Can Urban Water Markets Work? An Optimistic View

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Until recently there has been a common perception that urban water provision is a natural monopoly and, as such, must either be government-owned business, highly regulated, or both. Since the mid 1990s the urban water authorities have been run as a corporatised (state or local) government business, regulated by a state government regulator using traditional price caps and rate-of-return regulation.[2] However, it has become apparent over recent years that the urban water sector is not as efficient as it might be. Thus there has been a growing acceptance that there is some scope for the introduction of competitive urban water markets.

In their paper, Crase, O'Keefe and Dollery (2008) correctly observe that there are two catalysts for growing enthusiasm for the development of urban water markets: (i) success in rural water markets and (ii) success in other utility reforms. They focus on the former, and argue that the preconditions for success in the rural water markets are not present in the urban water sector. They thus present a somewhat pessimistic view of the prospects for urban water reform.

In contrast, this paper considers reform of the urban water sector from the point of view of 'utility reform'. This is worth considering, in conjunction with Crase, O'Keefe and Dollery's arguments, because all utilities are 'network' industries. For instance, the value chain in an urban water network is in many respects qualitatively similar to an electricity network (though clearly the technicalities of the engineering are very different). In particular, water (electricity) is supplied to consumers through a water network (grid) by a bulk water supplier (generator). Thus common issues arise, relating to the efficiency of their operation, across different types of utilities.

Because urban water is a network industry, an urban water market would look different from the existing rural water markets. In rural water markets, participants exchange their entitlements at a market-clearing price until they exhaust all gains to trade. Entitlements are diffuse and a participant's role as either a buyer or seller may change across seasons. In the urban water sector there are a relatively small number of sources (which are always suppliers) supplying a large number of consumers (who are always buyers) connected by

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[2] Water bills usually include a volumetric and fixed charge. Regulators set the fixed charge to ensure that a water authority makes a target rate of return.

a common network. Nonetheless, in both rural and urban water sectors the efficient allocation of water can only occur if participants face an efficient price. It is agued below that urban water allocation in Australian cities is particularly inefficient because the current regulatory framework has not set the efficient price for water. Introducing competitive urban water markets represents the best option for establishing an efficient price and thereby an efficient (least-cost) urban water sector.

This paper therefore presents an optimistic view of the prospects for urban water reform. It does so by first arguing that the current performance of the urban sector is quite poor. Using this analysis, a case is made for the introduction of urban water markets in Australian cities. Some options for the introduction of competition into the urban water sector are then canvassed. The final section considers potential impediments to the proposals to implement urban water markets discussed earlier in the paper.

State of Play: Politicisation

When one asks whether urban water markets will work, one must also ask 'work relative to what?' The implicit assumption is often that the current 'command and control' regime is working satisfactorily. This is not the case. There are no commercial or management decisions made by water authorities that are not politicised. This has resulted in significant distortions of the urban water market in Australia.

There are three sources of distortion in Australian urban water provision. First, price signals for urban water are almost completely absent (Sibly 2006a). This absence is in spite of the fact that any increase in the volumetric rate would only increase the bills of high users. This is because a water authority's charges are regulated so as to satisfy a revenue-raising requirement. Thus an increase in the volumetric rate should be accompanied by a corresponding reduction in the fixed charge. Equity issues could be addressed by providing rebates on the fixed charge for the disadvantaged.

The resultant price inflexibility results in rationing ('water restrictions') as a ubiquitous response to drought. Water restrictions cause a loss of allocative efficiency (see, for example, Sibly 2006b). The extent of this cost has only recently become apparent. Grafton and Ward (2008a) estimate the cost of water restrictions in Sydney, and find this is a little less than half the household water bill. This is consistent with Brennan *et al.*'s (2007) finding that households would pay between $374 and $870 per season to avoid water restrictions. Mansur and Olmstead (2007) estimate the efficiency loss from a two-day-per-week watering restriction used in 11 urban regions in the US and Canada. They found that this one restriction caused an efficiency loss equal to a quarter of the household's

water bill.[3] Thus, as setting a market-clearing price for water yields the same allocation as water trading, Crase, O'Keefe and Dollery's view that "there are relatively modest welfare gains from trade between households *per se*" does not appear to be correct.[4]

Increasing block tariffs (IBTs) are the second distortion created by the politicisation of the urban water market. Instead of implementing an efficient (flexible) volumetric rate in response to the current drought, state regulators have implemented IBTs. While the implementation of IBTs is often portrayed as a 'price response' to the drought, they are better described as a political response to the drought. IBTs are easy to justify politically, because their implementation is aimed at 'water hogs'. In Australia, the tiers of the IBTs are set so as to insulate the typical consumers from facing the cost of decreased availability of water. In fact, volumetric rates (at the margin) for most consumers have varied very little over the course of the drought. Hence, the implementation of IBTs give the illusion of a response to decreased availability without actually delivering the required increase in the volumetric rate to most consumers. Thus IBTs are a contributing source of the current allocative inefficiency in Australian urban water provision (Sibly 2006a). Recognition of the inefficiency of IBTs has caused the National Water Commission to call for their replacement with a flat 'scarcity price' of water (National Water Commission 2008).

The third distortion created under the current regime is the underinvestment, or inappropriate investment, in infrastructure. Urban water-infrastructure developments are highly controversial, being the subject of much ill-informed and ideological discussion. The resultant political decision-making is likely to be excessively risk averse. With such obstacles to planning infrastructure development, efficient projects are likely to be subject to costly delays or even replaced with less-efficient projects. There are many examples of this process. As a result of the Toowoomba referendum,[5] the relatively cheap recycling option was replaced by a relatively expensive option to build a 40km pipeline to pump water up from Wivenhoe Dam. The cost of this relatively expensive option will presumably be carried by the Queensland taxpayer rather than solely by those who voted for it. Similarly, following years of indecision on how best to augment the Sydney water supply, a decision to build a desalination plant was made in 2007. Grafton and Ward (2008b) have argued that the desalination plant under construction for Sydney could have been delayed for many years if flexible pricing had been used (an option which is apparently never considered when

[3] The efficiency loss is measured relative to the case in which price is used to curb demand by an equivalent amount.

[4] To realise these gains the institution framework must be one in which there are relatively low transaction costs. See the proposals below.

[5] In July 2006, a 62 per cent 'No' vote was recorded in the City of Toowoomba's referendum on recycling 'waste water' (sewage) as drinking water.

making such decisions). They estimate the expected cost of these inefficient policies to be more than $1 billion. Given these and other similar events, it is difficult to believe that the current planning regimes yield an optimal investment in urban water infrastructure.

Why introduce urban water markets?

The ubiquitous use of restrictions, the introduction of IBTs and poor investment in infrastructure reflect significant shortcomings in the current regulatory and planning framework. There is clearly scope for reforms that would improve the performance of this industry. Central to any such reform of the water industry must be an implementation of an efficient volumetric rate for water.

In order to achieve an efficient (or least-cost) provision of urban water it is necessary for consumers to face an efficient volumetric rate. Allocative efficiency can only be guaranteed by having an efficient volumetric rate. This rate clears the market in each period and thus there is no need for costly water restrictions. An efficient volumetric rate must reflect not only the current availability but also the expected availability of water (Sibly 2006a). Australia's erratic rainfall patterns mean that large storages are needed if cities are to be provided with water from surface water. The efficient volumetric rate generates an efficient inter-temporal allocation of water, and thus the optimal storage at each time. An efficient volumetric rate is also needed to assess the efficient type and timing of infrastructure investment.

Australian water markets are not likely to be static. Future climate variability and unexpected demographic changes will require frequent adjustments to the operations of urban water markets. As well as being subject to the distortions described above, the current arrangements do not exhibit sufficient flexibility to adapt efficiently to changing circumstances. The natural inclination of economists would be to introduce competitive markets for urban water. Competitive markets are (unlike the current arrangements) self-correcting mechanisms. They ensure that all market participants face to true costs and benefits of their actions, and thus provide market participants with appropriate incentives to develop innovations. A competitive market would be distanced from the political process, and therefore not subject to the distortions described above. However, a competitive market requires a substantial number of suppliers. The following section considers proposals about how this could be achieved.

It might be wondered whether the current arrangement of a regulated urban water monopoly overseen by a regulator could be modified to overcome the problems identified above. For instance, perhaps it is possible to enhance the independence of state-based regulators, and ensure they are distanced from political pressures. The independence from the political process of the Reserve Bank's interest-rate decisions could be a model for this type of institution. Such

a regulator would be charged with setting the optimal scarcity price for the monopoly supplier. No doubt this reform would result in an improved performance of urban water authorities.

However, there are limitations to the ability of regulation to enhance efficiency, even in the absence of political pressures on decision-making. Markets have the ability to aggregate decentralised, diffuse information in a way that regulators cannot. Regulated industries, particularly those facing price caps and rate-of-return regulation, have a poor incentive to innovate because they often cannot capture the full returns to their innovation. As noted above, the ability to respond flexibly to change is likely to be of increasing importance in providing urban water to Australian cities. Regulation is thus an inferior option to competition, provided competition is feasible. The question therefore becomes whether it is realistic to introduce a competitive market for water in Australia cities and, if so, how this is best done.

Implementing urban water markets

In order to discuss whether urban water markets can work, it is necessary to consider the institutional framework in which the proposed markets will operate. Worldwide, there have to date only been tentative reforms directed at introducing competition. While these reforms will increase flexibility and efficiency, they only address partially the above problems.

In Australia, Part IIIA of the *Trade Practices Act* allows for third-party access to an urban water networks, provided a 'declaration' of that service is made. So far only one such declaration has been sought — by Services Sydney in 2004 trying to gain access to the sewerage infrastructure of Sydney Water. This access was resisted by both Sydney Water and the New South Wales premier. This ultimately led to the development of the *NSW Water Industry Competition Act* (2006), which regulates third-party access to urban water infrastructure in the Sydney and Hunter regions. More recently, the ACCC has made a determination on the methodology used to set access prices to water infrastructure (for a detailed discussion of these issues, see Gray and Gardner 2008). To date, no third-party access to urban water networks has occurred in Australia.

In the UK the *Water Act* (2003) allowed the implementation of the current 'Water Supply Licensing' regime. This regime (like that in Australia) has not, to date, produced significant competition in UK water supplies. The UK water regulator, Ofwat, identifies the current cost of access, including current access, as the reason for this (Ofwat 2007). Ofwat has recommended changes to the way in which the urban water industry is structured so as to increase the level of competition. In particular, it argues for a separation of contestable from non-contestable markets (sewerage and retail sectors are specifically identified)

and the development of new market models for upstream competition (Ofwat 2008: 8).

Sibly and Tooth (forthcoming) and Young, McColl and Fisher (2006) propose methods by which the role of urban water markets could be expanded in Australia. These proposals involve, to some extent, a decoupling of water and network ownership (as do all that suggest the implementation of competition). Young, McColl and Fisher (2006) propose a model in which the market is supplied by a monopoly water authority, but one which allows trading between its customers. To generate urban water trading, they suggest allocating each household a tradable allowance of 200 kilolitres per annum. Households would need to purchase additional water to consume beyond that limit and could sell any unused allocation. Water use beyond 200 kl/yr could be regulated by (i) a scarcity price or (ii) a cap-and-trade system. Young, McColl and Fisher propose that the scarcity price would be related to dam levels. If such a price were regulated, it need not necessarily be set at the market clearing level. In this event, water restrictions would remain necessary. In the cap-and-trade system a limit on total water consumption above 200 kl/year/household would be set, and households could bid for a share of the available water. Such a process would eliminate excess demand for water, and thus could eliminate water restrictions. However, to ensure the efficient inter-temporal allocation of water (storage) the cap must be set appropriately in each period.

Sibly and Tooth (forthcoming) propose a more comprehensive change in the way urban water markets function, with an aim to introduce competition at every point in the value chain. In particular, their proposal removes the presence of the monopoly water supplier. It suggests that private parties, so-called virtual water suppliers, be given the right to own the water stock held in dams. New inflows into the storages are proposed to be periodically auctioned off to these private water owners. Virtual suppliers compete with one another in the provision of bulk water. The implementation of this proposal, when combined with effective third-party access to urban water networks, would lead to a competitive bulk water market. Retailers would coordinate the supply of bulk water in each period with consumer demand. Entry into the retail market would have relatively low costs. Thus the retail market would also be competitive. In this way the volumetric price would be efficient at every point in the value chain, giving all market participants appropriate price signals. Note that under these arrangements consumers need only negotiate supply with retailers, and do not require the hydrological expertise of the participants in rural water markets.

Introducing competition in urban water markets, as proposed by Ofwat, Young, McColl and Fisher, or Sibly and Tooth has not been attempted before. It may be advisable to introduce these reforms gradually, so that unforeseen

difficulties can be identified early before they cause too much disruption. Indeed, Ofwat (2008) presents a timetable for the gradual introduction of competition into UK urban water markets. Similarly, a variant on the Sibly and Tooth approach would be to allow some limited private ownership of stored water in parallel with the existing allocation system. The role of the private market could be expanded gradually over time, until eventually all urban water was traded on an open market.

Discussion

This paper has argued that the implementation of urban markets would substantially improve the performance of the urban water sector. It is true that many of these reforms have not been attempted before. However, reform of this sector is more urgent in Australia than elsewhere because of forthcoming climate variation and demographic change. Australia's climate is likely to vary, whether this is due to anthropogenic climate change or just natural variations in weather patterns. Australia needs an urban water sector that can rapidly and efficiently adjust to such changes more than most countries. Similarly, demographic changes and industrial structural adjustment mean changes in water demand. The current regime has not proved capable of dealing with this. Opening up water networks to competition will provide incentives for all market participants to adjust efficiently to the myriad changes ahead. The alternative would appear to be lurching from water crisis to water crisis.

The greatest impediment to the implementation of competitive urban water markets is inappropriate or inadequate regulatory reform. If water markets are to be introduced effectively prospective participants must have unencumbered access to either water or infrastructure. There cannot be artificial obstacles (legal or bureaucratic) to entry that increase the cost of access. If this is not the case then incumbents (such as existing water utilities) will be given excessive market power, and this will limit the gains from introducing water markets.[6]

Any reform must also deal with past poor infrastructure decisions. If, for example, the desalination plant in Sydney indeed turned out to be a high-cost bulk water source, its market value would be much lower in a competitive urban market than its capital cost. In this environment, if the NSW government were either to sell it or contract out its operations it would make a considerable paper 'loss' on the transaction. There is a danger the government might try to prop it up and such actions might have the effect of interfering with the efficient operation of the urban market.

[6] For instance, the costs and delays that Services Sydney faced in gaining access to Sydney Water's infrastructure represent a significant barrier to entry. If these costs and delays remain, they will deter many prospective entrants, and thereby decrease the competitiveness of any future market.

Similarly, Crase, O'Keefe and Dollery are correct in arguing that in any reform to create an urban water market the government must resolve the issue of interconnectivity of the rural and urban water sectors. Rural water is almost certainly the cheapest available source of new water for urban areas. Many prospective bulk water projects could not compete with the relatively inexpensive water from rural sources. However, the issue here is a failure of government to provide the appropriate regulatory framework to establish interconnectivity between markets, not that urban water markets cannot work.

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