemption.

The preconditions discussed above strongly suggest that the scope for effective preemption in the current telecommunications market is limited. Preemption in services is especially unlikely to be successful, and in my view does not pose a serious regulatory challenge. There may be some limited potential for preemptive investment in facilities in particularly small markets. It is important to emphasise, however, that the opportunity for preemptive investment is not limited to incumbent firms. An alert new entrant may fill a market niche, or provide superior technology for provision of existing services, and thereby foreclose profitable operation by the incumbent. In any event, the rapid expansion of fiber networks by cable companies and other providers casts serious doubt on the practical relevance of preemptive investment by incumbent local exchange companies.

In theory, it may appear that regulation could prevent preemption directly by imposing restrictions on incumbent investment or indirectly by constraining pricing flexibility which would reduce the incentive to invest.[7] But how could a regulator distinguish *in practice* between preemptive

---

[6] Preemptive investment will be a less effective strategy when exit costs are smaller, price competition between incumbent and the new entrant is more intense, and the incumbent's different products are closer substitutes. For the formal argument see Kenneth Judd, "Credible Spatial Preemption," *Rand Journal of Economics* (Summer 1985), 153-166.

[7] In the United States, the most important direct restrictions at the federal level are the telephone company/cable television cross-ownership rules, and the investment approval procedures under Section 214 of the Communications Act which can substantially delay introduction of new services. For example, in 1992 the FCC authorised telephone companies to offer basic platform for video dialtone

investment and efficient investment? Like all asymmetric regulation, such restrictions run the very real risk of creating large technical efficiency losses. An alternative policy would be to rely on interconnection to sever the link between market power in facilities and market power in service provision. If mandated interconnection at nondiscriminatory rates could be enforced, service competition could be preserved even if investment preemption occurs. However, there are formidable practical problems with this approach, which I return to later. One practical alternative may be to link the degree of regulatory streamlining to the presence of a competing facility in the relevant geographic market (see discussion in Section 4).[8]

The second strategy for entry deterrence is the *vertical price squeeze*. This refers to a situation in which an integrated incumbent has monopoly control over essential facilities but faces actual or potential competition in service provision. Left unencumbered, the incumbent can squeeze the profit margin of nonintegrated service providers by suitably raising the price of interconnection to its facilities. If the squeeze is tight enough, it could deter low cost entry and create technical efficiency losses. For this strategy to deter entry, however, it is not enough that the incumbent currently monopolise facility provision. There must also be no effective potential competition in the supply of facilities. This requirement limits the scope for vertical price squeeze, especially with the enhanced technological flexibility in providing transport and switching functions.

The most direct way to prevent a vertical price squeeze is to enforce mandated interconnection at nondiscriminatory rates, at least in geographic markets where there is a single facility provider. While feasible in theory, this policy raises a number of serious difficulties. First, it would require

---

(VDT) service within their operating territories, but has not yet approved any applications for nonexperimental, tariffed VDT service. (*Telephone Company/Cable Television Cross Ownership Rules*, CC Docket No. 87-266, Second Report and Order, Recommendation to Congress, and *Second Further Notice of Proposed Rulemaking*, 7 FCC Rcd 5781, 1992). Leading examples of indirect restrictions include limits on downward price flexibility, restrictions on nonlinear pricing design, and rules governing the allocation of broadband facility costs to voice, data, and video services.

[8] One plan along these lines was proposed recently by the United States Telephone Association in the federal LEC price cap review. See USTA's Petition for Rulemaking, *Reform of the Interstate Access Charge Rules*, RM-8356 (filed September 17, 1993).

ongoing regulatory involvement in the determination and supervision of access prices in all geographic markets. Second, because it places the full weight on this single policy instrument, the determination of the access price becomes critical. If the rate is set too high it may prevent efficient entry, if too low it creates price umbrellas for inefficient entry. Both errors run the risk of technical efficiency losses. Recent theoretical research shows that efficient (welfare-maximising) access price depends delicately on the specifics of the economic environment.[9]

Even in a static framework, the efficient access price depends on the range of instruments available to the regulator (e.g., the feasibility of taxes on network access and final telecommunications services, entry subsidies, and money transfers to the monopoly to fund network costs), demand substitution or complementarity between services provided by incumbents and entrants, and asymmetric information of the regulator (e.g., imperfect observability of costs). Introducing important dynamic considerations such as incentives for network investment, entry of new firms, and limited regulatory commitment would further complicate the determination of efficient access prices. Even in a simplified static setting, research has shown that it is *not* efficient to set the access price at the marginal cost of access except under very restrictive conditions. The reason is that marginal cost access pricing does not cover fixed network costs and so transfers to the network provider are needed. This requires that the regulator either tax final services (supplied both by the incumbent and competitors) and use the tax revenues to defray network costs, or make direct transfers financed some other means. There may be statutory or practical constraints on the regulator which make this infeasible and, in any event, there is a positive shadow price attached to these funds (i.e., allocative efficiency losses due to taxation). Therefore, in general the efficient access price will be higher than the marginal cost of access and will contain an implicit imputation to fund the fixed network costs. Under certain conditions, this takes the form of the "efficient components pricing rule" (ECPR)

---

[9] For theoretical discussion of optimal access pricing, see Jean-Jacques Laffont and Jean Tirole, "Access Pricing and Competition," Institut d'Economie Industrielle (Toulouse, France: December 1993), forthcoming in *European Economic Review*.

proposed by Baumol: set the access price equal to the incumbent's full opportunity cost of providing access. But even this conceptually simple rule is difficult to implement correctly - particularly distinguishing between pure monopoly rent, which does not belong in the opportunity cost under the ECPR, and the existing contribution to fixed network cost which does belong.[10]

The discussion so far has focused on linear (uniform) access prices. Actually, linear access pricing is not efficient in general even if the marginal cost of access is constant. First and most importantly, nonlinear pricing can mitigate the problem of inefficient bypass and the associated technical efficiency losses.[11] Second, nonlinear price schedules for final services are common in telecommunications and it is well-understood that they generate allocative efficiency gains. If the regulator superimposes a uniform access price on these nonlinear price schedules, some of these allocative efficiency gains will be lost. Additional complications would arise in designing efficient nonlinear access prices where the incumbent and potential entrants are multiproduct firms.

In short, it is much more difficult than it first appears to design and implement a policy of mandated access and *efficient* access pricing. In practice, the efficient access price is not likely to be set and the policy runs the serious risk of creating large technical and allocative efficiency losses. One alternative approach is for the regulator to require that some competing facilities be present in a particular geographic market before it streamlines regulatory constraints in that market (e.g., removing restrictions on pricing flexibility). I briefly discuss the costs and benefits of this approach in Section 4. It may prove to be the main practical policy alternative to highly imperfect, regulated access pricing and deserves serious consideration by both researchers and regulators.

---

[10] This was a key issue in the recent dispute about the validity of the ECPR in New Zealand. The High Court affirmed the ECPR in principle but this was overturned by the Appeal Court. In the final decision, the Privy Council reaffirmed the ECPR but sidestepped the question of how to treat monopoly profits in practice, declaring that matters of monopoly pricing were for the New Zealand Commerce Commission to decide. See Privy Council Appeal Number 21, Appellant: Telecom Corporation of New Zealand, Respondent: Clear Communications Ltd., *Judgement of the Lords of the Judicial Committee of the Privy Council*, London (October 19, 1994).

[11] For example, see Jean-Jacques Laffont and Jean Tirole, "Bypass and Creamskimming," *American Economic Review*, 80 (1990), 1042-1061.

The third strategy analysed is *predatory pricing*. Predation is a strategy to induce the exit of competitors. If it succeeds, it may serve as a signal which deters potential entry as well. The standard definition of predatory pricing is setting a price below short run marginal cost (incurring losses on marginal units), in order to impose losses on competitors and drive them from the market.[12] It is important to emphasise that, on this definition, it is *not* predatory to price below the short run marginal cost of high cost competitors, even though that drives them from the market. This is the essence of price competition that ensures technical efficiency. In theory, predatory pricing can be employed by any firm with a protected and profitable market (or other source) to fund the short run losses, not just an incumbent local exchange carrier. Predation may enable an incumbent to deter socially efficient entry by pricing below the marginal cost of a lower-cost entrant. On the other hand, it can also enable an entrant to induce the socially inefficient exit of a lower-cost incumbent. Predatory pricing can create both types of technical efficiency losses, and one requires a symmetric approach to prevent its use by incumbents and entrants.

In order for predatory pricing to be a rational (long run profit maximising) strategy, however, it must enable the firm to *establish and maintain* market power so that it can recoup the short run losses and earn monopoly profit. Predatory pricing will be ineffective unless there is some barrier to entry that permits sustainable market power after predation.

---

[12] For a game theoretic discussion of predatory pricing, see Jean Tirole, *op.cit.*, Chapter 9 and the extensive literature cited there. The standard reference for legal standards is Paul Areeda and Donald Turner, "Predatory Pricing and Related Practices under Section 2 of the Sherman Act," *Harvard Law Review* (1975) 88: 697-733. The traditional definition of predation has been criticised for being too narrow. One broader definition that has been proposed identifies predatory pricing as any strategic pricing by incumbents that is designed to induce exit of competitors and would not be profitable in the absence of such exit, even though no short run losses are incurred. See Janusz Ordover and Robert Willig, "An Economic Definition of Predation: Pricing and Product Differentiation," *Yale Law Journal* (1981) 91: 8-53. This broader definition has its own limitations. First, pricing behavior which is "predatory" under this definition can increase social welfare and one presumably would not want to prohibit it - e.g., prices by an efficient incumbent (above incremental cost) that drive out high cost producers and increase technical efficiency. Second, the rule does not give clear and useful guidelines to firms who wish to avoid violation of the law. Finally, the rule creates implementation problems because it is difficult in practice to distinguish between legitimate competitive responses to entry and behavior judged predatory under this definition.

The technological and demand conditions in telecommunications make it unlikely that predation will be an effective exit-inducing strategy, especially with open network architecture, unbundling, and mandated interconnection. Fiber optic cable (and other transport modes) has extensive carrying capacity, is capable of delivering a range of different services, and is largely a sunk cost. These characteristics strongly suggest that markets for individual products in specific geographic markets should be effectively contestable, provided there are accessible transport facilities. Predation by an incumbent in a given service market will not be effective because it will not enable the firm to acquire and maintain any market power. Predatory pricing may temporarily discourage the competitor from providing that particular service, but the facility remains and will be used to deliver other services (both through internal provision and interconnection). If the incumbent tries to recoup predation losses by raising price, it will induce re-entry into that service market relatively quickly. The capacity, fungibility, and sunkness of fiber make individual product markets contestable and thereby render predation ineffective.

Even if predatory pricing were a viable strategy, there is no need for asymmetric regulation to redress it (e.g., limitations on downward price flexibility of incumbents). The appropriate regulatory response is to put in place and enforce price floors based on incremental cost (or some suitable proxy). This safeguard should apply equally to all firms in the market, not just incumbents. It should also be emphasised that all firms, including regulated exchange companies, are subject to antitrust sanctions against predatory behaviour and are liable to substantial civil damages if convicted. As transition to full competition in exchange markets is completed, these legal sanctions should serve as the exclusive safeguard against predation.

The last strategy analysed is *cross subsidisation*. The technical definition of cross subsidisation is provision of a service for which the incremental revenue at current prices is less than the incremental cost at the current volume, taking into account cross elasticities of demand and cost

complementarities.[13] This is essentially the multiproduct generalisation of predation, and the same observations I made about predation as an entry deterrence strategy apply to cross subsidisation. Two key points deserve reiteration: (i) both multiproduct incumbents and entrants can use the strategy, and (ii) the firm must be able to create and maintain market power in the cross subsidised market in order for the strategy to be effective. If product markets are approximately contestable (given the presence of a competing, accessible facility), as I have argued, cross subsidisation will not be an effective strategy to deter entry.

Even if cross subsidisation were a real threat, it does not warrant asymmetric regulation. The most effective policy to minimise the risk of cross subsidisation is: (i) to undertake access reform that segregates geographic markets and imposes separate price caps according to the extent of competition (as proposed by various parties in the federal LEC price cap review in the United States; see Section 4 for more discussion), and (ii) to eliminate sharing and other features in the price cap that reintroduce strategic cost allocation into the picture (e.g. the low-end adjustment in the current LEC price cap). These reforms would delink the determination of prices in monopoly and competitive markets (for each service basket) and eliminate the need to compute trigger rates of return. In so doing, they removes the incentive and opportunity for strategic cost allocation and cross subsidisation across services by the incumbent.

---

[13] The classic reference is Gerald Faulhaber, "Cross Subsidization: Pricing in Public Enterprises," *American Economic Review*, vol. 65, no. 5 (December 1975), 966-977. Faulhaber develops two price bounds that define the set of subsidy-free prices (based on the principle of Pareto superiority): the lower bound given by the generalised incremental cost test stated in the text, the upper bound given by the stand-alone test. For analysing the entry deterrence potential of cross subsidisation, only the lower bound is relevant. The term cross subsidisation is often used more loosely to refer to any elevation of prices for services where a firm has market power to underwrite price reductions in another market subject to competition, regardless of whether the lower bound is violated. The policy to prevent cross subsidisation described in the text also resolves cases under this broader definition.

3. Transition to Competition: Reform the Rules Now

It is helpful to view the process of regulatory reform in the context of a two-stage game played by incumbents and potential suppliers of local exchange services. Potential suppliers include competitive access providers, interexchange carriers, cable companies, cellular, PCS, satellite providers, electric utilities, and large end-users who can internalise various functions of the switched network. In the first stage these potential suppliers make independent (noncollusive) decisions whether or not to enter a particular market. The entry decision typically involves a sunk investment cost, such as construction or extension of fiber optic cable networks. In the second stage, firms supply differentiated services (imperfect substitution on the demand side) and engage in price competition, given the production capacities which are determined at the first stage. The entry decision is based on expected profits, and hence depends on the firm's expectation of the competitive conditions that will prevail at the second stage.[14]

This abstraction is of course a simplification of the ongoing competitive process, but it highlights a very important point.[15] The entry decision is governed by two basic factors: the magnitude of sunk entry costs and the intensity of competition at the second stage. Therefore, *any regulatory restrictions that constrain the competitive game in the second stage will affect the entry decisions at the first stage*. The most important regulations which constrain post-entry competition in the access market in the United States are limitations on downward price flexibility by incumbents, delayed introduction of new services, and existing indirect methods to fund universal service

---

[14] Two remarks are in order. First, firms compete both in terms of prices and, increasingly important, the introduction of new services. Entry decisions will depend critically on firms' expectations regarding regulatory restrictions on pricing flexibility and the introduction of new services. Second, the entry decision by a firm often involves sunk costs by its customers as well, such as dedicated internal facilities and idiosyncratic skill acquisition (referred to as "customer switching costs"). Technical efficiency losses from high cost, protected entry must include these affiliated investment costs as well.

[15] The multi-stage dynamic game framework is commonly used in the academic literature to analyse entry and imperfect competition. Examples include Jean Tirole, *The Theory of Industrial Organization* (Cambridge: MIT Press, 1989); and John Sutton, *Sunk Costs and Market Structure* (Cambridge: MIT Press, 1992).

obligations that impinge asymmetrically on incumbent carriers. These asymmetric regulations distort entry signals and induce capital investment decisions based on factors unrelated to relative efficiency levels. The regulations provide protective umbrellas that create opportunities for privately profitable but socially inefficient entry. The associated efficiency losses represent an important, though hidden, waste of social resources in the construction of the modern information infrastructure. Moreover, as long as such umbrellas exist, the fact that new entrants successfully erode the market share of incumbents does not mean that the level and composition of the new investment is socially efficient. *Ex post* success is an indication of relative efficiency only if price signals are meaningful and restrictions are symmetric.

This line of reasoning has an important policy implication. In order to avoid distorted price signals and a socially inefficient pattern of entry and investment, the regulators need to develop the broader regulatory framework governing competition at the earliest possible stage, not postpone it until competitive incursion is at an advanced stage.[16] The key is to design regulations which ensure that market price signals guide private investment decisions.

4. Price Cap Reform

This section briefly discusses some key principles that should guide price cap (access) reform for local exchange companies in two critical areas: definition of price cap baskets, and procedures to streamline regulation in geographic markets characterised by diverse degrees of competitive discipline.

First, technological developments have not only reduced the cost of providing access services, but have also sharply increased the "cross elasticity of supply" in the delivery of these services. It

[16] The importance of this point may not be fully recognised by regulators. In the Notice of Proposed Rulemaking (NPRM) in the LEC price cap review, the FCC identifies a set of "transition issues" which includes *inter alia* the criteria for streamlined regulation, pricing flexibility, and competition-induced revision of price cap basket definitions (*Price Cap Performance Review for Local Exchange Carriers*, NPRM, CC Docket No. 94-1, FCC 94-10, released February 16, 1994). These key issues, which will effectively define the post-entry competition game, were provisionally scheduled to be addressed as *competition develops* (NPRM, para. 94, emphasis added).

is now possible to satisfy the same functional requirements of end users by a variety of technical means, including recombinations of existing "products.[17] This makes the traditional product-oriented boundaries increasingly obsolete. New services often do not fit the rigid classifications, and this will inevitably lead to the proliferation of narrow product subcategories within price cap baskets that has characterised incremental reform in the United States. There is an urgent need to define price cap baskets along *functional rather than product lines* in order to enable suppliers to exploit the new technological flexibility in innovative ways.

Second, a mechanism is needed to link pricing flexibility and other forms of regulatory streamlining to the degree of competition in relevant geographic submarkets. This is critically important because the intensity of competition varies widely across markets, both because of demographic differences and regulatory policy.[18] What is needed is a mechanism that triggers deregulation in particular submarkets when effective competitive discipline exists in those markets. The key issue is how to determine when there is effective competition that warrants partial or full deregulation.

To set ideas, consider the polar case of contestable markets. In a contestable market, a potential entrant can enter to exploit any transitory profit opportunity without incurring any sunk entry

---

[17] There are many illustrations of this supply cross elasticity. First, customer premise equipment can be substituted for switched network functions - e.g., PBX can satisfy the same end user demand as Centrex service from the LEC central office. Second, dedicated links can be substituted for switched network services. Customers with large long distance switched service volumes can sort and direct local and long distance traffic by using flexible combinations of switched local loops, switched transport facilities, CPE, and dedicated links to the interexchange carrier office. In the other direction, switched network facilities can substitute for dedicated links, the leading example being virtual private line service (VPS). VPS does not fit very well into a classification system (as in the United States) that segregates services into "switched" and "special" and is a good illustration of the rigidity of product-oriented boundaries. Third, simple voice communications can be provided by cellular in place of the LEC switched network, and cellular modems extend this capability to data connections for portable computers. PCS and cable networks will also provide these functions.

[18] The geographic variations in competition are themselves partly created by regulation, especially geographic rate averaging and restricted price flexibility of incumbent exchange carriers. In order to compete effectively, regulated firms must be given both downward price flexibility (subject to appropriate price floors to safeguard against predation) and the right to use nonlinear pricing commonly employed by their unregulated competitors.

or exit cost - "hit and run" entry. The mere threat of entry fully constrains the behaviour of incumbent firms. If the relevant geographic market is contestable, incumbent firms cannot exercise any market power and are forced to set economically efficient prices.[19] In this polar case, the number of incumbent firms and their market share is immaterial to the equilibrium pricing outcome. At first blush, the conditions of the model would appear to make it inapplicable to telecommunications markets since firms must incur some sunk costs to enter a new geographic market, primarily the investment cost of transport capacity such as fiber optic cable. But the correct conclusion to draw from this fact is that contestability does not apply well to specific geographic markets considered *as a whole*. However, because of the capacity and flexibility of broadband fiber and other modern transport facilities, any firm with access to transport facilities does present a potent and credible threat to product submarkets within that area.

The important conclusion is that *product markets within geographic markets* should be considered contestable for purposes of regulatory policy, provided either that there is a competing transport facility in the relevant geographic area or that mandated interconnection is enforced at non-discriminatory rates.[20] The competing transport facility need not be fiber - the transport mode capable of delivering services at comparable cost would suffice to approximate contestability. Note that the actual market share of incumbents in particular product submarkets within the geographic area is not relevant to this determination.

This line of argument suggests that the determination of effective competition should turn on the existence of competing transport capacity in the relevant geographic market. It is important to note that this criterion does involve some risk of inducing high cost, socially inefficient entry since, if deregulation is triggered by entry of the second transport carrier, this entry decision will be taken

---

[19] More precisely, the resulting price structure is "constrained efficient" - i.e., maximises allocative efficiency subject to the constraint that revenues cover total costs. Marginal cost pricing is a special case when there are no economies of scale or scope.

[20] This argument is analogous to the distinction between entry into the airline industry *de novo* which involves considerable sunk investment, and entry into individual airline routes which may not.

under the distorted entry signals provided by the price umbrella. However, this risk should not be substantial *if* potential entrants fully understand the ground rules that will govern post-entry competition *and* these rules are symmetrically applied to incumbents and entrants alike. This underscores the importance of the regulatory authority developing, at an early stage, clear, symmetric regulations that will govern competition between incumbents and alternative suppliers.

As indicated earlier, the alternative approach is to rely on mandated unbundling and interconnection at nondiscriminatory rates to break the link between market power over facilities and market power over services within a given geographic area. In theory this might work, but it presents a formidable challenge to determine the efficient access price, and a serious administrative burden of ongoing regulatory supervision and enforcement of access pricing in all geographic markets. Before adopting this policy, serious consideration should be given to assess whether it is feasible and superior to one that conditions streamlined regulation on facilities competition in the relevant geographic market.

Any policy to streamline regulation according to the degree of competition requires appropriate definitions of geographic and product market boundaries. Given my emphasis on a second source for accessible transport facilities, the geographic market should be defined narrowly. The key question is how distant transport facilities can be from potential customers and still be accessible (at sufficiently low extension cost). In general this will depend on the spatial distribution of customers, the cost of extending fiber networks and other competing forms of transport facilities, and other factors. Clearly, markets defined at the national, regional, or even municipal level are too broad to be useful for formulation of regulatory policy.

In contrast to the geographic market, the relevant product market should be defined very broadly for two related reasons. First, transport facilities are highly fungible in terms of the range of services they can deliver, so that diverse product markets may be virtually contestable once transport is accessible in the geographic market. Second, the available technology enables service providers to cross traditional product market boundaries to provide functionally equivalent services.

Narrow product market definitions are not appropriate from an economic perspective and would subvert the potential for competition created by the new technological flexibility.

An entirely different approach for assessing the degree of competition, proposed in the United States and elsewhere, is to use the incumbent's market share as an indicator of market power.[21] This approach is wrong on analytic grounds and creates perverse economic incentives that undermine efficiency. The core problem is that market share is not an appropriate or useful index of market power because it ignores whether the incumbent has the power to raise and sustain price above cost. From an economic perspective, market power is summarised by the price elasticity of demand facing the firm (not the industry). The greater this price elasticity, the less scope the firm has for independent pricing (market power) and the higher the equilibrium price-cost margin.[22] The *fundamental factors* that determine the price elasticity faced by a firm are the price elasticity of industry demand and the pattern of efficiency levels (marginal cost) across firms. When firms are more similar in terms of efficiency level (i.e., the distribution of efficiency across firms has a smaller variance), there is a greater cross-elasticity of supply and any given firm has less scope for discretionary pricing above marginal cost. This fact is increasingly recognised in antitrust policy in the United States and Europe.

The market share of a firm is an endogenous variable and is determined by the same fundamental factors that govern market power. Market share does not cause market power any more than market power causes market share.[23] The fact that market power and market share both reflect

---

[21] In the recent federal LEC price cap review, a number of parties proposed using market share to guage market power of incumbents. See for example, "The Unlevel Playing Field: Asymmetric Market Power Demands Asymmetric Regulation," Teleport Communications Group (March 1994).

[22] It is well known that any profit maximising firm (under uniform pricing) sets the price-marginal cost markup equal to the reciprocal of the price elasticity of demand it faces. This holds for a monopoly and all models of imperfect competition. Analytic results are more complicated under nonlinear pricing.

[23] In many models of imperfect competition, one can mathematically express the equilibrium price-cost margin as a function of the industry demand elasticity and the firm's market share. It is analytically incorrect, however, to interpret this as saying that market share is a (partial) determinant

the underlying relative efficiency levels of all firms in the industry cannot be overemphasised. A policy which conditioned regulatory streamlining on the incumbent's market share would have the effect of penalising efficiency and commercial success, and would represent major retrogression from the recent provision of efficiency incentives under price caps.

Provided there are no artificial barriers to the entry and expansion of new entrants and incumbents, long run market share in a competitive game will be a reflection of the relative efficiency levels of different firms. Barriers can be created by asymmetric regulation, but they may also arise from certain restrictive trade practices of incumbent firms. In the telecommunications industry, the most important potential entry deterring practices are predatory pricing and vertical price squeeze. The appropriate regulatory policy is to design clear, enforceable rules to prohibit potentially entry-deterring trade practices and to apply them symmetrically to all firms, incumbents and new entrants alike. Beyond that, however, there should be no artificial constraints on entry, pricing, or other dimensions of the competitive game. The simple but key fact is that no one including the regulator can assess the relative efficiency levels of different suppliers *ex ante*. For this reason, regulatory policy must not be in the business of "picking winners," either by deliberate design or unintended consequence. Using the market share of incumbents to assess the competitiveness of a market would have precisely this consequence and is bad public policy.

5. Universal Service Obligations

In most countries, including the United States, universal service obligations are funded primarily through implicit subsidies in the price structure. These obligations are an important source of asymmetric regulation because they apply to incumbent carriers but not to alternative service providers. In the long run, competition that targets the high-value services will make these indirect subsidies unsustainable, and will force either reform of the universal service funding mechanism or

---

of market power. Market share is itself determined by the industry demand elasticity and efficiency levels.

abandonment of universal service objectives. In the meantime, however, the price structure creates price umbrellas, distorts investment signals, and, as with all asymmetric regulation, creates a serious danger of misdirected investment and major efficiency losses. The magnitude of indirect subsidies makes the potential efficiency losses particularly worrisome.[24] To avert this danger, the regulatory authority must initiate reform of universal service obligations and their funding mechanisms *early in the transition process*.

There are three main issues that need to be addressed by regulators and legislators: (i) how to define universal service obligations, (ii) how to fund them, and (ii) how to select the universal service providers. On the first issue, there is an urgent need to redefine the appropriate scope of universal service obligations and to design ways to target these services effectively so as to reduce the overall cost. The long-standing policy of untargetted support for residential and rural telephone customers, independent of income level, is highly dubious on economic or social grounds and simply subsidises inframarginal users at very great expense. Once universal service obligations are suitably defined and targeted, the issue is how to fund them. In order to preserve appropriate market signals for investment, the regulator needs to replace indirect subsidies with a funding mechanism that is *supply-side neutral*. The universal service funding mechanism must not distort entry (or exit) signals in favour of any particular set of firms or technologies. Neutrality requires some kind of "universal service tax" that is uniformly imposed on all telecommunication service providers. This approach has the additional advantage of transparency - clearly identifying the economic cost of maintaining

[24] For example, a recent study estimates that for the United States switched access services to interexchange carriers and intraLATA message toll service provide a contribution (defined as price above long run incremental cost) of roughly $20 billion per year. See Calvin Monson and Jeffrey Rohlfs, "The $20 Billion Impact of Local Competition in Telecommunications," Strategic Policy Research (July 16, 1993). This figure is an upper bound to the implicit subsidy because it includes the difference between average and incremental cost arising from economies of scale and scope. There are also direct funding mechanisms that impose costs on local and interexchange companies unevenly, in both directions. The argument in the text for symmetric treatment applies to all service providers.

universal service obligations.[25] One possible model is the scheme used in the United States to recover the costs of providing interstate telecommunications relay services (TRS).[26]

Finally, the appropriate method to select universal service providers depends on the nature of the services under consideration. The key distinction is between services where single firm provision is deemed efficient (because it requires dedicated setup costs) and those where multiple firm provision is efficient. In the first case (e.g., "carrier of last resort" obligations, and rural service), the regulator needs to develop a mechanism designed to select the efficient provider under asymmetric information, such as competitive bids for a time-bound universal service obligation. For services where multiple firm provision is efficient (e.g., lifeline service, TRS), the key is to preserve customer choice among alternative suppliers in order to promote efficient service provision. There are various ways this can be achieved, including direct transfer of the subsidy to consumers through a voucher system or rebates to suppliers.

Concluding Remarks

Recent technological developments and the associated intensification of competition in telecommunications have outgrown the existing framework of price cap regulation, and there is an

---

[25] Two remarks are in order. First, the term "tax" is not meant to imply that the levy should be imposed by Congress as part of the annual budgetary process. Congress may set the general mandate for universal service, but leave the design and implementation of funding mechanisms to the regulatory authority. Second, from a theoretical perspective it is not generally optimal to set a uniform tax rate, but in practice the information needed to set optimal (Ramsey) tax rates is unavailable. Note that the funding mechanism is treated here as a means to recover the costs of supplying "merit goods" (defined by universal service), not to price a consumption externality efficiently.

[26] The TRS scheme imposes a uniform gross revenue levy on a wide variety of service suppliers, which preserves supply neutrality, and then rebates TRS providers. The levy is applied to interstate revenues of resale, cellular, access, PCS, packet switching, WATS, video, telex, mobile radio, 800, 900, operator, MTS, private dedicated, international, satellite and intraLATA service providers. See *Telecommunications Relay Services, and the Americans with Disabilities Act of 1990*, CC Docket No. 90-571, Third Report and Order, FCC No. 93-357 (1993). As a model for funding universal service, this scheme has two limitations. The first is that the tax does not apply to service provision internalised by large end users. Since the tax required to fund universal service obligations may be substantial, this could induce uneconomic internalisation. Second, the tax is based on gross revenues rather than value added, which creates certain well-known distortions.

urgent need for comprehensive reform. This paper discusses the economic principles that should guide the required regulatory reform. Above all else, the regulatory framework regulation must preserve the appropriate market price signals to guide entry of new firms and efficient investment in the telecommunications infrastructure.

There are two key recommendations in the paper. The first is that price cap reform should be based firmly on the principle of symmetric regulation. Departures from symmetry should be adopted only in special cases where it is demonstrated that there is a substantial capability of incumbents to deter entry strategically (unrelated to any efficiency advantage), and that there is no less costly way to redress the imbalance. It is neither necessary nor advisable to introduce asymmetric regulation in order to ensure against the possibility of preemptive investment, predatory pricing, vertical price squeeze, or cross subsidisation. Alternative regulatory mechanisms that do not distort market signals for investment and do not induce major efficiency losses are available.

The second recommendation is that regulatory authorities should formulate a broader regulatory framework that will govern the transition to full competition at this time, and not postpone it until competitive incursion expands. The entry and investment decisions of new firms and incumbents depend critically on the rules they expect to govern post-entry competition. The regulatory authorities must act now in order to prevent a socially inefficient pattern of investment based on distorted entry signals. The reform program should include access reform and the design of universal service funding mechanisms that are consistent with the principle of symmetric regulation. The paper provides some guidelines in these areas.

There is an old Russian proverb: "The dogs bark but the caravan keeps moving." I think this is too pessimistic a view of the regulatory reform process. Sensible, symmetric regulation is the right way forward and we need to advocate it at every opportunity. A clear vision and a persistent temperament will no doubt help.

Biographical Sketch

Mark Schankerman received the B.A. in Economics from Brandeis University, and the M.A. and Ph.D in Economics from Harvard University. He has taught at New York University and at the London School of Economics, where he is presently tenured Associate Professor of Economics. He was Research Associate in the Programme on R&D and Productivity at the National Bureau of Economic Research in Cambridge, Massachusettes for ten years. He has lectured on the economics of technological change and econometrics at universities in Jerusalem, Milan, Brussels, Vienna, Gothenberg (Sweden), and others. His main academic interests are the economics of R&D, intellectual property rights, productivity growth, and regulation of public utilities.

He worked on African economic liberalisation and deregulation policies (including telecommunications) at the World Bank during 1992, while of leave of absence from the London School of Economics. He has extensive consultancy experience - for GTE, Pacific Gas and Electric Company, the Bell Laboratories, AT&T, the World Bank, and the EBRD. He was actively involved in the design of incentive regulation in California, and recently participated in the federal proceedings on cable regulation and the LEC price cap review. In January 1995 he will become the Director of Policy Studies at the European Bank for Reconstruction and Development (EBRD) in London, on leave of absence from the London School of Economics.

GTE Price Caps

- Basic Principles of Price Caps
- Perspective on Price Caps
- Need for Access Reform
- Competition Experienced by GTE