Toward Competition in Local Telephony: A Review

Draft

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OVERVIEW

The goal of Baumol & Sidak was to develop a monograph on regulation and pricing for the non-economist. The monograph accomplishes its goal; it is a comprehensive review of state-of-the-art theory on regulation and pricing applied to the telephone industry.

The monograph is useful for anyone involved in regulation, not simply telephony, and should be read by anyone who practices this activity, irrespective of the industry they regulate; for despite its title, the majority of the book is not concerned explicitly with telephony, but rather with proper regulatory policy. For those in the telecommunications industry, it must be read, but with attention to the cautions indicated below.

Chapter One introduces the monograph, the second chapter reviews the prospective competitors for the exchange market; the next three chapters discuss the basic principle of regulation and pricing of exchange telephony, including a discussion of incentive regulation. Chapter Seven covers the less familiar ground of intermediate goods pricing, but the authors make the convincing case that the application of the previously developed theory applies in this case. The last two chapters are concerned with specific policy prescriptions regarding entry and revision of the regulatory system for telephony. Most of this material should be familiar to those economists who have followed the industry, although it is consolidated in an easily read narrative. For those who are not familiar with this literature, it is an excellent introduction which does not require the usual mathematical gymnastics to comprehend.

To simplify, their prescription for regulation is to allow price flexibility with appropriate price ceilings and floors to insure against monopoly rents and predation. This emulates the contestability (competitive) solution when competition is not possible. Intermediate products provided by the incumbent, but needed by rivals, should be priced using the "efficient-component pricing rule", pricing on the basis of the average incremental cost of the intermediate product plus the opportunity cost of lost market.

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2 This review has benefited from a discussion with Professor Mark Schankerman and the reading of his submission to the FCC (Appendix A of GTE’s filing in CC Docket 94-1). Ms. Barbara Miller offered excellent editorial assistance. The usual disclaimer applies.
3 Local exchange carrier (LEC) is redundant, I prefer to omit "local" despite the common usage in the industry of LEC.
MICROECONOMICS THEORY:

Chapters One and Two

Chapters One and Two set the stage for the analysis. The exchange market had been considered a "natural monopoly" or bottle neck for decades, but current and potential competition in the form of cable and wireless technologies appear to put the lie to this casual observation.

Competition in the local arena is provided or threatened from a bewildering array of sources: The interexchange carriers (IXCs), overlapping LECs, resellers, cable television firms, private bypass arrangements, cellular telephone and the wireless services, and local fiber-optic networks.\(^4\)

According to the authors, given the forces operating in the market, unless inefficiency is to prevail, the regulator must determine when competition is effective for the implementation of deregulation and what rules are required to avoid abuse.

Chapter Three

Chapter Three reviews the concept of economic efficiency, marginal cost pricing, Pareto optimality and Ramsey pricing and contestable markets. The rationale for economic efficiency is reviewed from both the perspective of Pareto optimally and the competitive solution sans economies of scope and scale. Both lead to the same solution. With the introduction of economies of scope and scale marginal cost pricing will not keep the firm financially viable; thus Ramsey pricing is required to maximize economic efficiency while keeping the firm whole.

Endogenous Demand

The application of Ramsey pricing (the inverse elasticity rule in its simplest form with independent demand functions) is not straight forward when demand is endogenously determined. Legislators and regulatory influence demand in the regulated telecommunications market in a variety of ways, including:

1. barriers to entry erected by the Federal Communications Commission (FCC) and state regulators, e.g. cross ownership rules, video program restrictions, foreign ownership restrictions, etc.,
2. the Modified Final Judgment line of business restrictions on the Regional Bell Operating Companies (RBOCs),
3. delay in tariff authorizations,
4. the franchising process, and
5. the inefficient allocation and constraints on the use of spectrum\(^5\)

\(^4\) Ibid., p. 7
\(^5\) Baumol and Sidak, op. cit., pp. 41-42.
Thus, the correct Ramsey prices cannot be easily determined in a straight forward manner. To overcome this and other difficulties, the authors turn to the theory of perfectly contestable markets.

Perfectly contestable markets would preclude inefficient entry, cross-subsidization, and will produce economically efficient Pareto optimal prices. This generalization of the competitive model can be used and, according to the authors, is being used by some in the regulatory community. Having developed the rationale for using contestable markets as the model, the authors turn, in Chapter Four, to developing the pricing rules to emulate such conditions.

**Chapters Four, Five and Six**

The next three chapters cover the role of pricing and costing of products; the first two cover the final product and the last of these chapters applies the costs rules to intermediate goods and services. Fortunately, the same guidelines apply.

Chapter Four points out that both costs and demand are required for the determination of efficient prices. Costs alone are not sufficient. Moreover, if the regulators could find the correct prices, it is unlikely that they would be sustainable due to the changing nature of demand. However, the firm's management has strong incentive to track changing demand and, just as important, better information to do so. Thus, the authors argue that setting floor and ceiling prices will be sufficient to regulate the firms. The ceiling will protect the consumers and the floor will prevent predation.

Rate-base rate-of-return regulation is dismissed because of its inflexibility and the distortions it introduces.

Baumol and Sidak note that price ceilings are preferred to profit ceilings, which can be supported by an infinite set of prices. Setting profits is difficult due to, *inter alia*:

- the dynamics of the competitive market where it is virtually impossible to calculate the "correct" rate of return due to risk,
- the average, long-run economic profits (including a return to capital) are to be zero in the competitive market, but will not be over the business cycle, and
- innovative firms will receive a return above normal, and this is the incentive necessary for the firm to undertake such innovation.

**Costs**

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Price ceilings and floors based on cost are not so restrictive and are, in principle easily to calculated. Thus, it is to costs that the authors turn. Fully distributed costs, which are correctly dismissed as being arbitrary, are clearly inefficient except by chance. The traditional marginal cost, MC is discussed in order to lay the foundations of the two less familiar cost concepts of Average-Incremental Costs (for an entire service) (AIC) and the Stand-Alone Cost (of a combination of services) (SAC_yz...).

\[
SAC_{yz...} = TC(0,y,z...)
\]

The latter represents total cost just to produce a specific combination of goods. The AIC_y is the average (over y) of total costs of all combinations less the cost of producing all but y, i.e.

\[
AIC_y = \frac{TC(x,y,z...) - TC(0,y,z...) \right)}{x}
\]

As is the custom with economists, capital cost, opportunity costs and replacements costs are included in the above cost calculations, about which more will be said later.

Price Floors

The basic cost concepts are used in Chapter Five. Predation and cross-subsidization are defined in the context of the above definitions. Either marginal cost or average incremental cost is the correct pricing floor, which ever is higher. The logic is as follows:

Common sense suggests that prices should be no lower than marginal costs, but using AIC as a floor insures that all required (sum of) incremental costs will be covered in the declining cost situation. Marginal cost will produce a deficit or surplus, depending on the decreasing or increasing nature of the cost function. Only the AIC will cover all of the costs required in order to cover all the costs when MC is declining and thus, is the required standard. Marginal cost will not, by definition, cover any of the fixed costs of production, but AIC, by definition, will. Conversely, when marginal costs are increasing, marginal cost should be the standard.

The above rule will work for the single product, but most products are produced with some common cost elements. After having satisfied the above pricing floor for a single product in a multi-product firm, a combined incremental cost and revenue floor is suggested. That is, the production of two goods covered their combined incremental cost and the combined incremental revenue of the products,

\[
R(x) + R(y) > C(x,y) + AIC_y + AIC_x
\]

where C(x,y) is the common cost for the production of both x and y.

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This must be satisfied for all combinations of products, which could be a substantial number of combination even if products are grouped.

The above formulation allows for non-linear pricing within a product. To insure that non-uniform prices are not predatory or cross-subsidized, these prices must satisfy the AIC test at that level of output\(^{10}\). In this situation some customers may be receiving the product at a price lower than other customers seemingly situated customers, for example a customer might receive a volume discount. This price differential is beneficial even to the customers who pay a higher price, if the discounted price satisfies the AIC test at that level of output, thus contributing to the lowering of the price to the high price customer had the discounted-price customer not been served.

*Price Ceilings*

contestability is the guide for determining the upper limit of prices. The ceiling price should be no more than the stand-alone cost of the single product, and, just as with the floor, must include all possible combinations of the SAC costs, since a potential entry could be a multi-product firm. For all the firms products, this becomes a revenue requirement constraint, similar to the traditional rate-of-return (ROR) approach, but it is not equivalent.

The ROR approach provides no incentive to improve productivity, innovate or save costs, it is a cost plus approach with all the problems thereof. By invoking SACs, the firm is held to a cost standard "that would be incurred by the entry of a hypothetical efficient entrant\(^ {11} \). The SAC offers price flexibility the ROR does not.

A version of price ceilings, known as "Price-caps," has been adapted by regulators, and was first implemented in Britain.\(^{12}\) Price-caps are initiated by determination of the stand-alone cost\(^ {13}\), prices are allowed to change periodically no more than the percentage change in a price index, usually the consumers price index less a factor for a productivity target\(^ {14}\). Price-caps emulate the market in the following sense, if above average innovations and other productivity gains accrue to the firm -- it beats the productive adjustment. If, however, the firms is below average in these gains, the firm and hence its stock holders suffer.

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10 Ibid., pp. 70-73.
11 Ibid., p. 87 (Emphasis the authors)
13 In most cases this step is skipped and the current revenue requirement or rates are accepted. This can lead to embedding monopoly profits in the price caps. See “Cautions” discussion, below.
14 This productivity adjustment should be exogenously determined; however, in both the United States and the United Kingdom, these rates are based on regulatory review -- i.e. judgment, rather than, more correctly, an index of productivity for the industry.
The authors note that the stand-alone costs and incremental costs have been accepted and applied by regulators recently. Stand-alone costs can be developed directly from the appropriately defined incremental and total costs.

Let the total cost equal:

\[ TC = TC(x,y,z...) \]

The incremental cost is of a subset is

\[ IC_{yz...} = TC(x,y,z...) - TC(0,y,z...) \]

The SAC for a complementary subset of services to the above is equal

\[ SAC_{yz...} = TC(0,y,z...) \]

which is the incremental cost, \( IC_{yz...} \), less the total cost. This relationship generalizes to all subsets. Thus

...to find the stand-alone cost for any preselected subset, \( S_2 \) of a firm we need only determine the complementary subset \( S_1 \), calculate its incremental cost, and subtract the incremental cost from the firm’s total cost.\(^{15}\)

This allows the application of these cost tools with no significant change in methods currently employed. The authors note that complications arise if the firm is not efficient, although this problem is not unique to these cost tests.

... if the regulated firm passes the combinatorial price-floor test and earns no more than competitive profits, then the price-ceiling tests must automatically be passed.\(^{16}\)

The method, according to the authors, eliminates the disputes over the allocation of costs in the fully distributed cost methodologies. Complaints are not based on the rate of return, but on the specific set of prices adherence to the floor/ceiling rules.

Price-caps ameliorate many of the problems with profit/price ceiling which is the hallmark of rate-of-return regulation. Although it may not be as efficient as Ramsey pricing, its virtue is in its simplicity and ability to adjust to the continuous changes in the market place.

**Chapter Seven**

*Prices of Intermediate Goods*

Chapter Seven addresses the more difficult issues of pricing the intermediate goods sold to competitors. In the telecommunications industry, the price at which the "access" to the end user is priced to the IXC is critical because the LEC competes

\(^{15}\) Baumol and Sidak, *op. cit.*, p. 83.

\(^{16}\) Ibid. P. 84.
with the IXC in the intraLATA toll market. The authors indicate the same rules apply -- the service should be sold at its average-incremental costs, the contestability equivalent to the marginal cost, including the opportunity cost. This is in contrast to the standard method used by some regulators of allocating a proportional share of the "common" costs to the rivals. With the "Efficient-Component Pricing Rule," the idea is that the firm which sells an intermediate product to its rivals (the landlord and tenant firm, respectively) must receive the sum of all the marginal cost required to produce the product, the definition of AIC, including any forgone revenue as a result of the loss of market share to the rival or the opportunity cost associated with the service. The rival is assumed to offer exactly the same product but requires the intermediate product from the incumbent for some part of the service.

The efficient price requires two critical assumptions:

1. The landlord firm is pricing efficiently initially, i.e., no monopoly rents are embedded in its AIC, a stringent assumption. Alternatively, the opportunity cost does not include any monopoly rents associated with the service.

2. The intermediate products sold are substituted one-for-one for the landlord’s intermediate products. The distinction between the market loss to the rival and the market gained by the rival’s own initiative has to be made, also not an easy undertaking. I.e. if new traffic is generated by the

The issue is actually more difficult than the authors characterize it because of the institutionalized subsidies that flow to the access market and, in the reviewer’s opinion, the services are incorrectly defined and priced. See Edmund L. Andrews, "Bell Companies Use Regulations to Stop Rivals", New York Times, July 24, 1994, pp. 1 and 26, for a discussion of the current situation in the United States; Victor Toth, "It's Time (Already) to Rewrite the Access Rules, Washington Perspective", Business Communications Review, October 1993, and Kaserman, David L. and John W. Mayo, "Cross-Subsidies in telecommunications: Roadblocks on the Road to More Intelligent Telephone Pricing," Yale Journal on Regulation, Volume 11, Number 1, Winter 1994, for a discussion of subsidies, and Alleman, et al., op. cit. for the proper definition of subscriber access. Also see Steve G. Parson, "Seven Years after Kahn and Shew: Lingering Myths on Costs and Pricing Telephone Service," Yale Journal on Regulation, Volume 11, Number 1, Winter 1994 and the references cited therein.

Universal service is the acknowledged goal of the subsidy, however, as pointed out two decades ago, and repeatedly since then, the incidence of the subsidy has not been addressed by regulators. Apparently, the situation has not changed. See Stone, Robert F., Mark A. Schankerman and Chester G. Fenton, Selective Competition in the Telephone Industry: An Independent Responses to the FCC Docket 20003, T+E, Cambridge. They pointed out that targeted subsidies are to be preferred, if subsidies are supported at all, to the service subsidies currently applied in the industry. A point elaborated by Willig, Robert, "Consumer Equity and Local Measured Service," in J. A. Baude, et al., Perspectives on Local Measured Service, Ablex, New Jersey, 1979. The argument is simple. Inframarginal subscribers do not need a subsidy to remain on the service. Only the marginal subscribers have to be subsidized to remain on the system at prices that cover the increment cost of access. It is more efficient because less of a subsidy is required (by a factor of one-fifth to one-tenth). Also see Leland Johnson, Telephone Assistance Programs for Low-Income Households: A Preliminary Assessment, Technical Report R-3603-NSF/MF, The Rand Corporation, February, 1988.
rival, it should not have to pay to the landlord for this additional traffic. The difficulty is separating the "new" traffic from that lost by the incumbent or landlord.

Note that in the above formulation, prices and quality are constant, the payment to the incumbent is only on "lost traffic" not "new traffic", and monopoly profits are assumed away. No restriction on entry into the intermediate service is suggested.

This is the most controversial prescription in the monograph\textsuperscript{18}. In the limit, all of the contribution lost by the landlord must be paid by the rival (tenant) under the efficient-component pricing rule. This makes many uncomfortable, but the logic is impeccable, \textit{as far as it goes and if the assumptions hold}.

There are two interpretations of the implied model of the analysis. Under one interpretation the model does not comport with the stylized model of the exchange telephone service. The intermediate product the authors address is based on the flow of traffic over the network, not on the subscriber's access to the network i.e., it does not address the subscriber's loop (or only indirectly as a given "common cost" parameter). Under the alternative interpretation, it does address this loop issue. The cost of the loop is sunk, and so long as excess capacity exists, it has zero opportunity cost. Thus, it suggests that the cost to the tenant of this usage they expect to generate. Changes in prices of usage generated by the competitors could change the demand by subscribers for access to the network, and hence, opportunity cost.

Nor does the chapter address the question of what the rule would be with the addition of a new access for subscribers, but functionally equivalent to loop access, such as cellular service. How would the addition of another subscriber line be handled? It is not clear that the answer is addressed by the authors with their pricing rules.

The Loop

In the telephone industry most of the costs are embedded in the subscriber's loop, only a small portion of the costs are traffic sensitive, thus the definition of the services is critical. If the subscriber were responsible for the entire cost of the subscriber loop, rather than apportioning it among the exchange and interexchange service, as an intermediate product, then much of the above problem would disappear.

The monograph would have been much stronger if it had confronted this problem directly, rather than leaving the various interpretations to the readers.

\textsuperscript{18} An expanded version of this chapter, "The Pricing of Inputs Sold to Competitors" by the authors appeared in the \textit{Yale Journal on Regulation}, Volume 11, Number 1, Winter 1994. In the same volume William B. Tye and Alfred E. Kahn, and William E. Taylor, "Response: The Pricing of Inputs Sold to Competitors," and "The Pricing of Inputs Sold to Competitors: A Comment," respectively, take issue with the application of the methodology.
Certainly, the arguments surrounding the magnitude of the efficient-component price would not be as shrill, since the efficient-component price would be significantly less and, therefore, error would not be as serious.

If the interpretation of efficient-component price rule is that the rival carriers are charged both the AIC of the exchange traffic delivered and the AIC of the subscribers loops and its associated carrying cost then to apply the above rule in this fashion is not correct.

Currently, subscribers are not receiving the correct price signals which equates the economic cost they generate with the prices they are charged. That is, the subscriber's loop represents a fixed cost which one (I believe, incorrect) interpretation of the above solution would address with a variable price on the rival. This has been the continuous error made in the proposed solutions to the "local" loop problem. The Baumol and Sidak book is silent on this issue.

Chapter Eight

Baumol and Sidak specifically address telephony issues in Chapter Eight. They make a plea not to restrict entry in any of telephony's markets, and note that virtually any arrangement on the part of regulators to manage markets will seriously distort economic efficiency. "The public interest never gains by preventing competition." Fears of predation have been overblown, but even if they exist they can be handled by the regulatory rule developed in the monograph. They "...conclude that extended freedom of entry is desirable in telecommunications." Government restrictions on entry may bear prime responsibility for any continued ability on the part of the LEC's to use cross-subsidy as an anti-competitive device. The best method to determine "natural monopoly" is not to restrict entry and insure that entry barriers are not erected. Thus, they prescribe ten rules to follow to eliminated entry barriers and promote economic efficiency in the industry. These are:

1. Interconnection should be "... required for all qualified applicants,"
2. Services should be unbundled,
3. Interconnected services should be identical in technical and quality terms,
4. Efficient component pricing rules apply to interconnection,
5. No resale or user restrictions should apply,

20 Baumol and Sidak, op. cit., p. 118
21 Ibid., p. 119.
22 Ibid., p. 120
23 Ibid., pp. 121-122.
6. Price floors should be "... enforced to prevent cross-subsidy and predatory pricing."
7. Nondiscriminatory telephone number assignment and portability,
8. Elimination of franchising restrictions,
9. Expeditious allocation of spectrum to increase exchange competition, and
10. Discouragement of delaying legal actions which have no merit.

They make two significant observations which many regulators have not absorbed.

First, the low income subscribers use all telecommunications services, and to cross-subsidize only the exchange service does not benefit these customers, since they also use long distance service. If regulators wish to subsidize low income consumers, it should target the (potential) customer, not a service24.

Just as regulators intervene in markets to segment markets, regulatory agencies routinely constrain and handicap incumbent firms vis a vis new entrants, to the detriment of economic efficiency. "... to often, the result of a bizarre set of rules designed to protect the entrant at the incumbent's expense ... at the expense of the public."25 The only aid they would advocate for the entrant is via the capital markets. The imperfection in these markets could inhibit viable competition.

The authors close with a plea to lift the line-of-business restrictions imposed by the Modified Final Judgment on the RBOCs. In addition to the losses associated with the restrictions of entry, are the losses as a result of product innovations. Too much emphasis is placed on predation to the negate of new products foregone. It is the role of government policy to maximize the total welfare, ... rather than minimize the former.

Chapter Eight closes with a proposed bifurcation rule which addresses the concerns of cross-subsidy and predation, while still capturing the gains for economies of scope. The rule would have a second public corporation with two class of shares, one owned by the RBOC with voting rights and no claims on the profits and non-voting shares with claims on the profits. The RBOCs would control and manage the second corporation, thus capturing any economics of scope but cross-subsidy would not benefit the RBOCs since they would not be able to claim the gains from the practice.

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24 Service subsidies are to be avoided, since they are inherently inefficient and, although they may support a particular customer group, they also send the inappropriate price signal to all the other customer and, of course, require contributions from elsewhere in the business. See Stone, et al., op cit. and Willig, op. cit. The cost of this subsidy has been discussed at great lengths in the industry, See e.g. Robert W. Crandell, After the Breakup: U.S. Telecommunications in a More Competitive Era, The Brooking Institute, Washington, D. C., 1991 and the reference cited therein. The funding of even a targeted subsidy is an issue which I do not have the space to address here, but suffice to say it should not be by the providers of the services nor their competitors.

25 Baumol and Sidak, op. cit., p. 128.
While an interesting proposal, it is not as thought out nor is the supporting literature as rich as that associated with the balance of the monograph.

Chapter Nine

The concluding chapter pleads for a revised regulatory system which adopts the whole of the authors' proposed program. A recommendations this reviewer concurs. Socially optimal regulation of local telephony is composed of a number of parts, and those parts can serve their purpose only if they are adopted and carried out together. They have built a logically coherent regulatory structure which the political system should implement, but the authors note that the political issues are beyond the scope of the monograph.

Cautions:

Opportunity Cost

The narrative leave does not always emphasis particular cautions in the analysis. For example the monograph does not stress strongly enough that when the opportunity cost to the incumbent of competitive entry should be the compensation, born by the entrant, it should only be the hypothetical opportunity cost associated with a competitive solution, not one in which monopoly rents are embedded. Alternative, the ex post competitive result should be the consideration, not the ex ante circumstances.

Baumol and Sidak note that, indeed, this monopoly rent should be detected by the regulator, but offer no prescriptions for its detection nor elimination. If this monopoly rent is ignored in practice, then the rent would be institutionalized into the potential entrant's cost, and perhaps precludes entry, certainly it would not have the desired efficiency effect.

Ease of Implementation

For the reason already discussed, the pricing approach proposed by Baumol and Sidak has a simplicity which belies the omissions or difficulties of implementing the proposal in the industry:

- Monopoly rents are not easily eliminated from the opportunity costs in the calculation of the comparative efficient prices.
- Distincting between the traffic replaced by the competitor versus new traffic developed by the competitor is difficult,
- New substitutes and/or complementary services are not addressed in the methodology

26 *Ibid.*, p. 140. (Emphasis the authors)
• Only the pricing of traffic to the rival is addressed by the authors, not the total pricing methodology for the exchange carrier, and

• Insuring that the telephone subscribers receive the correct pricing signals is not addressed.

Conclusions

The monograph is useful for anyone involved in regulation, not simply telephony, and should be read by anyone who practices this activity, irrespective of the industry they regulate; for despite its title, the majority of the book is not concerned explicitly with telephony, but rather with proper regulatory policy. For those in the telecommunications industry, it must be read, but with attention to the cautions indicated above.

The authors' policy prescription is simple, but powerful: Market forces are preferable to government intervention. Competition should be allowed as a regulatory instrument if feasible. The regulator should serve as a monitor of the competition, and keep hands off unless problems arise. The regulator should set price ceilings and floors based on incremental costing principles and competitive results if actual competition is not feasible while allowing the firm to maintain price flexibility.

The regulator's task [s]...[are] ...first, to determine the rules of behavior that the regulatory firm could have been expected to follow if it had operated free of regulation in a market with fully effective competitive forces; second, to constrain the regulated firm to behave as it would in such a competitive market, and to circumscribe its behavior no less and no more that this27

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27 Baumol and Sidak, op. cit., p. 5. (Emphasis the authors)