A RAND NOTE

Price Caps in Telecommunications Regulatory Reform

Leland L. Johnson

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PREFACE

This Note addresses the merits of substituting price caps for rate of return regulation in the telecommunications industry. Among sources of evidence, it draws upon submissions in Federal Communications Commission CC Docket 87-313 dealing with issues of price cap regulation, and upon experience in the United Kingdom, where British Telecom has operated under price cap regulation since it was privatized in 1984.

An earlier version of this study was prepared for the Twentieth Annual Conference of the Institute of Public Utilities, Michigan State University, December 5-7, 1988, in Williamsburg, Virginia. The study was supported under a grant by The Markle Foundation, supplemented by funding from The RAND Corporation. State and federal regulatory and legislative bodies, telephone companies, and consumer groups may find it of particular interest.

SUMMARY

For decades, much concern has been expressed about the perverse incentives and other undesirable characteristics associated with the "cost plus" nature of rate of return (ROR) regulation. Especially notable are the weakened incentives for the firm to maximize its efficiency (i.e., to minimize cost for given outputs), the incentives to use excessive amounts of capital relative to other inputs, the incentives to engage in predatory, below-cost pricing in competitive markets, and the costly and time-consuming administrative procedures.

In recent years the notion of imposing price caps as a substitute has attracted widespread attention. This approach would permit the firm to raise prices to reflect general inflationary forces and other factors beyond the firm's control, and would require it to lower prices in accordance with a productivity factor that reflects the greater productivity advances in telecommunications relative to advances in the rest of the economy. This approach is appealing because it would (1) sever the regulatory connection between prices and costs, rewarding the firm with whatever cost savings it achieves through improved efficiency, (2) sever the connection between profits and rate base, thereby eliminating the incentive to use excessive amounts of capital, (3) impose price ceilings on monopoly services to restrict the firm's ability to finance predatory undertakings in competitive markets, and (4) impose a smaller administrative burden.

However, price capping faces a number of difficulties. Fundamental is the fact that the regulator cannot completely ignore the firm's rate of return in establishing a pricing formula or in adjusting it over time. Thus, the perverse incentives of ROR regulation cannot be entirely eliminated by price caps.

Other problems include (1) the difficulty of establishing an appropriate productivity adjustment factor, which has been a source of particular controversy because even small differences in the adjustment can make big differences in dollars; (2) the threat of anticompetitive

cross-subsidization of services within a "basket" of services subject to a single price cap; (3) the possibility that service quality would fall; (4) the difficulty of identifying which firms and services are the most appropriate for price cap regulation; and (5) the difficulty of determining how exogenous cost changes should be treated, since no single general price index can be expected to measure exactly the cost changes beyond the firm's control.

This study treats issues of productivity adjustment, pricing flexibility and anticompetitive practices, service quality, and appropriate applications of price caps, as related to telecommunications.

THE PRODUCTIVITY ADJUSTMENT

The appropriate productivity adjustment is subject to a good deal of controversy. For example, the Federal Communications Commission (FCC) has proposed a price cap formula that consists of the GNP Price Index minus a 3 percent annual productivity adjustment to reflect the more rapid pace of technological advance in telecommunications than in the economy as a whole. This formula would be applied (on a voluntary basis) to the interstate services offered by AT&T and the local exchange carriers (LECs). But the FCC's 3 percent estimate has been assailed from all sides.

Even if the adjustment is underestimated, price cap regulation would prove superior to ROR regulation under a wide range of circumstances. For example, suppose that a productivity adjustment caused prices under a price cap plan to rise 20 percent above those under ROR regulation. In a simple model of a monopoly firm with constant costs, only a 4 percent cost reduction would be required to offset this 20 percent increase in price, even if the price elasticity of demand were as high as 2.0 (e.g., a 20 percent increase in price causes a 40 decrease in output); while only a 1 percent cost reduction would be needed if price elasticity were 0.5. Thus, if the productivity adjustment factor errs on the low side, even a small improvement in the firm's efficiency encouraged by price caps may nevertheless suffice to make society better off.

PRICING FLEXIBILITY

Price caps would also increase the firm's pricing flexibility. Subject to an overall weighted price ceiling for a basket of services, the firm would be permitted to adjust prices for specific services without time consuming and contentious regulatory review. A widely voiced concern, however, is that the firm could cut the price of a service in the basket below cost as a predatory maneuver against competitors, could hike prices elsewhere in the basket, and could still comply with the overall price cap constraint. A partial remedy, at least, is to put monopoly services in a basket separate from competitive services. For AT&T, the FCC has proposed two baskets--one for switched, the other for non-switched, services. This would be a proper choice if the two were to face markedly different levels of competition. But other combinations may be preferable, depending on competitive pressures from MCI, US Sprint and other players.

SERVICE QUALITY

Concern has also been expressed that service quality might fall as carriers, seeking to maximize profits, unduly cut back on new network investments. This concern is questionable because such reductions in network investment would generally affect both monopoly and competitive services, which share many of the same facilities such as switches and trunk lines. To reduce investment would invite expanded competitive entry and erosion of the firm's profits and market share.

SCOPE FOR USE

Much of the attention in proposing price caps has been devoted to their use for AT&T. However, AT&T has not been able to earn even its FCC-authorized rate of return since the divestiture in 1984. Thus, no reason exists for believing that AT&T lacks strong incentives to behave efficiently. The primary advantage for AT&T of price caps lies in the greater freedom to price flexibly without costly and time consuming FCC reviews, in response to changes in an increasingly competitive environment. For AT&T, price caps can best be regarded as a transitional regulatory tool on the road to full deregulation.

More important targets for price caps are the local exchange carriers for services subject to state regulation. The LECs hold a core monopoly for basic local exchange telephone service at the same time that they offer services (such as intraLATA toll) subject to varying degrees of competition. This combination of monopoly and competitive services raises troublesome issues about the potential for cross-subsidization between the two services to disadvantage competitors. Perhaps the most significant contribution of a well designed price cap mechanism would lie in helping to protect against anticompetitive behavior, thereby facilitating the dismantling of line-of-business and telephone/cable TV cross-ownership restrictions against the LECs.

ACKNOWLEDGMENTS

Representatives of the Office of Telecommunications, British Telecom, Mercury Communications, Consumers' Association, and the Telecommunications Users' Association gave patiently of their time in answering my many questions about the British experience with price cap regulation. I am also indebted to RAND colleague R. E. Park, whose many insightful comments on a draft greatly improved the final product.

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I. INTRODUCTION

PROBLEMS POSED BY RATE OF RETURN REGULATION

Thousands of pages have been written about perverse incentives and other undesirable characteristics of rate of return (ROR) regulation. Especially notable are concerns about:

- The weakened incentives for the firm to maximize technical efficiency (i.e., to minimize cost for given outputs) because of its ability to pass along whatever costs it incurs, owing to the "cost plus" character of ROR regulation.
- The incentives to combine excessive amounts of capital relative to other inputs, if the firm's allowable ROR exceeds its cost of capital and if other conditions are met, because doing so expands its rate base and its total profits.
- The incentives to engage in predatory, below-cost pricing in competitive markets by shifting costs to ROR regulated markets, thus financing these ventures out of the pockets of "monopoly" ratepayers.
- The high administrative cost involved in establishing authorized rates of return and in determining whether particular costs were properly incurred.[1]

To be sure, little hard empirical evidence exists about the actual effects of these distortions. The Federal Communications Commission (FCC) notes that "in the past two years alone, we have disallowed more than $163 million in dominant carrier investments and ordered switched access charge reductions totaling nearly $900 million--a total of over

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[1]In the annals of telecommunications, probably the most sobering body of evidence about the difficulties posed by ROR regulation is in the FCC's 13-year rate investigation of the Communications Satellite Corporation (Comsat). See Leland L. Johnson, *Issues in International Telecommunications: Government Regulation of Comsat,* R-3497-MF, The RAND Corporation, Santa Monica, Calif., January 1987, Ch. III.

[2]FCC, *Further Notice of Proposed Rulemaking,* CC Docket No. 87-313,

$1 billion."[2] But no one knows whether this is the tip of the iceberg. Numerous studies have focused on whether regulated firms use excessive amounts of capital, generally with inconclusive results.[3] Allegations of predatory conduct are very hard to prove, complicated by the lack of a bright line to separate anticompetitive from "normal" competitive behavior.[4]

As many have pointed out, perverse incentives are weakened by the way that ROR regulation actually works. Especially, regulatory lag permits the firm to keep some of the cost savings arising from improved efficiency, and helps to blunt the bias toward excessive expansion of its rate base. Paradoxically, it seems, ROR regulation works well only when it works imperfectly.

Despite the lack of hard empirical evidence, and the mitigating effects of imperfect ROR regulation, it is fair to say that most observers remain uncomfortable. The likely presence of perverse incentives continues to be of nagging concern. For example, although predatory pricing is hard to prove, widespread perceptions exist that it does occur or could easily do so--and perceptions are important, for better or worse, in the formulation of public policy.

FCC 88-172, released May 23, 1988, p. 27. It is not clear from the FCC's evidence whether any double counting is involved between carrier investments and access charges.

[3]See, for example, E. R. Arzac and F. R. Edwards, "Efficiency in Regulated and Unregulated Firms: An Iconoclastic View of the Averch-Johnson Thesis," in M. A. Crew (ed), *Problems in Public Utility Economics and Regulation,* Lexington Books, Lexington, Mass., 1979, pp. 41-54; D. Z. Czamanski, J. S. Henderson, C. J. Odle, and V. Witkind, *Regulation as a System of Incentives,* The National Regulatory Research Institute, Columbus, Ohio, December 1980; and R. G. Noll, *Empirical Studies of Utility Regulation,* Social Science Working Paper 135, Division of the Humanities and Social Sciences, California Institute of Technology, Pasadena, Calif., August 1976.

[4]For particularly good surveys of the voluminous literature, see J. F. Brodley and G. A. Hay, "Predatory Pricing: Competing Economic Theories and Evolution of Legal Standards," *Cornell Law Review,* Vol. 66, 1981, pp. 738-803; and J. A. Ordover and G. Saloner, "Predation, Monopolization, and Antitrust," in R. Schmalensee and R.D. Willig (eds.), *Handbook of Industrial Organization,* North Holland, 1987.

THE WIDESPREAD INTEREST IN PRICE CAPS

Consequently, much effort has gone into finding ways to improve the incentives of regulated firms. In recent years the notion of imposing price caps as a substitute for traditional ROR regulation has attracted widespread attention. This development has been encouraged by the apparent success in the United Kingdom of using price caps for British Telecom (BT) after its privatization in 1984.

The FCC has proposed a plan (for adoption by carriers on a voluntary basis) under which AT&T's and local exchange carrier's (LEC's) interstate services subject to FCC jurisdiction would be grouped into specified "baskets."[5] Each basket would be subject to a weighted average price ceiling determined by the GNP Price Index (GNP/PI), as a measure of exogenous cost changes to the firm, minus a 3 percent annual productivity adjustment to reflect the estimated greater productivity gain in the telecommunications sector than in the economy as a whole, along with certain other adjustments for exogenous factors. The Commission estimates that productivity would increase by 2.5 percent in the absence of price caps, while the use of price caps with their improved incentives would add another 0.5 percent as a "consumers' dividend." Thus, if GNP/PI increased by 4 percent during a given year (and abstracting from other possible adjustments), the firm would be permitted to increase the weighted average price of each basket by only 1 percent. The FCC proposes that a formal review of the program be initiated at the end of the third year to provide a basis for revisions.

Some states are also moving away from traditional ROR regulatory practices. Vermont's "social contract" agreement with New England Bell and a rate increase moratorium agreement between the New York Public Utilities Commission and New York Bell are leading examples. In varying degrees, such plans involve mechanisms for limiting increases in local rates to basic telephone subscribers, similar in some respects to the FCC's efforts at the interstate level.

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[5]FCC, op. cit.

Price cap regulation is appealing for several reasons:

- By severing the regulatory connection between prices and costs, it rewards the firm with whatever savings the firm achieves through improved efficiency.
- By severing the connection between profits and rate base, it eliminates the rate base bias.
- By imposing price ceilings on monopoly services, it restricts the firm's ability to finance predatory undertakings in competitive markets by hiking prices to monopoly ratepayers.
- By offering straightforward criteria for enforcement, it imposes a smaller administrative burden.
- By giving the firm greater pricing flexibility for services within each basket, it encourages the firm to move toward socially optimal, Ramsey prices.[6]

With respect to this last point, price flexibility is not a unique characteristic of price regulation cap. In principle, the same pricing latitude could be accorded to the firm subject only to an overall ROR constraint. A potential advantage of price caps, however, lies in permitting certain services to be singled out for capping, thus guaranteeing to their users--most notably politically powerful ones--that their prices will not rise above pre-specified levels regardless of whatever pricing flexibility the carrier exercises elsewhere.[7]

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[6]For a description of Ramsey Pricing, see Edward E. Zajac, *Fairness or Efficiency: An Introduction to Public Utility Pricing,* Ballinger, Cambridge, Mass., 1978, Ch. 3. A demonstration of how price caps may lead the firm to adopt Ramsey pricing is given by Ingo Vogelsang, *Price Cap Regulation of Telecommunications Services: A Long Run Approach,* N-2704-MF, The RAND Corporation, Santa Monica, Calif., February 1988.

[7]Of course, this additional constraint on specified services may reduce the firm's ability to move toward socially optimal prices. This illustrates one of the many compromises that may be required to make the price cap approach politically feasible.

POTENTIAL PROBLEMS POSED BY PRICE CAPS

Against these attractive features, price capping faces a number of difficulties. Most basic is the fact that the regulator cannot completely ignore the firm's rate of return in establishing a pricing formula or in adjusting it over time. As we are frequently reminded, the Communications Act of 1934 stipulates that the FCC must ensure that rates are just and reasonable and not unduly discriminatory. Moreover, the Fifth Amendment to the Constitution prohibits regulators from prescribing confiscatory rates. In the apt words of one commentator, *it is legally impermissible, then, to devise a model in which the regulation of rates is not in some way tied to costs.*[8]

Thus, the perverse incentives of ROR regulation cannot be entirely eliminated by price caps. At best, the firm would be permitted to keep whatever savings it achieves between formal rate reviews.[9] Thus, the outcomes might be indistinguishable from those of ROR regulation operating under a formal time lag. The FCC asserts that a rate of return policy "that consciously relies on regulatory lag" to mitigate perverse incentives is a policy "at war with itself."[10] I would suggest that a price cap policy also would be "at war with itself." This does not mean that price caps should be rejected. On the contrary, price caps are a promising alternative to ROR regulation despite the inevitable tension between adopting measures that seek to reward firms for efficiency, while at the same time needing to assure that the firm's profits are not entirely uncontrolled.

Price caps pose other problems, including:

- The difficulty of establishing an appropriate productivity adjustment factor. This requirement is highly controversial

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[8]Comments of Cable & Wireless Communications, Inc., CC Docket No. 87-313, October 19, 1987. Emphasis in the original.

[9]At worst, the formal review would be sufficiently constraining to rob the firm of the rewards earned in the previous period.

[10]FCC, op. cit., p. 61.

because even small differences in the adjustment can make big differences in dollars. As one study notes, "Cost data submitted to the FCC indicates that each one-half of 1% change in the productivity offset would be worth about $210-million annually at the beginning of the price caps plan, and about $260-million when the carrier common line cost base was included in the plan in 1990."[11]

- The threat of predatory behavior. The danger exists of anticompetitive cross-subsidization within a basket of services. The FCC proposes to limit price adjustments for each service within the basket to 5 percent annually to help forestall such behavior, but some parties call for price floors as well as price ceilings.
- Possibilities of reduced service quality. In contrast to ROR incentives to "gold plate," concerns have been voiced that price caps would encourage reductions in service quality, leading to "creeping dilapidation" of the network.[12]
- The difficulty of identifying firms and services that are appropriately subject to price caps. Some conclude that only AT&T should be subject to price caps, at least in the early years. Others believe that the LECs should also be included, but with no consensus about the pricing formula to be used. Still, others conclude that price capping is appropriate only for services subject to some degree of competition.[13]

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[11]W. Page Montgomery and Lee L. Selwyn, *Customer Benefits under "Price Caps" Regulation: Rethinking the FCC's May 1988 Proposal,* CC Docket No. 87-313, Economics & Technology, Inc., Boston, Mass., July 26, 1988, p. 13.

[12]Peter Huber, as quoted by Bethesda Research Institute, *Regulatory Systems for the 1990s: A Comparative Analysis of Price Caps and Rate of Return Regulation,* CC Docket No. 87-313, Bethesda, Maryland, July 1988, p. 48.

[13]There are other problems of price caps not addressed in this study. Perhaps the most notable involve choosing the most appropriate price index for measuring exogenous cost changes, and deciding whether other adjustments are needed in the price cap formula to reflect exogenous changes.

ORGANIZATION OF THIS STUDY

In Secs. II, III, IV and V, I evaluate the issues noted above about the appropriate productivity adjustment, price flexibility and anticompetitive behavior, service quality, and the appropriate scope of price caps. In each evaluation, I draw upon elementary economic theory, supplemented by evidence from filings in the FCC's docket CC 87-313 and, especially, from experience in Britain with price cap regulation. Major conclusions are summarized in Sec. VI.

II. PRODUCTIVITY ADJUSTMENTS

THE OPTIMAL ADJUSTMENT

To judge the appropriateness of a given productivity adjustment one needs a baseline for comparison. This baseline is most usefully formulated by reference to the "perfect," or socially optimal, adjustment. The optimal adjustment is one that, combined with the rest of the price cap formula, maximizes aggregate economic welfare, or the sum of consumer and producer surplus.[1]

After describing the characteristics of the optimal adjustment, I evaluate the consequences of either underestimating or overestimating the adjustment--a useful exercise since no one knows the level of the optimal adjustment. This section concludes by briefly treating the problem of achieving consensus about the appropriate productivity adjustment.

To maximize aggregate economic welfare, the price cap should induce the firm to price its services at marginal cost, subject to the constraint that it just cover total cost (including "normal" profits and no producer surplus). Thus, if the firm has constant costs (marginal cost equals average cost), price would also equal average cost and the firm would just break even. The firm would have an incentive to minimize costs for given outputs (i.e., maximize technical efficiency), for otherwise it would lose money.

If the firm has decreasing costs (marginal cost is below average cost), price must rise above marginal cost to cover total cost. For a single product firm, price would be equal to average cost. For a multi-product firm, individual prices would rise sufficiently above marginal costs to cover total cost. Ideally, the "mark ups" above marginal cost would be inversely related to the elasticity of demand, in accordance

[1]Consumer surplus is the difference between the amount consumers pay and the higher amounts that they would have been willing to pay for the level of total sales. Producer surplus, or "excess" profit, is the difference between total revenues and total cost for that level of sales.

with Ramsey pricing principles, to minimize the loss of consumer surplus caused by the need to raise prices above marginal cost.

Another possibility that should be noted, although it is probably not relevant for our purposes, is a firm with increasing costs (i.e., marginal cost exceeds average cost) so that marginal cost pricing generates revenues in excess of total cost, unlike the previous cases where producer surplus is zero. A firm with increasing costs would normally be subject to strong enough competitive pressures to obviate the need for either ROR or price cap regulation.

Figure 1 illustrates the optimal price cap for a firm with a single monopoly service, constant costs, a demand curve that remains fixed from period to period, and an unchanging overall price index in the price cap formula, where the index perfectly measures cost changes exogenous to the firm. The line AC1 depicts the average (and marginal) cost in period 1. With the demand curve DD, the "perfectly" operating cap results in a price of P1 and output of Q1. In this case, producer surplus is zero and consumer surplus, which is maximized, is measured by the entire area under the demand curve above AC1.

Suppose that in period 2 average cost falls to AC2. Even if the firm were permitted to maintain price at the previous level--P1--society would gain because the increase in technical efficiency reduces unit cost from AC1 to AC2. The total gain in technical efficiency, shown by the area of the rectangle H, would be captured by the firm as producer surplus. However, if the cap forces price down to P2 to equal AC2, with ouput rising to Q2, an additional "allocative" gain arises equal to the area of the triangle K. Price P2 is superior to P1 because the gain in technical efficiency is retained (though converted to consumer surplus) and an *additional* consumer surplus equal to K (which measures the increase in allocative efficiency) is generated by equating price and marginal cost. Under the assumption of constant costs, the sum of consumer and producer surplus is maximized when price is reduced to the point where producer surplus is zero. Thus, the optimal productivity adjustment results in price P2 and output Q2. For example, if average cost falls by 5 percent--the difference, say, between P1 and P2--the optimal productivity adjustment "X" would be 5 percent.

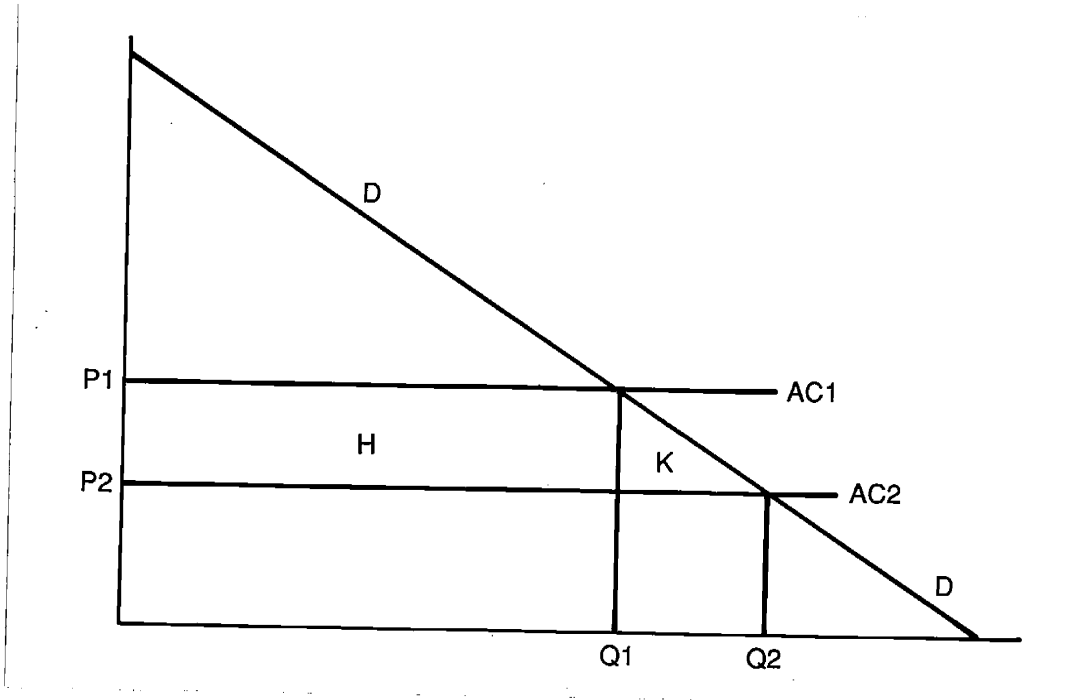

Fig. 1--The optimal productivity adjustment

The situation is more complicated if the firm is not operating at maximum technical efficiency when the price cap plan starts. Suppose that the firm operates under ROR regulation instead of price caps, earns a "fair" rate of return and, because of perverse cost-plus incentives, operates at a price higher than P1 in period 1. The optimal adjustment factor must be larger to capture both the initial inefficiency and cost changes from technological advance so that, again, the firm operates at price P2 in period 2.[2]

[2]It is because of alleged initial inefficiences that some parties urge that the percentage adjustment factor be higher in earlier years than subsequently.

How can X be estimated, since no one knows its optimal value? As a practical matter, the estimate will reflect a politically acceptable compromise among the contending parties, informed to a degree by historical experience.

Numerous studies have been made of past productivity increases with distressingly high variability in results. Part of the difficulty is that productivity change is not constant, but fluctuates over time. The FCC's estimate, based on its reading of past experience, is 3 percent for both AT&T and the LECs. But its number has been attacked from all sides. Two analysts conclude that "the proposed 3 percent productivity adjustment, in combination with the GNP Price Index, sets an unrealistically high target for the local exchange companies."[3] Two other analysts conclude that "an efficiency target equal to at least a 5% to 6% offset from the GNP/PI" is required.[4]

A key point, however, is that under a wide range of circumstances a price cap formula that includes an erroneous estimate of the optimal adjustment factor "X" nevertheless would generate better results than those of strictly enforced ROR regulation. I consider separately the consequences of underestimates and overestimates of X, where in the case of underestimates the price cap constraint may not always be binding.

THE CONSEQUENCES OF BINDING UNDERESTIMATES

An underestimate of X included in the price cap formula is binding on the firm if, in the absence of the cap, the firm would have set higher prices than those permitted by the cap. I consider three binding alternative caps: the first operates perfectly, as described above; the second includes an underestimate of the productivity adjustment factor such that the resulting higher price is equal to the price under ROR regulation with less than maximum technical efficiency; and the third includes a greater underestimate of the productivity factor so that

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[3]Alfred E. Kahn and William B. Shew, *BellSouth Testimony in FCC Price-Cap Proceeding,* CC Docket No. 87-313, July 25, 1988, p. 12.

[4]Montgomery and Selwyn, op. cit., p. 9.

price exceeds that under ROR regulation. These three price caps--PC1, PC2, and PC3, respectively--are illustrated in Fig. 2, where again the firm produces a single monopoly product under constant costs.

If the underestimate leads to the same price as that under ROR regulation (PC2=ROR and price is P2), society is better off with the price cap than with ROR regulation. The improved technical efficiency drives average cost to P1, resulting in a reduction of "waste" and an increase in producer surplus equal to the combined areas of the rectangles G and J.

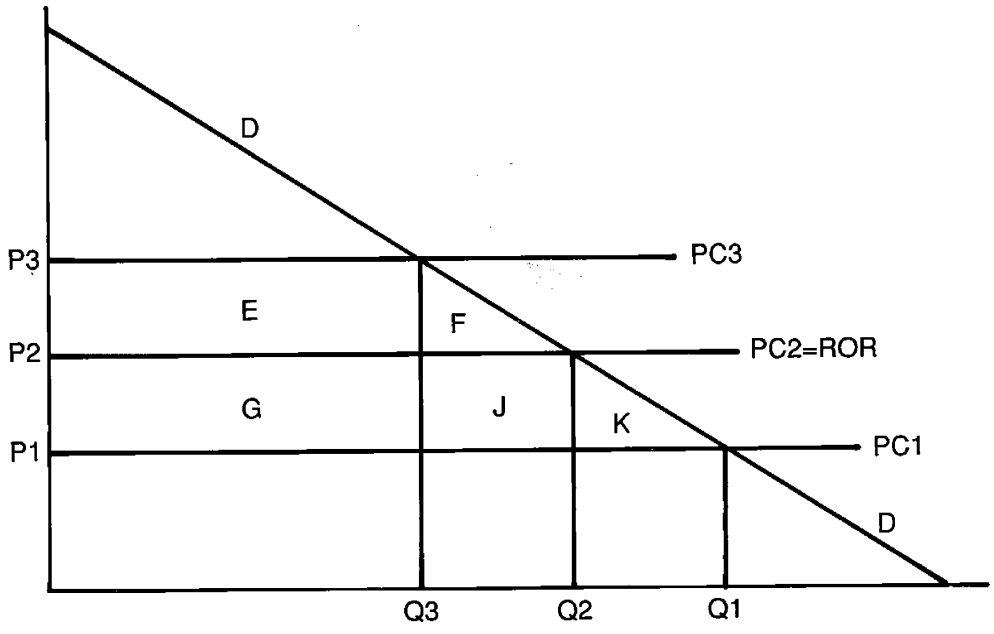

Fig. 2--Productivity adjustments and welfare tradeoffs

Welfare Tradeoffs

In the third case, shown by PC3, price P3 is higher than P2 under ROR regulation. Whether society is better off here than under ROR regulation depends on whether the area of the rectangle G exceeds the area of the triangle F; that is, on whether the increase in technical efficiency exceeds the loss in allocative efficiency. The larger the technical efficiency gains and the smaller the price elasticity of demand, the greater the net gain (or the smaller the net loss) to society caused by the use of price caps as an alternative to ROR regulation.

Past empirical studies of distortions between prices and costs show that allocative losses are generally quite small, and that only small increases in technical efficiency (sometimes called X-efficiency) are enough to more than compensate.[5] For example, if the price increase were 20 percent and if the price elasticity of demand were as high as 2, (e.g., a 20 percent increase in price causes a 40 percent decrease in output), only a 4 percent unit cost reduction would be required to offset the allocative loss. If price elasticity were 0.5, a cost reduction of only 1 percent would suffice.[6]

These comparisons highlight the promise of price caps as a mechanism of regulatory reform. If the productivity adjustment factor errs on the low side, even a small improvement in technical efficiency encouraged by price caps may nevertheless be sufficient to make society better off.

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[5]The classic article is by Harvey Leibenstein, "Allocative Efficiency Vs. 'X-Efficiency'," *American Economic Review,* June 1966, pp. 392-415.

[6]Oliver E. Williamson, "Economies as an Antitrust Defense: The Welfare Tradeoffs," *American Economic Review*, March 1968, pp. 18-36. These numbers, and Fig. 2, are based on his "naive" tradeoff model. The analysis has important qualifications, which he discusses.

The Issue of Income Distribution

The preceding has treated consumer surplus as if it were worth the same, dollar for dollar, as producer surplus. This is the standard approach in economics; in terms of economic efficiency, no basis exists for saying whether a dollar of one kind of surplus is worth more than a dollar of the other.

But it is not the standard approach in politics. As one would expect, the contending parties--telephone companies, consumer groups, and others--are very much concerned about their portion of the pie. A basic danger, however, is that the distribution resulting from the political struggle could reduce the size of the pie as well.

To appreciate how the size of the pie could shrink, consider the following example. Suppose that consumer groups conclude that they have nothing to gain from price caps and therefore opt for continuation of ROR regulation--and suppose that they are *right* insofar as the prices they pay are the same under either regulatory regime. This situation is illustrated by PC2=ROR in Fig. 2, where the prices are identical. However, under price caps (here PC2) society as a whole is better off because of the producer surplus generated, equal to the area of the rectangles G and J. It is of critical importance to recognize that this producer surplus reflects a reduction of waste in favor of more efficient production to the benefit of society as a whole. With the reduction of waste the size of the pie is larger than under ROR regulation. This increase in size is reflected in the value to society, including consumers of telecommunications services, in using for other purposes resources that would otherwise be used less efficiently in the telecommunications sector.

Of course, issues of how the pie is divided are important as well. While increasing the size of pie makes society in the aggregate better off, it does not necessarily make each and every individual better off. Indeed, increases in technical efficiency may make some people worse off.[7] In many cases, therefore, conflict arises between the goals of

[7]For example, improved technical efficiency may require the layoff of workers who have difficulty finding work elsewhere.

economic efficiency and equity in income distribution. A principle espoused especially by economists to deal with this conflict is to pursue the goal of economic efficiency, thereby maximizing the size of the pie, and then by suitable taxation and public expenditure policies to redistribute income to deserving groups such as the unemployed and those in poverty.[8]

Politically, however, it is very difficult to keep separate the goals of efficiency and equity. In the regulatory arena, as elsewhere, cases exist where economically inefficient programs are pursued for the benefit of particular groups at the greater expense of society as a whole.

THE CONSEQUENCES OF NON-BINDING UNDERESTIMATES

Another possibility is that the price cap formula is so loose (i.e., the estimate of X so low) that the formula is not binding. This situation could arise because (a) the firm imposes on itself an ROR constraint, or (b) the prices permitted by the price cap are above the prices that maximize the firm's profits.

A Voluntary ROR Constraint

This situation is illustrated by the British experience. British Telecom was spun off from the British Post Office in 1981 and privatized in early 1984. Alternative forms of regulation were explicitly considered prior to privatization. Notably, a report written by Stephen Littlechild in 1983 recommended that ROR regulation be rejected in favor of price caps, essentially for the reasons tabulated earlier.[9]

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[8]Telephone "lifeline" programs and the FCC's "Link Up America" program are examples of subsidized assistance afforded to low income households for telephone service. For a description of these programs see Leland L. Johnson, *Telephone Assistance Programs for Low-Income Households: A Preliminary Assessment,* R-3603-NSF/MF, The RAND Corporation, Santa Monica, Calif., February 1988.

[9]*Regulation of British Telecommunication's Profitability,* Department of Trade and Industry, London, 1983.

The decisionmaking process was remarkably rapid--at least judged by U.S. standards. Littlechild's basic recommendations were accepted by the government, an initial productivity adjustment of 3 percent was set, and the Retail Price Index (RPI) was adopted as the basic indicator of exogenous price changes. Capped services were placed in a single basket consisting of line rentals and domestic local and long distance service. The license to BT setting down the RPI-3 formula and attendant conditions was granted in June 1984, the year after the Littlechild report. The plan started only two months later--on August 1, 1984--with monitoring and enforcement by the Office of Telecommunications (Oftel).

The maximum permitted increase in the weighted average price of the basket is equal to RPI-3, with BT ordinarily making any price adjustments in November of each year. The RPI (and BT's revenues used as weights) are measured during the 12-month period ending the prior June.[10] BT may carry forward for up to two years any difference between the ceiling and its actual price increase. Moreover, BT and the Director General of Oftel agreed that the ceiling for residential line rentals would be RPI+2 to permit a limited relative increase in the price of local access--the process of "rebalancing" common in a number of countries including the United States. The RPI-3 formula runs for five years, to July 1969, after which it is subject to revision based on a prior detailed review by Oftel.[11]

The results to this writing are summarized in Table 1. For example, as of November 1984 the RPI for the base period August 1983-July 1984 rose by 5.1 percent, permitting an increase of 2.1 percent in BT's prices. Because BT raised prices by only 2.0 percent, a 0.1 percent allowance was carried forward to November 1985.

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[10]Use of previous time period data for measuring RPI and BT revenues facilitates administration of the plan by requiring only actual rather than forecast results. Moreover, use of prior period weights helps to assure that the firm will move toward Ramsey prices for services in the basket. For an elaboration of these points, see Vogelsang, op. cit.

[11]In addition to privatization of BT, the Thatcher government decided to permit Mercury Communications to compete with BT. This duopoly policy is to be reviewed in 1990.

Table 1

PERCENTAGE PRICE CHANGES WITHIN RPI-3 PRICE CAP: BRITISH TELECOM

	Nov. 1984	Nov. 1985	Nov. 1986	Nov. 1987	Nov. 1988	Cumulative
RPI change in base period	+5.1	+7.0	+2.5	+4.2	+4.6	+25.6
RPI minus 3 percent price cap	+2.1	+4.0	-0.5	+1.2	+1.6	+8.6
Carry forward from previous period	n.a.	+0.1	+0.4	+0.2	+1.3	n.a.
Maximum permitted increase in period	+2.1	+4.1	-0.1	+1.4	+2.9	n.a.
Weighted average actual increase	+2.0	+3.7	-0.3	0	0	+5.5

Source: Kip Meek, *Telecommunications Price Control in the U.K.* International Institute of Communications, London, 1988.

BT has not taken full advantage of the opportunity to raise prices under the RPI-3 formula. While the RPI-3 formula would have permitted a cumulative increase of 8.6 percent, BT has chosen to raise prices by only 5.5 percent. Indeed, BT voluntarily agreed to a price freeze from July 1987 to July 1989, when a new formula, RPI-4.5, is to take effect based on a formal review of the program conducted by Oftel during the first half of 1988.[12]

This situation suggests that the 3 percent adjustment has been too small to be binding. Why has BT not exploited more fully its market power under the RPI-3 formula? The answer may lie in BT's belief that it should impose a loose form of ROR regulation on itself to avoid adverse public reaction, and to position itself favorably for the formal review in 1988 that led to the new RPI-4.5 formula. During the period 1983 to 1987, BT's pretax rate of return rose from 19.3 percent to 21.4 percent.[13] In comments filed with Oftel this return was generally

[12]Oftel, *Statement: The Control of British Telecom's Prices,* 7 July 1988.

[13]Oftel, *The Regulation of British Telecom's Prices: A Consultative Document,* January 1988, p. 6.

regarded as not excessive even by consumer groups, which one would expect to be at the forefront in alleging unreasonably high profits if there were any doubts. As one consumer group observed

> BT's rate of return on assets employed is not yet excessive. Typically, in other sectors, profits would need to be at least in the range 25-30 percent to attract the attention of the Office of Fair Trading. As telecommunications is a relatively low risk business, BT might come at the lower end of this range.[14]

If BT had taken full advantage of its price flexibility under RPI-3, its ROR in 1987 might have risen by several percentage points above the 21.4 percent recorded. This higher level might well have been regarded as excessive--especially since it would have intensified the upward trend of earnings from the 19.2 percent level recorded in 1985, the first full year of privatization. This situation might have brought a more severe response during Oftel's formal review, perhaps resulting in a new formula much less favorable to BT than RPI-4.5. Indeed, large profits could have triggered an earlier formal review. As the Director General of Oftel has noted:

> It will probably never be desirable to rule out the possibility that a given formula will be reviewed before the end of its nominated period. A review might become necessary either because profits seem grossly excessive or because the firm is suffering financial hardship to the point where it cannot finance the investment needed to maintain its services.[15]

The salient aspect of the British experience is the shadow of ROR regulation. Whether an ROR constraint is imposed by regulators or voluntarily by the firm, the perverse incentives associated with ROR

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[14]Consumers' Association, *The Regulation of British Telecom's Prices,* submission to Oftel, March 1988, p. 6. As in the case of other groups, the Consumers' Association expressed more concern about BT's perceived inadequate level of service than with its profits, as elaborated below.

[15]Oftel, *The Regulation of British Telecom's Prices,* p. 7.

would persist. Seeking to keep the ROR within "acceptable" levels, the firm would have weaker incentives to minimize cost for given outputs than would one fully free to maximize profits.

The British experience illustrates two notable points: First, the results of underestimating X would be no worse than those under ROR regulation if the firm voluntarily imposes the same ROR constraint on itself. Second, an underestimate can trigger rather prompt remedial measures. The fact that the RPI-3 formula was too weak was perceived early in the program and contributed to BT's agreement to freeze prices during the last two years before the more stringent formula RPI-4.5 was to go into effect.

The Profit Maximization Constraint

The price cap could be so weak that the firm is able to maximize profits while staying well within the cap.[16] In effect, the firm would be deregulated. In this case, one would assess the tradeoffs between the loss in allocative efficiency and the gain in technical efficiency for the profit maximizing firm compared with the situation where it is subject to ROR regulation. If the gain in technical efficiency caused by abandoning ROR regulation is sufficient, society would be better off with price caps even if they permit the firm to raise prices enough to maximize profits.

THE CONSEQUENCES OF OVERESTIMATES

The discussion can be much briefer for an excessively high productivity factor. In this case the firm must cut prices in excess of its productivity advances. It would necessarily suffer financial losses, which would be all the more serious if it did not have excess profits initially for a cushion.

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[16]Conceivably, competition from Mercury Communications also has eroded BT's market power so that its recorded profits are near profit maximizing levels. However, competition by Mercury is at a much earlier stage than, say, competition among AT&T, MCI, and US Sprint in the United States. For the year ending March 31, 1987, Mercury's gross revenues were less than 0.4 percent of BT's revenues for domestic telephone service. Mercury Communications Limited, *Report and Financial Statements for the Year Ending 31st March 1987,* p. 6; British Telecom, *Supplementary Report 1988,* p. 8.

However, firms generally have enough financial flexibility at the expense of their shareholders so that they can suffer stress for some years without going out of business. Certainly, we have seen many cases where firms record losses for a number of years and then live to see better times (the airlines are a good example). During formal reviews the firm could seek a more liberal revised formula. Under the worst of circumstances it could file for an emergency waiver.

Some critics of price caps have viewed the possibility of emergency relief as a "heads they win, tails we lose" situation. If the adjustment factor is underestimated, the firm enjoys excess profits; if the factor is overestimated, the firm can seek special relief on grounds of confiscation of property. But getting this relief may not be a simple, easy process. No bright line exists between confiscatory and non-confiscatory price levels--as illustrated by many cases where firms operate at a loss during some time periods. Presumably, the firm would have a heavy burden of proof in supporting a special claim for relief. Although the firm would be under stress, it would have strong incentives for achieving technical efficiency, so that society could, on balance, benefit from a price cap program involving a short term overestimate of the adjustment factor, relative to technical inefficiency under ROR regulation.

THE PROBLEM OF ACHIEVING CONSENSUS

The preceding will offer little comfort to either telecommunications users or to regulated firms. Users would not placidly accept higher prices content in the knowledge that others in the economy might be better off. Nor would firms willingly accept whatever regulatory environment is imposed knowing that, at worst, they will not go bankrupt immediately.

Probably the single greatest difficulty lies in achieving sufficient political acceptance for adopting a productivity adjustment that only roughly approximates the optimal adjustment. Of key importance is whether a sufficient consensus can be forged among competing interests in favor of specific productivity adjustments to permit price caps to be implemented.

In the United Kingdom, building such a consensus went surprisingly smoothly. The initial 3 percent adjustment factor was adopted by Oftel without great time delays or acrimony, and the new adjustment of 4.5 percent was achieved after straightforward review of the evidence and negotiations with BT. Nothing suggests that the decision for the 4.5 percent adjustment will be appealed in court.

Events can hardly be expected to unfold so smoothly in the United States. Differences in laws and administrative processes, and the likely greater reluctance of some parties to settle for only rough justice, will continue as hurdles to price cap implementation.

III. PRICING FLEXIBILITY

THE ISSUE OF ANTICOMPETITIVE BEHAVIOR

Depending on their specific design, price caps increase the firm's pricing flexibility. Subject to the overall weighted average price ceiling for the basket, the firm may adjust prices for specific services without time-consuming and contentious review of tariff filings by regulators.

Of leading concern is that the firm could cut the price of a service in the basket to below cost, hike prices elsewhere in the basket, and still comply with the overall price cap constraint. In response, to reduce the possibility that the carrier will engage in anticompetitive behavior, the FCC has proposed that the carrier not be permitted to raise or lower particular prices by more than 5 percent annually. The difficulty with this approach is that it may unduly restrain the carrier in responding to rapidly changing market conditions.

A potentially better remedy is to put services subject to competition in a basket separate from the monopoly basket, or, with sufficient competitive pressure, simply to deregulate them. With a cap on monopoly services, the firm could not easily hike rates to its monopoly ratepayers by simply shifting costs from its competitive services to its monopoly services.

To be sure, if the firm earns excess profits in the monopoly basket because of a too-small productivity adjustment factor, it could more easily than otherwise finance anticompetitive activities. But it would sacrifice money out of its own pocket to do so, to the extent that it could otherwise keep whatever it earns in the monopoly basket rather than forgo the gains through ROR regulation. In this case, it would be in the same position as any profit maximizing firm that could engage in anticompetitive behavior, but at the expense of up-front losses whose eventual recovery would be uncertain.

To illustrate, consider a price capped firm that earns excess profit in its monopoly basket compared with a ROR regulated firm. Suppose both firms estimate that for each dollar of up-front cost the expected return in the competitive market is only 90 cents. The ROR regulated firm may decide to enter this market even though it is not likely to fully recover the up-front cost, because much of this cost might be shifted to its monopoly ratepayers. In contrast, the price capped firm is more likely to decide not to pursue the competitive venture, even though it earns excess profits in the monopoly basket. The reason is that the up-front cost would be financed out of excess profits that otherwise would go to the benefit of the firm and its shareholders. With the price cap in place, monopoly ratepayers would be protected from the danger of financing the firm's anticompetitive ventures, because the price they pay would be constant regardless of how the firm uses its excess profits.

Of course, the preferred strategy is to design a price cap system in which the firm earns no excess profit in the monopoly basket. But, as emphasized in Sec. II, no price cap system will operate perfectly. Even if, through price cap imperfections, the firm is able to earn excess profits, its incentives for predation would be weaker than those of the ROR regulated firm.

To reduce incentives for predation, the criterion for designing baskets should be the degree of competitive pressure for various services. Those facing no competition would be in one basket; those facing some, or potentially some, in another; while those that are competitive would be deregulated. The FCC proposes two baskets--one for switched, the other for non-switched, services. This would be a proper choice if the two were to face markedly different levels of competition. But other combinations may be preferable, depending on competitive pressures from MCI, US Sprint, and other players.

This is not to say that basket design is an easy process. Drawing lines between monopoly and competitive services will be complicated by the fact that the degree of competition will vary from service to service, and will change over time. This situation is well illustrated by Britain's experience.

SERVICE BASKET DESIGN: THE BRITISH EXPERIENCE

The British price cap system covers a single basket, where the RPI-3 formula is supplemented by the agreement with Oftel that BT not raise residential line rentals by more than RPI+2. Table 2 displays price changes for the various services included in BT's basket.[1] Substantial price adjustments were made during the first three years, with long distance calls exceeding 56 kilometers showing large decreases and shorter distance calls showing increases--especially peak period local calls. Exchange line rentals rose, as expected. However, even here BT has not fully exercised its freedom to raise prices under the RPI+2 agreement. As Oftel's Director General has noted, BT "has kept rentals well within the limit set by this non-license cap--an actual increase of 20% against the limit of 29%."[2] Moreover, while the formula gave BT leeway to raise the real price of residential line rentals, the cumulative increase of 20.5 percent was less than the 25.6 percent increase in the RPI shown in Table 1.

The pattern in Table 2 reflects the workings of two factors. First, technological advances have been greater in long distance than in local markets. Thus, one would expect a relative fall in the price of long distance service--as we have seen for decades in the United States. The large changes during the first three years may have been in response to a badly distorted price structure inherited from the British Post Office. Second, competition with Mercury Communications for long distance traffic has caused price adjustments, as explained below.

Problems of Basket Design

Two aspects of basket design are notable. First, monopoly and competitive services have not been separated into two (or more) baskets. To be sure, the RPI+2 agreement for line rentals separates this monopoly service from everything else in the price cap program. But local

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[1]A number of other services, such as international calls, are not currently included in the price cap program.

[2]Oftel, *The Regulation of British Telecom's Prices*, p. 5.

Table 2

PERCENTAGE PRICE CHANGES BY SERVICE: BRITISH TELECOM

	Nov. 1984	Nov. 1985	Nov. 1986	Nov. 1987	Nov. 1988	Cumu-lative
Exchange Lines						
- Residential	+ 7.1	+ 8.5	+ 3.7	0	0	+20.5
- Business	+ 6.8	+ 8.8	+ 3.9	0	0	+20.7
Local Calls						
- Peak	+ 6.8	+ 6.4	+18.9	0	0	+35.1
- Standard	+ 6.8	+ 6.4	+ 6.4	0	0	+20.9
- Cheap	+ 6.8	+ 6.4	- 3.6	0	0	+ 9.5
National Calls less than 56 km						
- Peak	+ 6.8	+ 6.4	+ 1.6	0	0	+15.5
- Standard	+ 6.8	+18.3	+ 1.1	0	0	+27.7
- Cheap	+23.1	+ 6.4	+ 2.7	0	0	+34.5
National Calls over 56 km - Low Cost Routes						
- Peak	-10.3	-13.9	-12.0	0	0	-32.0
- Standard	-10.2	-13.7	-12.0	0	0	-31.8
- Cheap	+ 6.8	+ 6.4	-12.0	0	0	0
National Calls over 56 km - Other Routes						
- Peak	-14.0	- 6.2	-16.0	0	0	-32.2
- Standard	-13.9	- 4.9	-17.0	0	0	-32.0
- Cheap	+ 6.8	+ 6.4	- 6.2	0	0	+ 6.6
Weighted Average Increase	+ 2.0	+ 3.7	- 0.3	0	0	+ 5.5
Maximum Increase Permitted under RPI-3	+ 2.1	+ 4.1	- 0.1	+1.4	+2.9	10.8

Source: Meek, op. cit.

exchange service--a de facto monopoly held by BT--is in the same basket with long distance services competitive with Mercury. Redesign of the baskets, with line rentals and local exchange service under a single cap, might reduce risks of predation and give greater protection to basic telephone users.

Second, BT's price adjustments illustrate problems that arise from the fact that the degree of competition varies among services within a single, generally competitive, basket. This is shown by the substantial increase in long distance cheap rates relative to standard and peak rates. This adjustment is curious in that cheap rate calls are confined to night and weekend hours when marginal costs of using the largely idle network are virtually zero. To promote economic efficiency, one would expect prices for such off peak services to be reduced, rather than increased.

This upward adjustment probably reflects differential competitive pressures from Mercury. Cheap period services are used largely by residential rather than business customers, and the residential market is less competitive than the business market. The reason is that the cost of gaining access to Mercury's lines is a greater burden on residential than on business customers. Only about 20 percent of BT's access lines are connected to exchanges with tone signalling, which give customers with tone signalling phones access to Mercury lines (in areas of the country where Mercury service is available). The other 80 percent are served by exchanges with pulse signalling. In these exchanges, the customer needs a specially designed telephone for access to Mercury lines. Bearing the cost of this equipment is more clearly justified for heavy users of long distance, such as businesses, rather than for light users, such as most residential customers.[3]

In response to these differential competitive pressures BT has raised the rates during the relatively noncompetitive night and weekend hours, while lowering rates during standard and peak periods when it faces competition from Mercury for business traffic.

One would ordinarily expect any business enterprise to adjust its prices to reflect differential competitive pressures. As long as each service is priced so that it covers its long run *incremental* costs, it

[3]According to one Mercury sales brochure, the price of a telephone designed specifically for use with Mercury lines (and for BT service for local calls) is currently advertised at £51.99--about $93.00 at current exchange rates.

does not burden users of other services, so that the system is subsidy free.[4] Otherwise the problems of cross-subsidy and anticompetitive practices arise.

The cost of a telecommunications network is greatly affected by the amount of capacity that is installed; and the amount of capacity is dictated by the level of peak period traffic. To promote efficient network design and use, peak period customers should pay at least the incremental costs required to serve them. If they do not do so, other groups are required to subsidize peak load users. This situation raises a key question about the pattern in Table 2. Are peak period long distance users (primarily business users) being subsidized by others, such as cheap rate long distance (primarily residential) users?

Even if no subsidies are involved (all users cover their incremental costs), questions arise as whether the price adjustments in Table 2 move away from allocatively efficient Ramsey prices. If the demand for cheap rate service is relatively elastic, and since marginal cost for this service is near zero, Ramsey pricing would dictate that the price for this service be low (i.e., the markup over marginal cost be small to reflect the relatively high demand elasticity), while relatively high prices would be set for services with smaller demand elasticities and higher marginal costs (e.g., prices for line rentals).[5]

Questions about cross subsidy and efficient pricing cannot be answered here. But they merit serious attention by Oftel.

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[4]Incremental costs are to be carefully distinguished from fully distributed costs that involve an arbitrary allocation of common costs among the firm's services. The use of fully distributed cost methodology in establishing rates has been severely criticized by economists and others. See, for example, W. J. Baumol, M. F. Koehn, and R. D. Willig, "How Arbitrary is 'Arbitrary'?--or, Toward the Deserved Demise of Full Cost Allocation," *Public Utilities Fortnightly,* September 3, 1987, pp. 16-21. For discussion of tests for cross-subsidization, see Gerald Faulhaber, "Cross-Subsidization: Pricing in Public Enterprises," *American Economic Review,* December 1975, pp. 966-977.

[5]Although line rental prices rose substantially as shown in Table 2, they may still be too low relative to cheap period long distance service.

Oftel is aware of potentially unfavorable impacts on certain consumers. As Oftel's Director General notes, "So long as scope exists for significant changes in the relative prices of different services, it is not possible to ensure that all customers share equally in the benefits of price control."[6] In response to problems of protecting subclasses of consumers against undue financial burden, Oftel is analyzing bills paid by "representative" residential customers. As the Director General explains, "I shall publish a computation of the effect of any significant price changes on a representative domestic customer and I shall be seeking to satisfy myself that the bill of this customer is not rising at a rate faster than the rate of inflation."[7]

Analysis of representative bills would be a satisfactory methodology to examine the burden on consumers if purchases were unrelated to prices. But, of course, the two are related. The increases in long distance cheap period rates are a good example. With these increases, customers can be expected to make fewer and shorter cheap period calls than otherwise. Thus, they could be worse off with the price adjustments shown in Table 2, even though their bills may rise more slowly than inflation. Moreover, analysis of representative bills sheds no light on whether cross subsidization is occurring, or whether prices are consistent with Ramsey pricing.

If cheap period long distance service were truly a monopoly, a case could be made for including it with line rentals and local service in a separate "monopoly" basket. But this would be at the expense of a more complicated price cap system where the problem is partially transitional. British Telecom is upgrading its exchanges to provide tone signalling service that will facilitate customer access to Mercury lines.[8] As this modernization evolves, increasing competitive pressure

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[6]Oftel, *Statement: The Control of British Telecom's Prices,* London, 7 July 1988.

[7]Ibid.

[8]According to one BT interviewee, the percentage of access lines connected to tone signalling exchanges will rise from about 20 percent today to about 50 percent by early 1990 and to about 80 percent by 1992 or 1993.

will arise in residential markets, encouraging a readjustment of time-of-day rates.

Implications for the United States

In the United States most customers, residential and business, have easy access to a range of long distance suppliers because of FCC actions, after the AT&T divestiture requiring the Bell operating companies to convert their exchange equipment on an expedited schedule to permit equal access. There is no reason to believe that a price cap system in the United States would induce AT&T to significantly increase its nighttime rates relative to daytime and peak period services. One might as easily argue that AT&T, seeking to stimulate traffic when the network is otherwise largely idle, might further reduce its nighttime rates relative to others as a way to increase profits.

But other cases may arise in which the firm subject to price caps, whether AT&T or the LECs, will face differential competitive pressures that will trigger substantial price adjustments within a basket. Some users will probably assert that the resulting rates are not "just and reasonable" as mandated under the Communications Act of 1934, or are "predatory." They may also complain of the frequency and unpredictability of changes.

This situation illuminates two considerations. First, the increasing competitiveness of the industry will lead to larger and more frequent price adjustments than customers have seen in the past. Suppliers can be expected to behave more like supermarkets and less like traditional public utility monopolies. This will inevitably lead to consumer complaints, as just one of many stresses, on the road toward a more competitive industry.

Second, a key task in the formal review of a price cap program will involve redesign of the baskets in response to market changes. A monopoly service, at one time, may become quite vulnerable to competitive entry, at another. Moreover, the degree of competition among services within a basket may change, dictating the creation of more, or fewer, baskets. The design of baskets--like estimates of the productivity factor discussed in Sec. II--cannot be expected to proceed

smoothly. The resulting price cap system will operate only imperfectly. The key issue will remain whether this imperfect system achieves better results than also-imperfect ROR regulation.

IV. SERVICE QUALITY

As part of its proposal, the FCC would monitor service quality with mechanisms already in place. But one analyst concludes

> Measuring public perceptions of service quality holds no promise for controlling the much more serious danger that carriers will improve their profit margins by delaying long term investments in the network infrastructure. Irreparable harm can occur *before* inadequate investment manifests itself through declining service quality.[1]

This perceived threat to the network seems exaggerated. Reductions in network investment would generally affect both monopoly and competitive services, since they share many of the same facilities (e.g., central office switches and transmission lines). To cut back investments would invite expanded competitive entry and erosion of the regulated firm's profits and market share.

An asymmetry exists between the bias toward excessive costs under ROR regulation and the feared bias toward underspending under rate caps. Under ROR regulation, the firm may invest excessively in the network that, among other things, encourages excess capacity. This situation might benefit the firm in two ways. First, it would discourage competitive entry. Because investment in excess capacity is an irreversible commitment, it enhances the credibility of a threat to cut prices to render entry unprofitable.[2] Second, the expansion of rate

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[1]Bethesda Research Institute, op. cit., p. 47. Emphasis in the original.

[2]The pioneering analysis is by A. M. Spence, "Entry, Capacity, Investment and Oligopolistic Pricing," *Bell Journal of Economics,* Vol. 8, 1977, pp. 534-544. This strategy is further assessed by A. Dixit, "The Role of Investment in Entry-Deterrence," *The Economic Journal,* March 1980, pp. 95-106; D. F. Spulber, "Capacity, Output, and Sequential Entry," *American Economic Review,* June 1981, pp. 503-514; and J. Bulow, J. Geanakoplos, and P. Klemper, "Holding Idle Capacity to Deter Entry," *The Economic Journal,* March 1985, pp. 178-182.

base might increase the firm's profits. In contrast, under price caps attempts to cut back on network investments to raise profits would not confer these twin benefits.

The firm could try to skimp in ways that would not invite competitive pressures by reducing services to its monopoly customers such as residential subscribers. But this decline in service quality is the kind that the FCC's monitoring policy is designed to detect. If such problems were to arise, regulators might consider the kind of penalty program that BT has designed to meet Oftel and consumer concerns. If BT fails to install new telephone service within two days after it promises, or if it takes more than two days to repair a fault, BT must pay a fine of five pounds per day of delay. This penalty program has been established because of widespread complaints of poor service by BT.

Let me hasten to add that it would be wrong to conclude that these service problems have arisen *because* of the price cap program. The obsolescent network inherited from the British Post Office, combined with an engineer's strike at one point and greater than expected traffic volumes, is largely responsible.

As discussed earlier, BT has not made use of its full price flexibility because of concerns that it would show excessively high profits. If it could easily have improved service quality by simply spending more money, the wise course of action would have been to do so and to raise prices within the RPI-3 ceiling to keep profits from falling.

Moreover, were the price cap plan itself responsible for poor service, one would expect consumer groups in the United Kingdom to support the adoption of ROR regulation. But they have not done so. While service quality is certainly of concern, with consumer groups and others suggesting remedial measures to Oftel, these suggestions have been within the context of a continued price cap program. In the words of one group, "there is insufficient evidence that a shift to rate of

return control would benefit consumers, provided that there is a tighter constraint on BT than RPI-3."[3]

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[3]Consumers Association, op. cit., p. 11. The Telecommunications Users' Association has also made suggestions within the context of a continued price cap program in its comments to Oftel, March 4, 1988.

V. THE SCOPE OF PRICE CAP REGULATION

AT&T

Much of the attention at the federal level has been devoted to possibilities of applying this approach to AT&T. However, AT&T is among the least interesting candidates. Of key importance here is that, since the divestiture, AT&T has not been able to earn its authorized rate of return. The authorized level was prescribed by the FCC in 1986 at 12.2 percent. But AT&T recorded an actual rate of only 10.2 percent in 1984, 11.8 percent in 1985, 11.5 percent in 1986, and 8.6 percent in 1987.[1]

No reason exists for believing that AT&T lacks strong incentives to minimize costs for given outputs. The notion that ROR regulation contributes to technical inefficiency and rate base bias is based on the assumption that the ROR constraint is binding. If it is not, which is at least currently true for AT&T, its positive incentives would be as strong as those of a firm free to maximize profit or those of a firm already subject to a well-designed price cap system.

The primary advantage for AT&T of a price cap system lies in the greater freedom to price flexibly without costly and time consuming FCC reviews, in response to changes in its increasingly competitive environment. Not surprisingly, its competitors are concerned about the increased possibilities for predation, with some urging that AT&T be subject to price floors as well as to price ceilings.[2]

Much better than price floors, however, is strengthening incentives not to engage in predatory behavior. The appropriate cost criteria for setting floors are subject to great controversy, and the issue is not yet settled among economists. Even if the appropriate criteria were clear, the task of measuring costs in conformance with the criteria (e.g., long run incremental costs) would be formidable.

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[1]Bethesda Research Institute, op. cit., Table 1.

[2]See, for example, Cable & Wireless Communications, op. cit.

One might argue that despite its current inability to earn its allowed rate of return, AT&T has "pockets" of monopoly power that cannot be fully exploited because of the FCC's tariff review process. If this process were "streamlined," AT&T would be able to raise rates sufficiently that the overall ROR constraint would become binding, at which point the threat of perverse incentives and anticompetitive cross-subsidies would reemerge.

If this argument has merit, the appropriate remedy is for the FCC to identify these pockets of monopoly and to put them in a basket separate from that for competitive services, as discussed in Sec. III. Indeed, services deemed to be competitive could simply be deregulated.

The FCC's price cap plan can best be regarded as a transitional regulatory device on the path toward full deregulation of AT&T. It would help protect consumers and AT&Ts competitors to the extent that AT&T continues to wield monopoly power. However, as competition expands, price capped baskets would be narrowed in coverage and would eventually be abolished.

LOCAL EXCHANGE CARRIERS

More important targets for price caps are the LECs for services subject to state regulation as well as to FCC oversight. While one can argue about the degree to which AT&T faces competition in its various markets, it is clear that the LECs hold a core monopoly, subject to binding ROR constraints, for basic local exchange telephone service. But they also offer services (e.g., intraLATA toll) subject to varying degrees of competition. This combination of monopoly and competitive services (sharing common facilities) raises troublesome issues about the potential for cost shifting and anticompetitive behavior.[3] The line-of-business restrictions imposed by the Modified Final Judgment on the regional Bell operating companies, and the FCC's cross-ownership restrictions on telephone company ownership of cable television systems, were established to help protect against such behavior.

[3]The sharing of common facilities is important, because otherwise the anticompetitive shifting of costs would be easy to identify and prohibit.

Perhaps the most significant contribution of a well designed price cap mechanism, compared with ROR regulation, would be to protect more effectively against predatory behavior, thereby facilitating the dismantling of line-of-business and cross-ownership restrictions. To illustrate, consider the FCC prohibition on the ownership by telephone companies of cable television systems within their own territories. In response to the FCC's current inquiry into whether to modify or abolish this restriction, cable operators offer the familiar argument: In the absence of these restrictions, telephone companies would build broadband networks and price services at below cost to drive out incumbent cable operators, while financing the ventures out of the pockets of their monopoly customers.

But suppose that price caps were in place for these monopoly services. Telephone companies could not simply finance up-front losses by raising basic local rates. The situation would be similar for other competitive services that share common facilities with monopoly services. Price caps do not offer total protection from predatory conduct; they will not be entirely free of ROR regulatory distortions, and the productivity adjustment might be underestimated. But price caps may be a sufficient improvement over ROR regulation that we could comfortably liberalize or abolish line-of-business and cross-ownership restrictions.

For this reason, the moves by some states away from traditional ROR regulation, and the interest expressed by many other states in doing so, are encouraging. If these efforts result in effective price caps (not necessarily modeled exactly on the FCC's proposal), the way would be clearer to relax other restrictions on telephone companies.

VI. CONCLUSIONS

The basic problem in designing price cap formulas is to improve the incentives for efficient behavior while at the same time assuring that consumers will share appropriately in the benefits of regulatory reform. This problem fuels the controversy about the appropriate adjustment factor, where, as commonly perceived, the smaller the value of the adjustment the greater the probability that consumers will lose rather than gain.

However, even if the productivity adjustment is underestimated, the allocative loss caused by higher prices than otherwise might be offset by a surprisingly small increase in technical efficiency. Improvements in technical efficiency encouraged by price caps would benefit society as a whole. A danger to be guarded against is design of a price cap system so constrained--as, for example, by imposing very short periods between formal reviews--that neither producers nor consumers gain from substituting price caps for traditional rate of return regulation.

More broadly, this study concludes that:

- Under a wide range of circumstances, price cap regulation will be likely to achieve results superior to those of traditional ROR regulation.
- The results of price cap regulation may be indistinguishable from those of ROR regulation with formal time lags, because profit levels cannot be entirely disregarded in designing and revising price caps.
- Under plausible assumptions, the reductions in cost encouraged by price caps would more than offset the losses to telephone users, if the productivity adjustment factor is underestimated.
- Although overestimates of the productivity adjustment factor would cause financial stress to the regulated firm, the firm would probably have enough financial flexibility to continue to the next formal review, when adjustments could be made.

- Monopoly and competitive services should be placed in separate baskets. But the design of baskets will not be easy, because the degree of competition varies widely among services and the pattern of variation will itself change over time. A key task during each formal review should involve the redesign of baskets to reflect market conditions.
- No plausible basis exists to believe that price caps would cause a serious degradation in service quality.
- For AT&T, price caps can best be regarded as a transitional regulatory tool on the road to full deregulation.
- Price caps are a more important regulatory tool for the LECs, which have a core monopoly in basic local exchange service.
- By reducing the threat of predatory behavior by the LECs, price cap regulation enforced by the states would help facilitate the removal of line-of-business restrictions imposed by the Modified Final Judgment and by the telephone/cable TV cross-ownership restrictions imposed by the FCC.