Water Regulation: The Periodic Review

DIETER HELM and NAJMA RAJAH

I. INTRODUCTION

Since the privatisation of the water industry in 1989, issues relating to the pricing of water, charging structures and the conduct of the water regulators have rarely been out of public attention. Water prices have increased ahead of inflation, in some cases by more than 10 per cent per annum, profits have been high, construction costs have fallen dramatically in the recession and the investment requirements to meet EC Directives have been revised upwards.

In the first years following privatisation, the Director General (DG) of the Office of Water Services (OFWAT), the economic regulator of the industry, has, in the face of major shocks, used his discretion to intervene in the pricing and investment arrangements repeatedly. Indeed, the shocks have been so large that the DG has brought forward the review of the regulatory formula governing prices from 1999–2000 to 1994–95. It is this review of the price limits (called the Periodic Review) which is the subject of this paper.

The review will be far reaching, involving decisions about the appropriate cost of capital for the industry, the valuation of existing assets, the capital expenditures required to meet environmental quality targets, and the level of operating costs and efficiency. To date, the DG has issued a series of consultation papers, culminating in Setting Price Limits for Water and Sewerage Services: The Framework and Approach to the 1994 Periodic Review, published in November 1993, which details his approach to the Periodic Review. The aim

1 Dieter Helm is a Research Associate and Najma Rajah a Research Officer at the Institute for Fiscal Studies. The authors are grateful for comments by and discussions with Ian Byatt, Simon Cowan, Vivien Foster, Colin Mayer and Stephen Smith. All errors remain unfortunately the authors’.

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of this paper is to examine the economic principles underlying the DG’s approach and to consider the implications for the future of water regulation.

The structure of the paper is as follows. Section II provides an overview of the current regulatory regime, which was set up at privatisation. Section III considers how the regulatory framework has developed since 1989, with particular focus on the capital expenditure out-turn, shareholder returns and the revisions to the process instigated by the DG. Section IV analyses the DG’s approach to the Periodic Review and describes the ways in which pressure has been brought to bear on the various components of the capital expenditure, cost of capital, asset valuation and operating expenditure to reduce the rate of increase in prices. Section V provides an assessment of the prospects for the success of the DG’s approach. Finally, in Section VI, we summarise our main conclusions.

II. THE ROLE AND STRUCTURE OF REGULATION IN THE PRIVATISED WATER INDUSTRY

The conduct of regulatory policy in the water industry is inevitably influenced both by the structure of institutions within the industry and by particular characteristics that set the water industry apart from the other privatised industries. These features are also likely to play a major role in the Periodic Review.

1. The Privatisation Contract

In 1989, the Water Act was passed by Parliament, leading to the privatisation of 10 regional Water and Sewerage Companies (WASCs) and a number of Water Only Companies (WOCs). The Act also described and created a variety of regulatory institutions, discussed in more detail in subsection II(3).

The WASCs and WOCs contain significant elements of natural monopoly. Operating efficiency, investment decisions and pricing are therefore not exposed to the test of competition, and regulation, required to prevent the abuse of monopoly, is likely to be a permanent feature of the industry (Cowan, 1993). In the UK, utility regulation has focused on the setting of prices for fixed periods, within the framework of licences granted to companies. These arrangements, which have been followed in the water industry, can be viewed as creating ‘contracts’ between the privatised companies on the one hand, and customers, represented by the regulator, on the other. Within a legislative context, these contracts have been termed Licences. The privately owned companies provide a range of utility services, usually specified at the time of privatisation, and in

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2 The ‘contract’ approach to regulation has been extensively developed in the US literature. See Crocker and Masten (1991) and Priest (1993).
return they receive the contract ‘fee’ which takes the form of a charge (the price limit) for services levied on customers. The regulator (the DG) monitors the Licences’ operation and — at the Periodic Review — revises the contracts. The regulator can also propose changes in the Licence, though these can only be enforced by agreement with the companies or by reference to the Monopolies and Mergers Commission (MMC).

The economic attribute of the water industry that sets it apart from most of the other privatised utilities, and which has been a preoccupation of the regulators, is the high level of investment that is required for the provision of improvements in the quality of water and sewerage services (OFWAT, 1993d). During the early 1980s, spending on capital declined in the water industry as a result of the general squeeze in public spending that occurred as part of the Government’s wider economic policy. Consequently, by the end of the decade it was necessary to invest heavily in the water industry just to maintain existing standards (see Figure 1).

**FIGURE 1**

*Capital Investment in the Water Industry, 1987–88 prices*

In addition to infrastructure renewal, the first few years of privatisation have also seen a rise in the level of quality-driven investment in the water industry due to the imposition of more stringent environmental standards. Over the past two decades, three major pieces of European Commission legislation have come into force, establishing a new set of water quality standards (EC, 1976; EC, 1980; EC, 1991) and a timetable of compliance for the Member States. The water companies have consequently been required to carry out a general programme of environmental improvement, necessitating additional capital expenditure. Thus, unlike all other utility privatisations, every water company was obliged at privatisation to produce formal expenditure plans for investment in underground assets for the next ten years. These were known as the first asset management plans (AMP1).

Over the period 1989–93, there has been a total of nearly £11 billion of investment in the water industry in 1992–93 prices. Indeed, water industry investment in 1992–93 accounted for 3 per cent of gross fixed capital formation in England and Wales (OFWAT, 1993a). Early estimates of the level of investment to be provided by the companies for the period 1995–2000 amount to around £17 billion in 1993–94 prices (OFWAT, 1993b). One consequence, therefore, of the privatisation of the water industry was that the water companies had effectively taken over a large segment of capital expenditure which would otherwise have fallen upon the Government.

The scale and nature of investment in the water industry give rise to a number of issues that will continue to differentiate the future regulation of the industry from that of most other utilities. These relate to the incentives of the privatised companies, to the role of the regulator in determining, monitoring and changing the new asset management plans (AMP2) and to the greater significance of the duty placed on the regulator to ensure that the companies can finance their functions, given the scale of borrowing required to finance the investments.3

Whilst none of these issues represents differences in kind, they have necessitated in a monopoly context a much more intrusive form of regulation from OFWAT as compared with the other regulatory bodies, particularly OFTEL, OFFER and OFGAS.

2. RPI + K Price Limits and Quality Regulation

In the water industry, the ‘contract fee’ was determined at privatisation by a price control through the operation of a formula relating average changes in prices to the retail price index (RPI). In most other utilities, this is known as RPI – X, but in the water industry, because prices were set to rise faster than inflation, it was termed RPI + K. The average price increase that a company can

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3 It is likely that by the end of the century, water companies may have run up around £8.5 billion to £12 billion of debt. These approximate figures were based on the assumptions of 50–75 per cent gearing ratios and an investment programme of £17 billion in 1993–94 prices.
make is limited to the percentage change in the RPI over the 12 months to the November of the year before the charges apply, plus a factor $K$, where $K$ is a value set for each company for each year to reflect what the company needs to charge to finance investments and provisions of service for its customers. The average price controls apply to a weighted basket of five items for the water and sewerage companies and three items for the water supply companies.

The $K$ factors were originally devised by the Department of the Environment in conjunction with the Welsh Office. Subsequent monitoring of the RPI + $K$ contract, including Interim Determinations (formal changes in $K$ between Periodic Reviews due to changes in pre-specified circumstances) and Periodic Reviews, is the responsibility of the DG of OFWAT. It was widely envisaged at initial $K$-setting that each company’s $K$ factor would hold until the next Periodic Review, which was expected to be in 10 years’ time, though provision was made for a possible review after five years.

The rationale of the RPI + $K$ price cap is that, once fixed, companies maximise profits by minimising costs. At a future date, the price limit is revised at a Periodic Review. However, provided the period is long enough and regulators refrain from intervening between Periodic Reviews, the efficiency incentives are likely to yield longer-term benefits to customers. Both operating costs and capital expenditure would be lower than they would otherwise have been under annual rate-of-return regulation (Beesley and Littlechild, 1989).

The nature of the investment component of the water regulatory contract encouraged the Government to introduce at privatisation two significant modifications to the conventional utility model. First, it was recognised at the time of privatisation that finance for the substantial programme of investment in the water industry would only be forthcoming if investors knew that they would receive a rate of return on their investments that was comparable to the rate from investment in similar types of projects. A guideline rate of return (7 per cent real) was indicated, a positive $K$ set$^4$ and the regulator given an explicit duty to ensure the companies could finance their functions.

The second modification related to protection from shocks and was provided through the Interim Determination mechanism. It was recognised at the time of privatisation that long-term investment planning in the water industry was subject to a considerable degree of uncertainty, relative to that in the other utilities. One such source of uncertainty identified at privatisation was the impact of future environmental legislation, and this was one of the reasons that a cost-adjustment mechanism was built into the regulatory formula. Consequently, the specific circumstances under which $K$ factors could be adjusted in between

\footnote{For very different reasons, prices were also permitted to rise above inflation in some of the Regional Electricity Companies for their distribution service activities.}
Periodic Reviews, through formal Interim Determinations, were documented. This mechanism can be interpreted as a cushion against shocks within the contract framework. Though designed primarily with protection against higher costs in mind, with one exception (South West Water) it has been used to claw back the windfall construction costs bonus and hence excess profits, as we discuss below.

3. The Institutional Framework

Environmental standards determine the dominant part of capital expenditure from which part of the ‘contract fee’ is derived. However, the economic regulation of the contract through OFWAT is separated institutionally from the standard-setting, monitoring and enforcement of quality, even though there are close links between the two types of regulation.

Environmental regulation is institutionally complex. It is ultimately the EC that is responsible for the determination of large parts of the environmental quality of water in the UK (Haigh, 1989). But although the Commission limits the level of categories of pollutant that can be present in various water types, in many cases there is no legislation detailing the method that Member States’ governments should use to control water pollution and so it is up to each country whether they make greater use of pollution charges or direct regulation. The standards that are embodied in EC legislation form the basis for national legislation approved by the British Parliament on water quality standards.

The responsibility for enforcing the quality standards laid out in the EC and UK legislation falls upon a number of organisations. The principal organisation in charge of controlling river pollution is the National Rivers Authority (NRA), established under the 1989 Water Act. It is responsible for the issuing and monitoring of consents, and consequently the degree to which the NRA enforces compliance will have significant effects upon water companies’ asset management plans. The Drinking Water Inspectorate (DWI) is involved in the regulation of household water and the implementation of the relevant EC Directives. Her Majesty’s Inspectorate of Pollution (HMIP), established under

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5 See Condition B, Section 2, Instruments of Appointment of Water and Sewerage Undertakers. A list of eight ‘Relevant Changes in Circumstances’ (RCCs) is provided. Changes to K to finance new environmental investments come under the RCC relating to new legal requirements.

6 One exception to this is the Urban Waste Water Treatment Directive (UWWTD) which specifies that WASCs install secondary treatment equipment in sewerage works.


8 The use of consents is classically ‘command and control’ since it involves the setting of a maximum level of pollution for each firm, based upon the application of the BATNEEC principle (see Helm (1993) and Pearce and Brisson (1993)).
the 1990 Environmental Protection Act, also has a limited role in water quality regulation.\textsuperscript{9}

At the time of privatisation of the water industry, it was not made explicitly clear how the two types of regulation would be co-ordinated, although there was recognition that some degree of co-operation would be necessary. One view was that the role of the economic regulator was merely to act as an intermediary, passing on details of environmental standards determined by the EC, the NRA and the Department of the Environment (DoE) to the water companies by means of cost-pass-through in the asset management plans and Interim Determinations, and, in consequence, the role was confined to implementing the required capital expenditure at minimum cost. Another view was that an element of ‘regulatory tension’ was implicit in the regulatory design and that the DG would involve himself in the level as well as the delivery cost of capital expenditure.

III. DEVELOPMENTS SINCE 1989 AND THE REGULATORY RESPONSE

The RPI + $K$ regime set up at privatisation, based on the concept of fixed-period price limits, has not worked entirely as envisaged. Within a year of establishing the $K$ factors for each company, it quickly became apparent that the assumptions upon which they had been set were, in practice, being undermined. to a degree this was perhaps inevitable, since there is always likely to be a large forecasting error associated with long-term investment plans. However, there were three particular reasons why the scale of ex-post errors in AMP1 was particularly large.

(i) The recession

The recession of the early 1990s hit the construction industry badly, leading to a sharp fall in construction prices. Over the period 1987–88 to 1992–93 the construction output prices index fell 20 per cent relative to the retail price index (OFWAT, 1993a). Given the scale of water companies’ capital expenditure plans, this had the effect of significantly reducing water companies’ costs so that the original $K$ factors set in 1989 were now much higher than strictly required to finance AMP1.

(ii) Changing environmental standards

The downward pressure on construction costs was partially offset by the growing importance attached to complying with EC environmental standards. In particular, in 1991, the European Commission’s Urban Waste Water Treatment Directive (UWWTD) came into force and this

\textsuperscript{9} The Government has announced that the necessary legislation to set up a new Environment Agency (Department of the Environment, 1991), comprising the NRA, HMIP but not the DWI, will be passed within this Parliament. For a discussion of the ways in which the existing organisations may be merged and the role of the new agency, see Helm (1992).
substantially increased the water companies’ environmental obligations, over and above the provisions accounted for in AMP1.

(iii) Compliance timetables
The quality regulators added to the upward pressures on capital expenditure by speeding up the timetable for compliance with quality standards. They were well within their remit to do this since they were not under any obligation to consider the implications of such actions upon the pricing formula. In particular, the DoE and the Welsh Office announced in 1991 that water companies should accelerate their investment programmes to comply with pesticide standards.

All three developments were largely unanticipated at privatisation. They jointly called into question the levels of $K$ that had been set by the DoE. The assumptions that had provided the basis for the regulatory contract had been undermined. On the one hand, the collapse in construction prices suggested that there was some scope for revising each company’s $K$ downwards; on the other, the increase in capital expenditure above the original investment plans (shown in Table 1) indicated that there was a case for revising $K$ upwards.

<table>
<thead>
<tr>
<th></th>
<th>Current estimate (£ million)</th>
<th>Original estimate (£ million)</th>
<th>Forecast error (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water resources</td>
<td>676</td>
<td>766</td>
<td>11.7</td>
</tr>
<tr>
<td>Water treatment</td>
<td>2,823</td>
<td>2,484</td>
<td>-13.6</td>
</tr>
<tr>
<td>Water distribution</td>
<td>3,743</td>
<td>3,971</td>
<td>5.7</td>
</tr>
<tr>
<td>Water, general</td>
<td>1,033</td>
<td>1,023</td>
<td>-1.0</td>
</tr>
<tr>
<td>Water, total</td>
<td>8,275</td>
<td>8,244</td>
<td>-0.4</td>
</tr>
<tr>
<td>Sewerage</td>
<td>2,713</td>
<td>3,075</td>
<td>11.8</td>
</tr>
<tr>
<td>Sewerage treatment</td>
<td>5,105</td>
<td>5,140</td>
<td>0.7</td>
</tr>
<tr>
<td>Sewerage, general</td>
<td>941</td>
<td>943</td>
<td>0.2</td>
</tr>
<tr>
<td>Sewerage, total</td>
<td>8,759</td>
<td>9,158</td>
<td>4.3</td>
</tr>
<tr>
<td>Total</td>
<td>17,034</td>
<td>17,402</td>
<td>2.1</td>
</tr>
</tbody>
</table>


Initially, no changes were made to the $K$ factors. OFWAT adhered to the fixed-period approach to the price contract in order to retain the efficiency incentives and apparently took the view that the increased profits could be used
to finance the extra capital expenditure. In effect, the shareholders took the risk that the enforcement of environmental standards might tighten, in exchange for windfall profits from the collapse of the construction industry. However, by April 1992, the DG began to intervene directly on prices and the majority of water companies had entered into ‘voluntary’ agreements to raise their tariffs by less than the levels permitted under the pricing formula. Nevertheless, the balance of the two effects — increased capital expenditure and falling construction prices — still strongly favoured shareholders, as Figure 2 indicates. Despite these ‘voluntary’ informal agreements and the increased costs arising from increased environmental standards, average dividend payments rose by just under 28 per cent over the period 1991–92 for the 10 water and sewerage companies (Arthur Collins and Co., 1992).

**FIGURE 2**

*Share Prices of the 10 Water and Sewerage Companies, April 1991 to March 1993*

![Graph showing share prices from April 1991 to March 1993 for water and sewerage companies.]

Source: OXERA utility index and CSO Financial Statistics.
### Table 2

**Changing K Factors**

<table>
<thead>
<tr>
<th>Water and sewerage company</th>
<th>1990-91</th>
<th>1991-92</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Original K</td>
<td>Unused K</td>
</tr>
<tr>
<td>Anglian</td>
<td>5.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Dwr Cymru</td>
<td>6.5</td>
<td>0.0</td>
</tr>
<tr>
<td>North West</td>
<td>5.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Northumbrian</td>
<td>7.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Severn Trent</td>
<td>5.5</td>
<td>0.0</td>
</tr>
<tr>
<td>South West</td>
<td>6.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Southern</td>
<td>5.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Thames</td>
<td>4.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Wessex</td>
<td>4.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Yorkshire</td>
<td>3.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**'Voluntary' abatement agreements**

<table>
<thead>
<tr>
<th>Water and sewerage company</th>
<th>1992-93</th>
<th>Proposed use of K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Original K</td>
<td>Original K + carry-forward</td>
</tr>
<tr>
<td>Anglian</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Dwr Cymru</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>North West</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Northumbrian</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Severn Trent</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>South West</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Southern</td>
<td>5.5</td>
<td>6.1</td>
</tr>
<tr>
<td>Thames</td>
<td>4.5</td>
<td>4.6</td>
</tr>
<tr>
<td>Wessex</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Yorkshire</td>
<td>3.0</td>
<td>3.6</td>
</tr>
</tbody>
</table>

**Interim Determinations**

<table>
<thead>
<tr>
<th>Water and sewerage company</th>
<th>1993-94</th>
<th>1994-95</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Original K + carry-forward</td>
<td>Revised K</td>
</tr>
<tr>
<td>Anglian</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Dwr Cymru</td>
<td>8.2</td>
<td>5.0</td>
</tr>
<tr>
<td>North West</td>
<td>5.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Northumbrian</td>
<td>8.0</td>
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<tr>
<td>Severn Trent</td>
<td>6.5</td>
<td>4.6</td>
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<tr>
<td>South West</td>
<td>11.5</td>
<td>11.0</td>
</tr>
<tr>
<td>Thames</td>
<td>5.1</td>
<td>4.1</td>
</tr>
<tr>
<td>Wessex</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Yorkshire</td>
<td>3.8</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Note: Those companies that do not make full use of their K factors are allowed to carry forward their unused K to the following year.

By October 1992, the DG decided upon more formal intervention in the regulatory contract and initiated an Interim Determination. He announced a reduction of $K$ factors for 15 companies. Contrary to the expectations of many commentators at privatisation, but well within the terms of the Licence, the cost-pass-through mechanism was used as a claw-back mechanism, reflecting the changes in construction costs. Table 2 shows the extent to which $K$ factors have been amended for the 10 WASCs since privatisation.

Thus, despite the aim of the RPI + $K$ framework to preserve price stability to maximise the efficiency incentives, the first years of privatisation have witnessed annual changes to the contract. The initial fixed-term regulatory contract has become subject to annual intervention, first through changes in the contract requirements and then through the cost-pass-through/cost-claw-back mechanism. This experience has not been replicated in any other regulated utility.

IV. THE DG’S APPROACH TO THE PERIODIC REVIEW

In 1991, the DG announced that he would be resetting the price limits for the WASCs and WOCs in the Periodic Review in July 1994. Although the Periodic Review is essentially concerned with specifying the price limits for water and sewerage charges that are to occur over the next 10 years, in practice the review is much more wide ranging. As at the original $K$-setting, the appropriate levels of prices will depend on the level of planned capital expenditure (which in turn will depend upon the degree by which and speed with which the quality of drinking water and sewerage effluent care are improved), the financial framework and the size of operating expenditure.

1. The DG’s Objectives

In the discussions leading up to the Periodic Review, the DG has made transparent what he wishes to achieve — ‘the stopping of the price escalator’ (OFWAT, 1993d). He has indicated that an appropriate longer-term average level of $K$ over the next 10 years is around 2 per cent or below. This approach marks a fundamental shift of emphasis from the way in which it was envisaged that the regulatory regime would operate at privatisation. As discussed earlier, it was originally believed that the quality regulators (DWI and NRA) would be responsible (ultimately through the Secretary of State) for quality standards and that, in response to these standards, the economic regulator would set prices to

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10 The exception to this reduction in prices was South West Water. In an Interim Determination in 1991, its $K$ factor was increased from 6.5 to 11.5. This was largely due to the costs of the bathing water improvement programme.

11 ‘I think that customers would be unhappy at continued increases in price above the rate of inflation and even more at increases which exceeded the likely rate of growth of average household income. In the longer term this might be expected to rise, in line with past trends, at around 2% a year in real terms’ (Byatt, 1993).
reflect these costs adequately, whilst at the same time ensuring that investors in
the water industry received a reasonable rate of return. However, an analysis of
the DG’s approach to the Periodic Review suggests that he has taken a much
more proactive role in determining the level of environmental expenditure. By
indicating what he believes customers can afford through a guideline level of $K$
ex ante, the DG has implicitly put a constraint on the level of investment and
consequently the level of environmental improvements that can occur over the
next 10 years.

In pursuing this strategy of bearing down on $K$, the DG has systematically
worked through all the key components that determine the revenue requirements
for the companies — capital expenditure, financial factors and operating
expenditures.

2. Controlling Capital Expenditure

Future levels of capital expenditure are central to the Periodic Review. The
water companies have drawn up a programme for investments in all assets over
the next 20 years, in the form of a second asset management plan, AMP2, which
was submitted as part of an overall Strategic Business Plan to OFWAT by the
end of March 1994. The DG will now take account of these investment plans
when setting the $K$ factors. The aim of lowering $K$ factors has required the DG to
take some rigorous measures to reduce AMP2, notably through customer
consultation and the so-called quadripartite discussions.

Customer Consultation and the Cost-of-Quality Exercise

In the run-up to the Periodic Review, the DG has stressed the importance of
customer consultation because it provides, in his view, a satisfactory way of
resolving the rising-quality/rising-bills trade-off. By encouraging customers to
reveal their preferences concerning the point at which the trade-off should occur,
the room for debate between the environmental and economic regulators relating
to the appropriate level of investment and the appropriate level of $K$ is limited.

With a view to utilising customer consultation to provoke a debate on the
rising-quality/rising-bills trade-off, in 1992 OFWAT published *The Cost of
Quality* (OFWAT, 1992b), a paper that indicated the impact of introducing a
range of environmental improvements on the future level of household charges.
These environmental costs have subsequently been labelled as the $Q$ element of
the price cap. In future the overall $K$ will be set on the basis of a utility element
($X$) and a quality element ($Q$). The DG also utilised other channels through
which customers could reveal their preferences. These included consultation
with the Customer Service Committees, established to represent water
customers’ views, and actively encouraging water companies to be more
responsive to customer views on AMP2, through the publication of market
plans.\footnote{Market plans provide customers with early indications of the likely levels of expenditure and bills.}

The true preferences of customers will, however, only be revealed, and the
appropriate level of capital expenditure will only be established, if customers
have access to sufficient relevant information. One serious drawback of the cost-
of-quality exercise is that whilst the document is explicit on the costs associated
with various types of environmental improvements, even rudimentary
explanations relating to the possible health and environmental benefits are
conspicuously lacking. The scant references made about the possible expected
benefits are clothed in technical and scientific terms. Hence, when faced with a
choice between higher charges and no clear explanation of the benefits that may
arise on the one hand, and lower bills on the other, not surprisingly, few
customers expressed a preference for the former option. Thus, although \textit{The Cost
of Quality} may have played a role in the politics of the debate between the
conflicting interests of OFWAT and the NRA, as a serious attempt to elicit
customer preferences it was flawed.

The Quadripartite Discussions

The second way in which the DG has sought to chisel away at AMP2 levels is
through the 1993 quadripartite discussions. These were discussions set up after
\textit{The Cost of Quality} (and its successor, \textit{Paying for Quality} (OFWAT, 1993b))
were published, involving the NRA, OFWAT, the water companies and the DoE.
It was intended that the talks would provide a channel through which the
problems of co-ordination between the environmental and economic regulations
could be addressed and the Secretary of State for the Environment, the ultimate
arbitrator,\footnote{Strictly the political decisions lie jointly with the Secretaries of State for the Environment and Wales. For
cconvenience we refer only to the Secretary of State for the Environment here.} could be informed of the differing views. It was also hoped that the
discussions would provide an answer to the problem of finding a clear
framework for policy decisions, taking into account the interactions between the
two types of regulators.

Two main results emerged out of the quadripartite discussions. First, it was
agreed that, in principle, major changes to environmental policy would be
implemented to coincide with the Periodic Reviews wherever possible, so that
the scope for subsequent Interim Determinations would be sharply reduced. In
practice, however, the DG admits that some uncertainty will remain (OFWAT,
1993d). Secondly, the Secretary of State for the Environment has also indicated
that it would be appropriate for water companies to drop existing obligations that
went further than the EC requirements. This substantially reduces the scale of
investment that was planned for in the original 10-year AMP1 over the period
3. Controlling the Cost of Capital, Asset Valuation and Rates of Return

A second component to resetting $K$ at the Periodic Review is the financial framework. The determination of $K$ requires the establishment of a cost of capital to be applied to the assets of each company, both existing at the time of the review and to be created in the future through the agreed capital expenditure in AMP2. The cost of capital (a weighted average of the cost of equity and the cost of debt) was originally set at 7 per cent for WASCs and 8.5 per cent for smaller WOCs. In trying to minimise $K$, the DG has attempted to lower this figure for two reasons: to lower the required revenue to remunerate the existing assets (including capital expenditure since privatisation); and to reduce the incentive for companies to invest in additional capital expenditure. If the permissible rate of return is greater than the actual cost of capital, then the companies will be encouraged to maximise AMP2 and therefore to act as environmental contractors. Clearly, the lower the permitted rate of return, the less the incentive to promote high AMP2.

In estimating the cost of capital, OFWAT has considered two models — the Capital Asset Pricing Model (CAPM) and the Dividend Growth Model (DGM). In the first, the cost of equity is calculated as the sum of the rate of return for a risk-free investment and a risk premium for the particular company relative to the market risk. The second element, the risk premium, comprises the rate of return on the market (the equity premium) multiplied by the beta coefficient for the company, where the beta coefficient represents the risk to the investors’ portfolios of holding this stock. The Dividend Growth Model, on the other hand, assumes that the cost of equity can be split into the dividend yield plus dividend growth.

In the consultation document *The Cost of Capital* (OFWAT, 1991c), the DG has stated a preference for the DGM since it focuses the attention of the regulator on the key question of what the expected rate of dividend growth is. In support of this view, he put forward the argument that the water industry is, in many respects, a relatively low-risk industry, more akin to a bond rather than an equity investment. He contended that the regulatory framework was designed to ensure that efficient companies would be able to secure a reasonable rate of return on their investments; that water companies’ revenues under the present form of unmeasured tariffs for most domestic customers were relatively stable and certain; and that the structure of the pricing formula covered companies for unexpected shocks through the Interim Determinations. Drawing all these arguments together, and in the light of experience with the informal changes to $K$ levels which were then followed by the more formal Interim Determinations, the

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14 These issues are considered more extensively in Mayer (1993).

15 In the document *The Cost of Capital*, the DG went as far as to state that ‘Equity in water and sewerage companies is likely to be regarded as an income stock with the return in the form of a steady yield, rather than capital gains’.
DG has concluded that the cost of capital for new investments should be set around 5–6 per cent (see OFWAT (1993d)). However, recognising that this is significantly lower than the existing out-turn rate of return, he envisages that the rate of return on existing assets will gradually converge to the 5–6 per cent level over the next 10 years.

Determining the cost of capital does not, however, directly determine \( K \) even if AMP2 is known. A further piece of the financial jigsaw is the value of existing assets — both those inherited at privatisation and those created in the first period up to 1994. In normal businesses, these are given at the current cost (CC) valuation. However, CC values greatly exceed market values in the water industry, and hence an alternative basis is required. In principle, there are two broad approaches to resolving the asset valuation issue — to take the value at privatisation, add subsequent capital expenditure and then roll forward at the appropriate RPI and rate of return, or to take current market valuation.\(^{16}\) In *Setting the Price Limits for Water and Sewerage Services* (OFWAT, 1993d), the DG has taken a modified version of the first approach, using the market value of the WASCs based on share prices over the first 200 days of trading after flotation as an indication of the initial value of water and sewerage companies. This initial value will then be rolled forward to include the capital expenditure since privatisation and RPI effects over the period. As a result, a regulatory asset value will be established at the Periodic Review (the rate base) below the market value. The difference between the two is explained by the fact that these existing assets will be allowed to earn a return above 5–6 per cent for the next period, converging only gradually over the period.

The final component in the financial determination of \( K \) is profiling — the smoothing of \( K \). Given that the capital expenditure is front-loaded in the 10-year period, a smooth uniform \( K \) is achieved through increasing the gearing of the companies. Currently, water companies’ gearing ratios are approximately 25 per cent but there is clearly some scope for an increase in line with those of other utilities and companies generally. If gearing ratios are increased to substantially higher levels, then the \( K \) factors will be lower in the early part of the period and higher thereafter. This could potentially have major implications for the water industry as the year 2000 approaches. One obvious consequence of having high gearing ratios is that changes in interest rates could have greater implications for \( K \).

4. Controlling Operating Expenditure

Having determined capital expenditure and the financial framework, it remains to determine the revenue required to cover the operating costs of providing the

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\(^{16}\) A third option is to roll forward the ‘indicative values’ which were set out by the Government to guide investors at the time of privatisation. These issues were at the heart of the MMC inquiry into British Gas (MMC, 1993).
utility services. The DG has approached the problem of identifying the efficient level of future costs through the comparison of efficiency between companies. A major comparative efficiency exercise has been conducted. The outcome of this exercise will be reflected primarily in the $X$ component of the new RPI – $X + Q$ formulas.

V. WILL A FIXED CONTRACT WORK?

At the heart of the DG’s approach to the Periodic Review is the belief that the best way of achieving his objectives is to adhere as far as practically possible to the fixed-period regulatory contract. Thus, in addition to exerting downward pressure on $K$, he has sought to reduce the scope for ex-post adjustments. His approach places great emphasis on simplicity: the companies are to be offered a 10-year contract, based upon an affordable price. The scope for Interim Determinations has been reduced by restricting the terms under which adjustments can take place — the RCC conditions — through ‘voluntary’ Licence changes. He has also attempted, through the quadripartite discussions, to gain acceptance of the harmonisation of the quality regulators’ timetables with Periodic Reviews. This approach to utility regulation has great merits: as noted in Section II, it maximises efficiency incentives and it serves the shorter-term needs of customers by minimising bills at the Periodic Review. However, as also noted in Section II, the water industry differs markedly from other utilities in the dominance of the capital expenditure issues driven by environmental, not economic, regulation. Therefore, we need to address a practical question: will the strategy of minimising $K$ factors on affordability criteria and reducing the scope for ex-post adjustment work? There are a number of reasons for believing that it will not, which we address now.

1. Variance in AMP2

As witnessed in the first period, the error on ex-ante assumptions of investment in the water industry is likely to be great. Whilst this was masked in the first period by the averaging effect of rising capital expenditure requirements for environmental reasons but falling construction costs, this outcome is unlikely to be repeated. Indeed, the converse is more likely to be true as the construction industry recovers from recession. Experience has also indicated that the pressure to intervene in the face of shocks is also great. There is no reason to expect the pressure for intervention after 1995 to be weaker.

However, rather than accepting that large investment programmes driven by environmental regulation will inevitably be subject to exogenous shocks, and providing a mechanism to adjust for this within the RPI – $X + Q$ framework, the

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\[ \text{See, for example, The Costs of Water Delivered and Sewerage Collected 1992–93 (OFWAT, 1993e).} \]
DG has reduced rather than increased the scope for Interim Determinations. This strategy tightens the rigidity of the regulatory contract, but in doing so makes it more likely that when shocks occur, the overall contract will break down. Of course, it is never possible to specify in advance how every type of shock should be accommodated but, nevertheless, retention (or possibly even expansion) of the RCC conditions would bring about two clear benefits. First, it would provide a formal channel through which water companies could shift from one optimal investment path to another in response to shocks. Secondly, explicit rules would reduce the scope for regulatory discretion. In the first period, the adjustments to the contract preserved the system: if prices had not been reduced, political intervention may have occurred. In the second period, the ability to accommodate unanticipated shocks might prove equally useful.

2. Separate Environmental and Economic Regulation

The second reason for doubting the stability of the DG’s approach to the RPI–X+Q framework relates to the inherent instability arising from the separate institutional structures of environmental and economic regulation, discussed in subsection II(3). Since regulatory functions are split between the NRA, DWI and HMIP on the one hand, and OFWAT on the other, then, as we have already seen, opposing forces are exerted on the level of $K$. Consequently, there exists a problem of different objectives — maximising environmental quality whilst at the same time minimising bills. This problem of conflicting objectives has been a persistent feature of the first period since privatisation, and it will only be fully resolved once some way of integrating the two regulatory activities is found.

There are a number of possible changes that could be made to the institutional structure of water regulation that would perhaps make the integration of environmental and economic regulation more feasible. One possibility would be to amalgamate economic and environmental regulation with the creation of a single umbrella regulatory body for the water industry. Alternatively, given that the NRA is responsible for a wide range of activities, including flood defence and the monitoring of other industrial and agricultural polluters (approximately 50 per cent of the pollution load is attributable to the water industry), a second possible solution could involve the handing over of water company environmental regulation to OFWAT, so that the economic regulator would issue its own form of consents to the industry, rather than the NRA. With a single regulator, there would, perhaps, be more chance that the two types of regulation would not be conducted in isolation from each other. Administrative cost arguments would also suggest that this arrangement is not without its merits. On a practical level, however, such radical institutional reform would require careful consideration, since a number of pitfalls exist.

First, the creation of a single regulatory body would increase the possibility of regulatory capture. Under existing arrangements, it could be argued that the
economic regulator acts as a constraint on the environmental regulator and vice versa. Secondly, it is possible that merely putting the two organisations under one roof would not resolve the fundamental conflict. Thirdly, regulatory reform in the water industry might be inappropriate at the present time given that the Government is planning to subsume the NRA into a new Environment Agency and so, given this uncertainty, it might be more appropriate to await the outcome of this reform before deciding upon institutional solutions.

More immediately, however, other courses of action exist. Greater use, for example, could be made of the new institutional mechanism, the quadripartite process. This has, so far, been a temporary and not altogether satisfactory arrangement, but this mechanism could be built upon in the future as a means of resolving the problems of conflicting regulatory objectives.

Alternatively, an option that would involve a minimum of institutional change is simply altering the legislative framework within which the NRA and HMIP operate. A greater role for economic assessment of environmental standards could be required within the BATNEEC framework (see Helm (1993) and Pearce and Brisson (1993)).

The suggestions outlined here are by no means exhaustive, and are merely intended to highlight some possible courses of action rather than provide concrete solutions. However, in the absence of change, the OFWAT/NRA tension is likely to trigger changes in capital expenditure between Periodic Reviews and, given the reduced scope for Interim Determinations, these are likely to put pressure on the stability of the new regulatory contract.

3. Commitment and Credibility

A final problem emerging for the fixed-period contract approach relates to the issue of the credibility of the regulators. There are likely to be inefficiencies arising from a situation where two parties are involved in an agreement of some kind but one of the parties lacks credibility in that it is believed that it will diverge from some prearranged course of action. This problem of commitment to policies is likely to be a more significant feature of public than of private agencies, because in the case of agreements between private individuals, there is typically some arrangement in the legal system to deal with broken contracts. Public organisations are, however, less likely to be restrained in this way.

It is possible that commitment and credibility issues are a problem for water regulators. The experience of frequent interventions in the first period will serve to weaken the credibility of the DG’s fixed-period contract in the second.

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18 The problem of commitment in a dynamic regulatory framework was considered by Baron and Besanko (1987) when they modelled the behaviour of a regulator and firm in the absence of complete information. In a dynamic framework, the regulator is able to observe firm behaviour as time progresses which reveals information about costs and, consequently, there is an incentive for the regulator to change policy.
VI. CONCLUSIONS

Our assessment of regulatory policy in the water industry suggests the following conclusions. The regulatory regime established at privatisation, and represented through the RPI + K pricing formula, had the characteristics of a quasi-fixed contract, set within a regulatory structure where environmental and economic regulation were separate. Whilst the fixed-period contract approach may be suitable for the regulation of the utility services, it is less appropriate for the capital-intensive water industry. The fixed nature of the regulatory contract, within a framework of long-term investment planning, was always likely to be subject to forecasting error. The regulatory regime is too rigid to cope with random shocks that inevitably occur over a 20-year planning horizon. These problems were further compounded by the separate structure of environmental and economic regulation. Within a few years of the regulatory regime, the fixed-term RPI + K pricing formula had in practice degenerated into annual interventions to a degree not witnessed in other regulated utilities. This has undermined its credibility.

Given the novelty of the privatisation regulatory regime, there were inevitably going to be faults with the system. The Periodic Review provides an opportunity to rectify these faults. However, an analysis of the DG’s approach indicates that the outcome will, if anything, be even closer to a fixed-period contract. The experience so far with this type of regulatory framework gives considerable grounds for scepticism. A more likely outcome is repeated interventions in the next period.

There are two major conclusions that arise from this analysis of the DG’s approach to the Periodic Review. The first is that, whatever the theoretical attractions of the RPI – X approach for conventional utilities, the fixed elements in the water industry are unlikely to be sustained. Although the separation of X and Q elements in the new formula recognises explicitly the special investment characteristics of the water industry, the attempt to reinforce the rigidity of the quality framework is unlikely to succeed in creating greater stability. It would perhaps be better to focus on developing the Interim Determination mechanism, to provide a more robust means for dealing with the shocks which occur between Periodic Reviews.

The second main conclusion is that the split between environmental and economic regulators is likely to increase costs and increase uncertainty. The solution to the problem of institutional separation requires the establishment of an institutional method of integrating economic evaluations explicitly into environmental regulation.
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