

The regulation of privatized monopolies in the United Kingdom

M. E. Beesley*

and

S. C. Littlechild**

This article examines the experience in the United Kingdom with the regulation of privatized monopolies. Its conclusions are (1) that there are significant differences between RPI - X (or price-cap) and U.S. rate-of-return regulation, which provides greater scope for bargaining in the former system; (2) that U.K. regulators have taken seriously their duty to promote competition, but that the existing economic literature is of limited help in this task; (3) that price regulation is likely to be more effective where technology is changing slowly and/or where there are many firms in an industry, whereas the promotion of competition is indicated where technology is changing rapidly; and (4) that the case for RPI - X price-cap, rather than rate-of-return regulation, is strongest in telecommunications, gas supply, and electricity supply and least strong in gas and electricity transmission grids.

Since 1979, the Conservative Government has transferred over two dozen public enterprises into private ownership. Most of them previously operated in more or less competitive industries, but three of the largest—namely, British Telecom (BT), British Airports Authority (BAA), and British Gas (BG)—had market shares approaching 100% for their core activities. These three companies now operate under licenses containing many obligations and constraints. Independent regulatory authorities, each headed by a Director General, monitor and enforce compliance with license conditions. The impending privatization of the water and electric industries will follow a similar pattern, although in these two industries there will be a number of successor companies rather than a single major one. Thus, in the U.K. there is now a set of five major privatized industries which (in the U.S. context) would normally be thought of as regulated utilities.

The statutory duties of the regulators include protecting the interests of producers (licensees), of consumers of various kinds, and of employees and third parties (e.g., environmental concerns). The wording varies but, for present purposes, three main objectives may be identified in the respective privatization Acts: (1) to ensure that all reasonable demands are met, and that licensees are able to finance the provision of these services; (2) to protect the interests of consumers with respect to prices and quality of service; and (3)

* London Business School.

** University of Birmingham.

We gratefully acknowledge helpful comments by Stanley Besen, Jan Acton, and a referee. This article was written before the authors were associated with the Office of Electricity Regulation and does not necessarily represent the views of that office.

to enable or promote competition in the industry. Strictly speaking, the duties of the regulator are not a direct obligation to achieve the stated objectives, but rather require the regulator to carry out his statutory functions in the manner which he believes is best calculated to achieve these objectives.

Economists may find it helpful to analyze privatization as the instrument of change in a cost-benefit appraisal. The privatization acts, and in particular the duties of the regulators, may be interpreted as consistent with a formal aim of maximizing the present value of expected net benefits to consumers plus producers, subject to a minimum profit condition and to various constraints on the distribution of benefits to ensure Pareto efficiency (i.e., no major interest group is to be made worse off). The problem then faced by each regulator is to interpret this general criterion and make it operational. In particular, the regulator has to balance the interests of present and future consumers, both against each other and against the interests of present and future producers.

This article examines the experience of the United Kingdom with regulation of privatized monopolies. In particular, we consider: (1) whether the form of price control adopted is significantly different from U.S. rate-of-return regulation and how far this constitutes an advantage; (2) how regulators have tackled their duty to promote competition and what mode of economic analysis is most appropriate for this; and (3) under what circumstances each of the two main regulatory duties is likely to be performed most effectively and what this implies for government policy.

2. Price control

■ Rate-of-return regulation is well established in the U.S. There have been numerous variants across jurisdictions, across industries, and over time, but for present purposes the key features of "traditional" rate-of-return regulation may be characterized as follows (see Phillips, 1969).

The regulated company files a tariff when it wishes to revise its prices. For an agreed test period ("frequently the latest 12-month period for which complete data are available," Phillips, 1969), the company calculates operating costs, capital employed, and cost of capital. The regulator audits these calculations and determines a fair rate of return on capital employed. These data plus assumptions about demand are used to calculate the total revenue requirement. This determines the *level* of the tariff. The *structure* of the tariff has to avoid unfairness and unjust or unreasonable discrimination. The tariff therefore has to be approved on a line-by-line or service-by-service basis, which typically requires the allocation of common costs on the basis of, for example, output, direct costs, revenues, etc. An approved tariff generally stands until the company files to change it, usually on the grounds that the achieved rate of return has become inadequate.

When making its plans for privatizing British Telecom (BT), the Department of Industry's original intention was to adopt a modified rate-of-return regulation. After further discussion and investigation, however (Littlechild, 1983), a control on prices, or price cap, was finally adopted and variants of it have been used for the other privatized utilities.

The key features of this price control are that, for a prespecified period of four to five years, the company can make any changes it wishes to prices, provided that the average price of a specified basket of its goods and services does not increase faster than $RPI - X$, where RPI is the Retail Price Index (i.e., the rate of inflation) and X is a number specified by the government. At the end of the specified period, the level of X is reset by the regulator, and the process is repeated.

□ Rate of return versus $RPI - X$. The pros and cons of rate-of-return regulation versus $RPI - X$ and other schemes have been frequently discussed (e.g., Littlechild (1983), Vickers and Yarrow (1988), Johnson (1989)). Briefly, the main arguments for $RPI - X$, as originally

spelled out in the context of privatizing BT and subsequently repeated in other cases, are three-fold. First, $RPI - X$ is less vulnerable to "cost-plus" inefficiency and over-capitalization (the "Averch-Johnson effect"). Because the company has the right to keep whatever profits it can earn during the specified period (and must also absorb any losses), this preserves the incentive to productive efficiency associated with unconstrained profit maximization. Part of this expected increased efficiency can be passed on to customers, via the level of X . Prices are therefore lower than they would be under rate-of-return control, without producers being worse off. Second, $RPI - X$ allows the company greater flexibility to adjust the structure of prices within the basket, and in principle there is no constraint on prices outside the basket. This is of particular importance where, as with British Telecom, initial prices were thought to be considerably out of line with relative costs, yet "optimal" prices could not be immediately determined and achieved because of inadequate knowledge of costs and demands, as well as political constraints on speed of adjustment. Third, $RPI - X$ is simpler to operate by the regulator and the company. It is more transparent and better focused on the parameter(s) of greatest concern to customers, hence providing them with greater reassurance.

The main counterargument against the incentive and efficiency claim may be summarized as follows. The level of X must in practice be set, and repeatedly adjusted to secure a reasonable rate of return. If not, allocative inefficiencies will arise (from prices being out of line with costs), and there will be political pressures from company or consumers. If the criteria for revising X are left unclear, this will increase the cost of capital and/or discourage investment. Clear guidelines must therefore be laid down, or must emerge from precedent, for resetting X . These guidelines will have to embody an explicit feedback from cost reduction to (eventual) price reduction. This will negate the superior incentive effects claimed for $RPI - X$. Specifically, companies may believe that the short-term advantages of increased efficiency and lower costs will be more than offset by a tougher X and therefore lower prices in the next period, and may even induce an adverse change of X within the current period. In this view, $RPI - X$ is merely a special form of rate-of-return control, embodying no significant net advantage over the U.S. approach on grounds of economic efficiency.

It is also questioned whether $RPI - X$ involves as much price flexibility and transparency as claimed. It is further suggested that greater price flexibility may be a disadvantage rather than an advantage, since it allows cross-subsidization which is allocatively inefficient and may be used anticompetitively.¹

The key questions to pose in this section are thus whether in practice $RPI - X$ makes any difference to regulation and, if so, whether the differences are beneficial. Our aim is to assess how $RPI - X$ has actually operated in the United Kingdom. We make no attempt to assess its potential effectiveness in or appropriateness for the U.S.

□ **Setting and resetting X .** In assessing these arguments, it is necessary to understand the procedures for setting and resetting X , and to appreciate the similarities and differences between them.

The $RPI - X$ constraint is one of many conditions in the regulated company's license, all of which are initially set by the government. Unlike the other conditions, it has a limited duration, typically five years, and there is no formal constraint on the magnitude of X in any subsequent period. The regulator may modify any license condition at any time by agreement with the licensee. If the licensee does not agree, the regulator may refer the matter to the Monopolies and Mergers Commission (MMC) and has the authority to modify the

¹ Other issues lie beyond the scope of this article. For example, it has been suggested that $RPI - X$ may offer less incentive to maintain service quality (Vickers and Yarrow, 1988; Besen, 1989). The framework of regulation needs to be designed accordingly, and the acts and licenses do in fact reflect this consideration.

license if and only if the MMC finds the licensees to be acting against the public interest. (With certain exceptions, the licensee has no power to refer possible license modifications to the MMC.) Renewal of the $RPI - X$ constraint, whatever the level of X , is equivalent to a license modification.

The initial level of X is set by the government at the time of privatization, *as part of the privatization process*, whereas X is reset by the regulator *as part of the continuing regulatory process*. This has three important implications.

First, the initial level of X is set as part of a whole package of measures, whose parameters affect the costs, revenues, and risks of the regulated company. Some of these parameters pertain to the design of the price control itself, including the duration of the price constraint, its scope in terms of goods and services included, what costs (if any) are allowed to be "passed through" into prices, and whether the constraint is calculated on the basis of historical or expected performance. All these parameters are embodied in license conditions. Other parameters pertain to the wider regulatory framework, including what other noncommercial obligations or constraints are put on the company, what steps are taken to encourage or restrict competition, what policies are adopted towards suppliers, and so on. Both sets of parameters are fixed by the government more or less simultaneously in full acknowledgement of the interactions and trade-offs between them. They are gradually firmed up and made more precise in the run-up to privatization, culminating in the determination of certain key parameters, including X , prior to publication of the prospectus, a few weeks before flotation. (The striking price of the shares is determined later in this last period and will be heavily influenced by the anticipated changes in the stock market level to the flotation date.)

In contrast, the resetting of X takes place in a context where these parameters have already been determined. Admittedly they could be changed, and in practice some have been, but to make substantial and unexpected changes would have potentially adverse effects on the company's cost of capital and hence on prices to customers. Moreover, insofar as any proposed changes pertain to the company's license, if the company does not agree to the changes, the regulator may not wish to run the risk of an unsuccessful appeal to the MMC. There are thus fewer degrees of freedom in resetting X .

Second, the initial level of X is set by the government as owner of the company, whereas X is reset by a regulator who does not own the shares. The government as owner can choose, if it wishes, to take lower proceeds in return for, say, lower prices to customers. The regulator does not have that extra degree of freedom: any shift in favor of one interest group (such as customers) will be at the expense of another group (such as shareholders). The regulator is constrained by the expectations of shareholders and customers, which were established at privatization, and his discretion is limited to whatever range is deemed acceptable (or can be so presented).

The third difference between setting and resetting X , which reinforces the previous two, relates to the effect on the company's share price. In both cases the level of X will influence the share price via its effects on expected net revenue streams, so the stock market in fact decides the yield to shareholders. At the time that X is initially set, however, this effect has to be conjectured. It is not known with any certainty how potential investors will evaluate the company put before them. Nor is there any market valuation of the previous or alternative arrangements with which to compare it. After privatization, however, the views of investors are clearly reflected in the company's traded share price, with its accompanying dividend yield, price earnings ratio, relative risk factor β , etc. A change in the stock market's evaluation of the company, following any action by the regulator, in particular his revision of X , can be immediately observed in the change in share price. If the market regards the regulator's decision as favorable to the company (i.e., more favorable than expected), its share price is marked up and its cost of capital falls; the opposite happens if the decision is regarded unfavorably. The regulator cannot ignore this consideration in his decisions, and it reinforces the greater constraints on resetting X than on setting it initially.

To summarize, when setting X initially there are many degrees of freedom. X is just one of numerous parameters chosen simultaneously in the light of the political and economic tradeoffs involved. There is nothing unique, optimal, or mechanical about the initial choice of X . When X is reset, there are significantly fewer degrees of freedom. Nevertheless, there invariably are degrees of freedom open to the regulator.

The following two examples will illustrate the above procedures and provide further insights into the characteristics of the $RPI - X$ approach.

Setting X for Manchester Airport. The Airports Act of 1986 provides for economic regulation of "designated" airports. At privatization, the Secretary of State designated BAA's three London airports and specified $RPI - X$ regulation with $X = 1\%$. He also designated Manchester Airport, but delegated to the Civil Aviation Authority (CAA), as regulator, the task of designing Manchester's regulatory constraint. The Airports Act required the CAA, in turn, to seek the advice of the MMC.

Since Manchester Airport was not to be privatized, but was to remain in the ownership of The Manchester City Council, in important respects the considerations involved were different from those where X is set or reset for a privatized company. Nonetheless, there are useful insights to be obtained from the MMC report because it sets out in some detail its reasoning on $RPI - X$. (Note that the MMC in this context is an "advisor" to the regulator, not the regulator itself, and by convention the MMC's report is its only means of conveying that advice.)

The MMC recommended that $RPI - X$ be adopted rather than rate-of-return control, for the kinds of reasons given earlier. The Airports Act set the review period as five years, and the MMC was advised that the scope of price control had to comprise landing, parking, and passenger charges, but not baggage handling charges. The MMC exercised judgement on four main parameters apart from the level of X . It recommended

- 1) that there be a single basket for all three charges rather than (say) three separate baskets or additional subconstraints on prices;
- 2) that the formula be based on a "tariff basket" (as used for British Telecom), with weights reflecting revenues in the previous year rather than on a "revenue yield" (as used for BAA) involving predicted revenue per unit and a subsequent correction factor;
- 3) that no special allowance be made for passing-through costs associated with changes in (noneconomic) government regulation, except for three-quarters of any additional airport security costs; and
- 4) that the present levels of airport charges (which some users claimed were too high) were the appropriate starting point for the formula.

In proposing a level for X , the MMC's procedure was first to examine four important issues: future traffic growth, the timing and financing of capital expenditure (particularly the construction of a second terminal), the development of (unregulated) commercial income, and the scope for cost reduction and productivity increases. After exploring a range of alternative assumptions, it adopted those used by the company itself (except on 100% self-financing policy), albeit commenting that some of these assumptions were rather cautious. On the basis of the adopted assumptions, it used the company's financial model to make predictions, for each year over a five-year horizon, of four financial magnitudes (operating profit before and after interest and tax, net current assets and shareholders' funds) and five financial ratios (gearing or debt-equity ratio, self-financing ratio, interest cover, dividend cover, and return on capital employed). The MMC then "looked for a value of X which would give the necessary degree of protection to users of the airport while leaving the company in a financially sound position and able to carry through its capital expenditure plans." (See MMC, 1987.) It recommended that $X = 1\%$.

Note that the MMC approach was explicitly based on *future predictions*, and a central problem for the MMC was to decide what those predictions should be. It felt that Manchester's assumptions were often cautious, but had no firm basis for making alternative assumptions. (Over time, a regulator would aim to secure an independent source of information on these matters, and the CAA has begun to do so, as have the other regulators in their own areas. We discuss this point further below.)

This forward-looking approach also applied to the financial calculations. The rate of return on (historic) book capital was only one of nine financial projections and ratios that the MMC looked at. It was projected to decline steadily from the present 18.8% to 9.0% at the end of five years. The MMC merely commented that these rates of return were considered "consistent with our assessment of the company's financial soundness, which is also reflected in the other projections." (See MMC (1987).) Thus, in order to assess the future yield to shareholders, the MMC found it necessary to go beyond a single historic cost ratio.

The CAA proposed to accept the MMC's recommendations. Manchester Airport then appealed to the CAA, arguing for $X = 2\%$ (i.e., $RPI - 2$) and a revenue yield approach. Other interested parties also made representations. The CAA upheld $X = 1\%$, but granted Manchester Airport's request for revenue yield. The CAA report hints at the bargaining situation in which it found itself but, in giving its verdict, does not quantify (for example) the differential effect on future cash flows of revenue yield versus a tariff basket approach. (See Civil Aviation Authority (1988).)

Setting and resetting X for British Telecom. At a late stage in the privatization of British Telecom in 1984, three parameters remained to be determined: the contents of the "basket" (i.e., the coverage of the price cap), whether to allow unrestricted resale of BT's leased lines, and the level of X . The third parameter had clear implications for prices and proceeds, but so did the other two. Unrestricted resale would allow competitors to use low-priced BT circuits to undercut high-priced BT phone calls; this would mean lower prices, revenues, and proceeds. Restricting the basket to local calls and connection charges, for which the monopoly was thought to be strongest, would leave little scope for price reductions. Indeed, British Telecom argued that local calls and connections were already underpriced. On the other hand, incorporating inland trunk calls—where competition was pending, prices were already considerably in excess of costs, and technological prospects were for yet lower costs—would give scope for greater average price reductions across the basket as a whole. (International calls, though known to be highly profitable, were not a serious candidate for inclusion at that time, perhaps reflecting the government's unwillingness to provoke issues of international liberalization at a time when only the U.S. was clearly pursuing similar policies.)

There was considerable negotiation, involving a wide range of X 's. (This has been repeated in subsequent privatizations.) The eventual outcome was a package comprising no resale, inland trunk calls in the basket, and $X = 3\%$. The detailed calculations on which this figure was based have not been published. (Nor, for that matter, have any of the calculations of other X 's by government departments.) The offer price for BT's shares was set to ensure that there would be demand from a large number of small shareholders and employees. After flotation, the share price was duly bid up by institutional shareholders, who had excess demand at the offer price.

As BT's profits increased, the question was raised whether they were excessive, even though its prices were within the $RPI - X$ constraint. The regulator published an assessment of the appropriate rate of return for BT to earn, concluding that the then-observed level of 18% on book value was about right (Director General of Telecommunications, 1986). (For a debate on the adequacy of this assessment, see Beesley, *et al.* (1987) and Carsberg (1987).) BT, in fact, held its prices below the permitted maximum for two years. The regulator also commented on BT's changing price structure, suggesting that rebalancing between inland

trunk and local call prices had gone far enough. His staff published an analysis of price structure based on Ramsey pricing (Culham, 1987), although this was viewed with caution by the regulator himself.

The resetting of X in 1989 was preceded by a consultative document (Director General of Telecommunications, 1988a) in which the regulator invited comments and suggestions for modification to the whole framework of BT's price control, such as substituting rate of return for $RPI - X$, using revenue yield instead of tariff basket, changing the coverage and duration of $RPI - X$, and so on. Each of these would have required a change in the license, and therefore allowed the possibility of a challenge by BT and reference to the MMC. An agreement was reached. The regulator reduced the duration of the subsequent review period from five to four years (to reflect the uncertainties involved and BT's own investment planning horizon), slightly extended the coverage of the price cap (to include directory services), and increased X from 3% to 4.5%. He rejected the options of including international calls in the basket, but indicated that he would keep this area under review. He gave no detailed explanation for his choice of X , beyond indicating that rate of return was the most important criterion, but not the only one. The other factor mentioned was the financing of investment. He stated that in determining X , he had considered the effect on growth in earnings and borrowing, as well as on rate of return. (Director General of Telecommunications, 1988b).

The regulator noted that he had taken some account of current cost accounting results. Perhaps a decision based entirely on such a valuation would have indicated higher prices and therefore a lower X , which would have been favorable to BT. In explaining his position, however, the regulator stated that current cost accounting should not be used as the sole basis of regulation unless it was also used as the main basis of reporting to shareholders. BT was evidently unwilling to do this. Nor did BT think it advantageous to challenge the decision on X , which would have meant submitting to an MMC investigation. As it happens, BT's share price did not move significantly after the announcement, suggesting that changing X to 4.5% did not alter the stock market's expectations of BT's future profit stream.

One may surmise that the regulator focused the issue of the future level of X on BT's prospective or possible gains in productivity. By making effective use of the degrees of freedom open to him in redefining the formula and of BT's unwillingness to challenge his decision, the regulator was able to get agreement to a higher X than would otherwise have been possible. He thus set a target for efficiency, which BT was constrained to follow; he did not base his judgement primarily on evidence of what had *previously* happened in the industry.

□ **Incentives and efficiency.** In light of these two examples, but also taking into account the experiences of the other industries, we may now address the argument on incentives and efficiency.

$RPI - X$ and rate-of-return regulation have certain common features. Both accept the need to secure an adequate return for the company's shareholders in order to induce them to continue to finance the business, without conceding unnecessarily high prices at the expense of customers. Nevertheless, there *are* significant differences between the two systems, which give $RPI - X$ a potential advantage with respect to incentives and efficiency.

First, $RPI - X$ embodies an exogenously determined risk period between appraisals of prices, whereas rate-of-return regulation makes the duration of this period endogenous. Admittedly, U.S. regulatory commissions have tended not to intervene when profits are increasing, provided that prices are not increased (Joskow, 1974), but the company can file for a new tariff whenever its performance diminishes, which may be quite frequently. This last is not possible in the U.K. The regulator can propose a modification of X within the risk period. BT's regulator considered doing this, but he decided not to. Apart from the

disincentive effects, there would have been a risk of not getting MMC support for a contested license modification. BT's regulator also reinforced the concept of an exogenous risk period by reducing its duration from five to four years to limit the extent of uncertainty during the period and stressed that any midterm review should be limited to major unexpected events outside the company's control (Director General of Telecommunications, 1988).

Second, $RPI - X$ is more forward-looking than rate-of-return regulation. The latter tends to be based on historic costs and demands, with adjustments for the future limited (at most) to an adjustment for inflation or the extrapolation of historic trends.² In contrast, $RPI - X$ embodies forecasts of what productivity improvements can be achieved and what future demands will be and is set on the basis of predicted future cash flows.

Third, there are more degrees of freedom in setting X than are involved in rate-of-return regulation. The latter system does allow flexibility (e.g., on the basis of asset valuation, the definition of the rate base, treatment of work in progress, etc.) but it would seem difficult to change these decisions repeatedly. X is initially set in the context of negotiations about the whole regulatory framework, including the coverage, duration, and form of the price constraints, the extent of noncommercial obligations, the restrictions on competition, and the permissible rate of adjustment from inherited pricing policies. In resetting X , the regulator has fewer degrees of freedom, but nonetheless can modify (at least at the margins) any aspect of this framework and in practice has done so.

Fourth, in setting X the U.K. regulator has more discretion and less need to reveal the basis of his decisions than does his U.S. counterpart. The U.S. tradition is to place all evidence and reasoning in the public record. In the U.K., there is less pressure for due process. The U.K. regulator is deemed to be a person to whom public policy may be safely delegated, subject only to judicial review on the question of whether his actions are legitimate in terms of the act. In the U.K., neither governments nor regulators have given detailed reasons for their decisions on X . This reduces the basis for challenge (by company, competitors, or customers).

The consequence of these four differences—exogenous risk period, forward-looking approach, degrees of freedom, and less requirement to explain—is that there is greater scope for *bargaining* in $RPI - X$ than in rate-of-return regulation. The level of X can reflect negotiations with the company, not only about the scope for future productivity agreements, but also about other matters affecting the company's future, including the details of the price constraint formula, the rate at which competition is allowed to develop, the provision of information, and so on. In short, X may be thought of as one of several variables in a political and commercial bargaining process.

It is not suggested that U.K. regulation is conducted, or even perceived, primarily in terms of bargaining. Nor, on the other hand, is it claimed that there is *no* scope for bargaining in U.S. rate-of-return regulation. Spulber (1989), for example, explicitly characterized U.S. rate hearings as a bargaining process between consumers and the regulated firm. The hearings economize on the transaction costs of forming consumer coalitions and bargaining directly with the firms. The regulatory commission establishes rules for negotiation and mechanisms for the resolution of conflict, selects the issues that are open to debate, acts as arbiter and

² "Commissions base costs upon a test year due to the need for certainty—the need to avoid unresolvable factual disputes that threaten lengthy proceedings, arbitrary decisions, and court reversals. Although last year's prices will differ from likely future prices, at least they are known. One thereby avoids what would be an endless and unresolvable argument about what future costs will probably be." (Breyer, 1982). "The Commissions have been hesitant to make future forecasts of consumer demand, often preferring instead to assume that the test period demand conditions will hold in the immediate future." (Phillips, 1969). Joskow (1974) noted that "a few commissions have begun to cautiously use 'projected' test year results, allowing companies to predict cost and demand conditions one or two years ahead," but this does not appear to have become standard practice. Automatic adjustment mechanisms are widely used, however (Joskow, 1974; Spulber, 1989).

"may select an outcome especially if bargaining does not yield a unique solution" (p. 270). Spulber also notes that "rates are often set *indirectly* through decisions on methods of estimating costs, demand, and rates of return" (p. 272). These insights are not inconsistent with our own assessment. Our claim here is simply that the U.K. approach offers greater and more direct scope for bargaining, with a correspondingly more active role for the regulator.

There is an important implication for incentives and efficiency. The exogenous risk period and the forward-looking approach mean that the company is not deterred from making efficiency improvements either by fear of confiscation *within* the period or by the belief that allowed *future* prices will simply be an extrapolation of past costs. The regulator can take an independent view of the scope for productivity improvements and can use the discretion and degrees of freedom open to him including the absence of a requirement to justify decisions in detail, to negotiate a better deal than would otherwise be possible.

Whether the difference between $RPI - X$ and rate-of-return regulation is significant depends on whether the regulator is able to use the additional bargaining power effectively. This depends upon the underlying scope for efficiency improvements and upon the extent and quality of the information available to him. (See Vickers and Yarrow (1988).) These factors will differ from one industry to another. We take up this issue in the final section of this article.

□ **Price flexibility.** Traditional U.S. rate-of-return regulation requires each price to be individually approved. Changing a price requires filing a new tariff. In principle, $RPI - X$ allows any price to be changed at any time, subject only to the price cap on the average price within the basket. The coverage of the price cap is approximately 37% of BAA's total revenue, 57% of BT's, 63% of BG's, and probably 95% or more of the water and electric companies. Again, in principle, there is no constraint on prices outside the basket.

In practice, the regulated companies are typically more constrained than this. BAA has subconstraints on its two major airports; the public electricity suppliers will have separate constraints on their distribution and supply activities; and BT gave a written undertaking (outside the license) to limit the rate of increase of residential line rentals to $RPI + 2$. The regulator has since added an additional constraint for BT's private circuits and brought directory services into BT's basket; nondiscrimination provisions have also been added for gas. There are also informal constraints: BT's regulator indicated that the rebalancing of trunk and local call prices had, in his view, gone far enough, with the threat of explicit control via modification of the license. There is always an incentive for a regulator to increase control by refining and extending the basket.

On the other hand, the rebalancing problem was in part attributable to the definition of BT's basket (which included competitive as well as monopoly services) rather than to the $RPI - X$ concept itself. As Johnson (1989) has suggested, a key task during each formal review is to redesign the basket(s) to reflect (changing) market conditions.³ BT's regulator did not in fact press his concerns on relative prices and, in particular, did not adopt the Ramsey pricing philosophy examined by his staff. Any new contested constraint would, in any case, need MMC approval. In effect, the burden of proof is on the regulator to show cause why the rebalancing of prices should not occur. The opposite applies in U.S. rate-of-return regulation, where the burden is on the company to justify the price changes it proposes. There seems no doubt that $RPI - X$ allows greater pricing flexibility for the regulated company.

³ The possibility of a company cross-subsidizing competitive uncapped services out of monopoly capped services is frequently mentioned in the literature (e.g., Johnson (1989), Besen (1989), Spulber (1989)) but to date this has not been a major issue in U.K. regulatory experience.

Whether this flexibility constitutes an advantage or a disadvantage depends upon how much need there is for price flexibility (e.g., to reflect changing conditions), how much information is available to the regulator for determining prices in detail, and what other instruments are available for dealing with anti-competitive pricing (e.g., nondiscrimination provisions). Again, we return to these issues in the final section of the article.

□ **Transparency: cost pass-through and the X -formula.** As privatization has been extended from BT to other utilities, questions have arisen as to whether the simple $RPI - X$ constraint is appropriate for industries with different cost and demand structures. For example, should certain costs be passed through into prices, and should the price cap be based on historic or predicted parameters? Decisions on these questions have implications for profits and proceeds, consumer prices, and economic efficiency, as well as having an effect on transparency.

Cost pass-through. An essential feature of any price-control scheme is the provision to be made for costs which are considered outside the control of the regulated company's management. Several options are available. A simple $RPI - X$ constraint, based on expected costs, would expose the company to greater risk, thereby increasing the cost of capital and reducing proceeds. Setting a lower (less stringent) value of X would provide a greater margin against risk, but would imply higher prices for customers. Shortening the review period would reduce risk, but also would reduce the scope and incentive for cost savings; the cost of review would also be incurred more frequently.

The fourth possibility is to allow increases in specified costs to be passed through to customers as they occur. This does not eliminate the risk, but simply transfers it from company to customer. It therefore reduces the incentive of the company to seek lower cost or less uncertain sources of supply—for example, by signing fixed-price contracts with suppliers—and increases that incentive for customers. To the extent that prices vary more directly with costs, there may be an increase in allocative efficiency at the expense of productive efficiency. There is a reduction in transparency because of the added complexity in the regulatory formula and the reduced predictability of prices.

U.K. practice has varied. Both BT and BAA have zero pass-through (except for three quarters of the unforeseen additional cost of airport security). The price controls in the other three industries make significant provision for pass-through: for BG the costs of buying gas; for the water authorities, the costs of meeting any unforeseen government commitment such as new EC directives (subject to a minimum threshold set at 10% of turnover); and for public electricity suppliers, the costs of purchasing electricity from the generating companies. In the latter case, a yardstick provision (relating a proportion of pass-through to the costs of the industry as a whole) is also envisaged.

Tariff basket versus revenue yield. Another feature of price control is the precise rule for determining allowed price changes. BT's rule is based on the concept of a "tariff basket," whereby price changes must be such that the average price of the services in the basket, as weighted by *observed* usage in the *previous* year, does not increase by more than $RPI - X$. The water industry has a similar rule. In contrast, price regulation for BAA and BG (and prospectively for the privatized electric companies) is based on a "revenue yield" approach, whereby price changes must be such that the *forecasted* average revenue-per-unit of output (e.g., per passenger or per therm) in the *next* year does not increase by more than $RPI - X$. The necessary forecasts of output are made by the regulated company itself, and the formula involves an additional correction factor to repay or recoup any deviation between prediction and outcome.

The relative incentive effects of each type of formula have been debated and are not unambiguous, although it has been suggested that the revenue yield approach is more open to strategic behavior by the regulated firm. (See Cheong (1989)). Revenue yield may be

expected to reduce the risk to the regulated company in two ways: it smoothes, over time, the average revenue-per-unit and gives the company (via determination of the forecasts) greater control over the total level of revenue. As with cost pass-through, however, this simply transfers the risks to customers and may reduce the company's incentive to seek a less variable pattern of income. There is also less transparency as the regulatory formula becomes more complex and future price changes less predictable.

In sum, the record on transparency is somewhat mixed. BT's simple $RPI - X$ constraint is still in place, but three of the other utilities make heavy use of cost pass-through, and three have revenue yield constraints based on expectations declared by the regulated companies themselves. Such features reduce transparency and efficiency, though they may protect profits and proceeds or may allow a tougher X on prices. In the absence of transparency, protection for customers has to depend upon faith in the regulatory process rather than upon an explicitly guaranteed outcome. In this respect, cost pass-through and revenue yield are similar to rate-of-return regulation.

3. The promotion of competition

■ The promotion of competition is not traditionally associated with the regulation of utilities in the U.S. The regulatory commissions have a long record of resisting entry, and it has been persuasively argued that the real purpose of regulation was to protect incumbents from competition (Stigler, 1971 and Jarrell, 1978). Admittedly, competition issues have loomed increasingly large in telecommunications, especially since the "above 890"⁴ decision in 1969. The FCC has been concerned lately with protecting entrants from various forms of anti-competitive pricing. Nonetheless (and in contrast to antitrust policy), there is nothing in U.S. utility regulation approaching a statutory duty to promote competition.⁵

The U.K. regulator's duty to promote competition reflects in part the fact that it is not possible to move from a nationalized monopoly to a competitive industry in a single step. The regulator needs the authority and duty to complete the process of transition (as does the Secretary of State), otherwise obstacles to competition might remain in place.

The emphasis placed on this duty differs greatly between industries, depending upon the scope for entry afforded by the underlying technical and market conditions. At one extreme, potential competition is very limited in water supply, sewage disposal, and airports.⁶ The promotion of competition has a correspondingly small place in the Airports Act of 1986 and the Water Act of 1989. At the other extreme, the 1984 Telecommunications Act and the associated licenses are, to an important extent, addressed to the pace at which competition in telecoms is permitted to develop. The regulator has a potential role in the licensing of entrants, specifying the terms on which rivals have access to BT's network and other facilities, and constraining BT's pricing policy (which might encourage or deter entry). Analogous provisions are embodied in the Electricity Act of 1989 and licenses. To a lesser extent, this is true of the Gas Act of 1986 and license, where the role of the regulator in promoting competition in gas supply has subsequently been strengthened as a result of the MMC report on that industry.

⁴ In Allocation of Frequencies in the Bands Above 890 Mcs, 27 F.C.C. 359 (1959), the Federal Communications Commission authorized the licensing of private communications systems to give large users an alternative to obtaining service from AT&T. Although this decision had little immediate effect, it set the stage for the introduction of Specialized Common Carriers, such as MCI, which eventually led to the competitive supply of ordinary long-distance telephone service.

⁵ The text by Phillips (1969) devotes just 2½ of its 774 pages to the then-novel concept of strengthening the forces of market competition.

⁶ Competition for the market, via franchising, has been much discussed (see Vickers and Yarrow (1988); Spulber (1989)), but is beyond the scope of this article.

The duty to promote competition cannot be taken in isolation. The regulator needs to take into account a variety of other economic, social, and political considerations. Specifically, he has duties to secure the financing of licensed activities and protect the interests of consumers. In most situations, different policies will be indicated, depending upon the weight given to each duty. We now give two examples of how regulators have in practice resolved this issue. We then consider the appropriate mode of economic analysis and suggest a direction for future research in order to improve the effectiveness of regulation to promote competition.

□ **An illustration from telecommunications.** When Mercury wished to interconnect with BT, it was unable to agree on terms, and the regulator, in accordance with BT's license, was called upon to adjudicate.

One option, stemming primarily from the duty to protect the interests of customers and using traditional welfare economic concepts, was to attempt to calculate levels of interconnect charges which maximized allocative efficiency. This would have required a detailed calculation (for each possible level of interconnect charges) of Mercury's likely outputs in relevant markets, BT's consequent costs and losses in revenue, and the effect of these revenue losses on BT's prices and outputs. Mercury's market share would fall out as a residual from this exercise. However, the approach would beg the question of how to determine Mercury's output reaction function, and Mercury's implied strategy of entry and growth would not necessarily be consistent with promoting competition.

An alternative option was to begin with the duty to promote competition and therefore to examine the impact of the interconnect decision on Mercury's strategy. This would have meant looking at the situation from Mercury's perspective. The margins it could secure were central to its prospects for building up its voice (and other) telephony business. Favorable access to BT's local distribution system meant that Mercury's customers could get not only the benefits of lower prices for calls made over Mercury's long-distance system, but also discounts on virtually all calls delivered by BT. Furthermore, the prospects for future entrants could be expected to depend on the terms achieved for Mercury. Of course, the interconnect charges to be paid by Mercury and others were only part of the story about predicting entry. The effects on BT's costs, revenues, prices, and outputs also needed to be taken into account. Nevertheless, the thrust of this approach is quite different from the allocative efficiency approach, and it would be surprising if its policy implications were the same.

Oftel's *Annual Report for 1985* simply noted that the Director General "established the prices, based on BT's costs, which should be paid by MCL (Mercury) to BT for use of its network." No explanation of this cost basis was given, perhaps to avoid any statement that might evoke a test of the decision by the courts. It is widely felt that the phrase "based on BT's costs" has to be taken with a pinch of salt. There was almost certainly no attempt to run a model of allocative efficiency. The essence of the matter was that the regulator either had to provide sufficient inducement for Mercury to enter the market, or his decision would put at risk a central point of the government's strategy—that Mercury should become a serious competitor. The regulator's decision does seem to have established a key condition for future effective competition. When it came to the crunch, therefore, the regulator did not let considerations of allocative efficiency stand in the way of a judgement about the promotion of competition, although the precise basis for this judgement was not given.

□ **An illustration from gas.** The second example is found in the MMC's 1988 report on gas. There had been numerous complaints against BG's policy of discriminating in price, according to whether its customers had access to an alternative fuel (typically oil). These customers, industrial consumers of substantial quantities of gas, lay outside the *RPI - X* price control basket, but were nevertheless within the regulator's general duty to enable

competition. The privatization acts empower a regulator to refer any practice to the Monopolies and Mergers Commission. The regulated companies are also subject to general competition law, and it was in fact the Director General of Fair Trading who referred BG to the MMC.

It is well known that, from an allocative point of view, price discrimination may have certain desirable properties. It can lead to greater output and aggregate value of output than a uniform monopoly price. Perfect discrimination yields an output and aggregate value of output precisely equal to that of perfect competition. Nevertheless, the MMC opposed BG's policy of price discrimination, primarily because it would deter new entry.⁷ The MMC acknowledged that the prohibition of price discrimination was likely to make some customers worse off, and would limit BG's ability to compete against the oil companies. However, it believed that these disadvantages would be outweighed by the improved prospects for new entry which would be necessary to create "gas-on-gas" competition, to which the MMC attached great importance.

This conclusion was consistent with the regulator's own view as given in evidence to the Commission. The MMC found BG's policy to be against the public interest and accepted the regulator's suggestion that BG should be required not to discriminate in price. It recommended specific provisions against discrimination to be incorporated in BG's license. The regulator subsequently negotiated a license modification of this kind. (Similar nondiscrimination provisions have been incorporated into the draft licenses of the electric companies.)

□ **Economic analysis of new entry.** The two examples presented above indicate that regulators have taken seriously their duty to promote competition, and that in so doing they have implicitly gone beyond traditional welfare economics. We now consider what the problem of promoting competition involves, and what kinds of economic analysis might be most helpful in that task.

Promoting competition involves facilitating the entry of new competitors, including the entry of existing competitors into new parts of the market. To do this effectively involves three main steps. The first is to assess the likely pattern of entry over the foreseeable future. This will require a prediction of likely changes in technological and market conditions, since these will often provide the necessary opportunities for entry. The second step is to identify decisions that the regulator himself can make in order to change the regulatory framework, and to assess the likely impact of these changes on the future pattern of entry. Examples of these regulatory decisions (in the British system) are the licensing of new entrants, identification and prohibition of anti-competitive practices, determination of interconnect or common carrier (use of system) charges, collection and publication of relevant information, and so on. The third step is to choose which regulatory changes to make. Other things being equal, the preferred changes are those likely to have the greatest positive impact on entry. This is not always an obvious calculation, however, particularly since the whole time path of entry must be considered. The telecommunications duopoly policy, for example, reflects in part the view that where an entrant has to make a large cost commitment, it is more likely to enter, the less swiftly is a subsequent entrant able to attack the same market (Carsberg, 1987).

In order to promote competition, the regulator's essential task is to assess the relation between his actions (which will include regulatory changes as well as determining disputes and constraining prices) and the probability that entry will actually occur. He will need to consider the scale and time path of entry and its impact on all the parties involved as well

⁷ "By relating prices to those of the alternatives available to each customer, it places BG in a position selectively to undercut potential competing gas suppliers; this may be expected to act as a deterrent to new entrants and to inhibit the development of competition in this market." (MMC (1988), paragraph 8.38 (b).)

as on other potential entrants. It will prove impracticable to analyze all the possible avenues and problems of entry simultaneously, however, if only because the regulator's time and resources are necessarily limited. The regulator therefore has to be selective, i.e., to take a view about where entry might be most likely, if encouraged, and hence most effective in producing net benefits to consumers and producers, as they will be refined by the impact of entry.

What kind of economic model is most helpful in doing this? It is natural to begin with the same comparative static welfare economic approach that is conventionally used to analyze the problem of price control. This model takes as given (1) the relevant cost and demand functions, and (2) the extent of competition in the market, which essentially depends on the conditions of entry. These assumptions are used to trace the implications for (equilibrium) prices, outputs, profits, number and size of firms, and so on. It is then asked, What kinds of constraints on the regulated firm will maximize aggregate net surplus subject to securing adequate protection for various classes of consumers? Rate-of-return regulation is set firmly in this world. There is an extensive literature aimed at determining optimal pricing and investment rules that maximize allocative efficiency, taking costs and demands as given.

$RPI - X$ requires the relaxation of the first assumption. It does *not* assume costs and demands are given or known: indeed, the problem is to provide adequate incentives for the company to discover them. The aim is to stimulate alertness to lower cost techniques and hitherto unmet demands. The emphasis is on productive rather than allocative efficiency (and even the $RPI - X$ price cap reflects distributional rather than allocative considerations). This is an Austrian world rather than a neoclassical one. (Austrian is here defined broadly to include both Leibenstein's familiar X -efficiency on the cost side and the corresponding Y -efficiency on the demand side proposed by Beesley (1973).)

The problem of promoting competition requires the relaxation of the second assumption. Here, the extent of competition and the conditions of entry are not given: the essential regulatory task is to ascertain what they are and how they might be changed. The object is to choose the regulatory policy which will maximize new entry, subject to adequate protection of the interests of producers and present consumers. Nor are costs and demands assumed given or known. Indeed, one of the means of promoting competition is precisely to *shift* potential entrants' assumptions about the costs and possibilities of serving new markets, and one of the expected benefits of entry is a shift in the incumbents' own assumptions about these parameters.

Substantial recent literature on potential competition and contestable markets analyze the relationship between conditions for entry and price. At least one textbook on regulation (Spulber, 1989) is more concerned with entry and competition than with static welfare analysis of pricing for a protected monopoly. There have also been important developments in the economic analysis of strategic behavior (Dixit, 1982).

In practice, however, these models are of limited use for the task of promoting competition. Although they analyze the effects of any given entry conditions, they do not help to identify what the entry conditions *actually are* in any particular situation, nor what the entry conditions *would be* as a result of any particular regulatory change. Thus, they are of limited assistance to the regulator in assessing how much entry will take place, and where, when, and by whom, as a result of different regulatory policies.

Briefly, an alternative approach would run as follows. In order to identify the entry conditions obtaining at any time, and to predict the consequences of a change in policy, the regulator needs to start from the question, Where and when will entry be *profitable*? This in turn requires looking at the situation from the point of view of the potential entrant. Given its assets, knowledge, resources, its ability to buy at current input prices, and the pricing and product policy of the incumbent(s), what parts of the existing market can it profitably develop? What (if any) better contracts with respect to cost, including superior productivity, can it establish? Where have incumbents missed possibilities for adding value

or been unable for various reasons to supply? How will incumbents react to its entry? Can it survive their response? In short, what advantages does it have over the incumbents, and how long will these advantages last? The answers to these kinds of questions determine the central calculation for an entrant: the equity that the entrant needs to ante up in order to be a player in the game (that is, its risk capital reflecting its potential sunk cost if unsuccessful), and its potential net revenue stream if successful (the reward for taking the risk).

Admittedly, the models referred to earlier assume profit maximization, but they do not ask where the profit is coming from. They deal with profit in a purely formal way which does not highlight the need for information about entry and gives little help to the regulator in identifying the relevant factors in practice. Future research might usefully reflect the Austrian insistence on profit as the engine of capitalism and, in particular, on the exploitation of hitherto unforeseen profit opportunities as central to the continuing market process (Schumpeter, 1950; Kirzner, 1973, 1985). Examination of actual rather than hypothetical situations is also necessary, as Coase (1988) has long argued. Applications of the proposed approach (e.g., Beesley (1986) on airlines and Beesley and Laidlaw (1989) on telecommunications) suggest that there is more scope for promoting competition than has hitherto been recognized.

4. Regulatory effectiveness

■ We argued in Section 2 that the *RPI - X* system offers more scope for bargaining, especially on productivity, than rate-of-return regulation. The importance of this depends upon the potential for productivity improvements and on the information available to the regulator to exploit this situation effectively. We also argued that *RPI - X* offers the company more flexibility in pricing. Whether this is an advantage or disadvantage depends on the need for price changes, on the information available to the regulator, and on the existence of alternative instruments of policy. In Section 3 we noted the U.K. regulator's explicit duty to promote competition, which in practice has been taken very seriously. Regulatory effectiveness depends upon the scope for new entry and, again, on the information available to the regulator.

In order to carry out his twin tasks of controlling prices and promoting competition, the regulator thus needs to acquire adequate information concerning the scope for cost reductions and the extent and effects of new entry. He will also need to transmit information to incumbents and potential entrants, in order to improve both efficiency and the prospects for entry. The generation and dissemination of information are therefore at the heart of regulatory effectiveness.⁸

Various devices intended to give companies the incentive to provide the regulator with relevant information have been suggested in the recent economic literature.⁹ Typically these devices are set within the context of a given technology and product line: innovation and entry are not encompassed. Once the latter phenomena are admitted, it becomes apparent that the information which the regulator acquired is ephemeral: over time, it gradually becomes obsolete and needs to be replenished. Thus, if the regulator is to succeed in either of his two tasks—controlling prices or promoting competition—he needs to acquire infor-

⁸ Like the market participants, the regulator himself needs to be alert to hitherto undiscovered opportunities for profit, deriving from both the cost and demand sides. Kirzner (1978) has argued that "nothing within the regulatory process seems able to simulate, even remotely well, the discovery process that is so integral to the unregulated market." Our argument is not that the regulatory process is more effective than the competitive market process. (As indicated, the regulator has some advantages and some disadvantages compared to market participants.) Rather, our argument is that an effective regulator needs to be alert in order to promote greater alertness in markets that are not (yet) competitive.

⁹ See, for example, the surveys and references in Vickers and Yarrow (1988) and Spulber (1989).

mation at a rate faster than that at which it decays. The feasibility of doing this depends on two main parameters.

First, there is the rate at which the underlying technological and market conditions change. The slower the change, the more likely the regulator will gradually come to acquire more relevant information and will be in a position to set realistic productivity targets (and, for that matter, performance standards) and determine allocatively efficient price structures for the regulated utility. He will also be able to assess the effects of new entry more accurately. Where the underlying rate of change is slow, new entry is less attractive. In these circumstances, there is likely to be greater payoff to controlling prices than to promoting competition. Conversely, the faster the underlying rate of change in the industry, the more likely it is that the regulator's knowledge will decay faster than he can replenish it, hence the less likely it is that he will be able to control prices efficiently.¹⁰ However, rapid change provides the very circumstances in which new entry is feasible. Hence, in these circumstances, the regulator's priority should be to promote competition rather than control price. In the longer term, as the industry becomes more competitive, this will tend to reduce the need for price regulation.

The second main possibility of the regulator acquiring information faster than it decays is where there are multiple sources of information. Where there are many companies in an industry, even though they necessarily differ one from another, they may be sufficiently similar that the regulator can use the performance of one as an indication of what another could achieve. This yields a basis for setting efficiency targets in an *RPI - X* price control scheme. In these circumstances, the regulator's priority is to ensure that the laggards improve to match the (observed) performance of the leaders, while providing sufficient incentive for the leaders to stay ahead and blaze the way for the next round of target setting. The threat of takeover (if either the leaders or the laggards lapse into managerial slack) is an important aid in this endeavor. Conversely, where there is only one company in an industry, the regulator is more dependent upon that company for information, and his effectiveness in bargaining for productivity improvements is thereby reduced.

The prospects for generating information for regulatory purposes should therefore be an important argument in a government's decisions about the structure of the industry and the nature of the regulatory regime. Where the underlying rate of change is slow, there will be information advantages in creating and maintaining many similar firms for purposes of comparison.¹¹ Of course, it is economically efficient to do this only where the benefits of greater information are expected to outweigh any economies of scale or scope. This is more likely to be the case where a regulated industry is mainly an aggregate of several local monopolies (as with airports and local distribution networks for gas and electricity) than where the natural monopoly element is itself on a national scale (as with bulk transmission grids for gas or electricity).

□ **An illustration from the United Kingdom.** These ideas may be represented in a 2×2 matrix. In Tables 1 and 2, the columns represent the underlying rate of change in technology (and market conditions), classified as "Low" or "High," while the rows represent the number of regulated companies in the industry, classified as "One" or "Many." Each regulated industry, or part thereof, can be located in one of the resulting four cells.

Table 1 shows the matrix as it appears today for the five regulated utilities in the U.K. The foregoing analysis indicates a policy of promoting competition in telecoms, gas supply, and electricity generation and supply. Water and electricity distribution provide the most

¹⁰ Beesley and Glaister (1983) argued that this is the case in the taxicab industry. Wiseman (1957) has long argued that the very notion of an optimal price is untenable once uncertainty and change are admitted.

¹¹ When dealing with mergers, the Water Act of 1989 embodies instructions to the MMC to this effect.

TABLE 1 Present Position

		Rate of Change of Technology	
		Low	High
Number of regulated firms	Many	Water Electricity Distribution	
	One	Electricity Transmission Gas Transmission and Distribution Airports	Telecoms Electricity Generation Electricity Supply Gas Supply

promising conditions for price control. The difficulty of the single regulated utility presents itself in airports, electricity transmission, and gas transmission and distribution.

The structure of those industries characterized by a low rate of technological change could only be altered by government legislation (and clearly many other factors would need to be considered). Where there is a high underlying rate of change, however, the promotion of competition—at its simplest, by licensing new entry—would shift those industries in the one-firm cell into the many-firm cell. With the development of competition, specific industry regulation would become less necessary; whatever needed to be done to help keep competition active might well be performed by the anti-monopoly legislation common to all industries. In other words, deregulation might be indicated.

Table 2 shows the situation that could result in the United Kingdom if the policies discussed were put into effect. In telecoms, gas supply, and electricity generation and supply, the regulator's role of promoting competition would be paramount, perhaps via general competition policy rather than by specific regulation. In water, airports, and gas and electricity distribution, an emphasis on price control would be indicated, with prospects of success. The problematic areas would be national transmission grids for gas and electricity. Paradoxically, because transmission is so crucial to supply, regulatory attention in these natural monopolies would need to focus also on the promotion of competition in upstream and downstream markets via the terms to be set for the use of transmission facilities. So for electricity and gas transmission (and distribution too) the dual role of the regulator might be expected to continue in the foreseeable future.

□ **RPI – X versus rate of return revisited.** Future research might usefully assess U.S. and U.K. regulatory systems in terms of the ideas suggested in this section, comparing their abilities to generate and use relevant information, depending upon rate of technological

TABLE 2 Potential Position

		Rate of Change of Technology	
		Low	High
Number of regulated firms	Many	Water Electricity Distribution Gas Distribution Airports	Telecoms Electricity Generation Electricity Supply Gas Supply
	One	Electricity Transmission Gas Transmission	

change and number of regulated firms. We may illustrate this by reexamining the initial question of the relative merits of $RPI - X$ and rate-of-return regulation with respect to incentives and efficiency. We argued that $RPI - X$ is indeed different because (*inter alia*) it incorporates a fixed risk period within which gains above the productivity bargain can be kept by the regulated firm(s). These productivity gains are potentially larger at the time of privatization than subsequently. They are also potentially larger the more rapidly technological conditions are changing, and where there are many different firms, with leaders blazing the way for laggards to follow.

Relating these considerations to the five regulated utilities, it follows that the case for $RPI - X$ price control rather than rate-of-return regulation is strongest in telecoms, gas supply, and electricity supply, where technology is indeed changing. If the aim is to "hold the fort" until competition arrives, as Beesley and Littlechild (1983) put it, $RPI - X$ will do this with greater potential productivity gains. At the other extreme, where there is less prospect of a shift in technology and only one firm in the industry, as with the electricity and gas transmission grids, there is less scope for bargaining about the potential for improvements in efficiency and no built-in mechanism to give the regulator scope for bargaining via directly relevant comparisons. Here, the grounds for preferring $RPI - X$ are least strong.

In the remaining industries, notably water, gas, and electricity distribution, there is a strong reason for preferring $RPI - X$ initially, given the potential productivity gains on privatization and the regulator's potential for generating superior information to that available to the companies taken separately. Admittedly, if there is indeed a low underlying rate of change in technology, both the scope for improvement and the discrepancies between companies may be expected to reduce over time, and in practice an $RPI - X$ regime may gradually become indistinguishable from that of rate-of-return regulation. However, a permanently low underlying rate of change cannot be taken for granted. For the present, $RPI - X$ seems to offer advantages.

References

- BEESLEY, M.E. "Mergers and Economic Welfare." In *Mergers, Takeovers and the Structure of Industry*, IEA Readings, No. 10, 1973, pp. 73-80.
- . "Commitment, Sunk Costs and Entry to the Airline Industry: Reflections on Experience." *Journal of Transport Economics and Policy*, May 1986, pp. 173-190.
- AND GLAISTER, S. "Information for Regulating: The Case of Taxis." *Economic Journal*, Vol. 93 (1983), pp. 594-615.
- AND LAIDLAW, B. *The Future of Telecommunications: An Assessment of the Role of Competition in UK Policy*. Research Monograph No. 42, Institute of Economic Affairs: London, 1989.
- , GIST, P., AND LAIDLAW, B.H. "Prices and Competition on Voice Telephony in the UK." *Telecommunications Policy*, Vol. 11, 1987, pp. 230-236.
- AND LITTLECHILD, S. "Privatization: Principles, Problems and Priorities." In John Kay, et al., eds., *Privatization and Regulation—The UK Experience*. Oxford: Clarendon Press, 1986.
- BESIN, S.M. *Statement Submitted by the National Cable Television Association*. In Federal Communications Commission CC Docket No. 87-313, Aug. 3, 1989.
- BREYER, S. *Regulation and Its Reform*. Cambridge: Harvard University Press, 1982.
- CARSBERG, B. "Regulation of British Telecom." *Telecommunications Policy*, Vol. 11 (1987), pp. 237-242.
- CHEONG, K. "The British Experience with Price Cap ($RPI - X$) Regulation." *Nera Topics*. London: NERA 1989.
- CIVIL AVIATION AUTHORITY. *Conditions as to Airport Charges in Relation to Manchester Airport under Section 40 (3) of the Act*. CAA Report, London: 25 February 1988.
- COASE, R.H. *The Firm, The Market and The Law*. Chicago: University of Chicago Press, 1988.
- CULHAM, P.G. "A Method for Determining the Optimal Balance of Prices for Telephone Services." Ofel Working Paper, No. 1, March 1987.
- DIRECTOR GENERAL OF TELECOMMUNICATIONS. *Review of British Telecom's Tariff Changes, November 1986*. London: Ofel, November 1986.
- DIRECTOR GENERAL OF TELECOMMUNICATIONS. *The Regulation of British Telecom's Prices*. A Consultative Document, London: Ofel, January 1988a.

- DIRECTOR GENERAL OF TELECOMMUNICATIONS. *The Control of British Telecom's Prices*. London: Oftel, July 1988b.
- DIXIT, A.K. "Recent Developments in Oligopoly Theory." *American Economic Review*, Vol. 72 (1982), pp. 12-17.
- JARRELL, G.A. "The Demand for State Regulation of the Electric Utility Industry." *Journal of Law and Economics*. Vol. 21 (1978), pp. 269-295.
- JOHNSON, L.L. "Price Caps in Telecommunications Regulatory Reforms." *RAND Note*, N-2894-MF/RC, January 1989.
- KIRZNER, I.M. *Competition and Entrepreneurship*. Chicago: University of Chicago Press, 1973.
- . "The Perils of Regulation—A Market Process Approach." In I. M. Kirzner, ed., *Discovery and the Capitalist Process*. Chicago: University of Chicago Press, 1985.
- LITTLECHILD, S.C. *Regulation of British Telecommunications' Profitability*. London: Department of Industry, 1983.
- MONOPOLIES AND MERGERS COMMISSION, *Gas*, Cm 500 London: H.M.S.O., 1988.
- . *Manchester Airport p.l.c.: A Report on the Economic Regulation of the Airport*. Report MMC 1, Civil Aviation Authority, London, December 1987.
- OFTEL. *Report of the Director General of Telecommunications (Annual Report 1985)*. London: HMSO June 1986.
- SCHUMPETER, J.A. *Capitalism, Socialism and Democracy*. New York: Harper and Row, 3rd edition, 1950.
- SPULBER, D.F. *Regulation and Markets*. Cambridge, Mass. and London: M.I.T. Press, 1989.
- STIGLER, G.J. "The Theory of Economic Regulation." *The Bell Journal of Economics*, Vol. 2 (1971), pp. 3-21.
- VICKERS, J. AND YARROW, G. *Privatization: An Economic Analysis*. Cambridge Mass.: MIT Press, 1988.
- WISEMAN, J. "The Theory of Public Utility Price—An Empty Box." *Oxford Economic Papers*, Vol. 9 (1957), pp. 56-74.

Copyright of RAND Journal of Economics is the property of RAND Journal of Economics and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.