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Bringing Competition to Urban Water Supply

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Abstract

This paper proposes a market-based reform that would introduce competition into the provision of urban water. This proposal calls for a decoupling of infrastructure control and ownership of water whereby the property rights to water would be transferred to private hands. The proposal involves periodically allocation (e.g. by auction) of existing water stock held in urban catchments to virtual suppliers who then compete in providing bulk water. This change when coupled with effective third party access and retail competition would lead to a competitive market for the provision of urban water. The approach aims to address concerns over inefficient pricing and infrastructure provision under the current arrangement.

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1 Introduction

There are growing concerns about the state of water supplies in all mainland Australian capital cities. The long term growth in water use is such that, without significant rainfall or capacity augmentation, some cities will run out of water in a matter of a few years. A common response by local authorities has been to impose water restrictions. Although water restrictions have appeared to reduce water use, demand continues to outstrip long term supply. Furthermore restrictions can impose significant costs on society.[1] In parallel, governments are evaluating substantial investments in alternative water provision such as recycled water plants and desalination plants. These investments are themselves the subject of significant political controversy.

Not surprisingly, many economists have argued for using price measures to ration available water rather than rely on water restrictions.[2] As most urban water use in major urban areas is metered, the introduction of flexibility in setting the volumetric rate is simply implemented. An efficiently set price would provide market incentives for investment in new infrastructure.

There are, however, two major challenges to the use of market based policies under the current institutional arrangements. Firstly, the regulators face complexity in determining an efficient price. The efficient price needs to balance current demand for water against future demand, and also account for changes in future supply, such as variations in dam inflows caused by the erratic Australian rainfall patterns and the introduction of alternative sources of supply such as recycled water plants and desalination plants.

Secondly, there are concerns that both the water authorities and regulators do not have sufficient independence from governments and that governments are unwilling to price efficiently. The current institutional arrangements encourage the politicisation of water provision, particularly the provision of new supply infrastructure. Infrastructure projects may be chosen by government for their political appeal rather than because they are the least cost method of delivering a particular quantity of water. The controversial nature of investment decisions has led to considerable delays, and there is little reason for confidence that those investments undertaken represent the least cost method of augmenting network capacity.

It is thus clear that the current arrangements have not delivered efficient urban water provision. More concerning, there are no reasons to suppose this institutionalised unresponsiveness of pricing and capacity decisions will change into the future. Even if significant rainfall alleviates the current situation, under the current arrangements the country will face the same set of circumstances when the next drought occurs.

This paper proposes a market based institutional solution to these challenges. This proposal calls for a decoupling of control of infrastructure and ownership of water. In particular, it is suggested that management of catchments be separated from the ownership of water stock held by the catchment (e.g. a dam). In effect, the various owners of water in the catchments would act as competing suppliers of water. In addition it is argued that water networks be required to allow “third party” access to the water networks, i.e. to allow private water producers to supply water through the operation of (for example) recycling or desalination

[1] These costs include significant deadweight losses. Grafton and Ward (2007) provide recent estimates for the cost of water restrictions in Sydney. These welfare costs are found to be considerable. Mansur and Olmstead (2006) for an estimate of deadweight loss associated with water restrictions in urban areas in North America, and also find these are considerable.

[2] For example, see Sibly (2006a, 2006b) and Grafton and Kompas (2007).

plants.[3] This arrangement would encourage an efficient and timely expansion of water supply and give rise to both an efficient allocation of water across different uses and time.

This paper is divided into 3 further sections. The following section provides a background that describes the typical Australian urban water supply system and current regulatory and pricing arrangements. Section 3 discusses some details concerning the introduction of virtual water suppliers. Section 4 discusses regulation, welfare and the administration of the water markets. Section 5 concludes the paper.

2 Background

The typical Australian urban water supply system is depicted in Figure 1 below. The primary supply of urban water typically involves the collection of water from surface catchments where it is then stored in dams or reservoirs. Water may also be abstracted from ground water basins or potentially extracted from sea water using a desalination plant. Water is pumped from the primary supply to water treatment plants (WTPs) where it is treated and then delivered to the end users directly or via bulk storage facilities. Waste water from the end users is captured and treated before being discharged or recycled for further use.

In Australia there is a small amount of recycling of water. A number of jurisdictions plan the introduction of desalination plants. Water from primary supplies may also be diverted to non-urban water uses such as irrigation or for environmental release purposes.

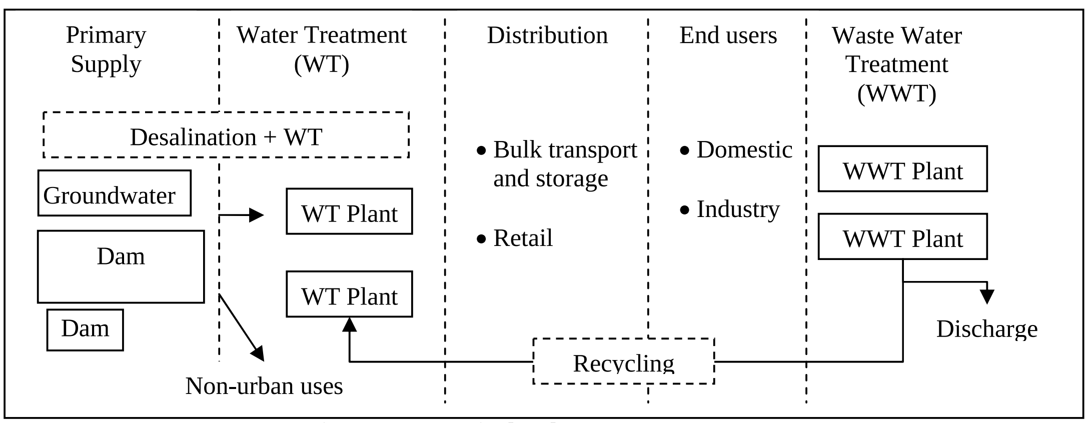

Figure 1: A Typical Urban Water System

Adapted from NWI Steering Group on Water Charges (2007)

Urban water suppliers are often described as natural monopolies; they typically involve large fixed costs, small variable costs and fixed capacity in the short term. There are significant fixed costs in building infrastructure (e.g. dams, treatment plants and pipe networks) and ongoing maintenance and administration. The variable costs primarily include some costs associated with the cost of pumping, treating water and the opportunity cost of the alternative uses including irrigation and environmental purposes. There are capacity constraints in both the treatment and distribution and in the bulk supply. In terms of bulk water supply, which is the focus of this paper, the capacity constraint relates to capacity of the reservoirs and the associated available stock of water.

[3] Although national competition policy requires government business enterprises to allow third party access, this has not been effectively pursued in practice.

The water supply in Australia's major urban areas is provided by state or local government owned water authorities. The management of the water catchments and the network is conducted by a single authority (for example in Western Australia) or by separate authorities (for example in Sydney).

In Australia, the pricing and regulation of water authorities is conducted by state regulatory agencies.[4] Since the implementation of national competition policy the main objective of regulation has been to achieve cost recovery. Most regulators aim to set the volumetric charge for water equal to long run marginal cost. This pricing methodology has the advantage of yielding price stability. However this methodology ignores the scarcity value of water which occurs during a drought, and is also intended to be used in conjunction with efficient infrastructure augmentations. The result of using the methodology in the current environment is that volumetric rate for water is likely to be dramatically under-priced (see Sibly 2006a and 2006b).

3 The proposed reforms of the urban water market

The concerns raised over the current management of urban water supplies would largely not arise if there were a competitive market for the supply of urban water. If such a market existed the market price of water would quickly adjust to a level that adequately reflected available knowledge on long term supply and demand and the need for price regulation would be limited to other functions of the water supply system. Furthermore, competition would encourage private investment in new infrastructure for water supply.

There have been a number of other proposals to develop markets for water in Australia (see ACIL Tasman (2003) for a summary). Many of these existing and prospective approaches have focussed on the rural and industrial markets and for trading between urban and non-urban uses. We are unaware of any proposal that create competitive markets for urban water usage for all end users.

3.1 Overview of the proposal

The aim of the reforms suggested in this paper is to introduce competition into bulk water supply, retailing and potentially other aspects of the value chain through allocating rights to portions of water stock in water catchments to new owners. This would, in effect, create virtual suppliers who compete with each other, and operators of alternative sources (such as desalination plants), in the provision of bulk water. Retailers act as middle men between the bulk water suppliers and the end users. A competitive market for retail water is then formed by allowing competing retailers to sell water services to end users.

A summary of the proposal showing water flows and potential payments flows is displayed in Figure 2 below. This figure shows that, as today, water moves from being under the management of a catchment operator (e.g. while it in a dam) to that of a *network operator* who manages the water treatment (including bulk transport to local reservoirs) and distribution (local storage and retail reticulation) through to *end users*. As is today the functions of the catchment operator and network operator may be combined into a single entity or further disaggregated. *Alternative bulk suppliers* may exist to provide other (i.e. non-catchment) sources of supply such as a desalination or a recycling plant.

[4] For example, in Sydney the NSW Independent Pricing and Regulatory Tribunal regulates the bulk water price is sold by the Sydney Catchment Authority and the price of Sydney Water services are both regulated by l

The figure shows two new market participants, *virtual suppliers* of water, and *retailers*.[5] Note that neither of these parties have any physical involvement in delivering water to the end-users. Their role is financial: it is limited to conducting the trade in water.

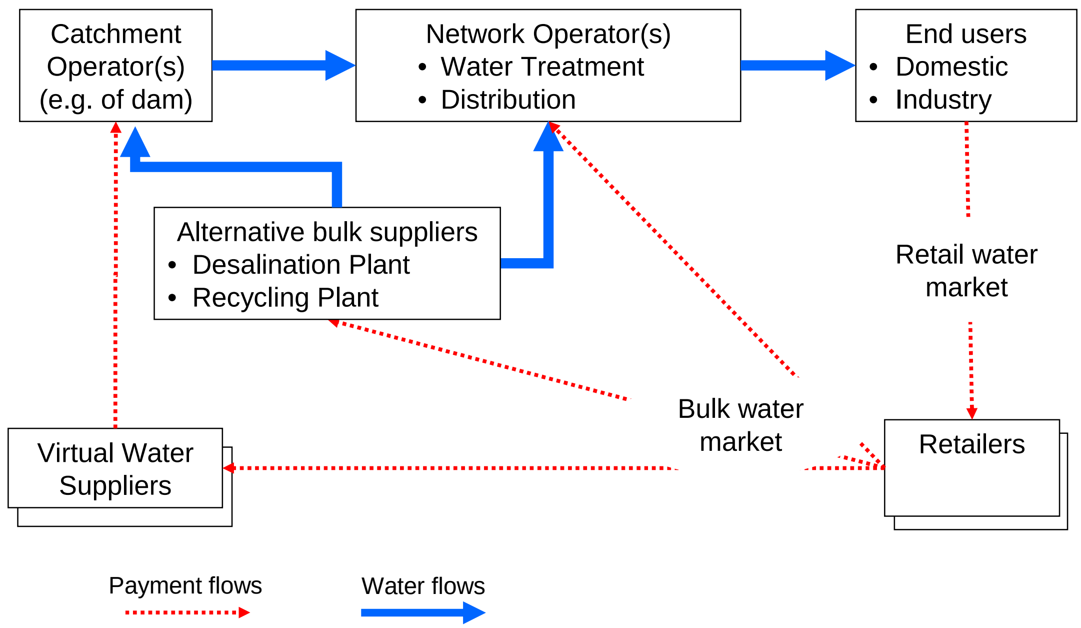

Figure 2: Potential model of water and payment flows

Under the proposed model, the catchment operator is required to sell rights to the water stock in its catchment via a competitive process to the virtual suppliers. The rights enable a supplier to hold the water, trade with other suppliers or to sell into the market.

The arrangement described removes market power in the bulk supply and retailing sections of the value chain. The catchment operator loses its market power via the compulsory sale of water stock. Due to low barriers of entry for suppliers, the market for selling the water into the system will be very competitive. Similarly there will be low barriers of entry for retailers.

Competition among buyers and sellers in each of the bulk water and retail water markets establishes a market price for bulk and retail water supply. In determining current supply decisions, virtual water suppliers would compare the benefit of supplying water now (the current volumetric rate) with the benefit of leaving the water in the storages (the future volumetric rate). If, for example, a drought is predicted, suppliers would expect the future volumetric rate to rise, and would tend to leave water in the storages. This would drive up the current volumetric rate. In this fashion, competition for bulk water ensures that the price supplied from each dam will come to reflect the opportunity cost of keeping the water to meet future demand.

3.2 Similarities and comparisons with other schemes

The approach has some similarities with other water management schemes such as capacity share schemes for water markets and tradeable water rights and similar virtual schemes established for electricity markets.

[5] The retail function exists in existing water markets however, typically there is a single retailer e.g. Sydney Water.

SunWater, a Queensland government corporation that owns and operates a number of dams, runs a scheme whereby end users can purchase entitlements to a share in the capacity of a dam and have an associated water account.[6] Although end-users can trade entitlements and water stock, the scheme is limited in that only end-users can hold entitlements and trading of water stock can only occur between entitlement holders. As a result there is no retail market. The schemes have been successful and provide a useful example that allocation of water entitlements within a dam can be effectively put in place.[7]

The general approach is similar to the concept of Virtual Power Plants (VPPs) that are used in the electricity industry. VPPs have been implemented by European regulators as a means of mitigating market power.[8] Effectively these involve requiring the incumbent power plant to sell part of its future production capacity. The sale of the capacity is virtual as no operational control changes hands. The VPPs then compete in the provision of electricity with the physical owner of the power plant. Competition from the VPPs mitigates the physical power plant's market power and encourages more allocative efficient pricing.

A virtual arrangement is possible because, like electricity, water is a commodity whereby each unit is indistinguishable from other units. Furthermore, there are some characteristics of the water industry that make it more conducive than electricity to the use of virtual suppliers to manage market power and introduce competition.

Unlike electricity, water is very durable in that it has very low marginal storage costs. The high storage costs of electricity mean that electricity is generated to meet current demand.[9] In contrast water is collected significantly in advance of its consumption. This characteristic means that whereas VPPs need to be allocated a level of future production capacity. In the case of water, virtual suppliers can be allocated a portion of existing water stock, instead of, or in addition to, future catchment inflow (analogous to production).

Another common feature in Australia is that there are water catchments with a large capacity that can meet the demands of existing users for long periods. This feature means that rights can be allocated such that under normal conditions no single supplier will have market power.

The durability and large stocks of water also mean that, unlike electricity markets, water pricing can established for long intervals. In Australia, offers of supply to the National Electricity Market are made every 5 minutes so as to match generating capacity with fluctuating demand throughout the day. Due to the high storage costs and fluctuating demand the wholesale price of electricity fluctuates significantly.[10] Even though water demand may fluctuate, due its low storage costs the market price for water is unlikely to fluctuate significantly unless water stocks are very low.

[6] The scheme described by SunWater as 'continuous sharing'. Entitlement holders can have rights to current stock of water and future inflows of water. See www.sunwater.com.au for more information.

[7] A number of commentators including Allen Consulting (2007) ACIL Tasman (2003) have also argued for increased use of water trading.

[8] For a discussion of Virtual Power Plants and their use in Europe see Willems (2005).

[9] Electricity is commonly described as a commodity which 'cannot be stored for future use' NEMCO (2005), pg. 4 but as described by Hunwick (2005) there are a variety of alternative, albeit expensive storage options.

[10] The National Electricity Market Management Company, NEMCO reports Regional Reference Price (RRP) for NSW and other regions. According to NEMCO price tables the from1 -23 March 2007 the daily average RRP for NSW varied from $27/MWh to $128/MWh with a peak as a high as $178/MWh.

3.3 The role of market participants

This section describes the role, design considerations and implications for each of the industry participants contained in Figure 2 above.

Catchment operators

Under the proposed approach, the role of the catchment operator would be similar to that of today. It incorporates maintaining the catchment, managing the water release and activities to prevent loss of water and/or augment the water catchment. The key change for a catchment operator is that it is required to auction off rights to its water.[11]

The catchment operator would incur the costs of the operations and management of the catchment. These could be covered by the revenue generated from the sale of the water rights and charges (discussed further below) imposed on virtual water suppliers for storage.

Under the proposed approach, it is assumed that the catchment and its management remain in government hands. Potentially, however, the management of the catchment could be sold as a going concern or outsourced as a concession. There are potential efficiency gains from a competitive tendering for the operation of this infrastructure, though the realisation of these gains will depend on the contract conditions imposed on the eventual operators. Consideration of these possibilities is outside the scope of this paper.[12]

Virtual suppliers

The role of virtual suppliers of water is to simply buy and trade limited water rights. Rights to water stock simply allow holders to sell water for release, trade to another party or hold. There appears no reason to limit these rights. The rights should be divisible (within practical limits), transferable and permanent.

In the most basic design a virtual supplier simply has a water account and a financial account. These would be updated as a result of trades and costs of water storage. A potential extension is to also allocate rights for future allocations of flows into the catchment. The costs of water storage and the issue of allocating rights for flows into the catchment are discussed further in the section on design considerations below.

Virtual suppliers can contract with retailers for the supply of their water at a given time and price. There is no further requirement of any activity for a virtual supplier. The execution of the release of the bulk water and administration of the supplier accounts is conducted by the catchment operator. The quantity sold by each supplier is simply updated against each supplier's account. Water not sold by a supplier is retained in the bulk water supply and recorded against the supplier's water account. Each supplier's water and financial account is then updated to reflect the quantities sold and retained and the storage and administration costs.

There would be very easy entry and exit. To enter, a new entrant simply needs to participate in an auction of new water stock. Exit is simply a case of selling the existing water rights in a

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[11] The catchment operator may also operate purification plants, in which case purified water is delivered to the bulk water. This is currently the case in Tasmania. Alternatively the catchment operator may deliver untreated water to the network operator, in which case the network operator is required to treat the water. This is the case in Sydney. The proposed reforms can be implemented equally well in either case.

[12] See Guasch (2004) and Lobina and Hall (2003) for a discussion of private management of water infrastructure.

secondary market. There is no apparent reason to limit entry other than to impose some maximum ownership restriction to prevent a supplier having market power.

Retailers

Retailers act as middle men between end users and the water suppliers. An important aspect of this role is to provide billing services for customer. Retailers are likely to offer a range of value added services including pricing plans which help to manage the water price risk for their customers. For example, retailers could provide a plan with fixed or variable pricing plans. They may also compete in providing different payment options.

Retailers who provide pricing plans that buffer their customers from pricing fluctuations will also want to take an active interest in price fluctuations of bulk water. For this reason retailers may also invest in bulk water supply directly or support financing of alternative sources.

The retail market should be very competitive as there will be very easy entry and exit. The main requirements to compete are an effective billing system and a customer base. For example, we would expect other utilities to be well placed to operate as retailers. To prevent a potential abuse of power it may be preferable to exclude the distribution network owner from also being a retailer. From a consumer's viewpoint, all that may change is the billing arrangements.

Network operators

The core elements of this proposal do not involve any direct changes to the functions of the network operator (i.e. water treatment and distribution functions) other than separation of these functions from the trading of water.

There are some potential improvements to these functions that come as a result of the core proposal and other opportunities for reform that may be considered. The core proposal may have a number of indirect benefits over the management of the water treatment and distribution functions. Firstly, there would be a better understanding of the opportunity cost of water and thus of the cost-benefit of infrastructure improvements. Secondly, retailers would have a stake in the quality and cost of services supplied and might help in providing better oversight of these functions. Finally, private sector involvement in alternative sources of supply, such as a desalination plant, may incorporate water treatment and bulk distribution and thus provide some competition to the existing organisations performing these functions.

Management of the water treatment and/or reticulation network could also be undertaken either by a government business enterprise or be delegated to a private operator.[13] In either case the variable costs of reticulation and relevant purification costs incurred by the network operator need to be imposed onto the end user or retailer and incorporated into the volumetric retail price. The remaining fixed costs, primarily infrastructure spending (such as capacity augmentation) and operations and maintenance cannot be directly attributable to units of water. As is currently done, these costs can be directed to households (either directly or via retailers) as a fixed charge. Although, price regulation is still likely (particularly if government ownership of the network is retained) to achieve economic efficiency, there may efficiency gains from the tendering for private operation of the network. Consideration of such contracts is outside the scope of this paper.

[13] Concessions have been used internationally in water services with mixed success. Lobina and Hall (2003) and Guasch (2004) discuss some of the experiences.

Alternative bulk suppliers

This proposal will have significant implications for private investment in alternative bulk supply. To date investment in alternative urban bulk water supply is at the discretion of government. Private investment has been effectively blocked by existing authorities, and in any event has been held back by a pricing system that does not provide appropriate incentives. The proposed reforms would lead to a clear efficient pricing process and thus remove the need for government funding of supplementary urban bulk water supply infrastructure.

There is considerable risk associated with a private investment in alternative bulk supply largely due to the significant uncertainty as to the future supply of water from the existing catchment. To manage the risk of a significant fall in the price of bulk water, we would expect alternative suppliers to contract with retailers and even potentially directly with large customers. A number of risk sharing arrangements are possible (e.g. fixed price contracts, options) and there appears no reason to put any limit on these.[14]

3.4 Additional design considerations

While relatively simple in operation, there are a number of design considerations. These include the allocation of future catchment flows, storage costs, length of trading period, how much water should be allocated and social objectives.

Allocation of future catchment flows

Potentially in addition to water stock, virtual suppliers could be allocated future catchment flows.[15] This approach is attractive in it potentially removes the need for periodic auctioning of additional water stock. If rights to future catchment flows were allocated then it in the interests of efficiency it would be desirable that these be permanent, fully transferable and divisible.

There are however a number of reasons why allocation of future flows is not preferable. Firstly, the benefits are likely to be small as the transaction costs associated with repeat auctions of water stock should be very low and, as discussed below, the repeat auctions may only be required very infrequently. The administration of the auction would be largely automated and so costs should be extremely low once a process and a system has been established. The costs to participants will also be small due to the use of an automated system and because the cost of valuing water is an activity that would be conducted regardless.

Secondly, there may be significant costs associated with allocation of flows. There are four main reasons. First, it could reduce the incentive for efficient management of the catchment. If catchment operators were to receive the proceeds of water stock auctions, they will have incentive to optimise the catchment capacity and flows – if future flows are sold this incentive is removed. Secondly, any change to the catchment capacity or flows may necessitate complex adjustments to existing rights associated with flows.[16] Third, an auction of future flows may result in an inefficient transfer of risk from the public to the private sector. The value of future flows is subject to great uncertainty. As private sector firms are not totally risk

[14] Some households may be reluctant to sign long term contracts with retailers (which in turn may limit the extent retailers will wish to share risk with investors in alternative supply). This should not be a significant issue – many households currently have multi-year contracts with electricity retailers. Furthermore there are a many large industrial users who could be interested longer term contracts to secure an affordable supply of water.

[15] This approach is effectively what is implemented by SunWater with its “continuous sharing scheme”

[16] Such adjustments are currently made on occasion by SunWater.

neutral,[17] such a transfer may be inefficient. The cost of the uncertainty may, however, be mitigated through repeated auctions of water stock. Finally, allocating rights to future flows reduces the ease at with which new suppliers can enter the market and thus increases the risk that suppliers may collude.

Storage costs

To encourage efficient choice between holding and selling water stock, virtual suppliers should be charged the marginal storage cost associated with storing their water stock.[18] There are three basic types of storage costs:

- Direct storage costs
- Loss from evaporation
- Loss from risk of overflow/release

Direct storage costs are those cost relating to the maintenance and operation of the catchment. Although for a dam the maintenance and operation costs are significant, it is expected that these costs are primarily fixed and do not change with the level of water of in a dam. Thus the marginal storage costs (i.e. with respect to an additional unit of water) are likely to negligible.

Evaporation from a dam can be a significant cost, removing up 10% of a water stock per year.[19] It is routinely estimated at major dams.[20] The rate of evaporation depends on a number of factors including the weather[21] and the surface area of the water supply. The decision of a virtual supplier to retain an additional unit of water will only have a marginal impact on the surface area of the water supply because the physical nature of dams is such that the surface area of the dam increases with the volume held. Thus some, albeit very small, evaporation charge should be levied against the virtual suppliers for evaporation.

The final storage cost considered is the loss from overflow/release. If for example, dam levels rise significantly the dam operator may be required to release water for overflow. Although the value of the water lost will be low, a question arises as to how overflows impact on supplier accounts. An optimal arrangement will be such that the catchment operator has incentive to optimise the catchment capacity and suppliers have incentive to optimise the risk of loss of overflow. A simple arrangement that would meet such optimal arrangements is to make the catchment operator a supplier of water when the there is some risk of overflow and for the catchment operator to bear any loss associated with the overflow.

How much water stock should be sold and how often?

There appears no reason to limit the amount of water stock sold. Typically there is a need for water for environmental uses but there is no reason why this cannot be purchased in competition with other water suppliers.[22]

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[17] Doherty (2005) notes that risk is costly to firms due to a number of reasons of tax non-linearities, managerial compensation, direct costs of financial distress and agency conflicts between shareholders and creditors.

[18] The remaining costs should be the responsibility of the catchment operator who then has incentive to minimise these. The catchment operator's costs should be paid out of revenues from auctioning of water stock. These revenues should be sufficient if there is value in the operation of the catchment.

[19] A rough estimation WA dam estimated evaporation rate at around 17gigalitres for a 200gigalitre dams so an evaporation rate of <10% per year

[20] For example see http://www.toowoomba.qld.gov.au/eBiz/artis/CressDam.php

[21] Evaporation rates increase with higher wind speeds, higher temperatures and lower humidity.

[22] See the Productivity Commission (2003) for a discussion on approaches to allocating water for environmental uses. They report that in California and Colorado, environmental agencies purchase water rights for environmental purposes.

A minimum amount needs to be allocated to ensure that no single supplier has market power. Under normal conditions this should be easily achieved by ensuring that for any trading period, the ownership of stock is such that no single supplier is required to meet expected demand for the trading period. If this were not the case, the largest supplier may hold back on release so as to increase the market price.

Given this one constraint, the allocation of water need not be done frequently. While there is no risk of a supplier having market power there is no benefit to allocating additional water stock and so to reduce transaction costs it may remain in the catchment unallocated for some time. Some simple rules could be established to the timing of water stock auctions.

An associated issue is around the transparency of the available water stock. Ultimately the value of a virtual supplier's stock is determined by the total volume of available supply. If there were a limitless supply, the marginal value of water stock effectively becomes zero.

There are challenges in determining the total volume of available supply. Firstly, there is some uncertainty as to what will be available and at what price. For example, there is an uncertain amount of water residing at the bottom of dams that may only be accessible by installing pumping or alternative access points.[23] Secondly, the catchment operator who receives revenues from the sale of water stock has incentive to make it appear initially that stocks are limited but then to 'discover' additional stocks when other stocks are close to exhaustion.

Length and frequency of the trading period

There is a degree of flexibility as to the length and frequency of the trading period used in pricing. A balance needs to be achieved between the administrative costs of a frequent price setting process and the lack of efficiency stemming from prices which are fixed for too long a period. Too long a period may also result in the largest supplier being required to meet demand and thus having some market power.

4 Regulation and market design issues

4.1 Regulation of participants

Provided there is sufficient competition in the bulk water and retail markets there should be no need for any special regulatory oversight of the setting of the volumetric rate. Competition should be sufficient to ensure that price is set efficiently. As with any market participants would be subject to the provisions of the Trade Practices Act.

Virtual suppliers will compete in a very competitive market so long allocation rules are, as discussed above, used to ensure that no supplier has market power. This can be simply achieved by imposing limits on the share of water that one supplier can acquire. Such a requirement may not be necessary in practice, as competition is likely to undermine any attempts to monopolise the water stocks.

Another concern may be that in periods of drought a privately owned and operated alternative bulk water supplier, such as a large desalination plant, may have excessive market power. It should be noted that the presence of virtual water suppliers undermines this possibility. If a

[23] For example, the Sydney Catchment Authority (SCA) is currently modifying existing and installing supplementary infrastructure to access 'deep water storage' at its Warragamba and Avon/Nepean Dams.

drought appears imminent, virtual suppliers will hold back their water stocks in anticipation of higher future prices. This has the effect of increasing competition in the drought period. Another regulatory solution to the excessive market power of the alternative supplier would be to require the supplier to, in advance, auction off part of their output to other suppliers. This would ensure that the alternative supplier faced competition.[24] Regardless of regulation, an alternative supplier may wish to enter long term contracts to manage their own risk.

Under the proposed reforms, the catchment and network operators may continue to have some market power in setting fees for storage, treatment pumping and network access. As such there is likely to be a role for regulatory oversight of the setting of these fees and charges.

A common concern about third party access to the water network is the maintenance of quality standards. It would appear appropriate that physical water suppliers be responsible for demonstrating to the network operator, the quality of the water they are introducing to the network. However given the importance of maintaining quality standards, there is a case for regulatory oversight of quality standards and the processes used to monitor them.

In public debate there is often concern expressed about the environmental impact of urban water supply decisions. Clearly there is a role for government in managing environmental outcomes. Such issues are complex and outside the scope of this paper. However there is no reason to view the development of urban water infrastructure any differently to that of other industries.

4.2 Meeting social welfare objectives

There is likely to be concern about the social impact of the proposed reforms. The volumetric rate is likely to be relatively high in times of drought, and in any case will tend to fluctuate over time.[25] However these concerns can be simply and efficiently addressed following the proposed reforms in ways which provide greater benefits to the socially disadvantaged households, and at a lower cost to society, than the policies that are currently in place.

The current inefficiently low volumetric rate in effect provides a subsidy to all households irrespective of their level of social advantage or disadvantage. It is hence costly because it is so poorly targeted. Social welfare objectives would be more effectively and transparently achieved by providing fixed subsidies on the water bill to those households that are identified as disadvantaged (Sibly 2006a). Such a subsidy would be more equitable and give the disadvantaged an opportunity to benefit more at no cost to society.

4.3 Market operator

The above discussion has abstracted from the institutional structure of the bulk and retail water markets. There are a number of ways these may be constituted. Potentially retailers could contract directly with virtual suppliers and other parties in the value chain. Another possibility is to introduce a market operator to determine spot prices for the supply of bulk water and to facilitate payments between industry participants. This role would be similar in function to that of the National Electricity Market Management Company (NEMCO) which supports the Australian electricity market.

Under this proposal the market operator would, for each trading period, match the supply bids from the water suppliers with forecast demand requirements to establishing a spot price (that suppliers receive) for bulk water by each catchment.

[24] This is the process discussed above which is used in the European power industry.
[25] It is possible that some retailers will offer stable water prices in long term contracts.

The market operator could also facilitate payments. This would involve collecting funds from retailers based on each retailer's volume of sales and distributing funds to virtual suppliers and other parties involved in water treatment and distribution. As such the price paid by retailers would need to account for water losses and financial costs involved in water treatment and distribution.

Introducing a market operator is advantageous if it lowers market participants' transaction costs. A market operator model may avoiding higher than necessary transaction costs for retailers in establishing and managing supply contracts particularly given the uncertainty of volumes that are consumed. Note that other mixed models are possible. For example the market operator could facilitate payments between retailers and virtual suppliers but the retailers could contract directly with the water treatment and distribution functions. Another scenario is that installation and maintenance of the reticulation network could be paid for directly by end-users (as this cost is not related to volumes purchased) or by the local council.

5 Conclusion

The current institutional arrangements have not efficiently delivered urban water in major Australian metropolitan areas. The reforms suggested in this paper are a practical method of ensuring an efficient price and capacity is established in urban water supply.

By ensuring an efficient pricing process, the approach removes the need for existing costly water restrictions and the need for any government funding of supplementary bulk urban water supply. Households and businesses will benefit from the removal of restrictions, the more efficient use of water and competition in water retailing.

The approach may not completely remove the need for price regulation over the catchment and network authorities. However, by providing price signals, these reforms have some benefits for the management of these authorities. Furthermore, through more effective subsidies, disadvantaged households would be better targeted by social policies. Finally, the approach does not compromise the quality of water provision as there are no required changes to the operation of water services.

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