10

OPTIONAL TARIFFS FOR ACCESS UNDER THE FCC'S PRICE-CAP PROPOSAL

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1. Introduction

Currently, the FCC is refining a proposal to regulate the access services of the local exchange carriers (LECs) under a price-cap scheme, modifying rate-of-return regulation. See FCC (1988, 1989). One element of the proposal is that new services be treated for tariff review purposes in a manner quite similar to the FCC's Optional Calling Plan Order, which set out a net revenue test for approval. This net revenue test would require that (1) a new service must be projected to increase net revenue for the service subject to price-cap regulation and that (2) this increase be projected to occur within the lesser of two time periods: 24 months from the incorporation of the new service into a price filing, or 36 months from the introduction of the services. This showing must be accompanied by net revenue projections which include marginal costs, price elasticity, and cross-elasticity effects.[1]

Under current rate-of-return regulation an optional tariff would have to pass a Part 69 test, which is based on traditional concepts of fully distributed costs (FDC). The main difference between the price proposal currently under consideration and rate-of-return regulation is that the test for approval would be based on incremental cost, not on FDC. Since there is no real difference in the notice period, the amount of cost support required, etc., more new services are likely to be approved under the price-cap plan than under current regulation.

Since 1986 there has been periodic discussion of the desirability of allowing the local exchange carrier to offer bulk discounts on access with end-user billing. In 1986 the two NYNEX companies each filed declining block tariffs for carrier access charges to be billed to end users. In its Open Meeting of November 25, 1986,

M. A. Einhorn (ed.), *Price Caps and Incentive Regulation in Telecommunications*

the FCC rejected these tariffs, partly because their justifications did not include sufficient consideration of economic efficiency.

There is good reason to suspect that tariffs of the kind proposed by the NYNEX companies will enhance economic efficiency. The NYNEX tariffs were declining-block tapered tariffs, which involved increased usage charges for small users, decreased usage charges at high consumption levels, and a claimed zero net effect on profits. The marginal cost of access was not known exactly, but was almost certainly lower than even the discounted rates. Bearing in mind that small users typically are much less price-elastic than are large users, the deadweight loss from the increased usage charges at low consumption levels would almost certainly have been outweighed by the efficiency gains of moving the marginal usage charge paid by large users closer to marginal cost.

In this article, we argue that bulk discounts with end-user billing, implemented as optional two-part tariffs, will face fewer regulatory constraints than heretofore. By making it easier for such tariffs to be approved by the FCC, the price-cap proposal can potentially increase economic efficiency. Alternatively this article may be taken to argue that optional bulk discounts *should* be treated with regulatory permissiveness because, as we demonstrate below, the potential exists for both consumers and the firm to gain thereby.

We have in mind a scenario in which the current carrier access charge structure is retained, but the LECs offer, in addition, sets of optional two-part tariffs to be billed to end users. An important feature of the price-cap proposal for LECs is that such options would appear to fit the definition of a new service set out by the FCC, which is that an offering that increases customers' options should be classified as new. Because these optional tariffs are, by definition, options to an existing tariff structure and because they involve end-user billing, it seems likely that they would be treated as new services and justified according to the net revenue test described above, rather than the FDC-based Part 69 test.[2] Because it is based on marginal cost, the net revenue test is easier to pass than the FDC-based Part 69 test.

In the balance of the article, we conduct two kinds of pricing simulations. First, as a matter of historical interest, we estimate the efficiency effects of the NYNEX tapered tariffs, and find that they would indeed have increased economic efficiency. Second, we compute optional two-part tariffs for access, billed to the end user, and find that both large users and the LECs stand to gain substantially.

2. Tapered Access Charges

The issue of the economic efficiency of proposed access rate structures billed to the end user came to the fore at the November 25, 1986, Open Meeting of the FCC, in which tapered tariffs proposed by NYNEX companies were rejected, partly because their justification did not include sufficient consideration of economic efficiency. In this section, we address this issue in two ways. First, in a highly stylized setting, we compare the consumer and producer surplus obtainable from a simplified version of the proposed New York Telephone tariff which we will call the "NYNEX" tariff,[3] with that obtainable from the carrier access charge then prevailing of 7.56 cents per minute.[4] Second, we compute an *optional* tapered tariff which has the characteristic that relative to the carrier access charge then prevailing, *no* customer is worse off and the firm's profits are higher.

Note that no mention has been made of a cost justification for tapered access charges - either here or in the debate surrounding the NYNEX companies' filings.[5] Ignoring costs seems to contradict recent regulatory and legislative actions which discourage declining block tariffs (primarily in electricity) usage.[6] However, these actions have generally been based on the belief that charging a large customer less than a small customer will induce the large customer to inefficiently overconsume relative to the small customer. Now the marginal cost for switched access appears to be much lower than any rate that anyone is proposing to charge for any level of usage. Thus proposed tapers do not induce large users to consume an inefficiently large amount of access, since they face a price that is still in excess of marginal cost. The perspective of this section is that some contribution over marginal cost must be raised from access charges and our task is to find the most efficient tariff that will accomplish that goal.

3.1 The Theoretical Setting

Suppose initially that there are two consumer types, Big (B) and Little (L) with demand curves as shown in figure 1: at any price, Big's demand $Q^B(P)$ exceeds Little's demand $Q^L(P)$. Initially, both customer types face a flat rate price of P_0 per unit. The firm's marginal cost is denoted by mc. Denote fixed cost by F. The firm earns a normal profit:

$$(P_0 - mc) * (Q^{B_0} + Q^{L_0}) - F = 0. \tag{1}$$

Now give the two consumers a choice: let them continue to buy at the uniform price P_0 or buy under a two-part tariff (E_1, P_1) having a flat entry fee

$$E_1 = Q^B(P_0) * (P_0 - P_1) \tag{2}$$

$$\text{and } a \text{ } usage \text{ } charge \text{ } P_1, \text{ where } P_0 \geq P_1 \geq mc \tag{3}$$

and E_1 is given by the sum of areas a and b in figure 1.

Clearly, Little will stick with P_0; the increase in consumer surplus he would derive from the lower usage charge P_1 is given by the area a, which is more than offset by E_1, given in figure 1 by the edged rectangle a+b. Big prefers the two-part tariff because E_1 takes only part of the increase in consumer surplus made possible by the lower usage charge, leaving him better off by the lined triangle ΔCS^B. The firm makes a nonnegative profit from the two-part tariff because of demand stimulation induced by the lower marginal price: the increment $(Q_1^B - Q_0^B)$ in Big's consumption takes place at price $P_1 > mc$. The rectangle ΔPS^B represents increased

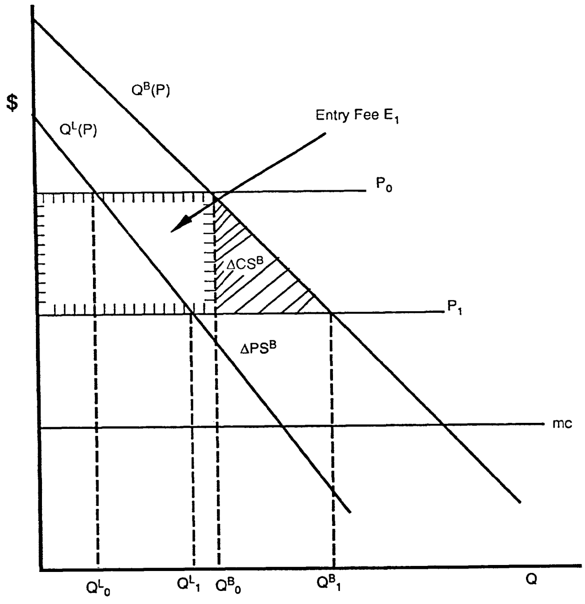

Figure 1

producer surplus for the firm.[7] Thus the firm as well as both customer types are better off facing the two-part tariff (E_1, P_1) than facing the uniform price P_0; such a tariff is said to "Pareto dominate" the flat rate tariff P_0.[8]

As we see in figure 2, what we have done is equivalent to constructing a declining block tariff with usage charges P_0 and P_1 and a break point at Q_0^B. The result is true in general: a declining block tariff can always be viewed as the lower envelope of a set of two-part tariffs from which consumers select their optimal consumption points.[9] On that declining block tariff, the two consumer types select consumption levels Q_0^L and Q_1^B.

Now suppose that there are three consumer types: Big, Medium (M), and Little. Their demand curves are consistent with the noncrossing assumption and are shown in figure 3. We can construct a set of optional two-part tariffs—(E_1, P_1), (E_2, P_2)—in the same way we did above:

$$mc \le P_2 \le P_1 \le P_0$$

$$E_1 = Q_0^M * (P_0 - P_1) \qquad (4)$$

$$E_2 = Q_0^B * (P_0 - P_2) .$$

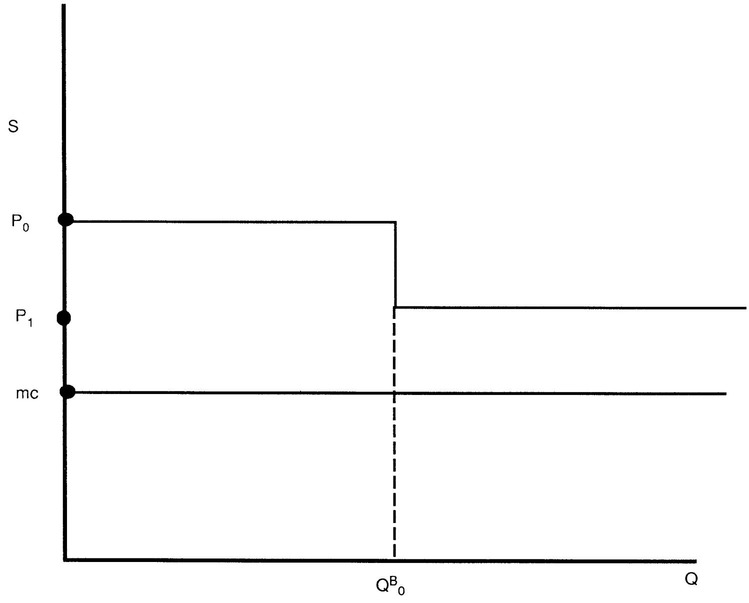

FIGURE 2

Using the same arguments as before, it is true that *if* Medium took (E_1, P_1) and Big took (E_2, P_2) then each would be better off than under P_0 and the firm would make higher profits. However, there is a potential complication: Big might prefer (E_1, P_1) to (E_2, P_2). If he did, then the firm might make less profit from him under the optional tariff than under the flat rate P_0, so that the firm might see higher profits under the flat rate tariff.[10] To ensure that the set of optional two-part tariffs Pareto dominates the flat rate tariff, we have to further constrain P_1 so that the lower entry fee that Big would pay under (E_1, P_1) is offset—for his demanded quantity—by the higher usage charge. The decrease in consumer surplus that Big would undergo under (E_1, P_1) due to the fact that $P_1 > P_2$ is given by the area of the rectangle $(C + D + \Delta_2)$ in figure 3. The reduction in the entry fee is given by the rectangle $(B + C + D)$. Thus, if $B < \Delta_2$, Big will prefer (E_2, P_2) to (E_1, P_1). We refer to this added complication as the *incentive-compatibility constraint.*

Note that by making P_1 suitably close to P_0, we can always ensure that this constraint will be met. As P_1 approaches P_0, Δ_2 rises while B declines. Thus at some level of P_1, the increased usage charge in going from P_2 to P_1 more than balances the reduction in the entry fee, inducing Big to select the tariff (E_2, P_2) which ensures the firm of higher profits from the optional two-part tariffs.

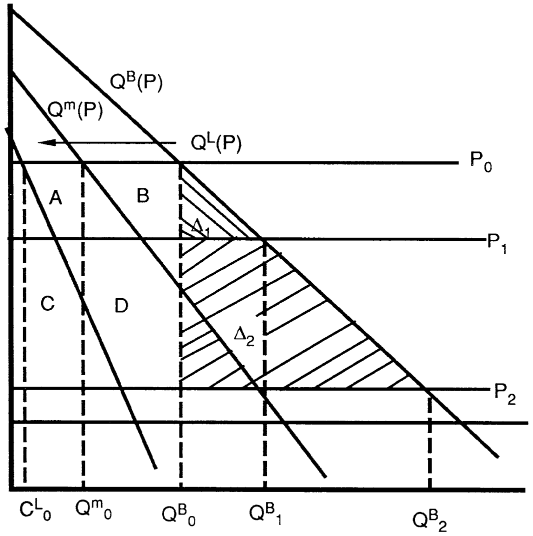

FIGURE 3

Summarizing the three consumer-type argument, if

$$mc \leq P_2 \leq P_1 \leq P_0$$

$$E_1 = Q_0^M * (P_0 - P_1) \qquad (5)$$

$$E_2 = Q_0^B * (P_0 - P_2)$$

and the incentive-compatibility constraint:

$$B = (Q_0 - Q_0^M) * (P_0 - P_1) \leq \Delta_2$$

$$= (P_1 - P_2) * \frac{Q_2^B + Q_1^B - 2Q_0^B}{2} \qquad (6)$$

is met, then the following happens:

— Big chooses (E_2, P_2) ;

— Medium chooses either (E_1, P_1) or (E_2, P_2) ;[11]

— Little stays at P_0 ; and

— the firm makes higher profits that at P_0.

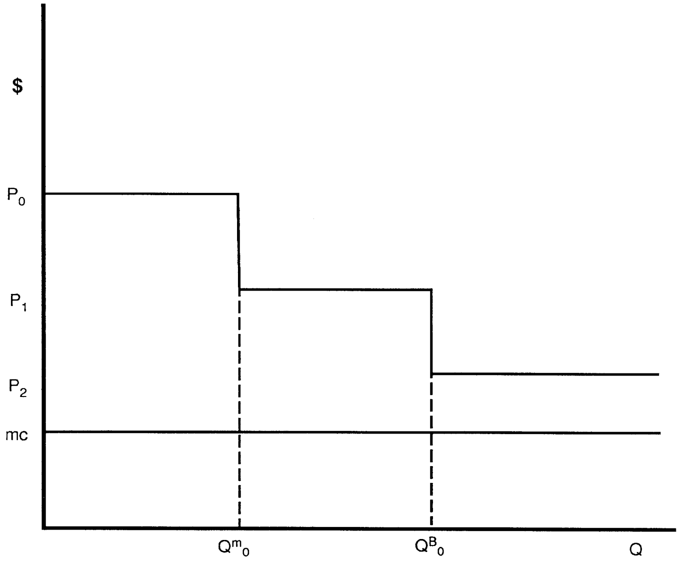

FIGURE 4

Relative to the flat rate tariff P_0, we refer to the set of optional two-part tariffs $\{E_i, P_i\}$ $(i = 1,2)$ as Pareto Dominating and Incentive-Compatible (PDIC).

As shown in figure 4, allowing consumers to choose among the set of three optional two part tariffs—$(0, P_0)$, (E_1, P_1), and (E_2, P_2)—is equivalent to presenting them with a declining block tariff with usage charges P_0, P_1, P_2 and break points Q_0^M and Q_0^B. Proceeding in much the same fashion, with N consumer types one could construct $N - 1$ optional two-part tariffs with the result that no economic agent would be worse off than under the flat rate P_0 and some (including the firm) would be better off. This set of $N - 1$ two-part tariffs would then be equivalent to a particular N-part declining block tariff which would Pareto dominate the flat rate tariff P_0.

3.2 Consumer Welfare Under Tapered Tariffs

We assume a simple demand model that relates access demand for a customer of type i to the full price of interLATA service. Thus $Q_i = Q_i(r + P)$ where r is the price charged for IXC service and P is the usage charge for access. If one takes the view that access is an input in the production of long-distance service, then changes in consumer surplus for customer i from changes in P can be calculated by writing

$r = r(P)$ in equilibrium and integrating under the equilibrium input demand curve. Thus if P is reduced from P' to P'', the effect on consumer i is given by[12]

$$\Delta CS_i = \int_{P''}^{P'} Q_i[r(P) + P]\, dp. \tag{7}$$

Thus to compare the change in consumer surplus from moving from a flat rate to a tapered tariff, all we have to do is calculate the area under each consumer type's demand curve above the marginal price he faces, subtract his entry fee, and subtract his consumer surplus under the flat rate tariff.

For convenience's sake, we assume that the equilibrium input demand function for consumer type i can be approximated by a simple iso-elastic form

$$\log(Q_i) = \log T_i - e_i \log (P_i) \tag{8}$$

where T_i is a taste parameter and e_i is the price elasticity of demand for customer of type i. We also assume there are six different customer types corresponding to the six steps in a tariff roughly reminiscent of the New York Telephone proposed tapered schedule.

To calibrate these demand curves, we require data on the distribution of usage and price elasticities by customer type. In table 1, we present the current usage distribution for New York Telephone MTS customers along with average monthly usage for customers in each band, noting that this usage was generated by a flat rate IXC access price of 7.56 cents per minute and this might differ from the usage distribution under an optional tariff.

Table 1. Distribution of NY Tel MTS Usage

Usage Band	Percentage of Accounts	Monthly MTS Minutes of Use (mou)
0-60	74.03	14.55
61-1000	25.47	160.21
1001-2000	0.26	1364.46
2001-7000	0.17	3547.77
7001-20000	0.05	11026.07
20000 +	0.02	67425.60

Source: NYTel Co., Tariff FCC No. 41, Transmittal No. 775.

From the six usage bands, we construct six user types with taste parameters T_i given by

$$T_i = [\text{avg mou}]_i\, [.0756]^{e_i}. \tag{9}$$

The price elasticities e_i for the different customer types are derived from known long-distance service price elasticities in the following way:

$$e_i = -\frac{\partial \ln Q_i}{\partial \ln P} = -\frac{\partial \ln Q_i}{\partial \ln(r+P)} * \frac{P}{r+P} \tag{10}$$

which is the derived price elasticity of demand for IXC access. Usage elasticities by customer size class were approximated by combining econometrically estimated MTS and WATS elasticities in different proportions for different customer size classes. Given e_i, T_i is easily computed from usage data in table 1.

It is important to note that this view of access ignores efficiency gains or losses due to bypass; the access elasticity is merely adjusted to account for the fact that the end-user price includes an IXC component. To allow for the possible effects of increased bypass competition, we analyze an alternative case: one which has sharply higher price elasticities for the larger users. Both sets of elasticities are presented in table 2.[13]

Table 2. Price Elasticities of Demand

Customer Type	Base Case	Alternative Case
1	.16	.16
2	.16	.16
3	.22	.50
4	.22	.50
5	.31	.70
6	.31	.98

We initially assume a marginal cost of access for each consumer type of 1 cent per minute, which represents an average of peak and off-peak marginal costs as reported in the New England Telephone filing. Note that this may overstate the true marginal cost for the largest group, since switched access may not be the most efficient form of access for some of these very large customers. The usage charge is for peak-period originating switched access for MTS services: the rate includes both traffic sensitive and non-traffic sensitive components. We effectively ignore WATS demand in this analysis.[14] The NYNEX tariff is given in table 3; the break points in the tariff correspond to the usage bands in table 1.

The efficiency effects of the "NYNEX" tapered tariff are given in table 3, for the high elasticity alternative case. We believe that these elasticities best reflect the future effects of bypass. As many parties have noted, compared to the flat rate of 7.56 cents per minute in the base case, customer types 1 and 2 are mildly worse off; however, together, these types comprise 99.5% of the customer population.

Table 3. Effects of the "NYNEX" Tapered Tariff (relative to flat rate $0.0756)
Alternative 2 Elasticities

Customer Type	"NYNEX" Tapered Tariff	Change in Consumer Surplus	Change in Producer Surplus
1	$.0961	-$0.29	$0.25
2	$.0713	-$0.80	$0.89
3	$.0484	$16.85	$0.36
4	$.0352	$119.61	-$50.93
5	$.0302	$582.87	-$214.14
6	$.0269	$5061.42	-$1134.39

Change in aggregate profit = -$0.007 per customer per month.
Change in consumer surplus = $1.135 per customer per month.
Change in total welfare = $1.127 per customer per month.

Substantial welfare gains for the largest 0.5% of users generate a significant overall welfare gain. Overall firm profit declines by $.0007 per customer per month as compared with the base case, but total surplus increases by $1.127 because of the increased benefit to the very large users. This last result, although resulting from a highly stylized model and an approximation to the NYNEX tariff actually filed, suggests that the NYNEX taper increases economic efficiency. Given the concern on this point expressed at the FCC open meeting of November 25, 1980, our results strengthen the case for the NYNEX tapered access tariff.

3.3 Calculation of Optional Two-Part Tariffs

We now compute the set $\{E_i, P_i\}$ of optional two-part tariffs which maximize profit to the local exchange carrier subject to three constraints. The first constraint guarantees that $\{E_i, P_i\}$ will be selected by type i in preference to a uniform price P_o:

$$C1: E_i = Q_i(P_o) \cdot (P_o - P_i). \tag{11}$$

The second set of constraints refers to incentive compatibility. With N types, to guarantee incentive-compatibility of (E_i, P_i) with respect to the other $N-1$ two-part tariffs is extremely complicated, in general. However, under the assumption that demand curves do not cross, $Q_i(P) > Q_{i-1}(P)$, the problem is reduced to ensuring incentive-compatibility for "downward-adjacent" pairs of two part tariffs. By this, we mean that type i prefers (E_i, P_i) to (E_{i-1}, P_{i-1}). To see why, define

$$\varphi_i(P_k, P_j) = \int_{P_k}^{P_j} Q_i(P)\,dP - Q_k(P_0) \cdot (P_0 - P_k) + Q_j(P_0) \cdot (P_0 - P_j)\,. \tag{12}$$

The function $\varphi_i(P_k, P_j)$ represents the change in surplus for type i from buying on the two-part tariff (E_k, P_k), instead of (E_j, P_j), $k > j$. For type i to prefer

(E_i, P_i) to (E_{i-1}, P_{i-1}) implies that $\varphi_i(P_i, P_{i-1}) \Rightarrow 0$. Pairwise incentive compatibility is represented by $\varphi_i(P_i, P_{i-1}) \Rightarrow 0$ and $\varphi_{i-1}(P_{i-1}, P_{i-2}) \Rightarrow 0$. From noncrossing, $\varphi_i(P_{i-1}, P_{i-2}) > \varphi_{i-1}(P_{i-1}, P_{i-2}) \Rightarrow 0$. Thus, we have:

$$\varphi_i(P_i, P_{i-1}) \Rightarrow 0 \tag{13}$$

$$\varphi_i(P_{i-1}, P_{i-2}) > \varphi_{i-1}(P_{i-1}, P_{i-2}) \Longrightarrow 0. \tag{14}$$

Because $\varphi_i(P_i, P_{i-1}) \Rightarrow 0$ and $\varphi_i(P_{i-1}, P_{i-2}) > 0$, we can add them to obtain

$$\varphi_i(P_i, P_{i-1}) + \varphi_i(P_{i-1}, P_{i-2}) = \varphi_i(P_i, P_{i-2}) > 0. \tag{15}$$

Thus, type i strictly prefers (E_i, P_i) to (E_{i-2}, P_{i-2}). The same exercise readily establishes that $\varphi_i(P_i, P_k) > 0$ where $k < i$. Thus, with noncrossing demand curves, incentive compatibility between downward-adjacent two-part tariffs implies incentive compatibility between (E_i, P_i) and all two-part tariffs for smaller consumer types.

We must now discuss incentive-compatibility for "upward-adjacent" tariffs. Consider incentive compatibility between (E_i, P_i) and (E_{i+1}, P_{i+1}). If type i choses (E_{i+1}, P_{i+1}), his consumer surplus must be higher than under (E_i, P_i); similarly, because of C1, the profit contributed to the firm if type i chooses (E_{i+1}, P_{i+1}) must be greater than if he selects (E_i, P_i). But if this occurs, profit cannot have been maximized in the first place. Hence, an optimal solution to the profit maximization problem of the firm must be incentive-compatible between (E_i, P_i) and the two-part tariffs designed for larger consumer types, and we need not explicitly account for incentive-compatibility for upward- adjacent tariffs.

To sum up, with noncrossing, incentive-compatibility between (E_i, P_i) and all other two part-tariffs is equivalent to the set of N constraints.

$$\text{C2: } \varphi_i(P_i, P_{i-1}) = \int_{P_{i-1}}^{P_i} Q_i\, dp - Q_i(P_0)\,(P_o - P_i) + Q_{i-1}(P_0) \cdot (P_0 - P_{i-1}) \geq 0. \tag{16}$$

Finally, we require that P_i lies in the compact interval $\mathbf{P} = [P_0 + \delta, mc - \delta]$, where $\delta > 0$. This is done to ensure the existence of an optimal solution:

$$\text{C3: } P_i \in \mathbf{P}. \tag{17}$$

Given these constraints, we wish to solve the following program:

$$\underset{\{E_i, P_i\}}{\text{Maximize}} \sum_{i=1}^{N} \left[E_i + (P_i - mc)\, Q_i(P_i)\right] g_i \tag{18}$$

subject to C1, C2, and C3, where g_i is the share of customers of type i. Note that $\mathbf{P}$ is compact and the objective function is continuous, so a solution exists. The following theorem can be shown true:[15]

Theorem: Let $(P_1^*, P_2^*, \dots, P_N^*)$ and $(E_1^*, E_2^*, \dots, E_N^*)$ be optimal. Then with noncrossing it is true that

$$P_0 \geq P_i^* > P_2^* > \dots > P_N^* > mc$$

$$0 \leq E_1^* < E_2^* < \dots < E_N^*.$$

Thus, under profit maximization consumers are faced with the necessity of paying a higher entry fee in order to get a lower usage charge. As noted by Faulhaber and Panzar (1977),[16] this implies that the outcome generated by the optimal set of two-part tariffs $\{E_i^*, {}^*P_i^*\}_{i=1}^{N}$ can be generated by a single tapered tariff which is the lower envelope of $\{E_i^*, P_i^*\}_{i=1}^{N}$. In addition, the Theorem implies P_i lies in the interior of **P**, so that C3 is not binding.

Turning to our isoelastic demand example, C1 and C2 can be written

$$\text{C1:} \;\; E_i = T_i \cdot (.0756)^{-e_i} * (.0756 - P_i) \qquad (19)$$

$$\text{C2:} \;\; \frac{T_i}{1 - e_i} \cdot \left[P_{i-1}^{1-e_i} - P_i^{1-e_i}\right] => E_i - E_{i-1}. \qquad (20)$$

From the results of the theorem, we can ignore C3. Therefore, the maximization problem is

$$\underset{\{E_i, P_i\}}{\text{Maximize}} \sum_{i=1}^{6} \left[E_i + (P_i - .01) T_i P_i^{-e_i}\right] g_i \qquad (21)$$

subject to C1, C2.

In table 4, we present results for the base case elasticities. Profit increases by 1.9% over the flat rate tariff, for a dollar gain of \$.10 per customer per month. The effects are confined largely to the largest customer types. Consumer surplus weakly increases for each customer type, for an aggregate of \$.077, so that total surplus rises by \$.177 as compared with the flat rate.

Table 5 presents the results for the higher alternative elasticities. Because types 5 and 6 are assumed to be more price-elastic than in the base case, the effects are more pronounced. The changes in profits, consumer surplus, and total welfare are far higher; profit, for example, rises 9.5%, compared with the level resulting from the uniform price of 7.56 cents per minute.

Table 4. Optimization Results - Base Case Elasticities (changes relative to flat rate $.0756)

Customer Type	Entry Fee ($/month)	Usage Charge ($/min)	Change in Welfare
1	~ $0	$.0756	$0
2	~ $0	$.0756	$0
3	~ $0	$.0756	$0
4	$0.492	$.0754	~ $0
5	$73.27	$.0690	$1.038
6	$2989.17	$.0313	$381.00

Change in aggregate profit = $.10 customer per month.
Change in consumer surplus = $.077 per customer per month.
Change in total surplus = $.177 per customer per month.

Table 5. Optimization Results - Alternative 2 Elasticities (changes relative to flat rate $.0756)

Customer Type	Entry Fee ($/month)	Usage Charge ($/min)	Change in Consumer Surplus	Change in Profits
1	~ $0	$.0756	~ $0	$0
2	~ $0	$.0756	~ $0	$0
3	$0.52	$.0752	~ $0	$0.23
4	$29.18	$.0674	$0.82	$12.06
5	$342.17	$.0446	$66.0	$170.61
6	$3495.58	$.0238	$2350.0	$1956.60

Change in aggregate profit = $0.50 per customer per month
Change in consumer surplus = $0.50 per customer per month
Change in total welfare = $1.00 per customer per month

It might be argued that changes in access charge structure since 1986 have greatly narrowed the scope for profit and welfare gains due to the kind of bulk discounts analyzed here. Most importantly, the 7.56 cents used as the initial price in these simulations was composed of two distinct charges per minute: (1) an artificial rate element (the common line charge) designed to recover a portion of the non-traffic sensitive (NTS) costs of the local loop and; (2) traffic sensitive (TS) rate elements designed to recover traffic sensitive costs of switching and trunking in the LEC's network. Since then, the NTS element has been removed from the carrier access charge (CALC) and added into the CALC paid as a flat amount each month by end users for each access line. Thus, the access charge now paid by carriers is more like 4.5 cents per minute. Table 6 presents the effects of the profit maximizing set of two-part tariffs using the alternative elasticities, but with an initial price of 4.5 cents per minute. The largest consumer, type 6, pays a usage charge of only 1.9 cents per minute, still a substantial discount, with an entry fee of $1,740.48 per month. Profit rises by 8 percent, lower than in table 5 (which had an initial price of 7.56 cents per minute), but still quite large enough to be interesting. Thus, optional tariffs for access minutes, billed to the end user, are probably still efficient enough so that the ability to file them as new services under the price-cap proposal is of significant benefit to both consumers and LECs.

4. Other Considerations

In this section we discuss qualifications to the above analysis that are of some potential importance.

4.1 End-User Billing

Billing the end user for access charges may be very different from current practice, but it is not at all at odds with economically efficient pricing. Access is not a good desired in and of itself; it is an intermediate good - an input into the production of long-distance services. And for efficient pricing, it is irrelevant whether those who cause access costs pay for that service through direct billing from the LEC or through their long-distance charges.

A bigger concern with end-user billing per se stems from marketing considerations. Since carrier access is purchased by the interexchange carriers (IXCs), the LECs have no direct contact with long-distance customers and, in effect, provide a wholesale service which is being retailed to customers by the IXCs. On the other hand, it has been argued that if access were sold directly to customers by the LECs, interexchange service might be perceived as the wholesale service being marketed or resold to end users by the LECs.[17] Thus, end-user billing for access charges is at the heart of a struggle for retail market presence between local and long-distance carriers, and the standard of economic efficiency has no relevance in deciding the outcome.

4.2 Bypass

Most of the arguments favoring tapered tariffs (billed to the end user or not) have proposed them as ways of extracting a contribution (above marginal cost) from large business customers without encouraging undue bypass. It is easy to understand the LEC's private concern with preventing bypass, but to what extent does this private benefit reflect an increase in social welfare? In our view, bypass and switched access are simply two substitute inputs into the production of a long-distance switched minute. Furthermore, the long-distance technology is fixed proportions—a long-distance minute of use cannot be produced without (roughly) two access minutes of use but all forms of access are essentially perfect substitutes. Extremely large customers will find dedicated access cheaper (whether it be private bypass facilities or LEC special access facilities) and small customers will find switched access cheaper (whether it be aggregated through private access resale and sent through a dedicated facility to the IXC or aggregated through the LEC local network).

4.3 Resale

A minor problem with tapered tariffs is that since they are based on a form of price discrimination (the marginal price paid by different size users is different), they set up incentives for customers to aggregate their traffic before presenting it to the exchange carrier network. Just as the WATS tariff has given birth to WATS resellers, bulk discounts in access would give rise to access resellers. However, if access resale (private aggregation of traffic) costs less than aggregation performed by the LEC switch, then society will be better off by allowing such aggregation.

4.4 Response by IXCs

Viewing access as an input to IXC service, it is important to take into account the reactions of the IXCs. With end-user billing, the effects of bulk discounts for access would be that the demand curve for IXC minutes of use for each customer type receiving a discount would shift outward. IXCs might be tempted to simply raise their own prices in response, which would reduce the demand response from the lower access charges and, with it, the profit and welfare effects calculated above. However, fully rational behavior by an IXC would be to extract potential increases in consumer surplus via a system of entry fees, and not cause the total marginal usage charge (access plus IXC charge per minute) faced by users to increase. This would reduce consumer surplus, but would not reduce the profit and total surplus effects calculated above.

5. Conclusions

In this article we have argued that one possible benefit of the FCC's proposed price-cap system for LECs is that it appears to make it easier for LECs to offer optional two-part tariffs billed to end users. Calculations are presented that suggest that the possible social benefits of this feature of the proposal may be large. This suggests that under price-cap regulation the public would be well served by and FCC policy readily allowing receivers from Part 69 tariff structure rules for optional tariffs on access.

Notes

The models, analyses, and conclusions herein are the authors' own and not those of Bellcore or National Economic Research Associates.

1. See FCC (1989), page 393, paragraph 891.
2. It may be that even under price caps, the FCC would have to grant an exemption from Part 69 rules on tariff structure, although the FDC cost test in Part 69 would not have to be passed.
3. Different tapered tariffs were filed by New England Telephone and New York Telephone. Calling our stylized tariff a "NYNEX" tariff thus emphasizes that it does not precisely correspond to any filed tariff.

4. In this section, the term "flat rate" denotes a rate structure with a constant price per minute of use, independent of the amount of usage.
5. There is probably general agreement that the marginal cost of *switched* access is roughly invariant to the amount of switched access purchased.
6. Recall that the Public Utility Regulatory Policies Act of 1978 (PURPA) recommended the elimination of tapered tariffs unless they reflected the cost of service. See Brown and Sibley (1986, 1987), chapter 4 for a discussion of this issue, in which they conclude that tapers can increase economic efficiency even when the marginal costs of serving large and small users are the same.
7. This is a simplified version of a more general result which appears in R.D. Willig (1979).
8. It is easy to show that if $P_1 > P_0$, the firm loses money, so to implement (2) with $P_1 > P_0$ does not Pareto dominate P_0.
9. See G.R. Faulhaber and J.C. Panzar (1977).
10. For an example of this, see S. J. Brown and D.S. Sibley (1986, 87).
11. If Medium takes (E_2, P_2) instead of (E_1, P_1), he is—by definition—better off and the firm must necessarily make more money than if he remained on (E_1, P_1).
12. See J.E. Anderson (1976).
13. Note that price elasticities derived from historical data have two defects if used for our purposes: (1) they represent the price elasticity of demand for switched long-distance service, not for switched access, and (2) they were estimated from data in which there was no alternative to switched access for long-distance service. In addition, the constant price elasticity of demand assumption is probably unrealistic when substitution is predominantly driven by bypass.
14. This is technically unrealistic since the traffic sensitive tapered rates apply to WATS usage as well as MTS and since the price elasticities of demand by band are derived from weighted averages of WATS and MTS own and cross price elasticities.
15. See Heyman, Lazorchak, Sibley and Taylor (1987).
16. See Faulhaber and Panzar (1977).
17. The Modification of Final Judgment imposes an absolute prohibition on Bell Operating Companies' carriage of interLATA traffic.

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