

ECONOMIC REGULATION OF PRIVATISED WATER AUTHORITIES AND SOME FURTHER REFLECTIONS

STEPHEN LITTLECHILD
University of Birmingham

I. INTRODUCTION

Privatisation of the water industry differs in several fundamental respects from most other privatisations to date. First, the water industry is likely to remain a natural monopoly. Unlike telecommunications, or even gas, there is no prospect of new competition on the horizon. Regulation will need to be permanent. Second, privatisation will involve not one but ten water authorities. They have different problems and prospects. Yet to make flotation and regulation tractable, a degree of uniformity is required. Third, there is a clear need to protect and improve the environment, and privatisation has to be designed to facilitate rather than impede this.

The Department of the Environment invited me to advise on these problems in mid-October, 1985. The study was commissioned in mid-October 1985. A first draft report was required by 22 November and a final report by 6 December. It published my Report entitled *Economic Regulation of Privatised Water Authorities* in February 1986 at the same time as its White Paper (Cmnd., 9834).¹

1. I have been much helped by discussion with representatives of the Department of the Environment, three water authorities, the Water Authorities Association, the Department of Trade and Industry, HM Treasury, No 10 Policy Unit, the Office of Telecommunications, British Telecom, and several academic economists. I am particularly grateful for the comments and suggestions of Professor M. E. Beesley on the economic issues involved. None of these representatives or individuals should be held responsible for the views expressed in this report.

The terms of reference of this study were as follows:

To advise the Department on the economic regulation of water authorities, if privatised, with particular reference to the applicability of the method used in the case of British Telecom, popularly known as RPI-X. You should consider whether amendments or qualifications of that approach are required; or, if you consider that method inapplicable, you should consider what alternative methods might be applicable. In carrying out this assignment, you would have access to the work already done by the Department on the possibility of privatising the water authorities, including the preliminary advice received from the Department's merchant bank advisers. To limit the scope of your work you should assume that the water authorities would be privatised in substantially their present form and that responsibility for economic regulation would be placed with an independent regulator, whose position would be similar to that of the Director-General of OFTEL.

The editors of this journal have suggested that it would be useful to make the discussion of economic regulation available to a wider audience. Similar issues will arise, for example, in the privatisation of the twelve electricity area boards. The following pages reprint chapters 2 to 5 and 9 to 12 of my Report. There are brief summaries of the other chapters, which deal mainly with levels of service.

Perhaps the idea of greatest interest to economists is the suggestion for tackling the 'permanent natural monopoly' problem. RPI-X price control was initially recommended for British Telecom as an interim measure, to 'hold the fort' until competition arrived (Littlechild, 1983). Some commentators have argued that if RPI-X were used on a permanent basis, with the level of X reset in the light of past performance, this would lead to the same disincentive effects associated with rate of return control that RPI-X was designed to avoid. The suggestion in the Report is that this danger can be reduced if a level of X is set which is uniform over all water plc's, and if uniformity is maintained when the level of X is revised each five years (say). Revision would be based on the performance of the water industry as a whole or of the median water plc.

In this way, the 'problem' of privatising ten authorities becomes an 'opportunity'. If the yardstick by which it will be judged will not be shifted as a result of its own performance, each regulated plc has a direct profit inducement to maximise performance. 'Yardstick competition' does not rely simply upon the management of a water plc taking pride in offering better quality of service or improved productivity compared to its fellow water plc's.

Another point of interest concerns franchising. There is growing evidence of the savings to local authorities from contracting out their services (e.g. Domberger *et al.*, 1986, 1987). Some commentators have suggested that franchising out water supply and sewerage services would be preferable to privatising the authorities in their present form. This structural question was beyond the terms of reference of my Report, but the recommended form of regulation does bear upon it. The Report notes the franchising debate among economists and makes two further points. First, a privatised water authority will itself be able to subcontract such services. Properly regulated, a private water authority will have greater incentive than a public one to identify and implement a suitable franchising policy.

Second, this incentive to contract out, which follows from the incentive to improve financial performance, will be even stronger to the extent that there is a threat of takeover. The threat of takeover applies at all times, not merely when a contract or franchise comes up for renewal; in effect, alternative management teams are *continually* bidding for the franchise. The Report therefore emphasises the possibility and desirability of competition in the capital market as an adjunct to, and partial surrogate for, competition in the product market.

It is not claimed that the proposed scheme of regulation will fully replicate the workings of a perfectly competitive market. (Such a benchmark is scarcely relevant anyway, since there is no practical way of achieving it.) RPI-X will operate against a background of environmental standards and levels of service which will largely reflect the judgements of the regulator, the NRA, and the water plc's themselves, rather than the preferences of customers directly. Thus the regulator rather than the market will decide the balance between quality and price, and at what rate cost savings get passed through to customers. Nevertheless, it is suggested that economic regulation based on RPI-X, with a uniform X and the possibility of takeover, is likely to be more successful in coping with the problem of permanent natural monopoly than any practical alternative scheme yet proposed.

Subsequent developments

In July 1987 the Government explained its intention to create a National Rivers Authority to take over the water authorities' regulatory functions and their responsibilities for protecting the environment. A significant part of my Report explained how economic regulation should and could protect and improve the quality of the environment. It also noted that the problem of bulk transfers of water, and more generally the important issue of property rights in water, required further investigation. These suggestions and warnings seem equally applicable under the NRA scheme, but are not our concern here.

There has been no public statement yet concerning the framework for economic regulation, although some aspects reportedly under consideration by the DoE are discussed by Glynn (1988). One issue concerns the feasibility of setting and maintaining a uniform X. (An alternative suggestion is RPI-X-Y, where X is uniform but Y varies by water plc, but if this is done the whole point of a uniform X scheme is lost.)

One argument against uniformity is that it would necessitate more capital restructuring and prevent desirable changes in relative prices between areas as costs develop in different ways. With respect to setting of an initial uniform X, I do not find these difficulties persuasive. Capital restructuring will be needed in any case, together with many other changes in prices, financial obligations, quality of service standards, and other contractual arrangements. The Report also stressed that there would be a whole range of acceptable values of X for any company, not just a single unique optimal value. Given this, and the scope for changes before flotation, I am not yet convinced that an initially uniform X is out of the question.

The key requirement, however, is that *changes* in X should be independent of each company's own achievements and arguments. So it would be entirely consistent with the scheme to set an arbitrary pattern of X's initially, provided that after the first five-year period all the changes were uniform — say, an increase in all values of X by 1 percentage point. To have uniformity initially is helpful as a way of establishing the expectation of uniformity at the time of renewal, in effect placing the burden of proof on those who claim special treatment.

The ability to compare the performances of ten water plc's will assist the regulator in maintaining uniform treatment. If some plc's plead that cost increases are beyond their control while other plc's have contained such costs, the regulator can legitimately base his calculations for the first group on lower cost increases in future, rather than simply conceding a relaxation in their value of X. Plc's which persistently fail to perform as adequately as their fellows thereby render themselves liable to takeover. For these reasons, I am not yet convinced that uniformity needs to be abandoned at this stage.

As regards other details of the RPI-X control, the 'tariff basket' variant was adopted for BT, the 'revenue yield' variant for British Gas and BAA. One issue is whether either variant induces a bias in pricing or output; another issue is whether the constraint should be levied on historical or forecast data. It has been suggested that forecasts are preferable because revenues will more accurately reflect general changes in cost inflation. But this misconceives the twin aims of RPI-X control: to reassure customers and to maintain incentives to efficiency. It is not meant to be an accurate reflection of costs. The great advantage of using historical data is that the resulting constraint is independent of the regulated company's judgement

and plans, and therefore less subject to suspicion of manipulation. Further discussion of these issues, which generally supports this view, can be found in NERA, 1986; MMC, 1987; Bradley and Price, 1988; and Littlechild, 1988.

The following are extracts from *Economic Regulation of Privatised Water Authorities*, 25 January 1986.

II. THE REPORT

1. Regulation of monopoly

i) Services provided by water authorities

The relative significance of the various services provided by a water authority is shown in Table 1. This sets out the turnover associated with the different functions of two representative Water Authorities: Severn Trent (ST) and North West (NW).

A striking feature of Table 1 is the similarity of the proportions. The 'core services' — Water Supply and Sewerage Services - together account for about 85 per cent of turnover for both authorities. (Excluding highway drainage, the proportion is about three-quarters.) Trade effluent, water abstraction, and other services pertaining to water resources, water supply, and sewerage account for about 10 per cent of turnover. Land drainage accounts for 3 per cent and environmental services for the remaining 2 per cent of turnover.

Table 1: Analysis of Turnover for Two Water Authorities

Charge	Severn Trent (£m)	North West (£m)
Unmeasured water supply	86	86
Measured water supply	48	56
Unmeasured sewerage	156	102
Measured sewerage	13	41
	<u>303 (83%)</u>	<u>282 (85%)</u>
Trade effluent	15	14
Water abstraction	14	11
Other water resources, water supply and sewerage	11	2
	<u>40 (11%)</u>	<u>31 (9%)</u>
Land drainage	12 (3%)	10 (3%)
Environmental Service Charge	6.6	4.1
Other environmental	1.4	0.5
	<u>8 (2%)</u>	<u>5 (2%)</u>
Total turnover	<u>363 (100%)</u>	<u>331 (100%)</u>

Source: Severn Trent Water Accounts, 1984-5, page 14. North West Water Accounts, 1984-5, page 9.

Note: Turnover includes abstraction, sewerage, and water supply charges which are charged internally (£10 million ST., £14 million NW).

The annual accounts suggest the relative magnitudes of expenditure and operating profit (on a historical costs basis, before interest charges) are roughly comparable to those for turnover. The main difference is that sewerage services account for a somewhat higher proportion of total operating profit, the other services somewhat lower. The profit on environmental services is approximately zero.

Economic regulation will need to focus especially on the core services of water supply and sewerage. These are provided to industrial customers (measured services) and to domestic and commercial customers (principally unmeasured). These services constitute the heart of the monopoly problem: the task of regulation is to protect all customers in their dealings with a monopoly supplier. The bulk of this Report is concerned with this problem.

Many of the remaining services involve environmental considerations. They involve externality and public good issues as well as monopoly. They are less important in money terms, but equally complex analytically, and potentially more contentious. In this Report it has not been possible to go beyond a few observations in the final chapter. Further investigation of these problems is required.

ii) The water industry as a natural monopoly

With the exception of British Telecom, all companies and nationalised industries privatised to date have been subject to competition across most of their activities. British Telecom currently has significant monopoly power with respect to local networks. Nevertheless, it is subject to competition in customer services and to impending competition on trunk and international networks. Technological change (e.g. satellites or cable) could quite conceivably reduce or eliminate even BT's local monopoly in the course of time.

Of those other industries privatised, British Gas has substantial monopoly power via its distribution network. It is none the less in competition with several other fuels in all its markets. British Airports Authority has significant local monopoly power in each city. However, the demand for airport services is derived from the demand for air transport, which is subject to competition from other modes of transport.

The UK water industry is even more monopolistic. Its natural monopoly derives from the established local networks of pipes and sewers. (Strictly speaking, there are two separate monopolies, one for water supply and one for sewerage, with interrelated demands.) Given these sunk costs, it would not be economic for potential competitors to install rival networks. In the 'core businesses' of water supply and sewage disposal there is no significant competition between authorities or from products or services produced outside the industry. Nor is the situation likely to change in the foreseeable future (at least, without dramatic technological advances, e.g. pertaining to recycling of water). The UK water industry is thus the natural monopoly *par excellence*.

There are certain respects in which the water industry is, or could be, subject to a degree of competition. Whether competition is facilitated or prevented will affect the extent of monopoly power in the water industry. The scope for competition depends upon the initial structure of the industry, the statutory obligations and licence conditions, and the nature of the economic regulation. These are discussed in section 4. But whatever the framework adopted, there is no doubt that the monopoly power in the industry is exceedingly great. Consumers will demand a more comprehensive and permanent scheme of regulation than would be appropriate in any other private or privatised industry.

iii) The need for regulation

Monopoly power may be exerted in a number of different ways: by increasing prices; reducing quantity, availability or quality of service; allowing the environment to deteriorate; or allowing efficiency to

decline. Regulation needs to be designed to prevent such adverse effects. Indeed, it should secure improvements such as lower prices, more adequate supply, higher quality, a better environment, and greater efficiency.

Water authorities provide a vertical chain of services: water resources, water supply, sewerage services, sewage and effluent treatment and disposal. (Unusually, the consumer is interposed in the middle of the chain.) Monopoly power can be exerted at any point in this chain. If the profit on, say, water supply is held down, monopoly profit can still be extracted by increasing the (internal) charge for water resources to the water supply division, or by increasing the price of sewerage services (since 'water in equals water out'). Regulation will therefore need to encompass all these services provided by the water authority.

One qualification may be noted here for future reference. Although monopoly profit may be extracted anywhere in the chain, it cannot be extracted twice. It is not possible to charge a monopoly price for water and for sewerage. There must be a limit (albeit perhaps a high one) to the total amount that customers are willing to pay. Increasing the price on one link thus reduces the monopolist's scope for raising the price on other links. (To the extent that if the Government were to extract monopoly profit via a tax on the abstraction of water, the ability of water supply and sewerage organisations to extract monopoly profit would be correspondingly reduced. An alternative form of economic regulation, not explored here, would be to replace controls on prices and profits by such a tax on water resources, and to distribute the proceeds to customers or taxpayers to compensate for high water prices.)

Large industrial customers have a degree of choice whether to use the water authorities' services. For example, recycling reduces the use of water, pretreatment reduces the trade effluent to be disposed of. Such alternatives are not generally available for the core services of fresh water supply and sewerage. Regulation will therefore need to protect all classes of customers, not only domestic, agricultural, and commercial, but also small and large industrial customers.

Because the core services of the water industry are expected to be natural monopolies for the foreseeable future, any framework for economic regulation of the water industry must be seen as permanent rather than temporary. In the case of British Telecom, price control was designed to 'hold the fort' until adequate competition developed. In the water industry, no such competition is presently foreseeable. This makes it all the more important to 'get the regulation right'. In particular, it is necessary to design for the longer term, by paying special attention to incentives and structural flexibility, as well as to immediate political considerations of prices and service levels and environmental standards.

iv) Ascertaining trade-offs between price and quality

Although regulation must cover prices, quantity, quality, environmental standards, and other obligations, there is a trade-off in the supply of these various elements. The higher the various qualities and standards imposed, and the heavier the other obligations, the more costly it will be to provide the required services. At some point, higher quality means higher prices.

There is also a trade-off between these elements from the point of view of customers. Lower price provides some compensation for lower quality; improved service is some compensation for higher price.

No one of the elements can therefore be pursued without regard to the others. Regulation of prices or profits must be determined jointly with other regulations on levels of service, and the other responsibilities of the privatised water authorities.

In a competitive market it is left to firms and customers to ascertain the trade-offs in cost and preferences, and choices are made accordingly. Regulation abrogates this process. It is therefore necessary to develop some mechanism for ascertaining trade-offs in order to strike the right balance between price and levels

of service. Specifically, Ministers and regulators need to judge the costs of improvements and the preferences of customers and others.

v) Disincentive effects

Regulation of prices and profits will have disincentive effects. To the extent that reductions in costs must be immediately and wholly passed on to consumers, and therefore do not accrue to the regulated company, there will be less incentive to improve efficiency and to innovate, and greater incentive to indulge in 'empire-building' regardless of cost. A balance must therefore be struck between encouraging efficiency and passing on the benefits to consumers. Means must be sought to increase the pressure for efficiency.

vi) Effectiveness of regulation

The more constraints that are imposed on a water authority, the more difficult and costly it is to enforce them. The more targets that are aimed at, the less weight that can be attached to any one of them. So there is another direct trade-off between the effectiveness of regulation (e.g. on a major issue such as environmental standards) and the number of regulations imposed. Effective regulation requires simplicity.

vii) Alternative regulatory philosophies

Given the various problems of regulation, one approach would be to dampen the profit incentive. This could be done by severely limiting payment of dividends, emphasising fixed interest rather than equity shares, controlling investment programmes, and heavily regulating all activities of the company. This would prevent excessive profit, and ensure that prices do not exceed costs. However, it would not escape the problem of having to decide what prices and levels of service ought to be. It would not ensure that costs themselves were as low as possible, nor encourage improvements in efficiency over time. Consumers could not be assured of improved levels of service at lower prices in future. The companies would not be attractive to potential shareholders.

The alternative approach proposed here is to harness rather than dampen the profit incentive. Specifying a maximum ceiling on price increases and minimum targets for levels of service, and allowing competition for control of water authorities via the capital market, is a means of organising competition to improve efficiency and provide required services at minimum cost. Regulation can be designed to ensure that, over time, the benefits of this competition are passed on to consumers in the form of lower prices and improved levels of service. Potential shareholders will find such companies attractive.

2. Privatising Water Authorities

The privatisation of water differs from all previous privatisations in so far as there are ten water authorities rather than one. This imposes certain constraints with respect to the uniformity of their treatment. However, it also offers the opportunity to make regulation more effective.

i) Uniformity of treatment

There are great differences between the ten authorities with respect to size, condition of assets, costs of supply, financial situation, present environmental standards, and other obligations. The framework of regulation must accommodate these differences.

At first sight, it seems necessary to 'treat each case on its merits', and to tailor the economic regulation of each authority to its own special situation. Certain common principles might be established (e.g.

uniform rate of return on capital). Allowable levels of prices, revenues, or profits will then be determined separately for each authority in the light of its predicted operating costs, investment programmes, and new capital requirements. These, in turn, would take account of the authority's obligations and the target levels of service and environmental standards which had been set for it. These parameters would subsequently be revised in the light of that authority's past performance and current prospects, and any desired changes in future obligations or targets.

Consider some of the implications of this approach. Setting licence conditions and writing the prospectus is not merely a matter of making decisions in the light of available information: it involves hard bargaining with the company to be floated. In this respect, the burden on the DoE and Ministers will be roughly ten times that of privatising British Telecom or British Gas.

Privatisation will create an entirely new category of shares on the stock exchange. Just as they did with BT, market analysts will attempt to place this unfamiliar beast in the context of other animals within the zoo. But now they will have ten such beasts to examine. Attention will inevitably focus on similarities and differences between them. Ranking the water authorities will be a new exercise, but one in which market analysts will be particularly adept. (BT has already found them more informed and critical than its former paymasters.) Variations in treatment will be highlighted. Initial differences in prospects will be clearly reflected in flotation proceeds.

Customers are aware that prices and levels of service vary across the country. They will question on what basis the changes in these prices and service levels are planned to vary from one authority to another. If, after privatisation, one authority's prices are allowed to rise faster than others, the Minister will have somehow to reassure its customers that privatisation none the less makes them better off than they otherwise would have been.

Analogous difficulties arise after flotation, in the course of regulation. Every change in the licence exposes the economic regulator and the Minister to charges of unduly favouring or penalising the water authorities concerned. Such allegations will carry particular weight when a regulatory decision can be publicly seen to affect an authority's stock market valuation by millions of pounds overnight.

Variety of treatment makes it more difficult to compare performance for purposes of control. It exposes the regulator to 'capture' by the private water authority. The resulting danger is that an authority's requests for (e.g.) price increases will be accepted without serious question, or that strict regulation of prices will be offset by tax regulation of standards.

To summarise, against the obvious attractions of 'treating each case on its merits' must be set the burden on the Minister and the economic regulator, the problems of inconsistency and alleged unfairness, and the difficulty of control. Design of the regulatory scheme therefore needs to embody as much uniformity and consistency between authorities and over time as their different situations permit.

ii) How much uniformity?

Uniformity of treatment is thus conducive to equitable and effective regulation. But how much uniformity is possible and desirable?

It is not necessary or desirable or even feasible to impose identical prices or levels of service or environmental standards on all authorities. Nor is it even necessary to provide for identical profit streams. Revenues need to be adequate to cover operating expenses and to ensure finance for necessary investment. They should not be so excessive as to encourage their dissipation on dubious schemes. But within this range, some variation in profit streams is inevitable. (Such variations in expected profits will be reflected in different flotation prices for the privatised authorities. They will not affect customers or shareholders.)

A major part of this report is concerned to explore how far uniformity of treatment across all authorities in the industry is desirable, and what it entails, and to consider what changes in financial conditions are indicated before privatisation in order to facilitate the required uniformity of treatment.

iii) Competition

Where there is a natural monopoly the viability of competition in the product market is severely limited, but is none the less worth facilitating. The presence of ten water authorities enhances the scope for competition, especially for non-core services and in the capital market. These topics are discussed in sections 4 and 5 below.

iv) Effective regulation

Privatising ten authorities provides the opportunity to make regulation more effective in protecting consumers than it otherwise could be. It does so by making more information and instruments available to the regulator. He can make comparisons. In enforcing and revising licence conditions for each authority he can draw on the experience, policies, and performance of the other nine water authorities, and indeed the views of their customers and the general public. He can use the performance of the water industry as a whole as a yardstick by which to assess the performance of each individual authority.

It was noted earlier that regulation of prices and profits discourages the search for efficiency by the regulated company in so far as any cost reductions have to be passed on to its consumers. If cost increases can also be passed on there is an incentive to indulge in 'expense padding' and 'gold-plating'. In order to judge prices or profits, the regulator requires a 'yardstick' which is outside the direct control of the regulated company, but none the less reflects actual or 'best practice' conditions in that industry.

The availability of ten water authorities means that the maximum price increases allowed to each authority could be based, not on changes in that authority's own costs and performance, but on changes in cost and performance in the water industry as a whole (e.g. on the average costs or performance of the ten water authorities). This ensures that average cost reductions are passed on to customers without blunting the incentives of any individual authority to reduce its own costs. Performance of all authorities is likely to be higher, hence benefits to customers greater.

The final important consequence of privatising ten water authorities is that the regulator could be provided with a more credible threat in case of serious and persistent violation of statutory duties or licence obligations. The ultimate sanction is to offer elsewhere the opportunities provided by the licence. This could take different forms, e.g. placing temporary contracts to manage the assets on behalf of existing shareholders, or most drastically by transferring the assets to another party. That there are nine other private water authorities, apart from other possible contenders, adds to the credibility of the sanction. (In this respect, again, water is distinguished from telecommunications and gas.)

v) Conclusions

Privatising ten water authorities offers both problems and opportunities.

The very different situations of the ten authorities need to be taken into account. Yet the burden on Ministers and regulators, and the need for equitable treatment and effective regulation dictate as much uniformity as possible.

The privatisation of ten authorities enhances the prospects for competition in the product market and capital market.

Privatising ten water authorities makes it possible to improve the effectiveness of regulation by (a) providing comparative information (b) enabling price and other controls to be related to a yardstick based on industry performance, thereby protecting consumers without discouraging increased efficiency, and (c) increasing the credibility of the ultimate sanction available to the regulator.

3. The Scope for Competition

In privatising British Telecom, it was appropriate to consider how far competition was or could be an alternative to regulation. To a lesser extent this is true of British Gas. In the privatisation of water, such a choice does not arise: competition cannot be seen as an alternative to regulation. None the less, it is appropriate to consider competition as a complement to regulation. Extensive regulation will be necessary in any case, but if competition can be encouraged it will facilitate the regulator's task and provide added protection to customers.

There are broadly three possibilities. First, competition in other commercial markets which are presently not a significant aspect of a water authority's activities. Second, competition in the provision of core services along the borders between neighbouring authorities. Third, the franchising out of particular activities or indeed whole services. We examine these in turn.

i) Commercial activities

Water authorities can compete with other companies in respect of various commercial activities ranging from bottled mineral water to overseas consulting. These are presently minor fringe activities, not part of the 'core' business. Some activities may require economic and political resources not presently available, but in future they could be quite significant for some privatised authorities.

One example is Thames Water Authority's £40 million tourism plan for the London stretch of the Thames. This involves new piers, probably housing shops and restaurants, and a service of fast river buses (*The Times*, 20 November, 1985.) Another example is described in *Water Bulletin International*, 8 November, 1985: 'The British water industry — including British Water International, the water authorities' overseas consultancy — is currently involved in a £2000 million plan to improve Cairo's sewerage system.' (The article also notes that 'future British participation in the project . . . lies in the hands of the politicians and bankers who will have to agree further loans and possibly aid money for the scheme to ensure British firms remain involved'.)

Water authorities are beginning to enter the market for customer services such as meter installation and pipe repairs, maintenance of private sewage works, and quality inspection of large buildings. They could even move into plumbing.

To limit the possibility of subsidisation of commercial activities by core services, and to aid shareholders in the appraisal of commercial success, it would be sensible to require non-core activities to be carried on by a separate subsidiary company. (More generally, it would be helpful to the regulator if all major activities were divided into separate subsidiaries.) It would also be appropriate to reinforce the 1980 Competition Act by an explicit licence condition to prevent anti-competitive practices such as 'predatory pricing' or 'vertical squeezing'.

ii) Competition between water authorities

The high costs of installing networks and transporting water or sewage means that direct competition between authorities to supply core services is largely uneconomic. Nevertheless, direct competition to

supply water or sewerage facilities could be feasible on the borders between two authorities—for example, in the case of a new town, shopping centre, industrial estate, or factory.

In order to protect consumers, each authority will need to be given a defined territory within which it has an obligation to supply core services if requested. However, there is no need for this to be a statutory monopoly. Consumers will be better served and protected if they have the right to invite supply from neighbouring authorities.

Present restrictive practices legislation will need to cover any 'market-sharing' arrangements, for both core and non-core services.

Water authorities presently act together on a number of other issues - for example, wage negotiations and dealing with Government. In some respects, it will be convenient for that to continue. But pressure from shareholders will change the attitude of the authorities themselves. It will also need to be considered how far the ten members of a private industry should be encouraged or allowed to act together. In wage bargaining, or in negotiating licence revisions with the economic regulator, a 'united front' may not be in the customer's best interest.

iii) Franchising

Given existing networks, facilities, and plant, other organisations could compete to provide water supply and sewerage services on a franchise basis. There could conceivably be limited competition in the provision of new water resources (e.g. reservoirs and boreholes) and sewage treatment plants. The maintenance and construction of the networks themselves could also be put out to tender.

Some have advocated that all these services should be compulsorily franchised, with the role of water authorities essentially limited to the granting and supervision of such franchises. The terms of reference of this study, which require me to 'assume that the water authorities would be privatised in substantially their present form', rule out consideration of this alternative structure. The question therefore arises how far any benefits of franchising could be achieved within the present structure.

A private water authority will have the freedom to contract out any of its business, as indeed is now widespread (e.g. mainslaying, repair, and maintenance) or to franchise any of its operations. In effect, there is competition between the authority's own in-house staff and outside contractors. This could be extended. Each authority will tend to specialise in those services where it has particular strengths (e.g. laboratory analysis) and to buy in other services. One can even imagine an authority having a subsidiary company responsible for administration of the regulated business, but buying in all its services (such as transport, computing, maintenance) from the most cost-effective source, whether from other subsidiaries inside the authority or from outside suppliers.

iv) Restructuring

The form in which the water authorities are initially privatised does not preclude subsequent restructuring, either by statute or as a result of market forces. Over time, and consistent with meeting their statutory responsibilities and licence conditions, the authorities will restrict or widen the scope of their activities, specialising in those activities where they have a comparative advantage and expanding into new areas perhaps outside the water industry itself. Provided that licencing policy does not preclude it, they could divide into separate organisations; alternatively, they could merge with other companies or with each other. They could engage in joint ventures to share investment in new resources.

All such restructuring would have to show net benefits in order to come about, otherwise shareholders will object. For example, any advantages from a merger between two water authorities (e.g. reduction in

transactions costs or economies of scale in the provision of customer services) would need to outweigh the dis-economies of large-scale operation. The Office of Fair Trading and the Monopolies and Mergers Commission would also have to be convinced that such benefits outweighed any detriments to competition, and that the merger was on balance not against the public interest.

If regulation can be designed to facilitate rather than discourage such voluntary restructuring in response to market forces, while continuing to ensure adequate service and to protect against monopoly power, this will allow more efficient industry structures to emerge over time, to the ultimate benefit of consumers.

Some have argued that there will be a tendency for authorities to prefer 'empire building' to cost-cutting. This is certainly likely if profits are regulated on the basis of cost-plus, or if there is sufficient pressure towards efficiency from the capital market. It is therefore important that economic regulation provides a strong incentive for the privatised authority to seek the most cost-effective set of contractual arrangements. The next section deals with this issue.

4. Efficiency and the Capital Market

Even if competition in the product market is increased, it will still be very limited. It is therefore necessary to consider how efficiency can best be promoted in other ways. A privatised authority must be prevented from extracting its monopoly profit in the form of inefficient management. A means needs to be found to counter possible disincentive effects of regulation.

The main pressure for efficiency must come from within: from the incentive of a private company to reduce costs so as to increase profits. As far as possible, regulation needs to maintain this incentive while at the same time ensuring that gains in efficiency are ultimately passed on to consumers in the form of lower prices and better service.

An important role in securing efficiency is played by competition in the capital market. The stock market sharpens the drive to efficiency because it provides such an immediate feedback on performance, both past and expected in the future. Shareholders care about future profits; they buy and sell shares in the light of their expectations. Share prices move accordingly.

The stock market influences control over resources. Other things being equal, more efficient companies will command higher stock market ratings, hence easier and cheaper access to capital. Companies that perform well will tend to expand; companies that perform less well will tend to contract.

The stock market also sharpens competition in the market for managerial talent. Top managers can more easily demonstrate success. The more able managers will be more quickly sorted from the less able, more highly rewarded, and given control of more resources. The less able managers will be asked to step down. Water authorities will be competing between themselves, and with quite different businesses, for the services of the best managers.

Competition in the capital market is naturally associated with the more entrepreneurial activities in which a water authority might engage. But it is equally applicable to its core business. The importance of water supply and sewerage services, and the lack of direct competition there, make it even more necessary to harness stock market pressures to increase efficiency. Price or profit control can bring down prices towards the level of cost, and eliminate excess profits. But regulation must rely on the profit incentive, enhanced by stock market mechanisms, to ensure that costs are systematically reduced wherever the opportunities to do so arise.

i) Takeover bids

A key feature of the stock market is the takeover bid. This is a means whereby alternative management teams compete to run the company. Under-utilised assets, overmanning, lack of corporate direction, failure to innovate, excessive or misdirected investment — all these render a company vulnerable to takeover. The takeover bid is the stock market's ultimate check on efficiency. It is also the major source of protection for shareholders.

Note that it is not low profits *per se* (or for that matter high profits) that render a company vulnerable to a takeover bid. The stock market judges a company's actual profit performance against its potential performance. The performance of other companies is relevant only as a guide to what this potential might be. Age of assets, market conditions, and regulatory constraints will all be taken into account. The central question is whether a company is doing as well as it could in the circumstances, or could do better under a different management.

ii) Takeover and natural monopoly

Where there is natural monopoly, it has long been recognised that competition in the market is not feasible. The possibility of competition for the market has often been discussed. Franchising is a means of organising this, but a very imperfect one. Takeover is a more effective means of organising competition for the market.

The threat of takeover thus has a particularly important role to play in the water industry. Many have argued the case for franchising out water supply and sewerage services as a means of introducing competition. There would be difficulties both in changing to this system and in operating it. Would there be effective competition between incumbent and potential franchisees at, say, ten-year intervals? What is to ensure that the franchising authority is itself efficient in awarding and monitoring franchises?

The possibility of takeover achieves the desired end more easily. If the incumbent management of a water authority is failing to operate efficiently, the takeover bid is precisely the means whereby a more efficient management can replace it. It is a continuous test, not limited to ten year intervals. A privatised water authority which insists on 'empire-building', when contracting out would be more cost-effective, will be more vulnerable to takeover.

Who benefits from takeover in the water industry? The technique itself is neutral. The distribution of benefits depends upon the regulatory framework. In order to protect shareholders, and to generate gains for redistribution, there needs to be sufficient inducement to potential bidders to discover and remedy inefficiency. But customers and the general public, too, need to benefit in the form of lower prices, improved levels of service, and higher environmental standards. At the same time, of course, regulation needs to secure the continuation of core services, to protect customers against the creation and abuse of market power, and to prevent takeover which might have other adverse consequences.

To summarise, the public interest will be promoted by regulation which facilitates competition between alternative management teams via the takeover bid, provided that the benefits of improved efficiency due to takeover are ultimately and in large measure passed on to customers, and that there is a mechanism to prevent 'undesirable' takeover.

iii) Feasibility of takeover

Will the water authorities be so large that funding a takeover would be impossible or implausible?

It is not yet known what values will be placed on the assets of the privatised water authorities. The current

cost valuation of their total assets is about £27 billion, so the average authority's asset value is just under £3 billion. This is large: but in 1984 alone there were fourteen takeover proposals for companies with assets over £1 billion, the average value being £3.8 billion. (*Source*: Annual Report of the Director General of Telecommunications, 1984.)

The future stock market valuations of the privatised authorities are equally uncertain. They could range between £100 million and £1.5 billion, but in recent years there have been five takeover bids worth over £1 billion, the largest being £1.86 billion (subsequently topped by the Guinness-Distillers bid of £2.2 billion).

Who might be interested in taking over a water authority? Potential candidates include design and construction companies and chemical firms. Direct experience of UK operations would be a valuable asset in bidding for overseas contracts. Foreign water companies are another possibility. The General Water Works Corporation, the second largest US water treatment company with a 1983 turnover of \$90 million, is a subsidiary of the French company *Société Lyonnaise des Eaux* (which supplies water to 47 per cent of the population of France). Not least important are the nine other water authorities in England and Wales.

Thus, the financial size of the privatised water authorities would not be a barrier to takeover. In this respect, the water industry will be significantly different from telecommunications and gas. Competition in the Water sector of the stock market could be as active as in any other sector.

iv) A golden share?

The possibility of Government retaining a special 'golden share' has been mooted. This would serve a variety of control purposes, and in particular could be used to prevent undesirable takeovers. There is no doubt that some form of protection is required, but is a 'golden share' the best way to achieve it?

Such a control mechanism is an alternative to the regulatory framework examined in this report. The conditions for its use would need to be explained to potential shareholders. It is not clear what additional merits a 'golden share' would have. Indeed, it has disadvantages. It constitutes an additional difference between 'privatised' and other private firms, and sets a questionable precedent. It weakens the main protection which shareholders (including employee shareholders) have against inadequate management.

The proper specification and enforcement of licence conditions is the main protection for consumers. In addition, the 1973 Fair Trading Act already provides a well-established procedure for dealing with the possibility of undesirable takeover. The Secretary of State for Trade and Industry, advised by the Director General of Fair Trading, can refer a proposed merger to the Monopolies and Mergers Commission (MMC). If the Commission finds that the merger or takeover would be against the public interest, the Secretary of State has power to prevent it.

There is no doubt that a takeover of a water authority would fall within the ambit of the Act, on the £30 million size of assets criterion alone. There is equally no doubt that any fears relevant to a water authority takeover (e.g. excessive concentration of ownership, or ownership by a foreign company) are within the statutory criteria pertaining to the public interest (s. 84) and are in practice taken into account by the MMC and the Secretary of State. It is not clear what kind of takeover might be regarded as not against the public interest by the MMC yet require a special 'golden share' to prevent it.

A vital pressure to efficiency is lacking where takeover is precluded by statute, or rendered highly unlikely by other considerations. Both shareholders and customers are thereby disadvantaged. A 'golden share' is likely to deter beneficial takeovers, thereby protecting inefficient management, but is unnecessary to prevent undesirable takeovers. It would be preferable to avoid it.

5. The Regulatory Framework

It is assumed that the economic regulator will have similar powers and responsibilities as in telecommunications. His task will be facilitated by the opportunity to compare ten water authorities (e.g. in assessing performance prior to revising price constraints or level of service obligations, or in considering failure to meet prescribed quality standards).

Licence conditions can be enforced through the Courts, if necessary by fines for non-compliance. But payment of fines might reduce a water authority's ability to meet its level of service obligations. An embargo on dividends until these obligations are met deserves consideration. The ultimate sanction for inadequate performance is revocation of the licence. This could have real force in the water industry. The economic regulator therefore needs power to compel a forced sale of a delinquent authority's assets and licence.

6. Regulating levels of service

Water quality standards will continue to be governed by the EC Drinking Water Directive, enforced by the Department of the Environment. Given the dramatic transition from public to private ownership, level of service targets proposed and enforced by the authorities themselves, while commendable, will not provide adequate reassurance of future improvements. Statutory provisions concerning levels of service need to be strengthened. Requiring the water authorities to publish information on indicators of service levels will facilitate enlightened public discussion and effective regulation.

7. Levels of service targets

To reassure customers that levels of service will improve, it is proposed that licence conditions include specific level of service targets. In order to be workable they should focus on those issues considered most important by customers and susceptible to measurement; they should be long-term targets (e.g. applying 20 years ahead), with additional interim targets; they should prescribe minimum acceptable standards rather than average levels; and they should be uniform over all authorities. The aim is systematically to eliminate the worst levels of service throughout the country as a whole. A similar approach could be applied to environmental standards if required. The levels and dates of the targets would be chosen together with the constraints on prices to ensure that all authorities could finance the investments required to secure improvements in levels of service.

8. Regulation of profits or prices

At the heart of economic regulation lies the question whether there should be constraints on profits or prices, and in either case how these constraints should be formulated and implemented. This financial regulation cannot be considered in isolation from the regulation of quantity and quality of service, nor from the 'regulation' stemming from competition in the product markets and capital markets. All these three elements are interdependent and form part of economic regulation. The effectiveness of economic regulation depends upon all three being designed to work in harmony.

Control of profits by means of an allowed rate of return on capital is the method used in American regulatory systems. It is well understood and accepted by US investors. Although not widely used in this country, it is the basis on which the statutory water companies are regulated. However, it has not been adopted for the regulation of British Telecom. There, a price control system is in use popularly known as RPI-X. The system adopted for BT is also proposed (with modifications) for BAA and British Gas, and is currently more familiar in the UK. There is increasing dissatisfaction with regulation in the USA itself, and American authorities have expressed interest in the RPI-X system used in the UK.

i) Rate of return regulation of profits

Under the US system, a regulated company that wishes to change its tariff puts forward a proposal to the regulatory authority. The total revenue which the proposed prices are expected to yield is compared with the total revenue requirement. The latter is defined as operating expenses plus depreciation plus allowed rate of return on capital.

The central argument for rate of return regulation is that it protects both consumers and producers by ensuring that expenses and investments are justified, and by providing a fair reimbursement for the services provided. These claims have increasingly been challenged.

The problems of 'cost plus' contracts are well known in the UK. Likewise, a company which is regulated under the US system has reduced incentive to cut its costs and seek efficiency, in so far as any savings must immediately be passed on. (This is offset to some extent by 'regulatory lag'.) There is also an incentive to 'gold-plate' the rate base by excessive investment, and to bias the long-term planning process towards capital-intensive rather than labour-intensive methods of production. There is limited evidence of this so-called Averch-Johnson effect in the USA.

To counter these tactics, the regulatory authority needs to determine in some detail which expenses are allowable, what depreciation policy is appropriate, and what rate of return is 'fair'. All these will typically change over time and be disputed. The regulatory authority also needs to approve major capital expenditure programmes to make sure the investment is not excessive. It needs to allocate joint costs between the regulated and unregulated businesses, and between the different services provided. The burden on the regulatory authority is therefore quite considerable, implying the need for a large staff and budget. Moreover, the allocation of joint costs is by definition arbitrary, and hence political.

The more the regulatory authority is involved in 'second-guessing' the company's plans, the more it becomes committed to defending the company when the approved plans are implemented. There is a heightened danger of 'regulatory capture'.

Empirical evidence suggests that prices in regulated US electric utilities during the earlier part of this century were no lower than in comparable unregulated electric utilities. It is increasingly apparent that regulation has served to keep prices higher than they otherwise would have been in the US airline and trucking industries. In many cases, it now appears, economic regulation was introduced and designed to protect producers rather than consumers. Other interest groups apart from shareholders, notably suppliers and employees, have also secured monopoly rent at the expense of consumers. All forms of regulation are vulnerable on this score; the point here is that rate of return regulation can no longer be assumed to offer the protection for consumers that was once taken for granted.

Economists have sometimes seen rate of return regulation as a means of securing 'optimal' prices in a non-competitive market. Some US regulatory authorities have taken an interest in the structure of prices, but on the whole the system has been notable for the lack of success in this direction. Nowadays economists are less convinced that a set of 'optimal' prices exists. More weight is placed on the incentives (or lack of them) provided by the regulatory system for the company to discover and meet consumer preferences and to adopt more efficient techniques of production.

ii) RPI-X regulation of prices

Under the system used to regulate British Telecom, it was written into BT's licence (and prospectus for flotation) that the company could not increase the weighted average of its prices by more than the rate of increase of the retail price index less 3 per cent for a period of five years. This is the RPI-X formula, with X set equal to 3.

There was relatively little discussion of the starting-point from which the rate of BT's price increase was to be measured. For the water authorities, these starting-points (i.e. the levels of prices obtaining at the time of flotation) may be crucial. This point is discussed in section 12.

iii) Advantages of RPI-X

There are four main advantages of RPI-X compared to rate of return regulation. They relate to political effectiveness, the quality of public decision-making, the cost and burden of regulation, and the effects on the efficiency of the regulated company.

a) Political Effectiveness

RPI-X focuses attention on what consumers ultimately care about: the prices they will have to pay. The first concern must be the average level of prices, in practice with respect to inflation.

b) Public Decision-making

In the context of water a crucial issue is the trade-off between price and quality. The higher the quality of service required, the greater will ultimately be the rate of increase in prices charged. A rate of return system tends to conceal the consequences of imposing higher quality standards because the costs of doing so are not, at the time, made explicit. An RPI-X regime, in contrast, obliges the level of service targets and the maximum price constraints to be juxtaposed and chosen jointly.

Flotation forces the issue. The Minister and his advisers at the DoE must ask themselves the question: what will be the consequences of setting price and quality licence conditions at this level rather than that, and what will the public prefer? The DGW at will have a similar decision to make at periodic intervals thereafter, when modifications in X and in level of service targets are under consideration. An RPI-X system may thus be expected to clarify and improve public decision-making concerning the allocation of scarce resources. (*Inter alia*, it will determine how far additional capital is attracted into the water industry.)

c) Burden of Regulation

Under the RPI-X mechanism, the company has discretion to change its level and structure of tariffs within the agreed formula. Once X has been chosen, the regulatory authority does not need to approve price changes nor vet the company's investment programme. There is less intervention in the company's business. Fewer regulatory staff are required. Regulation is cheaper. Decision-making is not held up or distorted by bureaucratic inertia or political pressures.

d) Incentive to Efficiency

RPI-X does not blunt the incentive to efficiency. The company is assured of keeping the fruits of increased efficiency during the period while X and the level of service targets remain unchanged. In this way, adverse consequences of the cost-plus approach may be minimised. Profits may be higher, but because costs are lower, an average price ceiling can be imposed that is lower than the cost-related prices that would otherwise obtain. (A parallel may be drawn with patent legislation, which protects profits in order to stimulate innovation and thereby generate longer-term benefits for consumers.)

iv) Conclusion

These advantages suggest that price control along the lines of RPI-X rather than rate of return control should form the basis of regulating privatised water authorities.

However, price control, as embodied in the RPI-X approach, is not entirely free of the problems associated with rate of return control. This is especially true when regulation is permanent. The next section explores these problems.

9. Problems of Permanent Regulation

RPI-X was initially adopted as an interim measure for regulating BT, pending the development of more effective competition. It has yet to be decided whether to retain this constraint after the first five years, and if so whether to modify the scope of the control and the level of X.

For privatised water authorities, price control will be necessary for the foreseeable future. Adoption of the RPI-X scheme therefore needs further justification. One set of worries concerns the 'right level' of X: the other more serious problem concerns incentives to efficiency.

i) A 'right level' for X?

One argument is as follows. Since the future is uncertain, the regulated company's operating costs or investment requirements may turn out to be higher than expected. The company will make losses, further capital will not be forthcoming, unemployment and perhaps bankruptcy will ensue, required services will not be provided, and customers will suffer. Alternatively, operating costs and investment requirements may be lower than expected. Profits will be excessive, but will tend to be absorbed by higher wages and salaries and 'managerial slack': resources will be dissipated in 'empire-building'. Shareholders, management, and employees will benefit again at the expense of customers. This suggests, so the argument runs, that the success of the RPI-X system is balanced on a knife-edge, requiring the 'right level' of X to be chosen, yet it is extremely difficult to know what the 'right level' of X should be.

A further twist to this argument has been put forward. After the event, it is claimed, we shall know whether X was too low, because the company will be in obvious financial difficulties. But we shall never know whether X was too high because any excess profits will be absorbed by 'managerial slack' or 'empire-building' before we can observe them. (Actually, the uncertainty is just as great in the first case: how do we know whether a company's difficulties reflect inadequate revenues or excessive costs?)

The force of these arguments is to suggest that, if RPI-X is not actually replaced by a rate of return system, it should at least be supplemented by a rate of return system. In other words, X should be set initially, and revised frequently (perhaps annually) so as to ensure that the regulated company earns a specified allowed rate of return of capital.

Parts of this argument are valid. The future is uncertain — both market conditions and company performance— so profits may turn out lower or higher than expected, perhaps to an unacceptable degree. It is also difficult to judge *ex post* what performance might have been. But this does not invalidate the use of RPI-X. There is a feasible range, which may be quite wide, rather than a knife-edge, of levels of X under which the system will work. Nor is a rate of return system required to supplement it. Rate-of-return considerations are already necessarily implicit in the choice of X. The argument does, however, highlight the need periodically to revise the level of X, and to secure the information required to do this. It will help to spell out these counter-arguments more fully.

ii) A feasible range for X

The stock market price immediately after flotation will reflect the market's estimate of the company's future profits. Revenues will depend upon the initial level of prices and the level of X (which constrains the average rate of increase in prices); expenditures will depend upon the levels of service required (which influence operating costs and required investment). Undemanding price and service constraints will be

immediately translated into a high share price: tight price and service constraints into a low one. The share price will simply capitalise the expected future profit stream and provide the same rate of return to shareholders as other investments of comparable risk. Shareholders are thus not affected by the initial level of X and the required levels of service, since they can decide whether or not to invest in a given authority. At the time of flotation, then, there is a direct trade-off between benefits to consumers (in terms of price and quality) and benefits to taxpayers (via proceeds accruing to the Treasury), but shareholders are not affected.

After flotation, the situation changes. Taxpayers and the Treasury are henceforth unaffected by changes in market conditions, in X and in the target levels of service (except for tax considerations and to the extent that the Government has not yet disposed of all its shares). Shareholders will be affected by unexpected changes in these parameters. Any changes in the expected net income stream will be immediately translated into changes in stock market price. So after privatisation, the trade-off is between consumers and shareholders, with taxpayers essentially unaffected.

Because the initial level of X is simply reflected in the initial share price, the only requirement for the system to be workable is that the share price should be sufficiently high (hence X sufficiently low and if necessary negative) to generate a positive expected profit stream in order that the company can be floated. As conditions change over time the precise location of this end point will vary, so X may need to be changed, but the ultimate constraint is to maintain a positive share price if the company is to survive.

The location of the other end-point to the feasible range of X depends upon political rather than financial or economic considerations. A high initial RPI- X (i.e. a low or negative X) will not benefit shareholders but it will benefit taxpayers at the expense of customers; a subsequent increase in RPI- X will benefit shareholders at the expense of customers. There is a limit to which the electorate will accept either of these redistributions of income.

To look ahead briefly, the existence of a feasible range for X , which may be quite wide, rather than a single optimal level, will be important when it comes to the question of whether X should be uniform across all water authorities. If there were a unique optimal X for each authority, it is implausible (given their different situations) that licence parameters could be chosen to make these X s the same. But if each authority had a wide feasible range for X , indeed, if it is essentially open-ended in one direction, the problem of choosing a single X which is feasible for all authorities is a much more tractable one.

iii) Importance of the capital market

Some have argued that the RPI- X constraint needs to be set as tight as possible (i.e. to yield at most a 'normal' rate of return given the other licence obligations). This is to prevent 'management slack' and 'empire-building', and to force the company to increase efficiency. It is suggested that, in the absence of competition, the company may need such a 'stick' in order to force through managerial reorganisations, changes in work practices, and other revisions of policy which would otherwise be resisted internally.

These postulated dangers are real, but they depend upon market conditions rather than upon the level of X . In the absence of competition in the product market, the crucial determinant is the degree of competition in the capital market. A company which is not subject to effective stock market pressure is indeed likely to allow costs to rise and to dissipate profits. As emphasised earlier, the effectiveness of the RPI- X constraint in dealing with natural monopoly depends upon the threat of takeover.

iv) Permanent RPI- X control

The longer the period that RPI- X control is expected to remain in operation, the greater the uncertainty

about the location of the 'feasible range' for X, and the greater the likelihood of this range moving beyond the initially chosen X. An RPI-X price control that is expected to be permanent must therefore make provision for revising the level of X when necessary.

This immediately reintroduces the problem of incentives. The great merit of a fixed RPI-X over rate of return control is that the former preserves the incentive to cut costs while the latter does not. But if X is able to be revised, the regulated company will consider what effects its actions are likely to have on future levels of X. It will realise that greater cost reductions today will lead to pressure for greater price reductions when X is reset in future. Higher profits may even lead to a public demand to revise X prematurely. To this extent, incentives to maximum efficiency are blunted. When RPI-X is seen as a permanent regulation, this is a potentially serious problem.

v) An industry yardstick

To avoid blunting the incentive to efficiency, it is necessary to base the revision of X on factors outside the direct control of each authority, but none the less relevant to that authority's situation. An 'industry yardstick', reflecting performance and prospect in the industry as a whole, could be developed for this purpose. Each authority then knows that the future level of X is essentially independent of its own performance. If it fails to maintain comparable efficiency to the rest of the industry, it loses profits and its shareholders suffer. If it performs above average, it keeps the profits and its shareholders benefit. Future levels of X will reflect the past and expected future performance of the water industry as a whole. Thus the benefits of increased efficiency will be systematically passed on to consumers in the form of lower prices (or alternatively higher standards). The crucial advantage of the industry yardstick is that no authority has any incentive to hold back on improving performance for fear that it will jeopardise the prices and profits allowed to it in this future. The water industry is significantly different from telecommunications in that the presence of ten authorities enables this procedure to be adopted.

The precise way in which revisions to X relate to industry performance needs further consideration. It would not be desirable to reset X merely to accommodate the least efficient authority. The emphasis needs to be on average performance of 'best practice'. If average performance could be distorted by one or two exceptionally good or poorly performing authorities, revisions in X might be related to median performance (i.e. the authority 'in the middle'). The comparative cost indicators currently being developed by DoE may also have a useful role to play here.

If an industry yardstick is appropriate for periodic revisions in X, would it be preferable to relate the price constraint itself to an index of industry costs instead of to the Retail Price Index? This was done in the control designed by the MMC for London Rubber Company's pricing of contraceptive sheaths. The advantage of this system is that prices might not get out of line so quickly. But changes in technology or market conditions could still necessitate revisions in X, so the latter problem still has to be solved. The advantages of the Retail Price Index are that it is not subject to influence by the parties involved, and more widely understood and accepted by the majority of consumers and investors.

What should be the mechanism for triggering a revision of X? Leaving it until sufficient pressure develops introduces political considerations and involves more work in monitoring. It would be preferable to have a periodic review at fixed intervals. A shorter interval reduces the risk of X lying outside the 'feasible range' but involves a greater burden on the regulator and may reduce incentives to efficiency. An interval of 5 years seems about the minimum time necessary to protect incentives: 10 years is about the maximum that shareholders, customers, and government would find acceptable.

In deciding how far to revise X (and other licence conditions), the economic regulator needs to examine the company's production methods and investment programme. He must ascertain the scope for cost and price reductions through increased productivity and efficiency, and the need for capital expenditure. He

needs to predict the consequences of different levels of X on what the company will do, how it will do it, how consumers will be affected, and how consumers and others will react. (The Minister needs similar information in setting the initial level of X.) So permanent regulation is more complex than temporary regulation.

vi) RPI-X and rate of return

It should now be evident that rate of return considerations are necessarily implicit in setting and resetting X. The Minister and economic regulator know that flotation and continued operation are not possible if the rate of return falls below the cost of capital (i.e. negative profit stream), and that an excessively high rate of return will not be politically acceptable to customers. The bargaining between Minister and company before privatisation concerns precisely the level of X necessary to get within the feasible range. The DGTel has recently said explicitly that he would have cost of capital in mind when appraising BT's prices and profits (*The Times*, 19 November, 1985). The concept of a combination of the rate of return system and the RPI-X system, which is somehow different from RPI-X alone, thus reflects a misapprehension.

vii) Conclusion

Since price control of privatised water industries will be permanent rather than temporary, adoption of the RPI-X scheme needs further justification. Concern about the 'right level' of X is largely unfounded: there is a feasible range of X, which may be quite wide, over which the system will work. The danger that an undemanding level of X will lead to 'management slack' and 'empire-building' can be met by fostering competition in the capital market, in particular, by maintaining the threat of takeover.

A permanent RPI-X system must nevertheless provide for periodic revisions of X, to prevent prices and costs getting too far out of line. To avoid blunting the incentive to efficiency, the revisions in each authority's X must be based on factors outside the control of that authority itself. An 'industry yardstick', reflecting performance in the water industry as a whole, can be developed for this purpose.

10. Single or Multiple Constraints

Precisely how will RPI-X apply to water authorities? This section examines whether each authority should have one single RPI-X constraint applying in aggregate to all services covered, or whether each authority should have multiple constraints, one for each separate service or customer class. The chapter also examines the implications of metering for this question.

i) An illustration

An aggregate RPI-X constraint modelled on the BT formula would take the following form: in any of the five years beginning with the date of flotation, an average increase in measured and unmeasured water supply and sewerage charges, weighted by respective revenue in the preceding year must be at least X percentage points below the rate of increase in the retail price index over the previous 12 months. (Other services besides water supply and sewerage might be included in the constraint, but this Report has not examined them.)

A base year could be chosen as an alternative to the preceding year, but updating follows consumer preferences more closely. (Although water services differ from telecommunications in being jointly demanded and less responsive to price.) It also gives a higher weight to services where prices have earlier been raised the most. If the actual price increases in any year are less than the limit, BT can take credit for this in either of the next two years.

The average increase in each of these charges would be reasonably straightforward to calculate. Tariff

levels and structures vary between authorities, but are no more complex than in British Telecom. In Severn Trent, for example, unmeasured water supply is charged at a constant price per £ of rateable value; this charge varies by division (from 16.6p/£RV to 20.8p/£RV) to reflect differences in average levels of rateable value throughout the region. The same is true for sewerage charges, where there are three schedules according to whether the customer takes the full service, or a partial service of only surface water or used water disposal. Measured water supply is charged at a constant price (26.7p/cubic metre), as is measured used water (18.6p/cubic metre). In other authorities standing charges would need to be incorporated. Changes in minimum charges would also need to be considered.

Table 2 illustrates the way in which RPI-X calculations would be made, using purely arbitrary price increases for Severn Trent and North West. Because of the different proportions of revenue in the two authorities, the average price increase is slightly lower in Severn Trent than in North West, even though the assumed price increases are identical for each service separately.

Table 2

Calculation of Average Price Increase with reference to Aggregate RPI-X formula

Severn Trent	Hypothetical			
	Revenue £ million	1984-5 (%)	Price increase (%)	Weighted increase (%)
Unmeasured water supply	86	28.4	7	2.0
Measured water supply	48	15.8	4	0.6
Unmeasured sewerage	156	51.5	2	1.0
Measured sewerage	13	4.3	2	0.1
	303	100.0		3.7

Weighted average price increase is 3.7 per cent

North West	Hypothetical			
	Revenue £ million	1984-5 (%)	Price increase (%)	Weighted increase (%)
Unmeasured water supply	86	30.2	7	2.1
Measured water supply	56	19.6	4	0.8
Unmeasured sewerage	102	35.8	2	0.7
Measured sewerage	41	14.4	2	0.3
	285	100.0		3.9

Weighted average price increase is 3.9 per cent

The next section discusses whether X should be uniform for all authorities. But regardless of this, there is no requirement that the individual price increases for each service be identical for all authorities. Thus, it may be calculated that North West could alternatively meet a 4 per cent RPI-X constraint by, say, increasing all sewerage charges by 10 per cent and reducing all water supply charges by 2 per cent. (Or,

for that matter, it could reduce sewerage charges by 2 per cent and increase water supply charges by 10 per cent, since in that particular authority sewerage and water supply currently generate equal amounts of revenue.)

ii) Single or multiple constraints?

For each authority, should there be one single aggregate RPI-X constraint on the average increase in charges for all water supply and sewerage services? Or one constraint for water supply and another for sewerage? Or separate constraints for each class of customer (domestic, industrial, commercial, and agricultural)? Or even a separate constraint on each particular tariff?

A single aggregate constraint would be simpler. It would follow the British Telecom pattern, where the constraint applies to the weighted average increase in four main services. It would allow the water authorities to 'rebalance' their charges if they wished to do so. My understanding is that unbalanced tariffs do not constitute a significant problem in the water industry as they did in the case of British Telecom. Nevertheless, relative costs may change in future. Artificial obstacles to rebalancing tariffs would lead to inefficient use of resources and ultimately to higher costs.

The main disadvantage of a single aggregate RPI-X constraint is that, because it does not constrain the prices of individual services, each consumer might feel vulnerable to a significant rebalancing of tariffs. An aggregate constraint offers less protection than separate constraints. This would suggest a separate RPI-X constraint for each major class of customer. There may, however, be ways to avoid this added complexity.

iii) Alternative weights

Some domestic customers are most vulnerable: one possibility would be to define the weights used in calculating the average price increase in terms of revenues from domestic customers rather than revenues from all customers. In the two authorities studied, it seems that the ratio of sewerage charges to water supply charges is greater for domestic customers than for industrial customers. (For ST, sewerage accounts for 64 per cent of unmeasured charges and 21 per cent of measured charges; for NW the figures are 54 per cent and 42 per cent, respectively.) Thus, this approach would maintain a single RPI-X constraint but give a higher weight to sewerage charges in order to reflect concern for domestic customers.

Another variant would be to use the weights associated with the usage pattern of the customer with the median bill (defined as that amount such that half the water authority's bills are larger and half are smaller). The median bill is typically smaller than the average bill, and likely to be a domestic rather than industrial customer, perhaps even a lower income household.

This possibility was examined in telecommunications, when considering whether to include international and trunk calls in the 'basket of services' on which RPI-X was to be defined. These services had a significantly lower weight for residential customers than for BT's turnover as a whole. In the water industry, there is not such a variety of services available, nor such differences in usage patterns. It is not clear that the additional complication would be worthwhile.

iv) Formal undertakings

A preferable way to handle the problem of vulnerability is by means of formal undertakings. Because of concern on the part of domestic consumers, BT gave a separate written undertaking, not incorporated into the licence, to limit the increase in domestic rentals to RPI+2.

Whether such an undertaking is significantly different from a licence condition is debateable. An undertaking gives the company more flexibility. Unilaterally abandoning the undertaking would not constitute a breach of licence. Admittedly the Director General of Telecommunications could apply to the MMC to have the undertaking written into the licence but the MMC's agreement cannot be taken for granted.

The reception given to BT's price increases in October 1985 is instructive. It is widely believed by domestic customers that BT 'got around' the RPI-X constraint. The DGTel was forced to investigate. He found that BT's price increases were within the RPI-X constraint on average price and the RPI + 2 undertaking on domestic rentals. However, Oftel calculated that the bill for a residential subscriber who is a light user of the telephone would increase by about 8.6 per cent (*The Times*, 9 December 1985). In retrospect, it is apparent that domestic customers were not aware of the extent to which BT wished to rebalance its tariffs, nor of the extent to which the RPI-X constraint allowed this; had they been better informed they might have wished the undertaking to have been framed differently (e.g. to cover local calls as well as domestic rentals).

In the water industry, rebalancing is unlikely to cause such difficulty, but it would be helpful for the water authorities to make explicit their future intentions on structure and balance of charges and the implications for different classes of customer.

v) Separate constraints for each service?

An argument in favour of disaggregation by service is that each water authority is really engaged in several different businesses, and that the balance of activities differs from one authority to another. This is especially true with respect to likely future expenditure. Some current obligations (e.g. cleaning up the Mersey) bear heavily on sewerage rather than water supply. This would indicate at least two separate constraints, one for water supply and another for sewerage services.

Against this is the principle of integrated river management, which holds that these services are all aspects of the same business. We have also noted earlier the point that each water authority supplies a vertical chain of services in joint demand. A constraint on total profit is as adequate as separate constraints on individual services.

vi) Conclusion

The introduction of multiple RPI-X constraints necessarily raises questions of fairness and joint cost allocation. These questions are unanswerable by economic criteria and are hence political. The likely consequence would be to freeze the structure of tariffs in their present form. This would not be desirable in an industry which has been dominated for so long by political rather than market forces.

On balance, therefore, it seems preferable to adopt the simpler and more flexible single aggregate RPI-X constraint. This could usefully be coupled with formal undertakings, outside the licence, concerning future changes to each major tariff for, say, the next five years.

If an authority's pricing policy, while entirely consistent with the RPI-X constraint and any undertakings, does develop in a way which many customers and the DGWat feel to be undesirable, there are remedies available. The DGWat can warn the authority (as the DGTel has done with BT), and if necessary try to persuade it to accept a licence modification. If agreement is not reached he can apply to the MMC for power to modify the licence unilaterally. So customer protection on pricing is greater than the RPI-X constraint alone implies.

vii) Fine tuning

The RPI-X constraint was originally developed as a broad-brush reassurance during the dramatic transition from public to private ownership of BT. It may be extended by means of the industry yardstick to form a permanent constraint on average price increases (indeed, to ensure a slight but steady price decrease in real terms). It might also be possible to develop a set of indices relating to industry costs of difference services, which over time could supplement the aggregate RPI-X constraint. But RPI-X itself is not intended as a means of fine-tuning the tariff structure.

For this latter purpose the principles of Section 30 of the Water Act 1973 are more appropriate. Section 30 requires that in fixing charges the water authorities must have regard to the cost of providing services. Although they may make different charges for the same service in different cases, their charges must not show undue preference to, or discriminate unduly against, any class of persons.

The actual implementation of Section 30 has been subject to criticism. A recent study found as follows:

'We conclude that charging by reference to rateable value, the basis used a present for all except four out of every thousand households:

(a) offers only a rough and ready link with the amount of water customers use;

(b) does not give customers any incentive to take account of the cost of privatising a service.'

(Department of Environment, *Joint Study of Water Metering*, Report of the Steering Group, Chairman R. Watts, 1985, at para. 2.14.)

The British Telecom licence prohibits BT from showing undue preference or undue discrimination. This provision needs to be embodied in the water authority licences. Whether a cost-related condition is necessary and desirable needs further consideration.

viii) Metering

Whether or not to require metering is beyond the scope of this study: we are merely concerned here with any implications of metering for the regulation of prices and the form of the RPI-X constraint.

Metering will facilitate (indeed, may be necessary for) a greater variety and flexibility of tariff. The main argument for metering usually analysed is to depress demand so as to reduce the need for investment. But in the longer run metering may enable more water to be provided profitably (e.g. via discounts for demand at off-peak times, or when there is no danger of drought). More imaginative tariffs could also minimise any adverse effect of metering costs on smaller consumers (e.g. rising block tariffs with a cheaper initial segment for public health requirements and a more expensive additional segment for amenity and leisure use).

Private water authorities are likely to be more enthusiastic about metering than nationalised ones: metering is an integral part of the commercial customer relationship. The privatisation legislation and licence will presumably be drafted so as not in any way to prevent or inhibit metering itself or metering experiments. (Cf. *Joint Study of Water Metering*, op cit..)

If separate price constraints were levied on measured as compared with unmeasured services, the decision

whether or not to meter could be biased by the levels at which these disaggregate constraints happened to be set. A single aggregate RPI-X constraint avoids this difficulty.

The possibility of a licence amendment to require universal metering might usefully be put by DG Wat to the MMC after a few years of privatisation, before the first major review of RPI-X. By that time, further evidence may be available and attitudes are likely to be different.

11. A Uniform X

Since there are ten water authorities to which the RPI-X constraint will be applied, the question arises: should X vary from one water authority to another, or be uniform over all authorities?

The conditions of the water authorities differ greatly with respect to finance, geography, infrastructure, present levels of service, investment requirements, and future prospects. It seems both natural and inevitable that prices should reflect the situation of each authority.

This is entirely possible. A uniform X does not mean that prices must be uniform across all water authorities. It provides a uniform ceiling on average price increases—in effect, a uniform protection for consumers. It does not require that the ceiling be reached (BT has not done so), nor does it dictate how the average price increase should be composed. Most importantly, it does not assume a uniform starting-point. Present prices vary greatly between authorities. There is further scope (discussed below) for revising the price levels between now and flotation so as to accommodate the very different conditions of the ten authorities.

A uniform X seems necessary to operate the ‘industry yardstick’ described in section 9. It is conceivable that the yardstick could be applied to a set of different X’s—for example, revising them all by a common absolute or percentage amount—but this would be complicated.

A uniform X has a second advantage. Different X’s and changes in X render the Minister and the regulator vulnerable to political pressures from aggrieved consumers and shareholders. ‘Why do we have to suffer higher percentage price increases than they do?’ ‘Why has our company been restricted more than their company?’ As noted earlier, the existence of ten private water authorities quoted on the Stock Exchange will ensure that any initial differences in treatment, and any subsequent changes in the rules are immediately reflected in stock market prices. Critics claiming ‘unfair’ changes will point to millions of pounds added to, or wiped off, company valuations overnight. The regulatory authority, and ultimately the Minister, need protection against such allegations of unfairness and discrimination. A uniform X provides such protection.

A third advantage is the practical difficulty of negotiating ten different X’s.

i) The requirements of financial feasibility

Given the very different present situations and future investment requirements of the ten authorities, is a uniform X financially feasible, especially when coupled with uniform minimum level of service targets?

It was emphasised in section 10 that financial feasibility does not require identical or even similar profit streams. The magnitude of the expected profits is simply reflected in the magnitude of the flotation proceeds (which accrue indirectly to the taxpayer). If one water authority is expected to earn higher profits than another, this does not affect potential shareholders or customers of either company.

The requirement for financial feasibility is that it should be possible actually to float every authority. This requires that the expected profit stream of every authority be positive rather than negative. In other words,

even the water authority in the most difficult financial position should be able to earn sufficient revenue to cover operating expenses and to finance the minimum investment programme necessary to meet its statutory and other prescribed level of service obligations.

One way to achieve such profitability would be simply to remove any constraint on the rate of increase of prices. This would be unacceptable to customers. In fact, to reassure customers that they are benefiting from privatisation it will probably be necessary to ensure that average prices decline in real terms. So the requirement of financial feasibility becomes rather more severe: it should be possible to float every authority with a positive value for X .

There would be an advantage in avoiding such a spread of profits that some water authorities are so awash with cash that their costs rise and they are tempted to engage in empire-building projects for their own sake. But this can be countered by stock market pressures. Their shareholders will expect them to earn an adequate yield on the high capitalisation of the company. If resources are squandered, the authority will be vulnerable to a take-over bid. The water authority with the largest prospective profits is not necessarily in a more comfortable position than the authority with the lowest prospective profits. Both are under pressure to make best use of the assets and revenue available to them.

ii) Achieving financial feasibility

The 1985 Corporate Plans show quite a variation in expected increases in charges over the next few years, ranging from 5.5 per cent to 17.3 per cent per annum. However, these increases reflect government-determined financial targets and External Finance Limits (which have since been modified). They do not necessarily represent the pricing policy that would be followed after privatisation.

There are numerous 'degrees of freedom' available which suggest that it will be financially feasible to privatise all authorities with a uniform X and uniform minimum level of service targets.

First, there are different ways of meeting level of service targets via different capital investment programmes. There is also some discretion in depreciation policy, as to how fast investments are written off.

Second, there is a choice as to which aspects of service (and environmental standards) are entered into the licence (i.e., which are relevant in bargaining for X) and how each of these is precisely defined. If a particular constraint seemed likely to present a problem, it would be possible to vary the level of the target or the horizon date or the required rate of movement towards it. (The changes would be made for all authorities, not just one.)

Third, the relative financial situations of the authorities may be adjusted between now and privatisation (i.e. in the next two to four years). The obvious possibility is to adjust interim price increases. Government policy on EFLs and financial targets was recently laid down for 3 years, of which 1985 is the first. This effectively determined price increases until 1987. However, the 1986 financial targets have been relaxed and policy for 1987 is to be reviewed. 1988 policy is as yet unconstrained. It would seem possible to allow a faster increase in prices before flotation for water authorities with heaviest required investment programmes, and a slower increase or even no increase for other authorities.

A fourth possibility is differential write-off of capital before privatisation, hence lowering or raising depreciation charges after privatisation. This could be tied to government subsidy for those elements of expensive schemes (e.g. cleaning up the Mersey) which are primarily justified on environmental (as opposed to consumer) grounds. (Some might feel that this is inequitable insofar as the customers of other authorities have, over time, paid for the cost of avoiding pollution. But many of the customers who have not paid are now dead. To make future customers pay the shares of previous customers is not obviously more equitable.)

iii) Choosing X

It is worth emphasising again that the uniform level of X and the uniform level of service targets will all be chosen together before privatisation. They will be chosen in the light of the trade-offs between prices, quality, and flotation proceeds. But they must also be chosen so as to make it feasible to float every authority, i.e. to ensure that every authority can earn sufficient revenue to cover its operating costs and finance required investment.

Further detailed calculations need to be carried out. It will be necessary to estimate the likely implications for prices and service levels of present investment programmes. Then alternative hypothetical level of service targets can be postulated, and the implications calculated for investment, costs, prices, and flotation proceeds. In this way the relevant trade-offs can be estimated.

Finally, it will be necessary to make a realistic assessment of what improvements in efficiency privatisation can secure. The water authorities have been reducing manpower over the last few years. Some believe there is little scope for further savings in costs. BT's experience since privatisation proved there was scope for more savings than hitherto thought possible. BT has cut out a whole regional tier of management, reduced staff numbers, and announced plans for significant further manpower cuts. It has begun second sourcing and pressuring its UK suppliers (e.g. by going abroad) to reduce equipment costs. There is increased emphasis on getting value for money in investment. Changes in top management have provided new insights and determination. The scope for further savings in the water industry after privatisation may thus be greater than is presently thought.

12. Other Services

This chapter was summarised as follows:

The economic regulation of services other than water supply and sewerage has been examined only briefly, with the following conclusions.

- 1. A licence requirement periodically to publish long term plans to meet future demand would provide useful reassurance and information concerning water resources.
- 2. Land drainage, flood protection and sea defence account for about 3 per cent of turnover. The financing of these duties is assumed to remain in the public sector.
- 3. Highway drainage costs, which account for perhaps 10 per cent of turnover, should be charged to highway authorities rather than to customers.
- 4. The treatment of environmental services (fisheries, recreation, navigation, and conservation), which account for about 2 per cent of turnover has not been investigated here.
- 5. Bulk transfers, abstraction charges, discharge permits, and trade effluent charges account in total for about 10 per cent of turnover. The economic regulation of these services raises important issues which need more consideration than has been possible in this report.

REFERENCES

- Bradley, I. and Price, C. (1988), 'The Economic Regulation of Private Industries by Price Constraints', *Journal of Industrial Economics*, June (forthcoming).
- Department of the Environment (1986), *Privatisation of the Water Authorities in England and Wales*, Cmnd. 9734, London, HMSO, February.
- — Ministry of Agriculture Fisheries and Food, Welsh Office (1987), *The National Rivers Authority*, July.
- Domberger, S., Meadowcroft, S. A. and Thompson, D. J. (1986), 'Competitive Tendering and Efficiency: the case of refuse collection', *Fiscal Studies*, vol. 7, no. 4, 69-87.
- — — (1987), 'The impact of competitive tendering on the cost of hospital domestic services', *ibid.* vol. 8, no. 4, November, 39-54.
- Glynn, D. (1988), 'Economic Regulation of the privatized water industry', Chapter 5 in Johnson, C. (ed.), *Privatization and Ownership*, Lloyds Bank Annual Review, vol. 1, London & New York. Pinter Publishers,
- Littlechild, S. C. (1983), *Regulation of British Telecommunications' Profitability*, London, Department of Industry, February.
- (1986), *Economic Regulation of Privatised Water Authorities*, Report submitted to the Department of the Environment, London, HMSO, 25 January.
- (1988), 'The MMC and economic regulation: some reflections on the Manchester Airport case', presented at a seminar on The Future of Regulation in the UK, London Business School, 9 March.
- Monopolies and Mergers Commission (1987), *Manchester Airport*, London, Civil Aviation Authority, December 1987.
- National Economic Research Associates (1986), *Economic Regulation of the British Airports Authority plc*, Report submitted to the Department of Transport, London, H.M.S.O.