

1 PUBLIC UTILITY REFORM

This chapter provides a brief history of reform of public utilities, the impetus for the more recent reform and the various models adopted.

1.1 History of reform

Rationales for public ownership

Industries such as electricity, gas, and water supply are known as public utilities because of the ‘public good’ characteristics they display. They are ‘essential’ in the sense that in most urban jurisdictions households are required to be connected and, particularly in the case of water supply, a minimum tariff is charged regardless of use. Likewise for many industrial uses, the output of these utilities are an essential, and considerable, input. On the supply side, their core businesses exhibit natural monopoly characteristics such as economies of scale and scope (section 2.3).

The combination of these demand and supply characteristics has created a need for public intervention, either through direct provision by the public sector, and/or prescribed quantity or price to avoid monopoly abuse.

The method and extent of government involvement has varied over time and across jurisdictions according to economic circumstances, developments in economic theory, philosophies of governments and, in some cases, technological change.

It was quite commonplace in the United Kingdom (UK) and Australia for public utilities to be in the private sector up until the middle of the twentieth century. The Great Depression, followed by the Second World War, caused governments to intervene more in business activity. In the UK, for instance, most utilities were nationalised, or rationalised if already in public ownership, by the Labour government which held office between 1945 and 1951.

Australian utilities that used to be in private hands and have since been nationalised include railway, electricity and ferry companies. Since that time governments in Australia have traditionally been the owners and operators of utilities, reflecting in part past constraints on the ability of the private sector to finance the infrastructure. The economic rationale for retaining government involvement is the presence of significant market power, and use of this power

to restrict capacity, increase charges and earn monopoly profits (discussed in the following section).

Some countries did not experience nationalisation of their utilities. For instance, transport services have been purchased by French urban municipalities since the 19th Century while water treatment services have been franchised to the private sector for decades (see following section). The traditional approach taken in the United States (US) has been regulation of private monopoly, combined with regulation targeted directly at the problem created by the market failure.

From public to private or quasi-private ownership...

The more recent philosophy of privatisation of utilities originated in a variety of think tanks in the United Kingdom during the 1970s. The sustainability of the welfare state was questioned and the ideas of market failure were challenged by notions of government failure and a renewed belief in the power of the market. This belief rests on the premise that market forces generate appropriate information about consumer demand and incentives for firms to satisfy this demand in pursuit of profits. These theoretical arguments provided justification for the large-scale privatisations in the UK which were largely motivated by revenue considerations.

Since 1987, public utilities at all levels of government in Australia have undergone substantial structural and regulatory reform to make them more efficient and commercially oriented, and more accountable to government for their financial performance. Reform of government business enterprises (GBEs) (which has usually involved corporatisation discussed in the following section) was a major part of the government's micro-economic reform process. The objective of the reform process is to enable GBEs to become more commercially oriented in an increasingly competitive environment, and to encourage them to become more financially viable, both to reduce their demands on the budget and to ensure that they have a secure financial basis from which to expand and diversify their operations.

1.2 Reform options/models

There has traditionally been a wide variety of institutional arrangements in Australia, accounted for partly by widely differing physical circumstances across the continent, but also by a variety of historical factors. The system of water supply is a reflection of Australian federalism, with each State having its own system. Many traditional Australian institutional and regulatory

arrangements are probably technically and economically inefficient, and as such in recent years have been subject to scrutiny and reform.

Major reform of public utilities at the international level has involved either privatisation, together with a regulatory framework where monopolistic tendencies remain (the UK model); or corporatisation, so that the directors and management operate at arm's length from government, and have an increased capacity to take decisions without being subject to political direction (the New Zealand model). There is no distinctively Australian model of utility reform. Australia has adopted different types of reform from State to State and industry to industry.

The various institutional models and reform options are discussed below. Each model has its advantages and disadvantages. The models presented do not contain exclusive features and there is necessarily some overlap between them. For instance, local government authorities may be corporatised, and some corporatised or privatised utilities are subject to disaggregation.

Traditional Departmental model

For most of the post-war period Australian and New Zealand utility industries were operated as statutory authorities, supervised at a distance, but not at arms length, by a Minister. Along with nationalised industries in the United Kingdom, they often had an ill-defined role, lack of clear direction and conflicting objectives. This left considerable scope for managers and workers to pursue independent objectives, such as expansion, high employment and wages with little effective control (see Rees, 1984).

The problems with this model came to be seen as 'government' failure, parallel to the market failure which nationalisation had been designed to rectify. Along with revenue considerations, this provided a rationale for administrative reforms, corporatisation, and in the case of the UK, privatisation.

Market-related mechanisms and techniques used in Australia and the UK include:

- contracting out/separating the role of purchaser and provider;
- simulation of competitive market conditions;
- annual market-testing of a proportion of expenditure;
- user charges;
- devolution of operations to quasi-independent agencies and/or to lower tiers of government;

- setting performance objectives;
- establishing contractual arrangements between Ministers and Chief Executives; and
- publishing citizens' rights to a defined standard of service.

Departments answerable to Ministers and governments have the advantage of providing democratic accountability but the disadvantage of political interference. Administrative reforms are not as powerful as corporatisation in the sense that they place less pressure on governments to clearly spell out the circumstances in which departures from commercial practice are required.

Local government model

The local government model has been a major contributor to the almost universal provision of water as an Australian essential service. Local government boundaries are not always logical but they are at least clearly defined and consistent, a clear advantage for the organisation of water services. In providing conformity with a prescribed system of boundaries common to a variety of municipal services, the model ensures that water supply is not divorced from planning, environmental management and community needs. Nor is there any problem with accountability since the authority administering water supply is responsive to regular elections.

In theory the model conveys considerable community benefits over specialist water administrations which often transgress logical boundaries and are answerable to State and not local government. Separate local governments, because of their certain homogeneity, should be able to cooperate more effectively together than with bodies of different institutional design, such as with a Water Corporation. However, the increasing drive towards integrated total catchment management, and water catchments that overlap local government boundaries, could deem the model irrelevant. For most urban water supply the model has been replaced by corporatisation of a water utility.² For these reasons the model is not explored further in this paper.

Corporatisation

In a legal sense, corporatisation means the creation of a limited liability company incorporated under the Corporations Law, and the transfer of business

² Queensland is the only Australian jurisdiction with urban water supply by local government.

conducted by the government (perhaps already commercialised) to that company. This is the model under which the ACTEW was corporatised (see chapter 5). A government business utility can alternatively be constituted under its own corporate form by legislation, with the ownership and control retained by the government. The assets and liabilities are owned and borne by the company and the company makes the profits or incurs the losses, but the government indirectly controls the company by virtue of its share ownership. The first approach is known as 'umbrella legislation' which, according to the large legal partnership Sly and Weigall:

may be enacted in order to provide a general framework and consistent approach to important issues affecting all GTEs. Much of the business activity of government enterprises regulated under such an umbrella is subject to, and shaped by, the same requirements of corporate regulation as their competitors (Sly and Weigall, 1992, p. 49).

The second approach is known as 'individual legislation', under which, according to Sly and Weigall:

consistency of approach and possibilities of comparative measurement of efficiency and productivity may also be lost (1992, p. 50).

Key elements of the corporatisation model include clear managerial objectives, managerial authority, performance monitoring, rewards and sanctions, and competitive neutrality. It is intended to encourage further gains in efficiency, and higher returns to the State as owner, and establishes a clear commercial objective, with community service obligations clearly identified and funded by the Government.

The major utilities in New Zealand (NZ) were corporatised on 1 April 1987 under the *State-Owned Enterprises Act 1986*. From this time they have been required to operate as profitable, user-pays businesses, comparable with their private sector counterparts. Regulatory barriers were dismantled, exposing the new corporations to competition, and other forms of special assistance and exemptions were removed. Performance monitoring was enhanced by the establishment of measurable targets based on profitability as set out in corporate plans, and backed by new information systems. Departmental organisation was replaced by a limited liability company structure, with the government as sole shareholder. Managers were given independence in decision making, but were accountable to boards of directors appointed from the private sector, and ultimately to Parliament through the Minister of Finance and the responsible Minister. Decision-making was thus removed from direct political interference.

The first Australian example of corporatisation in the water sector was the corporatisation of the Hunter Water Board to form the Hunter Water Corporation (HWC) in New South Wales in 1991 (discussed in chapter 5).

A criticism of the NZ corporatisation model is that, since ownership is still vested in the Crown and cannot be transferred, managers still lack the incentives to perform that is provided through the share market (New Zealand Business Roundtable, 1988). Managers face no threat of takeover, and the monitoring of performance by shareholders and investment analysts is attenuated (the free rider problem). Moreover, the incentives provided by the possibility of bankruptcy are regarded as minimal because of an implicit government guarantee. This reduced risk is considered to lower the cost of capital and thus provide a competitive advantage over private competitors.

A further criticism relates to claims that decision-making is subject to residual government interference since the directors are political appointees and an annual statement of 'corporate intent' has to be approved by the government. Moreover, interest groups may pressure the government to hold inquiries into particular management decisions such as pricing policies. These considerations have provided justification for the privatisation of Telecom and New Zealand rail. NZ reform of its water industry is trailing reform of utilities such as electricity that have been corporatised.

Corporatisation does provide a more arms length relationship between governments and their water authorities than the traditional public ownership arrangement by giving the utility managers greater day-to-day autonomy. Corporatisation also tends to include a posited solution to the 'poacher/gamekeeper' problem, whereby the service provider and regulator are one and the same.

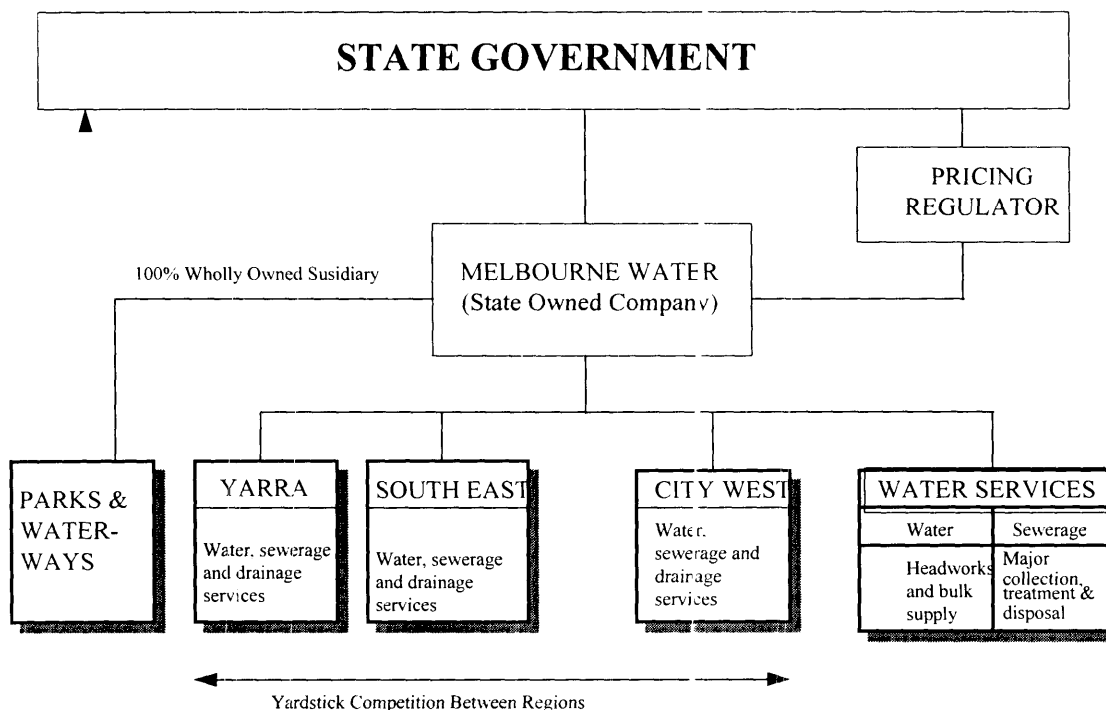
Moreover, the process of corporatisation of itself may help to focus authorities and their governments on setting priorities; establishing accountability; and devising ways to deal with potentially conflicting functions. However, it is not clear that under all circumstances corporatisation will achieve better outcomes. The Industry Commission suggested that governments should consider corporatisation of water services on a case by case basis, to assess whether there are gains to be had beyond administrative reforms (IC, 1992).

Disaggregation

In January 1995 Melbourne Water Corporation was disaggregated into three retail water businesses — City West Water, South East Water and Yarra Valley

Water — and a wholesale water and sewerage business which retained the name of Melbourne Water Corporation (see figure 1.1). Melbourne Parks and Waterways had been separated from the Melbourne Water Corporation in July 1994.

Figure 1.1 New structure of Melbourne Water



Source: Victorian Treasury 1993, *Reforming Victoria's Water Industry*, Appendix A.

Although disaggregation may cause some loss of scale economies, an advantage of geographically separate retail companies is the scope to compare performance (yardstick competition),³ provided that the shocks which affect the firms are sufficiently correlated.

The Victorian Treasury (1995) envisaged that:

Customers will be able to compare the performance, quality and service of their retail businesses with those in neighbouring regions to see that they get a fair deal. They will be assisted in this by the Office of the Regulator-General, who will be making the same comparisons...The Office of the Regulator-General will develop and oversight a reporting regime which establishes comparable performance measures and ensure publication of relevant data at least annually.

³ See Appendix B.

For the first time, water customers have a means to evaluate their retail company against other retailers. Within any industry the publicising of a “league ladder of results” drives managers to best performance.

One of the down-sides of vertical separation is a tendency for lower quality due to ‘free-rider’ effects (King and Maddock, 1996, p. 129). The reason given is that there will always be a tendency for vertically separated producers to blame each other for service or product deficiencies. If no producer has to face the full consequences of poor quality outcomes, for example in terms of loss of reputation and sales, each will have an incentive to ‘free ride’ on the other’s quality choice, claiming improvements as their own while denying responsibility for faults. Since a producer who invests in improved quality does not necessarily gain all the rewards from that investment, we would expect producers to devote less resources to improving quality when the industry is vertically separated (Geroski et al, 1989, p. 90). The effectiveness of yardstick competition in Melbourne and the UK water industries should depend on the degree of monitoring and sanctions.

The private ownership status in the UK means that the share market can provide some discipline. The Melbourne Water retail companies subject to this type of comparative competition do not have the share market discipline of the UK companies. However, because they are all in the same metropolitan area the shocks that affect them are likely to be sufficiently correlated and this makes performance comparison more meaningful. Comparable information increases the scope for actual competition to supply large companies at the boundaries of designated supply areas.

Outsourcing/private sector involvement in infrastructure

Actual competition is not possible for natural monopoly elements of privatised or corporatised enterprises or for government statuted monopolies. But among the market-type approaches to improve enterprise efficiency is to separate the roles of purchaser and provider by contracting for the actual provision or delivery of services. This leaves the government with the role of funding the services, and leaves scope for the services to be subsidised, for social or other policy reasons, while in theory taking advantage of the benefits of competition to achieve delivery of services at lowest cost.

On 1 January 1996, SA Water outsourced the management, operation and maintenance of Adelaide’s water and wastewater systems to United Water International for the following 15 years. A second major contract was also signed with the private sector to build, own and operate ten water treatment

plants to supply filtered water to the Adelaide Hills and country areas. In NSW, a contract was signed for the construction, operation and maintenance of water filtration plants at Illawarra and Woronora in 1994-95.

The French water franchise arrangements provide a further example of this model. The right to operate a water supply service is auctioned so that any excess profits are made by the public rather than the private sector. Under the 'affermage' contractual arrangement (the dominant form), the municipality retains responsibility for financing and commissioning new investment, while the lease company is usually responsible for operations and accounts, as well as renewal investment, for the term of the contract (10 to 15 years). New capital investment remains the responsibility of the municipality, acting on advice of the contractor.

Contracts for the operation of water systems are usually awarded on the basis of price to customers (and sometimes on the willingness to undertake investment). The winning company contracts with the municipality to supply water to all consumers at a certain (indexed) price and at a recognised quality standard (King and Maddock, 1996).

The process of competitive tendering provides a degree of competition. However, in the case of French water franchises, contracts rarely change hands and, according to London Economics (1992):

while bidding for the initial contract is fiercely competitive, it is doubtful that the subsequent renewal of contract is subject to any significant competitive pressure.

An objective assessment of contract proposals on the basis of effectiveness and value for money should include due consideration of quality as well as cost. In practice it is tempting to compare only aspects of the tender that are more easily measurable, such as cost, leaving quality outcomes under-accounted for in the selection process. Contract specifications should be designed so that parties are clear about the desired performance and respective obligations. To achieve the goal of getting best value for money, rather than minimising cost, quality objectives should be specified in the contract and closely monitored.

Privatisation

Private versus public ownership is perhaps the most contentious issue relating to public utility reform, especially regarding the water industry. According to Lloyd and Howell (1993):

The joint thrust of innovation and the desire for greater certainty, even control, of supply are important factors in the developing equation of public versus private water in Australia.

One of the major arguments for public ownership is espoused by Rix (1993):

the public sector contains the largest socially owned and controlled capital in the nation, and certain democratic advantages flow from that social ownership (p.179).

In theory, the case for private ownership rests on the incentives and constraints that the market provides to promote efficiency within the firm (technical efficiency)⁴ or cost minimisation for a given level of output (allocative efficiency). (See Domberger and Pigott, 1986, pp 35-36).

Public enterprises are often not considered to fulfil the technical efficiency requirement because of overmanning, 'feather bedding' and over-capitalisation, in the absence of incentives to economise on inputs. Advocates of privatisation argue that private ownership restores incentives which promote productive efficiency and has several additional advantages. The threat of bankruptcy — which may be regarded as the ultimate sanction on efficiency — is perhaps the most important.

While economists have long argued the virtues of competition in terms of enhanced efficiency, this debate is usually carried out at the theoretical level. It is very difficult in practice to measure efficiency and, therefore, to identify efficiency gains. Quality changes are even harder to measure.

Moreover, the success of privatisation judged in terms of productivity and profitability focuses upon the distribution of benefits primarily to shareholders. These benefits must be set against the distributional cost of achieving them and any decrease in quality. If the regulatory regime put in place is to be effective then other stakeholders should benefit from privatisation, such as consumers, by paying less for their services, by facing more stable prices or by receiving an improvement in the quality of the service (on which this paper focuses) .

The empirical work of Caves and Christensen (1980) supports the proposition that competition and managerial accountability are more important than privatisation, per se, in promoting economic efficiency. Others argue that the act

⁴ Technical or productive efficiency can be thought of as having two distinct requirements: that the minimum quantity of each input be used to produce a given level of output; and that those inputs be used in a cost-minimising combination, determined by reference to relative factor prices. For a given ratio of relative input prices there is a unique ratio of those inputs which minimises costs, given conventional assumptions on the production technology such as a strictly convex production function.

of privatisation itself promotes both economic efficiency and public confidence and therefore state-owned enterprises should be sold off to individual investors before efficiency gains can be realised (Moore, 1992).

Economists are now generally agreed that changing ownership of assets from the public to the private sector is not sufficient, or even necessary, to improve efficiency (although the nature of decision-making within government and the attenuation of property rights provide strong rationales for privatisation). What is more important is the threat of competition and therefore market conditions, and perhaps the regulatory regime (Bishop, et al, 1992). Bishop et al draw the following two conclusions:

First there is support for the view that the economic performance of all firms — public or private — is improved by a competitive environment and that under competition private firms are likely to do better. Second, where competition is absent there can be no presumption in the favour of private corporations. Furthermore, the regulation of private enterprise to prevent the abuse of its monopoly power (in an uncompetitive environment) may introduce serious distortions which result in its performance being worse than that of a corresponding public enterprise.

Melbourne Water Corporation, in commenting to the IC inquiry on its own consultancy provided by London Economics (IC 1992, p. 130), concluded that:

On the basis of international evidence, and given the natural monopoly status of the major services involved, no clear advantage in efficiency could be gained associated with the transferral of the ownership of Melbourne Water from the public to the private sector. The report reinforces the approach that the most significant efficiency gains are most likely to derive from the stimulation of genuine competition for particular activities undertaken while still retaining overall control and accountability with a single organisation.

The UK reform process provides the best example of wide-spread privatisation (chapter 5). Given the above proviso, empirical studies of UK privatisation conclude that liberation and deregulation of markets do not appear to have resulted in substantial improvements in efficiency. Vickers and Yarrow (1988, p. 425) argue:

By failing to introduce sufficiently effective frameworks of competition and regulation before privatising such industries as telecommunications and gas, the Government has lost a major opportunity to tackle fundamental problems experienced in the past under public ownership.

1.3 Summary of utility reform models

A variety of ownership, reform and regulatory models exist, from private monopoly combined with regulation targeted directly at the problem created by the market failure (the US model); corporatised publicly owned utilities with a 'light handed' regulatory regime (common in New Zealand); and public production, the traditional approach taken in the UK, NZ and Australia. Privatisation and the establishment of industry-specific regulators is the approach taken in the UK since the 1980s. Combinations along a spectrum of degrees of ownership, structure and regulation that might apply to utility industries are illustrated in Figure 1.2.

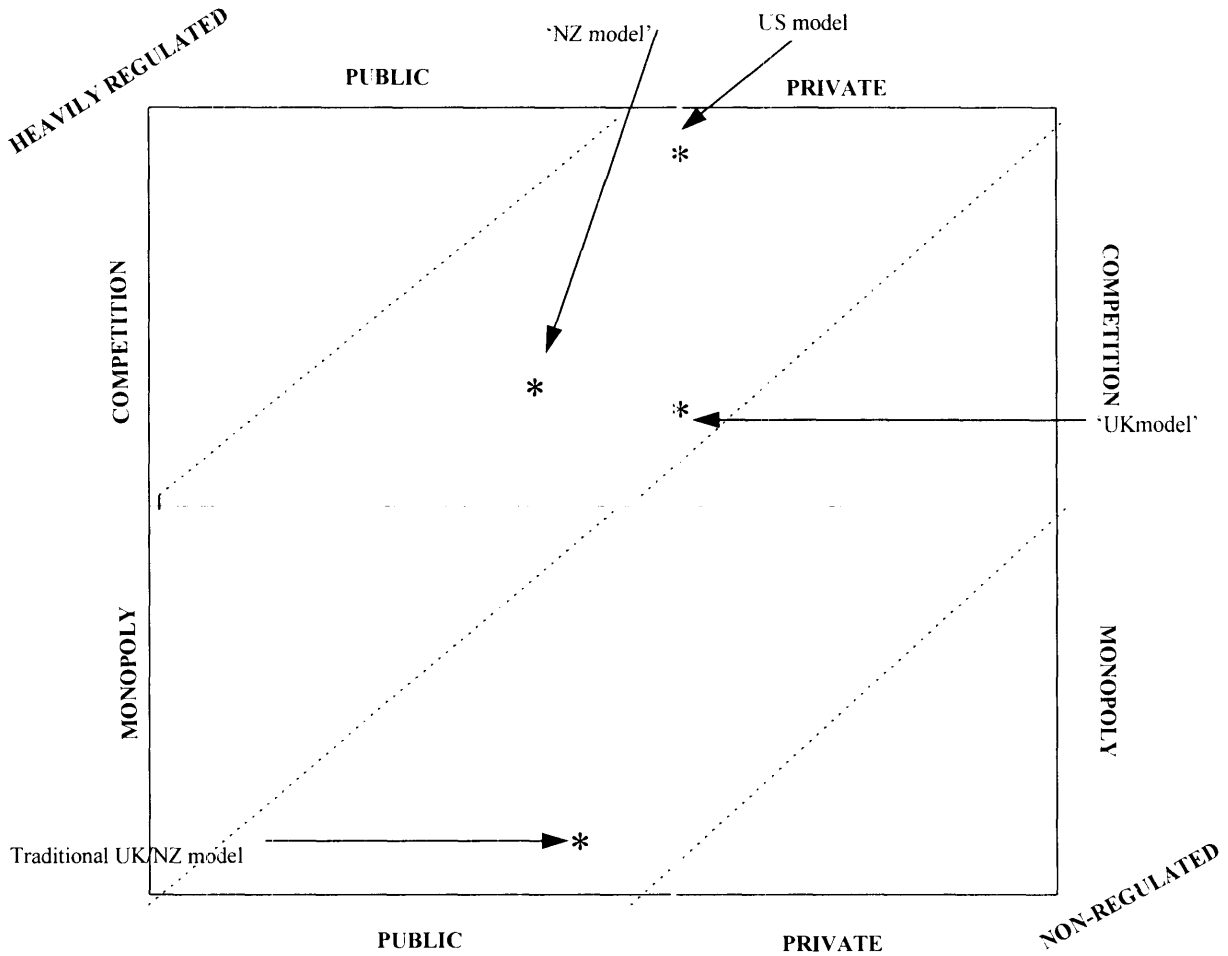
In practice, utilities may be partially privatised, subject to varying degrees of regulation and may have some degree of market power even if not a monopoly. Commercialisation and corporatisation could provide the means by which the industry and regulators learn how a successful private system could work, and thus constitute a precursor to privatisation.

Privatisation is considered most feasible where technological and other change enables former natural monopolies to be opened up to competition or where the natural monopoly functions are able to be structurally separated from potentially competitive functions. Where natural monopoly characteristics remain, governments may choose to allow private sector provision under an appropriate regulatory regime, including stringent quality control.

The capital market discipline argument does not carry much weight in the case of utilities. Water utilities are large and complex organisations, and therefore more resilient to takeover and bankruptcy, and more difficult for the capital market to monitor because of information asymmetries and possible vested interest on the part of management. Thus privatisation may not be able to solve all the perceived incentive problems.

A possible lesson from the UK experience is that if privatisation is combined with liberalisation to create a more competitive market structure, efficiency gains are likely to follow. However, if the privatisation involves the ownership of a natural monopoly the case is not so clear. It may be easier to prevent abuse of monopoly power by a public enterprise than a private one, in which case sale of existing monopolies to the private sector would not be desirable. Lack of competition and other concerns may hinder moves to privatise the water industry in New Zealand and Australia.

Figure 1.2 Models of structure, ownership and regulation



Appendix B provides more detail on methods of regulatory control of utility industries.

2 THE AUSTRALIAN WATER INDUSTRY

The water industry is amongst Australia's largest industries. We use 14,600 million cubic metres of water each year — 70 per cent for irrigation, 21 per cent for urban and industrial uses and the remaining 9 per cent for other rural uses. The industry accounts for around \$90 billion investment in current replacement value terms and contributes annual revenues of \$5 billion. Water use is also important in terms of its impact on our natural resource base, particularly the quality and health of the nation's river systems and the long term sustainability of the land to which it is applied.

2.1 Institutional and operational arrangements

The Australian water industry comprises water, sewerage and drainage (WSD) services traditionally provided by vertically integrated government enterprises. To date, Australian water utilities remain in public ownership although commercialisation and corporatisation have led to new management responsibilities vested in commercial boards. Responsibility for the management of water resources and the provision of water services is vested in State and local governments. The Commonwealth provides financial assistance to meet the establishment costs of supplying water to remote communities but the maintenance and operational costs are the responsibility of the States and Territories.

Within and between the States, institutional arrangements for water supply vary widely, from provision predominantly by local councils in Queensland, to provision by statutory authorities, water boards or corporatised government entities in other States. In New South Wales, the Hunter and Sydney Water Corporations supply water to urban areas, while local government councils service rural areas. The total water industry in Victoria has been corporatised and urban water supply has been disintegrated. Melbourne Water Corporation, the 'wholesaler', now provides bulk water (and sewerage and drainage), and the three 'retailers' — City West Water, South East Water and Yarra Valley Water — provide reticulation and sewerage. In contrast, water supply has been integrated with electricity supply in the ACT under the ACTEW Corporation to achieve scale economies.

The Australian water industry is part of the non-budget sector of State governments, which includes government trading enterprises (GTEs) and State owned corporations (eg Hunter Water Corporation). The Australian Bureau of Statistics (ABS) classifies these government businesses as ‘public enterprises’. They fund their operating costs mainly from user charges and their capital works from borrowings and internal funds. Public enterprises are subject to Ministerial direction and are required to submit annual reports.

The water GTEs provide bulk water, and to varying degrees are also involved in reticulation, sewage collection and treatment, drainage and irrigation. The Steering Committee on National Performance Monitoring of Government Trading Enterprises (SCNPMGTE) classifies water authorities into four groups — urban, mixed rural, bulk water and irrigation.

The results presented in chapter 6 are essentially concerned with ‘urban’ water authorities which provide the majority of their services to urban populations and comprise the largest group. The exception is Melbourne Water Corporation which, since January 1995, now only provides bulk water services and sewerage and drainage services. For the purposes of comparison, the Melbourne water industry is consolidated and included in the discussion under urban water authorities. This provides consistency with previous years’ data, when the four Melbourne GTEs were aggregated.

The water industry supply cycle can be grouped into the four stages commonly used in relation to other network-based infrastructure industries:

- *Generation*: Water generation or production includes the harvesting and collection of water, water treatment and pumping.
- *Bulk transmission*: Bulk water transmission relates to the bulk supply of raw and treated water using large diameter pipelines. Transmission pipelines transfer water from its source (rivers, dams and ground water aquifers) through pumping stations, treatment works and other headworks to a local storage reservoir.
- *Distribution*: Water distribution relates to water reticulation from bulk mains to users via a diffuse network of medium to small diameter pipes.
- *Customer service*: For water supply, includes advisory services, metering and billing.

The administration of water authorities has been undertaken, with different degrees of autonomy, by different levels of government in different jurisdictions. Management has been based largely on engineering models of the projected growth in demand. Only in recent years have demand management systems — where prices reflect usage — been developed more broadly.

Responsibility for water quality is commonly shared between water authorities, environmental protection agencies and health departments.

2.2 Economic characteristics of the capital assets

While the water industry is broadly similar in structure to other network based infrastructure industries, there are key differences in the economic characteristics of the infrastructure. First, the assets are comparatively more expensive to construct. The mains account for around 70 per cent of the industry's assets by value, compared with around 50 per cent for electricity and 60 per cent for gas (WSAA, 1997). In addition, most of the assets, including the mains network, are sunk in the sense that they have few alternative uses, and their resale values are well below the cost of replacing them (Cowan, 1994).

Second, it is comparatively more expensive to operate water mains networks than electricity, gas or telecommunications networks. In combination with the higher construction costs this makes the cost of distributing water much higher than for other infrastructure industries. For example, water transportation services account for around 21 per cent of the industry's total production costs, compared with 8 per cent of total costs for electricity and 14 per cent of total costs for gas. Climate variability also increases the cost of transporting water. Hence, it is less feasible to transport water over long distances than it is for gas and electricity.

Along with electricity, the water industry differs from other utilities in constituting horizontally disaggregated firms rather than a single monopoly. Both are divided into regional companies with de facto, if not permanent, legal local monopolies over much of the market, although the electricity industry is further divided vertically into generation, transmission and distribution (supply) companies with generation also split horizontally.

In terms of capital stock, the usual industrial classification used by the ABS aggregates electricity, gas and water into a single industrial sector. The total water industry assets (water and sewerage mains, pumping stations and treatment plants, storage dams, reservoirs and irrigation channels) amounted to \$81.9 billion in 1988-89. Of this, 66.2 per cent comprised water and sewerage mains, 13.4 per cent storage dams, and a further 12 per cent pumping stations and treatment plants. Storage reservoirs need to be constructed to protect water supplies against recurring droughts. Australian water supply systems are therefore characterised by large reservoirs and their associated capital costs. WSAA estimates the industry's assets at \$50 billion in replacement cost terms

and \$15 billion in historical cost terms, ranking it among the top industries nationally in terms of the size of its capital base (WSAA, 1997).

Without question, the water industry is highly capital intensive. As the assumed rate of return on assets increases, capital costs comprise a greater share of total costs. The relative capital intensity of the industry increased as the number of employees almost halved through the 1990s. The Water Services Association of Australia estimated that operating costs comprised around 40 per cent of total costs per property in 1995-96. This figure decreases as the assumed rate of return on assets increases above 4 per cent (WSAA, 1997). Since water systems enjoy significant economies of scale, large integrated monopolies arose in the industry quite naturally.

Water assets are also long-lived. According to WSAA (1997), a large pipeline can have a life well in excess of 100 years. They operate as systems which, particularly for underground assets, effectively have an indefinite life if well maintained. The ABS approach to measuring capital stock also provides estimates of the mean life of assets. Within non-dwelling construction, the mean life of water industry assets at 72 years is by far the largest of any other industrial sector. Concerning equipment assets, the water industry mean life at 22 years is joint second longest behind electricity and gas. This fact provides an important rationale for public provision of water industry infrastructure. Likewise in the UK, the average life of Thames Water's assets in 1989/90 was at least 40 years (Cowan, 1994) whereas the average for UK industry as a whole is about 17 years (Mayer, 1988).

2.3 Market failure

The nature of the water industry exposes it to certain market failures which provide a powerful economic justification for public intervention — natural monopoly, information asymmetry, externality and public good. A further rationale for intervention is where governments (or the public) choose to forgo a level of economic efficiency in order to pursue objectives such as distribution of resources. This applies in relation to water supply because of its essential nature.

Natural monopoly

The water industry is considered a classic case of natural monopoly. A natural monopoly can arise from economies of scale and/or economies of scope (when more than one output or service is produced). For a firm to be a natural

monopoly its cost function must be subadditive; that is, every conceivable way of dividing its output among two or more firms must lead to higher costs than if output were produced by a single firm. The only output produced by a water-pipe network is water supply. Since direct competition between firms in the provision of water mains networks within a given region would entail inefficient duplication, this part of the industry at least meets the economic definition of natural monopoly.

An important proviso to the above is that the property of subadditivity only precludes entry to the market from being economically feasible if there is a lack of available alternative technology. If an entrant could use a lower-cost technology to provide the entire market at a lower resource cost, its entry would be socially optimal. Likewise, the development of new technology could remove the natural monopoly characteristic of the asset. However, in the case of a water supply network, neither of these cases are likely in the foreseeable future.

Lack of direct competition between firms in the provision of mains networks is not in itself a barrier to competition. Firms could conceivably compete to supply water if they shared access to the pipe networks. However, the prospect of such competition in water supply is small. In order to gain access under the Australian regulatory regime a competitor would first need to have the network 'declared' under Part 111A of the Trade Practices Act (TPA). A successful declaration would require certain criteria to be met, such as that access to the service be provided 'without undue risk to human health and safety', and that access to the service 'would not be contrary to the public interest'.

Studies carried out by Ofwat when access was considered in the UK suggest it is technically feasible to introduce measures to protect health and safety standards. However, the cost of the measures may outweigh the benefits of access, and therefore would fail the 'public interest' test of the TPA. If the declaration application was successful, the next step would be for a competitor to negotiate an access price. Given the current excess capacity and low return on capital in the water supply industry, it is unlikely that a competitor would find it economic to enter the market, at least until pricing reforms are completed.

Water supply is essentially a local or regional monopoly industry because of the high cost of pumping long distances. In some cases, however, the industry has been disaggregated (eg Melbourne Water). This means that competition for large customers may be possible at the boundaries of designated supply areas.

Further, natural monopoly does not apply to the entire water industry. As shown in Chapter 1 there are already Australian examples of private provision of parts

of the industry through international competitive tender processes. In 1993, the Sydney Water Board (Sydney Water) contracted with two private companies to build, own and operate two water treatment plants. A third contract has since been signed. Moreover, the South Australian government has outsourced the management, operations and maintenance of Adelaide's water and wastewater treatment and networks. The contractor is also responsible for developing and managing the capital works program. Private sector involvement in the design, construction and operation of WSD facilities is likely to increase along with the trend towards build, operate and transfer (BOT) and build, own and operate (BOO) schemes.

Asymmetric information

A further market failure relating to the water supply industry is asymmetric information. Information asymmetry is where the amount of information about the characteristics of output varies between market participants. The producer and consumer, or the firm and regulator, may have different information about the quality of the service being traded. Solutions to the existence of information asymmetries may include those that are market determined (eg quality brands) and those that result from regulatory intervention (eg product standards or incentive regulation).

A classic example of information asymmetry relating to the water industry occurred in the UK in 1854 during an outbreak of cholera. In that case, when the information available to consumers failed to stop them drinking the tainted water, a medical doctor intervened to halt the spread of the disease by physically removing the handle from the local water pump. The doctor knew more about what caused cholera than did the people who drank the water. That was the reason for the intervention and has remained so ever since (Kay, 1993).

Even today, most consumers of water are unaware of the starting quality levels or how to interpret them in terms of their implications for health or amenity. Where consumers cannot easily detect a dimension of water quality, such as in the case of concentrations of metals, the firm might be tempted to reduce quality because a higher quality product costs more to produce. In this case of asymmetric information between the consumer and the firm about quality there is a clear case for regulation. Further, the firm has a comparative advantage over the regulator in the production of utility services, and in many instances the regulator does not know what the firm should do, and even if it does, cannot observe what the firm does.

Externalities

An externality exists when a producer or consumer imposes costs on others for which compensation is not required. In such circumstances the producer/consumer is not being charged the full costs of production/consumption. Because the full costs are not reflected in the price, the price is less than marginal (social) cost and production/consumption is higher than what is socially optimal. Where the marginal social benefit from intervention exceeds the marginal private benefit, such intervention can be justified on economic efficiency grounds.

Government responsibility for water (and sewerage) arose not so much from the essential facility angle, as for other utilities, but out of public health concerns. The provision of clean piped water generates externalities for the wider community which can justify public sector involvement. An externality would occur, for instance, if one's neighbours were able to choose to purchase tainted water from a cheap supplier and risk disease. Although others may choose to pay the higher price for better quality water they may still run the risk of contracting the disease from the neighbour. This provides a continuing rationale for the regulation of drinking water quality.

The largest externalities associated with water use relate to environmental degradation. Inappropriate use, water runoff from roads and farms, and poor catchment management cause soil and water salinity and algal blooms, and are sources of undesirable additives such as pesticides and other pollutants. Furthermore, poorly managed water recycling, treatment and waste water disposal can pollute primary water sources. Hence the importance of a total catchment and full-cycle management approach to water use.

Public good

Public goods are characterised by non-rivalry in consumption (what one person consumes can also be consumed by others), and non-excludability in ownership and use (no particular person has exclusive control). Excludability has both physical and legal elements, where the legal claim on control is referred to as a property right.

The water industry commands the special position of an essential service to most households, which is virtually universal outside some rural areas. In addition, it is difficult to differentiate quality for different customers — hence all customers must pay for improvements in quality and service levels.

2.4 A water industry in transition

The Australian urban water industry is undergoing substantial reform. Government policy such as the water reform agenda of the Council of Australian Governments (COAG) and National Competition Policy, as well as commercial pressures from the private sector, are driving the reform (see Appendix A). Corporatisation, outsourcing and pricing reforms are the dominant. Corporatisation has been matched by increased accountability through the setting of performance objectives, particularly rates of return on capital. Pricing reform includes the phasing out of property-value based charges and greater reliance on consumption based charges with a fixed charge component.

Structural reform

The creation of commercial water authorities requires clear separation of ownership, commercial operation and price regulation. All Australian States and Territories are separating the regulatory functions from their water businesses. In most jurisdictions environmental, health and water allocation regulators have been established or the responsibilities transferred to an appropriate body. Several Australian jurisdictions, for instance, have established economic regulators to oversight the performance of the industry, protect customer interests, and in some cases to regulate water prices.

Structural reform is providing water authorities with clear commercial goals of customer service, environmental compliance and sound business operation, free of other conflicting objectives. Health and environmental regulators are facing increasing pressure to be more accountable for the cost effectiveness of their decisions, and the consequent impact on water prices.

Pricing policy reform

The Council of Australian Governments (COAG) 1994 Agreement on Water Resource Policy provides for pricing reforms, including the adoption of consumption based pricing, full cost recovery, and removal of uncommercial cross-subsidies. Where cross-subsidies remain, they must be made transparent. Under the Competition Principles Agreement (CPA), all States and Territories have until 2001 to fully implement the reforms. Detail on these initiatives is at Appendix A.

While water authorities have generally made low and even negative returns on capital, they have operated with the intention of covering direct costs. This has

been easy to achieve since most water authorities have traditionally based a substantial proportion of their charges on the rated value of the property serviced (see King and Maddock, 1996). This has enabled the authorities to have a guaranteed revenue base, independent of demand. When meters are available, a fixed charge often covers a large part of the total bill. Past policies of setting fixed charges for water led to substantial cross-subsidies and overuse of water.

Operational reform

Commercialisation and corporatisation of Australian water utilities has led to management responsibilities being vested in commercial boards. Competition for input to the industry is being developed through major outsourcing and treatment plant BOT contracts and consideration of the practicalities of third party access to the industry's infrastructure. To achieve competitive neutrality with the private sector, water authorities are coming under tax equivalent regimes, and dividends are being paid to governments as the owners.

Specification of obligations to shareholders through 'Statements of Corporate Intent' and to customers through 'Customer Service Agreements' is developing, clarifying the accountability of the water corporations. Operating licences specifying customer service, environmental and commercial performance targets, and corresponding reward/penalty mechanisms, are being introduced.

2.5 Conclusion

Australia has a federal system of government with accountability for delivery of water services vested in the States and Territories. The States have adopted different approaches to reform and are at various stages of implementation (see chapter 5). The Australian water industry is therefore complex and it is difficult to make generalisations.

Nevertheless, themes in recent theoretical analysis of natural monopoly regulation applicable to the water industry can be drawn upon. They include:

- limited opportunities for individual companies to enhance market share by attracting customers from other companies (ie limited competition); and
- the implications of the asymmetry of information between the firm and the regulator.

The lack of effective competition in the water industry requires some form of price and quality regulation. However, the sunk nature of capital, and the fact

that asset lives are long, require a regulatory system that does not discourage investment. If investors face tougher regulation in the future they may not be able to earn adequate returns once the capital has been sunk — hence the importance of regulatory design.

Most fundamentally, there are theoretical reasons to reject private sector control over a resource to which everyone is dependent and has a basic human right. The natural monopoly characteristics of the industry suggest that heavy government involvement will be required regardless of whether it is in the public or private sector. In the UK for instance, extensive economic regulation is imposed by Ofwat and consumers have added representation through Customer Service Committees. Environmental and water quality controls are regulated by the National Rivers Authority, the Drinking Water Inspectorate and the Inspectorate of Pollution (discussed further in chapter 5).