7 SUMMARY AND CONCLUSIONS

7.1 Summary

There are a number of reasons why it is desirable for utility industries such as water supply to be provided by the public sector (p.12). However, public sector provision raises different problems, collectively known as 'government failure' (p.13). The jurisdictions surveyed have sought to overcome government failure through various types of reform such as corporatisation, disaggregation, outsourcing and privatisation (pp 15-24). These models are designed to subject the utilities, to varying degrees, to private sector disciplines.

However, due to the monopoly elements of the industry, the more commercially oriented utilities require a strong regulatory regime to protect consumers from monopoly abuse (pp 28-30). Price cap regulation has been the favoured method because it provides incentives to the utility to be productively efficient, thus overcoming a problem normally associated with monopoly industries, while protecting consumers from excessive price increases (pp 39-40).

The problem with price cap regulation is that, in the absence of explicit regulation of quality, it enables the utility to reduce costs by reducing quality (pp 40-42). There are several quality dimensions to water supply, ranging from the suitability of the water itself to the reliability with which it is delivered (pp 49-57). The need for regulation is strengthened by the health-related aspects of water quality which generate externalities (p.31). Some aspects of water quality are difficult to regulate because of asymmetries of information between producers and consumers, and between producers and regulators (pp 30). Even when quality is able to be regulated effectively, it is difficult to establish 'optimal' levels of quality because of difficulties in establishing consumer preferences (pp 58, 59-60).

The dissertation has examined methods adopted to regulate quality under several models of reform (pp 62-84), and attempted to assess their suitability by analysing available results in terms of several indicators of quality (pp 85-100).

The corporatisation model favoured in Australia appears to combine the benefits of public sector provision, in terms of transparency and accountability, with a more commercial focus reflective of the private sector. Where price caps are used they are normally combined with a requirement for the utility to pay the government a dividend. Quality standards and prices are set by individual States

and Territories so they are able to better reflect local conditions and requirements (pp 62-76).

It is not possible to say definitively whether the reform models of disaggregation adopted in Melbourne (pp 67-71) or outsourcing adopted in Adelaide (p.72), have advantages in terms of regulating quality over the NSW and ACT corporatisation models. The opportunity for performance comparisons across the three Melbourne utilities offers theoretical advantages in terms of quality pp 18, 68). The SA outsourcing model appears less transparent than the other corporatisation models surveyed (p.73).

The scheme used to regulate the UK water industry is a modified price cap which allows expenditure on quality improvements to 'pass through' the cap (pp 77-78). This reduces the incentive for the utility to reduce costs by reducing quality but raises additional problems. The price constraint advantage of the cap is significantly weakened and hence consumers in the UK have borne excessive price increases (pp 78-79). There are also problems with the presence of different regulators with conflicting objectives — Ofwat to keep costs low to ensure reasonable returns, and the DWI and EC to ensure high quality standards (pp 79-80, 83-84). The fact that quality standards are uniformly set across the UK, and often externally imposed by the EC, provides little flexibility to adjust them to suit local conditions (p.84).

The jurisdictions surveyed in Australia have generally met the standards set, both in terms of water quality and service delivery (pp 85-88, 91-98). Water quality standards in the UK are more stringent than in Australia, often calling for '100 compliance' which is unnecessarily high from a public health perspective. These standards are often not met and non-compliance usually requires further infrastructure investment and hence price increases for consumers (pp 88-91). UK customer service standards tend to be lower than in Australia (p.100).

7.2 Sources of the problem

This dissertation has identified several features of public utilities which, in theory, preclude the market from delivering optimal outcomes and create a need for public intervention. These are more pronounced in the water industry than other utility industries. Each is discussed in turn.

The first feature relates to the nature of the infrastructure. The water industry — to a greater extent than other utilities — is highly capital intensive with long-lived assets. As a result of inter-temporal links in demand and cost functions,

firms' decisions today will depend on the regulatory decisions expected tomorrow. If they expect to face tougher regulation in the future which precludes them from earning adequate returns, this will discourage further investment. Together with the fact that the industry is likely to remain a natural monopoly for the foreseeable future, this provides a strong rationale for public provision of water infrastructure.

Second, the water industry is characterised by asymmetry of information between producers and consumers and between producers and regulators. Consumers are not able to observe the most important attributes of water which affect their health, and know less about what is harmful to health than the firm or the health industry. Producers also know more about the water supply industry than the regulator and, even if the regulator had perfect knowledge about what the firm should do, is not always able to observe what the firm does. This provides another strong rationale for public provision of water.

Third, regulated firms will not choose the optimal quality. For instance, under a price cap regime the utility is able to reduce costs by reducing quality in the absence of explicit regulation of quality. It is particularly important to be able to regulate aspects of water quality that affect public health. However, these can be the most difficult to regulate because of information asymmetries.

Fourth, universal supply of clean piped water generates positive externalities in as much as it reduces the risk and spread of disease. This provides a rationale for ensuring that everyone is connected to the same 'good quality' supply of water. Inappropriate management of water supply can generate negative externalities. Together, these create rationales for regulation, if not provision, by the public sector.

Fifth, it is not economic to differentiate the quality of water for individual users or uses. The industry comprises regional or local natural monopolies due to the high costs of pumping water long distances. Consumer preferences are often diverse, depending on cultural and political backgrounds. Recycled water without expensive treatment is suitable for many uses. At present, all urban water is treated to the highest standard which a large proportion of domestic water consumption does not require.

Finally, water is essential and there are no substitutes for it. For this reason it has an inelastic demand curve which provides a strong rationale for regulation.

7.3 How the problems are being addressed

For the above reasons, water supply has traditionally been provided by the public sector. However, certain problems have emerged from this method of provision, known as 'government failure' parallel to the 'market failure' which nationalisation had been designed to rectify. These relate to the lack of incentives for public managers to be productively efficient, which in theory are provided in the private sector by the profit motive, share market discipline and threat of takeover.

Different methods have been used to address government failure — from administrative reforms to the public sector through to privatisation. Each of these models has a number of theoretical advantages and disadvantages. The corporatisation model, for instance, replicates the incentive structure provided in the private sector but enables the government to continue to provide the service.

Corporatisation in Australia, and to some extent privatisation in the UK, has brought with it a more direct focus on customer service and more transparent regulation. It is only in the years since corporatisation that results on water quality have been publicly disclosed, customer consultation initiated and the utilities made accountable. Likewise in the UK, Ofwat describes the systems of monitoring in place in 1989 as 'for some companies ...woefully inadequate', leading it to publish data which is qualified both by a reliability measure and by accuracy.

The tightening of quality standards and the large sums of money spent on infrastructure upgrading following the UK water privatisations indicates that, contrary to the theory, water quality in the private sector is far higher than in the public sector. This can be attributed, in part, to the regulatory regime which accompanied privatisation. Further, a more commercial approach imposed on the government owned utilities shortly before privatisation is thought to have caused the assets to run-down, with consequent results for quality and the need for the large investment programs being undertaken by the private companies. UK water infrastructure appears to be at an age where assets need replacement or refurbishment. Likewise in Australia, WSAA has stated that more asset failures due to ageing faults can be expected in the future.

The private sector might be better placed than the public sector to fund the large infrastructure requirements of the water industry. The SA and French models of allowing private sector provision of infrastructure has achieved private sector funding while allowing the government to retain control of the industry. However, the SA regulatory system is less transparent than other Australian models surveyed since the licence conditions of the private contractor, United

Water, have not been made public and water quality standards and outcomes are not well reported. This could be due to commercial-in-confidence considerations, but nevertheless signals a problem of lack of transparency in such private sector provision.

7.4 Regulatory responses

Moves to private or quasi-private (where certain features of the private sector are replicated in the public sector) provision of water supply have required new regulatory structures to protect consumers from the monopoly abuse possible due to the nature of the industry. This section examines whether regulatory arrangements are likely, on theoretical grounds, to handle the problem. It also examines whether, in practice, the arrangements are working.

Price-cap regulation

In monopoly industries such as water supply, there is a need to protect consumers from excessive prices — accentuated for water due to the inelastic demand curve. This can be undertaken either by regulating profits or regulating prices. Price-cap regulation has been the most common method in the new regimes because, unlike rate of return regulation, it contains a built-in incentive for firms to be productively efficient. In theory, the firm has an incentive to reduce costs in order to earn higher profits, while constrained to keep prices low.

A theoretical problem with price-cap regulation, as identified by several economic commentators, is the temptation for firms to reduce costs by reducing quality in the absence of specific regulation which precludes this. The regulatory regimes for the first privatisations of UK public utilities did not contain provisions for quality. Some Australian jurisdictions have set price-caps combined with a requirement for their water businesses to pay the government a dividend. The scheme used to regulate the UK water industry, while nominally a price-cap, has many of the features of rate of return regulation. The duty of Ofwat to ensure reasonable returns means that the rate of return on capital features significantly in price reviews and in cost pass through applications. The incentive to reduce costs by reducing quality is therefore reduced.

There is no evidence of the efficiency gains in the UK water industry championed by proponents of privatisation. The UK privatisation of water brought with it large price increases to customers because of the stringent water quality standards imposed since that time reflected in increased costs. Ofwat has

a duty to ensure that reasonable returns are able to be earned by the water companies and sets the price cap accordingly. This dissipates the theoretical advantages of private sector provision in terms of productive efficiency. Investments are allowed in determining the amount permitted for the corporations' expenditure on higher water standards. These generous 'pass-through' provisions place limited pressure on the companies to improve productive efficiency. Thus in the case of water, privatisation may not be an appropriate model because the theoretical advantages are not able to be realised.

Quality regulation

Regardless of the model adopted, there is the need to ensure the continuing integrity of public health aspects of water supply, as well as other aspects of water quality and service quality. This has been addressed through the adoption of mandatory standards and strong regulatory approaches. All of the jurisdictions surveyed in this study take the regulation of water quality seriously. The emergence of corporatised water supply in Australia, for instance, has brought into focus the question of who is responsible for the quality of drinking water — in particular concerns about the potential adverse health impacts despite the fact that with corporatisation the workings of water supplies have remained largely in the public sector.

Australia has no national water industry regulator such as Ofwat in the UK but the ACCC has powers similar to Ofwat in the area of service quality. Individual States and Territories set, monitor and enforce their own water quality standards, with the assistance of national guidelines and the processes detailed at appendix A. This allows standards to be adapted to suit local conditions and circumstances. In contrast, the UK standards are uniform across England and Wales and most come from obligatory European Community Directives.

In practice, Australian water quality standards tend to be met. Results in chapter 6 show that UK standards relating to health and aesthetics are sometimes not met by the water companies but because they include wide safety margins the breaches do not present a health risk. However, it is undesirable to have unnecessarily wide safety margins when the standards are not able to be met. Non-compliance usually involves a requirement to undertake further capital asset improvements. Hence, unnecessarily tight water quality requirements confer high cost penalties in the form of higher water prices where the costs of improvements are allowed to 'pass-through' the price cap.

Service quality standards over the surveyed period tend to be lower in the UK than in Australia, which could reflect the fact that a different regulator and standard setter is responsible for service quality than water quality.

Under most systems surveyed there are penalties for breaches of licence conditions. However, in all jurisdictions surveyed the results on customer service tend to be collected by the utilities themselves or their industry organisation. Surveys conducted by consumer groups or independent researchers could produce quite different results.

Results require careful interpretation. It could be tempting to attribute lower quality service delivery associated with the recent asset failures in Melbourne to recent reforms. Privatisation of the UK water industry has been blamed for many problems, such as the water restrictions associated with a severe drought which coincided with privatisation. That said, neither regulators nor consumers should accept at face value reasons for poor quality performance given by the water companies. Instead, they should satisfy themselves that the most obvious explanation for poor service quality performance is not masking some underlying problem for which the water company is responsible.

Yardstick regulation

The existence of several companies operating at similar levels in different locations offers potential yardstick competition. Two jurisdictions surveyed — Victoria, Australia and the UK — have a form of yardstick regulation whereby the companies are given opportunities to explain their different circumstances.

In the case of the Melbourne companies, the shocks which affect the firms, such as the dry weather experienced in 1995/96, are sufficiently correlated to make comparison meaningful. However, there could be a temptation for companies to use similar excuses in the future to justify non-compliance with quality standards.

In the UK, comparisons between the water companies have been left largely to regulators on an informal basis rather than being included explicitly in the regulatory structure. Monitoring is mainly based on industry-generated data. Moreover, the UK companies are more geographically separate than the Melbourne companies which could make comparisons less meaningful.

Accountability and transparency

The utilities need to be made accountable and regulation needs to be transparent. This is particularly challenging given the information asymmetry problems discussed.

Under both the corporatisation and privatisation models, the service provider, standard setter and agency responsible for monitoring water quality have been separated to provide a greater degree of transparency and accountability. Monitoring in NSW, for instance, is undertaken by a private board, while IPART is responsible for service quality and the Department of Health sets water quality standards. ACTEW has received water quality accreditation and as such is not subject to regulation by the ACT Department of Health. This reduces regulatory costs and in turn the cost of service provision to customers.

Ofwat has expressed concern that other regulators and standard setters, including the EC, do not take sufficient account of the costs of achieving quality objectives and that new obligations have been imposed on the industry since the price limits were set. Ofwat has produced scenarios of quality and price combinations in an attempt to involve customers in the process of setting new price limits and also conducted customer preference surveys. However, Ofwat cannot directly influence the externally imposed water quality standards. There is thus less flexibility in the UK than under the Australian systems.

Under the UK regulatory system, even if consumer preferences could be assessed accurately, it is unlikely that an optimal standard would be chosen because of the interaction of the different regulators. The DWI does not need to consider the costs of achieving a given standard and will therefore set the standards too high. Prices subsequently set by Ofwat then need to ensure that the costs of meeting these standards are covered. The inter-relationship between the UK water regulators has become increasingly complex and significant since privatisation and creates a potential conflict of interest.

As the industry-specific regulator there could be an element of 'industry capture' on Ofwat's part, as reflected in lower service quality outcomes over the surveyed period. If this is so, there is a strong case for a national regulator such as the ACCC in Australia as opposed to industry-specific regulators under the UK system.

7.5 The difficult areas

Ensuring that consumers only pay for the water quality they need appropriate to the use for which it is used is difficult. A solution to the problem would require the development of new technologies, eg in water recycling.

The Australian approach, whereby each jurisdiction sets its own standards to some extent enables regulation to be set to reflect local conditions. For instance, when SWC recently identified a need to improve water quality standards which would result in increased prices it undertook cost-benefit analysis to establish whether or not consumers were willing to pay for the improvements. This contrasts with the uniform system across the UK and even across Europe.

Another difficulty relates to the high variability in demand in Australia, mainly attributable to climatic variation, which has led to significant periods during the year when water infrastructure is under utilised. Moreover, high service standards can drive the renewal of water reticulation systems before their economic lives are reached. Customer requirements for minimum pressures or rates of flow, for instance, directly increase both capital and operating costs.

Future technological solutions, which enable water companies to supply different levels of quality of some services to different households, should prove more cost effective than current infrastructure development policies, and enable individual households to decide on the standards of service for which they are willing to pay.

7.5 Are there better ways?

There are two aspects to maintaining and achieving good water quality: the management of the water supplies and the level and type of treatment. Sometimes the solution to the quality problem is in better management of the water source. Poor source quality can have significant implications for the cost of treatment. Victoria has an accredited licensee system relating to environmental audits, environment improvement plans and environmental management systems, which represents an innovative approach to the regulation of water quality. However, water catchment management and associated environmental issues have not been able to be covered in this paper.

There are also two ways that water quality can be assessed. Requirements are usually defined on the basis of indicators of contamination and empirical rules of thumb. However, an approach that identifies the actual sources of risk within a system and their significance could provide a more efficient method of

regulating water quality. Epidemiological studies offer an early warning system (Wade and Bentley, 1997). To overcome the uncertainty and asymmetry of information, an information-base detailing research results of health impacts could be developed and made available to the public.

The regulatory system proposed for the NZ water industry appears to provide a less prescriptive approach than the approaches used in either Australia or the UK. Specific performance targets relating to minimum standards, customer service and the possibility of a consumer ombudsman or similar to empower customers have been proposed. If this proves insufficient then there will be resort to a more industry-specific regulator (see appendix B).

An alternative approach to the regulation of service quality is to allow the water business to trade-off changes in quality against the incremental costs of achieving them. Thus the regulator would not fix a unique level of service quality. Instead, the firm would choose whether to improve service quality or pay more compensation. Customer needs and expectations will influence to what extent each community will adopt the guideline recommendations for water quality. One community, for example, might choose to tolerate aesthetic problems provided it is suitable in public health terms, while another may choose to pay for treatment to bring the water quality within normally accepted limits.

Finally, a lesson to be drawn for Australia from the problems associated with regulation of the water industry in the UK is to get the regulation right while the water utilities are still part of the public sector. Overseas models of privatisation which result in heavy costs to consumers should not be replicated in Australia.

APPENDIX A: NATIONAL REFORMS APPLICABLE TO THE WATER INDUSTRY

A number of initiatives at the national level provided increased impetus for individual State and Territory water industry reforms. In 1994 the Council of Australian Governments (COAG) adopted a set of water resource policy principles which include user-pays pricing policies, and transparency of pricing decisions or elimination of cross-subsidies. Further, the 1995 agreements between the States and Federal jurisdictions to implement a National Competition Policy required all Australian States and Territories to begin the process of corporatising their water assets.

COAG Water Reform Agenda

The COAG Strategic Water Reform Framework of February 1994 describes the reforms required of the water industry. In summary they include:

- *Pricing reform*: consumption-based pricing and full cost recovery (including positive rates of return on the written-down replacement cost of assets); the reduction or elimination of cross-subsidies; and making remaining subsidies transparent — for urban water services by 1998 and rural water supply by 2001;
- *Investment reform*: investment in new rural water supply schemes or extension to existing schemes to proceed only if appraisal indicates it is economically viable and ecologically sustainable;
- *Water trading*: implementation of comprehensive water allocation systems or entitlements, including allocations for the environment, with rights separated from land title, and with trading in allocations or entitlements by 1998 (including interstate trading where feasible); and
- *Institutional reform*: the adoption of an integrated water catchment approach, separating the roles of water resource management, standard setting and regulatory enforcement no later than 1998, and further development of inter-agency performance comparisons.

In September 1996, the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) endorsed a set of Generic National Milestones developed from the COAG Water Reform Framework. The generic milestones form the basis for negotiation of specific milestones for each State

and Territory. These specific milestones will define the numerical milestones crucial to the reforms. The reforms defined by the Generic National Milestones cover:

- water pricing and cost recovery for urban services and metropolitan bulk supplies;
- separation of institutional roles;
- performance monitoring and best practice for delivery of water services;
- allocation and trading in sustainable water entitlements;
- environment and water quality; and
- public consultation and education.

In recognition of the significance and complexity of the water reform issues in implementing the COAG Water Reform Framework, ARMCANZ established a Task Force on COAG Water Reform. The Task Force manages and reports to the Standing Committee on Agriculture and Resource Management (SCARM) on the implementation of the COAG water reform agenda and associated national competition policy.

National Competition Policy

The National Competition Policy emanated from the report of the Hilmer Committee (Hilmer et al, 1993). It is given effect through the *Competition Policy Reform Act, 1995* and the Competition Principles Agreement, which form a package of ongoing reform. The competition principles relevant to the water industry are:

- pricing oversight - a State can request the ACCC to regulate prices for water services under the *Prices Surveillance Act, 1983*;
- competitive neutrality involving tax equivalent regimes and removal of anti-competitive practices under amendments to the *Trade Practices Act 1974*;
- structural reform of public monopolies and coverage of Corporations Law;
- review of legislation to identify anti-competitive elements; and
- access to services of significant infrastructure facilities.

The key feature of the Agreement is the requirement for the States and Territories to achieve reform milestones. Substantial payments from the Commonwealth are linked to achievement of the milestones in 3 tranches. The 1998 deadline for the second tranche payment requires progress on specific urban water reforms.

National Water Quality Management Strategy

The National Water Quality Management Strategy is a joint strategy of two Ministerial councils, the Australian and New Zealand Environment and Conservation Council (ANZECC) and ARMCANZ. The two councils represent environment and water resource interests respectively. The National Health and Medical Research Council (NHMRC) is involved in elements that have implications for public health.

In 1996, ANZECC, ARMCANZ and NHMRC implemented the new Australian Drinking Water Guidelines. ANZECC is currently reviewing the Australian Water Quality Guidelines for Fresh and Marine Waters which outline five environmental values (beneficial uses) covering requirements for both human use and ecosystem health.

APPENDIX B: REGULATORY CONTROL OF UTILITY INDUSTRIES

Common types of regulatory control of monopolistic utilities used in various countries are detailed below. Various methods to achieve quality can be used in conjunction with, or in some cases instead of, price controls. New Zealand's light handed regulation relies on existing anti-trust law but also includes an information disclosure requirement that allows consumers to more easily evaluate quality.

Economy-wide monopoly power regulation

Australia

The Australian *Trade Practices Act 1974* (TPA) covers mergers or acquisitions of companies, seeks to protect consumer and business from unlawful anti-competitive and unfair market practices, and enforces product safety/liability laws. The Australian Competition and Consumer Commission (ACCC), an independent statutory authority, is responsible for the enforcement of the *Trade Practices Act 1974* (TPA) and the *Prices Surveillance Act 1983* (PSA). The ACCC was created in November 1995 by the merger of the former Trade Practices Commission (TPC) and the former Prices Surveillance Authority under the *Competition Policy Reform Act 1995.*

The *Competition Policy Reform Act 1995,* and the associated agreements between the Commonwealth, State and Territory governments, represent a national approach to competition policy and the universal application of the TPA. As a national body, the ACCC is charged with fostering competition across the whole economy, including to unincorporated enterprises and State and local government business enterprises The ACCC also has responsibilities arising from provisions of the TPA which establish the legal regime to facilitate third party access to certain essential infrastructure. Access regimes apply to significant infrastructure facilities with natural monopoly characteristics and with wide economic influence.

New Zealand

The New Zealand Commerce Act 1986 is closely modelled on Australia's Trade Practices Act 1974, which draws heavily on United States anti-trust concepts and principles. The New Zealand Commerce Commission has a similar role, and similar objectives and powers, to Australia's ACCC. The strengthening of the Commerce Act was an integral part of the utility reform process. The Act is broad spectrum, covering all industries in the same way. New Zealand has no major industry-specific regulators, such as Austel in Australia or the myriad of industry regulators in the UK.

Both the Australian and NZ Acts are designed to promote competition on three fronts: by ensuring that competition is not artificially constrained through restrictive practices; by screening mergers and takeovers to prevent the acquisition or strengthening of an undesirable degree of market power; and to deter firms in a dominant position in a market from using that position to lessen competition. In New Zealand the Act provides the basis of the light handed regulation of corporatised and privatised utilities with market power discussed below.

Rate of return regulation

Rate of return regulation seeks to control a monopoly's behaviour by defining maximum allowable profits (BIE 1995, p. 43). Such regulation has for some time been applied in the United States of America to control private monopoly abuse. In designing such regulation for newly corporatised or privatised monopoly industries that would be effective in controlling quality as well as price, an assessment needs to made about what prices and quality of service *ought* to be to induce firms to produce optimally.

Rate of return regulation can prevent monopoly abuse and achieve allocative efficiency if the allowed rate is set very close to the cost of borrowing (Train, 1991). However, it does not achieve productive efficiency because of an unbuilt incentive for the operators to over-capitalise and the lack of incentive to reduce costs. Given the asymmetry of information between utilities and their regulators (as well as lack of market signals), such regulation cannot be designed to ensure that costs themselves are as low as possible, nor encourage improvements in efficiency over time. This means that consumers cannot be assured of improved quality at lower prices in future (leading to allocative inefficiency over the longer term). Moreover, the regulation is expensive to implement from the perspective of both the firm and the regulator.

Price-cap regulation

Price-capping, such as the RPI-X (known in Australia as CPI-X), is a form of regulation specifically designed for newly privatised or corporatised public utilities with monopoly elements (Littlechild, 1983). It places a regulatory ceiling on the amount by which enterprises can increase prices over a specified period (usually five years), providing profit incentives for enterprises to reduce relative costs. The constraint in the UK is 'RPI-X', since it requires the average price as defined to decline by 'X' per cent annually in real terms. Since X is a measure of the managerial efficiency improvement expected in each year, the regulation should induce firms to balance prices in the most allocatively efficient way (Vogelsang and Finsinger, 1979).

Direct control of prices avoids the productive efficiency problems associated with rate of return regulation. The regulated firm can increase profits only by reducing costs, and will therefore seek the least cost input combination. In practice a price-cap is easy and cheap to monitor but some forms may produce an inappropriate output mix (Price, 1994, p. 82). Given these benefits price-cap regulation is a good short term measure: Littlechild expected it would be an interim arrangement until rapidly developing competition in telecommunications rendered it redundant (Price, 1994).

Once the initial price-cap is determined as part of the privatisation bargain, its administration is relatively straight forward. However, if the industry believes that the regulator will choose the price-cap according to the firm's performance, it will adapt its behaviour accordingly. Since regulators have few criteria other than rate of return to determine the appropriateness of price levels, the necessary reviews of price-caps induce the firm to reduce rate of return and therefore to overcapitalise. Successive price-cap reviews therefore tend to become rate of return regulation; in between reviews the industry can reap the short-term benefits of efficiency gains, but would expect these to be transferred to consumers through a tighter price-cap at the next review.

The UK price-cap

RPI was used in the UK to avoid the problems of an industry cost-related index which could be influenced by the dominant regulated firm, and so enable excessive costs to be passed on in higher prices. Initial choice of 'X' was in all cases a political decision, emerging from private debate between the industry and the government. The link between the structure of the privatised industry and the extent and severity of the regulation was apparent. An industry privatised to maximise competitive potential would require regulation to control

a smaller proportion of its activities than one which was maintained as a monopolistic entity. But the government's desire to maximise sales proceeds (an important objective recognised in Littlechild (1983)) suggested maximum monopoly power with minimum regulation. The initial level of regulation reflected this requirement for a 'successful' (fully subscribed) flotation, and 'X' would be correspondingly depressed.

Type of cap

The type of cap may comprise either a base-weighted tariff basket or a current weighted (average revenue) price-cap. Tariff basket constraint is more likely to induce the firm to choose allocatively efficient prices subject to the limit imposed by the cap. The first explicit economic regulation in the UK, introduced in 1984 for British Telecom (BT), was a price-cap tariff basket. The prices which BT was allowed to charge were limited by a constraint on the revenue which would have been raised if the previous year's quantities had been sold at the current year's prices. Table B summarises the types of price-caps used in the UK.

Table B Types of price-caps used in the UK

Industry	BT	BG	BAA	Water	Electricity
Price index*	t.b.	a.r.	a.r.	t.b.	a.r.
Review (years)	5	ind.	5	10	3
Pass through	none	gas	85% sec.	many	general costs
Initial X %	3	2	1	varied	varied

Notes: *t.b. = tariff basket; a.r. = average revenue
Source: Price, 1994, p. 95.

Extent of regulation and to which market it is applied

The regulation of integrated monopolies such as water pose different questions from that applied to the disaggregated electricity industry. Where the privatised company is integrated, regulation and competition issues appear only in final markets. For electricity, however, 'regulation by parts' enables the price-cap to be applied more directly and selectively to the monopolistic sectors of the industry, but makes it more difficult to identify what proportion of final output is subject to regulation. About 75 per cent of the UK water industry's revenue is capped, compared to a much lower proportion for electricity, where generation is not regulated, but transmission and distribution are.

The element of costs passed direct to consumers outside the cap

UK utilities privatised after BT have formulae which allow certain categories of costs to bypass the formula (ie are not subject to its constraints) either in full or in part. The justification is that some costs are beyond the industry's control and cannot reasonably be reduced or absorbed. Cost pass through in the water industry applies to the costs of higher water standards, particularly those issued by the EC, and metering, which are 'allowed' in determining the amount permitted for capital expenditure.

Regulatory review period

Arrangements for reviewing the type and level of regulation vary considerably across utilities. The water industry's review period is much longer than for other industries — ten years — with an interim assessment after five years and more frequent variations to individual targets. Although the nominal lag of 5-10 years is long, Ofwat has intervened frequently to alter 'K' factors.[12] It has persuaded firms to withhold some price increases to which they were entitled, and formalised the process in 1992 when it required reductions in 'K' for 17 firms, on the basis that the recession in Britain had reduced construction costs below the estimates used when price limits were originally set.

The period between revisions is crucial in determining the balance between the appropriate pricing level and structure and the requirement for the company to share cost savings with consumers (the trade-off between allocative efficiency, managerial efficiency and equity reflected in the debate between rate of return and price control models). If the firm acts to maximise short term profit subject to a suitable price-cap this can have desirable allocative consequences, but strategic behaviour is likely as regulation review is approached, when rate of return and other profit measures will determine the level of regulation for the subsequent period. The shorter the time between reviews, the more likely is such strategic behaviour, and the more likely rate of return regulation is the constraint. However, a long revision period is rigid, does not enable changes in cost and demand conditions to be incorporated in the control and may result in 'excessive' (and politically unacceptable) profits.

The relatively short review period in Telecoms and the longer period in water may reflect appropriately the different rates of technological change in the two industries. An indeterminate period before revision may have the advantage of

---

[12] Each water company is subject to the adjusted price cap regulation, whereby its revenue is limited by RPI+K, where K varies according to investment expenditures required by each firm particularly in responding to EC quality directives.

not concentrating the industry's strategic behaviour as it anticipates review. Alternatively it may merely encourage the industry to act strategically at all times in order not to 'trigger' a review which would be disadvantageous to the industry.

A trend towards more frequent formal review of regulation and interim investigations is clear, somewhat counteracting the original design of an arm's length regulation. Regulation is developing as a more complex mechanism in the UK than originally anticipated. The independence of the regulator, not only from the industry but also from government interests, is crucial as regulation matures.

Level of price-cap and changes at revision

All price-caps are expressed as a limit on revenue, where 'X' represents a reduction in the real price level. 'X' is determined by expectations of potential cost reductions, which in turn depend on changing technology and demand. At review any political considerations for flotation no longer apply, and one would expect regulation to be tightened.

NZ Light-handed regulation and information disclosure

Light-handed regulation is an approach adopted in New Zealand which uses the existing competition policy regime to deal with anti-competitive behaviour and its effect on price and quality. It has been applied to the New Zealand energy and telecommunications industries and is being considered for water. The regime contrasts with the United Kingdom approach where industry-specific regulatory bodies were established as part of the privatisation and reform processes.

The New Zealand light-handed regulation approach includes extensive information disclosure on accounting methods, product characteristics and service procedures, to ensure that the performance of businesses with market power is transparent. Among the main objectives of information disclosure is to provide customers with information needed to make rational purchasing decisions. This can facilitate competition between retailing entities (see discussion on yardstick competition below).

A review of the Auckland water and waste water industry (Auckland Regional Services Trust, 1995) states that:

> The key criteria for success in implementing light-handed regulation relate to meeting customer needs, ie better quality standards, product availability, clear accountability mechanisms and assurance that quality standards are met.

The review also states that, based on the regime for the electricity industry, disclosure for the water industry could include performance measures which:

> ...should be able to be compared with information from preceding years and should include financial, efficiency, reliability and customer service performance measures, including the forward capital investment programme and its implications...an independent, external auditor to review and audit publicly disclosed information...

The review produced the following conclusions on the implementation of light-handed regulation:

> Implementation of light-handed regulation for water industries could provide for:
>
> - specific performance targets that can be reported on by organisations in the Auckland water industry, and also by the national water industry if this was desired, to ensure that:
>   - appropriate benchmark comparisons are made within the industry regionally, nationally and internationally
>   - industry participants are supplied with an appropriate range of performance targets.
> - a formal mechanism to review, analyse and report on disclosed information:
>   - could be done by the Ministry of Commerce, the Auditor-General or another suitable agent in consultation with an "industry expert" auditor to review and report on disclosed information
>   - will place more pressure on management to improve service and reduce costs
>   - will restrict the potential for abuse of monopoly power.
> - fair customer contracts with meaningful performance measures which are the main vehicle to develop a commercial relationship between customer and service provider
> - establishing a Customer Ombudsman (or perhaps a Customer Council) to empower customers.
>
> If the above regulatory approach proves impossible to develop, customers would need to rely on the Statement of Corporate Intent (SCI) to seek redress for their concerns and complaints about disclosure. This would require that the SCI reflect appropriate minimum performance standards and targets ...

> ...If it becomes apparent that the light-handed approach to regulation does not offer sufficient protection to consumers, then a form of more specific industry regulation should be adopted. This should focus particularly on consumer prices, service delivery standards, customer contracts and issues related to the access of new entrants to the system (Auckland Regional Services Trust 1995, p. 91).

Yardstick regulation

Yardstick regulation, also known as benchmarking, is a technique used to compare performance of industries against their competitors' best practice. The Australian Department of Finance (1995) adopted the following definition for a recent internal benchmarking exercise:

> An ongoing, systematic search to identify practices of demonstrated superior performance which are amenable to adoption by your organisation.

Benchmarking (or yardstick competition) is used by the UK water companies to compare their performance and, more recently, has been used by the Victorian government to compare the performance of the three Melbourne Water retail companies.

The Finance report notes the strong historic link between benchmarking and (private sector) competitiveness but goes on to state:

> ...the historic focus on competitiveness does not preclude the technique from application to Government Services. For a start, the lack of any obvious rivals does not prevent the Government from entertaining alternatives to current institutional arrangements for the delivery of services. Further, besides a clear obligation on those providing Government Services to do so in the most efficient and effective way, the reality of resource limits in the public sector mandates some form of effective continuous improvement in Government service delivery (DoF, 1995).

Performance indicators need to be developed which provide an evaluation technique for comparisons over time and between different entities. They need not always meet strict standards of accuracy of measurement to provide useful *indications* and *trends*. The easiest indicators to develop are output or process indicators. Technical efficiency indicators which show the relationship between inputs and outputs are next in order of difficulty. However, these do not necessarily take quality of service into account.

Ideally, the data used to support the indicator should be readily available or available at a reasonable cost/benefit ratio, adequately documented and of known quality, and updated at regular intervals in accordance with reliable procedures. In practice not all of these criteria will be met and where new data

is being generated, the best data obtainable at the time will need to suffice, with a view to improving data sources through updates.

REFERENCES

Abraham, D. 1993. 'Recent changes to price cap regulation of Australian Telecommunications', *Paper presented to the Second Industry Economics Conference*, University of Sydney, July 1993, p. 7.

ACTEW 1992. Submission to the IC Inquiry into Water Resources and Waste Water Disposal.

— 1996. *Canberra Drinking Water Forum*, Olims Hotel, Canberra, 10 December 1996.

— 1997. *Annual report 1996-97.*

Alexandra, J. David Eyre and David Howell 1993. 'Australia's Water Use', in Michael Johnson and Stephen Rix (eds) *Water in Australia: Managing Economic, Environmental and Community Reform*, Pluto Press Australia Limited, Sydney.

Amit, Eilon, 1981. 'On quality and price regulation under competition and under monopoly', *Southern Economic Journal,* 47, 4, April, pp 1056-1062.

Anglian Water. 1996. 'A Code of Practice for Domestic Customers', information leaflets.

Archer, J. 1991. *On the Water Front: Making Your Water Safe to Drink*, Pure Water Press, Brunswick Heads.

ARMCANZ/ANZECC 1996. *The 1996 National Health and Medical Research Council of Australia and the Resource Management Council of Australia and New Zealand, Australian Drinking Water Guidelines.*

Asher A., 1995. 'Consumer Charters', *Seminar on Quality of Service and Consumer Satisfaction in Government Agencies*, Lakeside Hotel, Canberra, 22 September.

Auckland Regional Services Trust 1995. *The Auckland Water and Waste Water Industry Review*, 31 August 1995.

Averch, H. and L. Johnson, 1992. 'Behaviour of the firm under regulatory constraint', *American Economic Review*, 52, pp 1052-69.

Baron and Besanko 1984. 'Regulation, Asymmetric Information and Auditing', *Rand Journal of Economics*, Vol. 15, pp 447-470.

Baumol, W. and R. Willig 1989. 'Price caps: a rational means to protect telecommunications consumers and competition', *Review of Business*, Spring, pp 3-8.

Bellar T.A., J.J Lichtenberg and R.C. Kroner 1974. 'The occurrence of organohalides in chlorinated drinking water', *Journal of American Water Works Association*, 66: 703.

Bernheim D. and M. Whinston 1986. 'Common Agency', *Econometrica* 54, pp 923-43.

BIE (Bureau of Industry Economics), 1995. *Issues in Infrastructure Pricing*, AGPS, Canberra.

Bishop, Matthew, John Kay and Colin Mayer (eds), 1995. *The Regulatory Challenge*, Oxford University Press.

Bishop, Matthew, John Kay and David Thompson 1992. 'Regulatory Reform and Productivity Growth in the UK Public Utilities', *Applied Economics*, No. 24, pp . 1181-90.

Blackmon, Glenn, 1994. *Incentive Regulation and the Regulation of Incentives*, Klumer Academic Publishers, MA.

Bös, Dieter and Wolfgang Peters 1988. 'Privatisation, internal control, and internal regulation', *Journal of Public Economics*, No. 36, pp 231-258, North-Holland.

BTCE (Bureau of Transport and Communications Economics) 1992. *Quality of Service: Conceptual Issues and Telecommunications Case Study*, Report 75, AGPS, Canberra.

Bull R.J. 1992. 'Toxicology of drinking water disinfection', in M. Lippmann (ed.) *Environmental Toxicants: human exposures and their health effects*, pp 184-230, Van Nostrand Reinhold, New York.

Bursill, Don (Director, CRC Water Quality and Treatment) 1996. Address to the *Canberra Drinking Water Forum*, 10 December 1996.

Byatt, I. 1997. 'Competition in the water and sewerage industry', presentation to the first annual general meeting, *Water and Effluent Forum*, 13 March, London.

Caves, Richard and Laurits Christenson 1980. 'The relative efficiency of public and private firms in a competitive environment: The case of Canadian railroads', *Journal of Political Economy* 80, pp 958-976.

Chapman, R., and S. Cuthbertson, 1996. 'Sydney Water: A Suitable Case for Private Treatment', *Agenda*, Vol. 3, No. 1, pp 45-58.

City West Water Limited (CWW) 1997. *Annual Report 1996-97.*

Clark R. 1990. 'Water Conservation for Adelaide: Looking into the Future', Water Resources Investigations, Engineering and Water Supply Department's shortened version of *Proceedings of 63rd National Conference Royal Australian Institute of Parks and Recreation*, Adelaide, 30 September.

Council of Australian Governments 1995. *The Second Report of the Working Group on Water Resource Policy* (unpublished).

Cowan, Simon 1993. 'Regulation of Several Market Failures: The Water Industry in England and Wales', *Oxford Review of Economic Policy,* Vol. 9, No. 4, Winter, pp 14-23.

— 1994. 'Privatisation and Regulation of the Water Industry in England and Wales', in M. Bishop, J.A. Kay, C. Mayer and D. Thompson (eds), *Privatisation and Regulation — the UK Experience*, Oxford University Press, Oxford.

Department of Finance (DoF) 1995. *Stage 2 Benchmarking Report: Estimates Update and New Policy Costing Processes*, May 1995, p. I.

Department of Resources and Energy 1993. *Water 2000*, AGPS, Canberra.

Dhrymes, P.J. 1971. 'Price and Quality Changes in Consumer Capital Goods: An Empirical Study' in Z. Griliches (ed.), *Price Indexes and Quality Change: Studies in New Methods of Measurement*, Harvard University Press, Cambridge.

Domberger, Simon and John Piggott 1986. 'Privatisation policies and public enterprise: a survey, *Economic Record.*

Dorfman R. and P.O. Steiner 1954. 'Optimal Advertising and Optimal Quality', *The American Economic Review*, December, pp 826-836.

Drinking Water Inspectorate (DWI) 1996. *Annual Report.*

Garvin, D. A. 1984. 'What does "Product Quality" Really Mean?', *Sloan Management Review*, Fall, pp 25-43.

Geroski, P. David Thompson and Tokers, 1989. 'Vertical Separation and Price Discrimination: Cellular Phones in the UK', *Fiscal Studies*, 10, pp 83-103.

Glass 1991. *Water Treatment Examiner*, 23 (2).

Goldfinch, R. 1997. 'When in Rome...Water Engineering in 97 AD', *Water*, Journal of Australian Water and Wastewater Association, V. 24, No. 6, November/December, pp 8-10.

Hilmer, F.G., M. Rayner and G. Taperell 1993. *National Competition Policy, Report by the Independent Committee of Inquiry*, AGPS, Canberra.

HM Treasury 1995. *Citizen's Charter*. Annual Review of 'Competing for Quality Program' UK.

IC (Industry Commission) 1992. Water Resources and Waste Water Disposal, Report No 26, AGPS, Canberra.

IPART 1997. *Annual Report 1996/97*, Sydney.

Kay, John 1993. 'The Regulation of Monopolies' in *But Who Will Regulate the Regulators?* Adam Smith, London, pp 11-16.

Killick, Jim 1996. 'SA water corporation case study: a groundbreaking experience in outsourcing', Speech presented in Melbourne, 15 March 1996.

King, Stephen and Rodney Maddock 1996. *Unlocking the Infrastructure – The Reform of Public Utilities in Australia*, Allen & Unwin, St Leonards, NSW.

Laffont and Tirole 1986. 'Using cost information to regulate firms', *Journal of Political Economy*, 94, pp 614-41.

Lancaster, K.J. 1966. 'A new approach to consumer theory', *Journal of Political Economy*, April, pp 132-157.

— 1977. 'The Measurement of changes in quality', *The Review of Income and Wealth*, June, pp 157-172.

Lewis, Tracy and David Sappington 1988. *Monitoring Quality Provisions in Regulated Markets*, University of California at Davis Economics Department Working Paper: 312, April.

Littlechild, S. 1983. *Regulation of British Telecommunications' Profitability*, London, Department of Industry.

Lichtenberg, Frank and Zvi Griliches 1986. 'Errors of Measurement of Output Deflators', Columbia First Boston Series in Money, Economics and Finance Working Paper, June.

Lloyd, C. and D. Howell 1993. 'Institutional arrangements for water in Australia', in Michael Johnson and Stephen Rix (eds) *Water in Australia:*

Managing Economic, Environmental and Community Reform, Pluto Press Australia Limited, Sydney.

London Economics 1992. 'International Experience of Private Provision in Water, Sewerage and Drainage Services', *Report to the Industry Commission* June 1992.

Maynes 1975. 'The concept and measurement of product quality', in N.E. Terleckyj (ed), *Household Production and Consumption*, National Bureau of Economic Research, Cambridge.

Melbourne Water Corporation (MWC) 1997. *Annual Report 1996/97.*

Moore, John 1992. *British Privatisation–Taking capitalism to the people*, Harvard Business Review, January/February, pp 115-124.

MWRR (Melbourne Water Resources Review), 1992. *Interim Report: Water for Our Future*, MWRR, April.

National AIDS Data Base 1995. National Centre for HIV Epidemiology, St Vincent's Hospital, Sydney.

New Zealand Business Roundtable 1988. State Owned Enterprises: Issues of Ownership and Regulation, Wellington.

Ofwat 1992. *The Cost of Quality*, Office of Water Services, Birmingham.

— 1993. *Paying for Quality: The Political Perspective*, Office of Water Services, Birmingham.

— 1994. *Setting Price Limits for Water and Sewerage Services: the Framework and Approach to the 1994 Periodic Review*, Office of Water Services, Birmingham.

— 1996. *The Changing Structure of the Water and Sewerage Industry in England and Wales*, Office of Water Services, Birmingham.

Office of the Regulator General, Victoria 1997. *Annual Report 1996-97.*

Price, Catherine 1994. 'Economic regulation of privatised monopolies', in Peter Jackson and Catherine Price (eds), *Privatisation and Regulation: A Review of the Issues*, Longman Publishing, New York.

Rees, Ray 1984. 'A positive theory of the public enterprise', in M.P. Marchand et al (eds), *The Performance of Public Enterprises*, Amsterdam: North Holland.

Rix, Stephen 1993. 'The Political Context of Public Sector Reform Debate', in Michael Johnson and Stephen Rix (eds) *Water in Australia: Managing*

Economic, Environmental and Community Reform, Pluto Press Australia Limited, Sydney.

Roberts, Peter 1997. 'Monopolies watered down, not skills', *Australian Financial Review*, 22 August, p. 51.

Rook, J.J. 1974. 'Formation of haloforms during chlorination of natural waters', *Water Treatment Examiner*, 23 (2):234.

Rovizzi, Laura and David Thompson 1992. 'The regulation of product quality in the public utilities and citizen's charter, *Fiscal Studies*, vol. 14, no. 3, pp 74-95, London.

SA Water 1997. *Annual Report 1996/97.*

SCNPMGTE (Steering Committee on National Performance Monitoring of Government Trading Enterprises) 1997. *Government Trading Enterprises Performance Indicators 1991-92 to 1995-96*, AGPS, Canberra.

Sly and Weigall 1992. Corporatisation and Privatisation in Australia: Efficiency Productivity Growth, Second Edition, March 1992, Melbourne.

SEW (South East Water Limited) 1997. *Annual Report 1996/97.*

Spence, A.M. 1975. 'Monopoly, Quality and Regulation', *Bell Journal of Economics*, 6, 417-29.

Stevens M. S. McConnell, P.R. Nadebaum, M. Chapman, S. Ananthakumar and J. McNeil 1995. 'Drinking water quality and treatment requirements: risk-based approach', *Water*, Journal Australian Water and Wastewater Association, November/December.

Sydney Water Board (SWB) 1992. Commercial Principles: Private Sector Build, Own and Operate Water Treatment Plants for Woronora, Macarthur and Prospect Supply Systems, Sydney.

— 1994. Submission to Parliament of New South Wales, *Report of the Joint Select Committee Upon the Sydney Water Board*, Submission 1e, April.

— 1996. *Annual Report 1995-96.*

— and Dwyer-Leslie Pty Ltd 1991. *Drinking Water Quality: Economic Evaluation*, Sydney, September.

Train, Kenneth 1991. *Optimal Regulation: The Economic Theory of Natural Monopoly*, Cambridge, Mass:MIT Press.

Vickers, John and George Yarrow 1988. *Privatisation: An Economic Analysis*, The MIT Press.

Victorian Treasury, 1995. *Reforming Victoria's Water Industry: The Restructured Metropolitan Industry*, Office of State Owned Enterprises, State Government of Victoria, January.

Vogelsang, I. and J. Finsinger 1979. 'A regulatory adjustment process for optimal pricing by multi-product monopoly firms', *Bell Journal of Economics*, no. 10, pp 157-71.

Wade, Alan and Keith Bentley 1997. 'Regulatory and non-regulatory approaches in health risk management in the water sector', *Australian Water and Wastewater Association 17th Federal Convention*, 16-21 March 1997, Melbourne.

Water Services Association of Australia (WSAA) 1997. *The Australian Urban Water Industry WSAA Facts '96*, WSAA Melbourne.

— 1998. *The Australian Urban Water Industry WSAA Facts '97*, WSAA Melbourne.

Water Services Association of England and Wales 1997. *Waterfacts 1996*, London.

Waterson, M. 1984. 'Recent developments in the theory of natural monopoly', *Journal of Economic Surveys*, 1, pp 59-80.

Winward, John 1994. 'Privatisation and domestic consumers', in Bishop, Matthew, John Kay and Colin Mayer (eds), *Privatisation and Economic Performance*, Oxford University Press, pp 251-264.

Yarra Valley Water Limited (YVW) 1997. *Annual Report 1996/97*.