Dealing with the Perceived Equity Embodied in Inclining Block Water Tariffs: Some Considerations in the Implementation of Demogrants

Lin Crase[1], Sue O'Keefe[2],

1 School of Business, La Trobe University, PO Box 821 Wodonga, 3689
2 As above

Abstract

The design of urban water tariffs is circumscribed by a number of often conflicting objectives including maximising the efficient allocation of the resource, the provision of sufficient and stable revenue for water businesses, affordability, equity and the perception of fairness. Recent drought conditions have also generated increased interest in price as a conservation signal. In this context, most Australian water authorities employ some form of inclining block tariff to achieve the objectives, but this pricing system has been criticised on both efficiency and equity grounds. This paper examines current urban water pricing arrangements, and raises some questions about the framework for judging the efficiency of a particular pricing regime. The perceived benefits and challenges of alternative pricing approaches are also scrutinised.

Key Words

Urban water pricing, equity, demogrants, inclining block tariffs

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1.0 Introduction

The pricing of urban water is a complex matter partly due to the peculiar status of water as a necessity for human survival. This is further complicated in the current Australian context by the recent and arguably belated public awareness that the water resource is, like all others, scarce. Historically, despite Australia's popular (albeit misguided) reputation as the 'world's driest continent' (Davidson 1969), water prices failed to capture the full costs of harnessing and delivering the resource. More recently, water policy reforms have focussed greater attention on water prices (see, for example, CoAG and NWI) although drought conditions have commonly been met by some type of non-price rationing in urban contexts, such as the current restrictions that prohibit certain activities at certain times. It is not surprising then that in the milieu of the current drought and attendant angst about 'climate change', media, political and public attention has increasingly turned to an examination of appropriate demand management strategies, of which price is one.

When considering water prices economists generally affirm their faith in the market mechanism, favouring the virtues of long-run marginal cost (LRMC) pricing to secure efficiency and deliver appropriate price signals. Nonetheless the idea persists that water is unique and should be priced differently from other goods (Sibly 2006a) . Hence, 'there has not been a history of efficient pricing of urban water in Australia'(Sibly 2006b).

The complexity in designing urban water tariffs is largely due to the myriad of often competing objectives of a pricing system. Boland (1997) shows that the 'best' pricing regime is determined by striking the most desirable balance between objectives considered as important by the particular community to whom the price applies. These objectives may include (but are not limited to) maximising the efficient allocation of the resource, the provision of sufficient and stable revenue for water businesses, affordability, equity and the perception of fairness, ease of implementation, administration and public understanding, the promotion of conservation and inclusion of

environmental costs (Rogers, deSilva & Bhatia 2002 p. 5-6). The potential conflict between these aims is obvious, with the result that the debate about water pricing seems inevitably to be reduced to the perceived trade-off between efficiency and equity concerns. Pragmatic political considerations appear to sit uneasily alongside the economists' faith in the price mechanism.

Given the complexity of these issues it is of little surprise that there is scant commonality in the intricacies of design of urban water tariffs across Australia (Edwards 2007). Most water authorities apply some type of inclining block tariff (IBT), usually consisting of a fixed component and two or more variable parts. The basic feature of an IBT is that the volumetric (marginal) charge for water consumption increases once a predetermined threshold is exceeded. The rationale for tariff structures of this type is complex, although supporters of IBTs point to the purported disincentive to use large volumes of water (since they are charged at a higher rate) and the equity benefits embedded in providing the first portion of consumption at a low (or even subsidised) price (See, for example, Barta 2004). Criticisms of IBTs hinge on the inefficiencies embodied in the tariff structure, the seemingly arbitrary nature of the thresholds within the tariff itself and the potentially perverse impacts on equity (see, for example, Edwards 2006; Silby 2006b; Crase, O'Keefe and Burston 2007).

And yet despite these limitations, IBTs continue to be the tariff structure of choice for most urban water utilities and calls for the implementation of more efficient structures are usually met with dissent on the grounds that such moves would be attended by undesirable redistributive effects. This inertia has become even more pronounced as politicians and bureaucrats explore the role of higher urban water prices to better reflect scarcity and provide a longer-term alternative to restrictions (See, for example Turnbull 2006). More specifically, the perceived plight of large households that may not be able to significantly reduce consumption in response to price signals persists as a major barrier to the abandonment of IBTs.

This paper is used to explore current and alternative pricing arrangements for urban water in Australia. More specifically, current pricing arrangements are considered from both efficiency and equity

standpoints, and some questions about the appropriate framework for judging the efficacy of a particular pricing regime are raised. The authors deliberately exclude the merits of the 'water for life' argument per se which is frequently invoked to justify subsidising a portion of urban water consumption, as occurs with most IBTs. Rather than tackle this thorny issue we treat this as a political necessity and endeavour to cast light on alternative mechanisms that can achieve this end with less objectionable efficiency violations than those embodied in IBTs.

Section 2 of the paper provides a synoptic overview of the current pricing approaches in Australia's urban areas before examining some of the broad equity considerations that circumscribe this field, in Section 3. Section 4 provides a description of alternative tariff structures that are gaining popularity in the US, whilst Section 5 is used to examine a specific alternative regime - LRMC pricing coupled with a demogrant. This section is also used to briefly review important implementation considerations that would necessarily accompany this approach. Some brief concluding remarks are then offered in Section 6.

2.0 Current Pricing Arrangements and Efficiency Conisderations

Edwards (2007) summarises the tariff structures that apply in Australia's major urban areas. He found that IBTs were applied in all major Australian cities (except Newcastle, the Gold Coast and Darwin) although there were notably variations in the structure of those tariffs. Outside the metropolitan areas IBTs are employed by some water utilities although discrepancies are common, even within single jurisdictions. For example, in Victoria the metropolitan water utilities apply IBTs and about a third of the regional urban water utilities employ this approach, albeit at much lower volumetric rates (The Lower Murray, for example, sets the lowest step at merely $0.26 per kilolitre whilst the first step price in Melbourne is usually about four times this amount).

Local governments set water tariffs in non-metropolitan New South Wales although an IBT is recommended to councils as 'best practice' by the state department with oversight for water services. In metropolitan NSW, IBTs are the norm and are regulated by the Independent Pricing and Regulatory Tribunal. The institutional arrangements for the delivery of urban water services in Queensland are currently being amended, partly in response to the chronic water shortages in the South East of the state. In May 2007 the Queensland government announced that it would be adopting a proposal developed by the Queensland Water Commission to establish a state-controlled water 'grid manager' (wholesaler) and rationalise local government water retailing. In the present context this implies a reduction in the number of pricing anomalies in this region insomuch as three regional water authorities are to replace seventeen local governments. There is no indication at this stage whether IBTs will be adopted as the preferred pricing regime although oversight is to be assigned to the Queensland Competition Authority (QWC 2007) which has hitherto not specifically advocated them.

In South Australia, urban water services are coordinated on a state-wide basis with SA Water charging an IBT approved by the Essential Services Commission of South Australia. An IBT applies in Hobart with prices regulated by the Government Price Oversight Commission. Other urban prices in this state are set by local government.

In Western Australia, the Economic Regulation Authority advocated the adoption of IBTs for residential customers in 2005 on the grounds that this structure was consistent with "increasing transparency, while retaining, in part, the principle of charging according to capacity to pay" (ERA 2005, p. X). A standard or 'postage stamp' IBT applies throughout

most of the state with little variation to account for cost differences arising from locational factors.

Crase, O'Keefe and Burston (2007) considered the relative benefits of the IBTs faced by Australian urban water customers against Whittington's (2003) and Boland and Whittington's (2000) four pricing objectives of revenue sufficiency, economic efficiency, equity and poverty alleviation. They observed that IBTs are capable of generating a revenue stream which can meet the operation and maintenance costs of the water utility. In addition, sufficient revenue can be generated from IBTs to attract equity and debt financing. However, there are no compelling grounds to advocate IBTs in preference to other (less complex) pricing arrangements to achieve this goal. Similarly, IBTs can be melded into a pricing structure that provides revenue stability, although this is primarily a function of the extent to which a water bill comprises fixed and variable components. There is some evidence that customers would prefer that a larger proportion of their water tariff be assigned to the variable component (see, for instance, Crase and O'Keefe forthcoming) although this, by necessity, requires that water utilities accept greater revenue risk. In any case, an IBT is not a prerequisite for revenue stability.

On the efficiency front IBTs perform relatively poorly. Dwyer (2006 p.11) notes that economies in billing and revenue collection *inter alia* imply that households that use a larger volume of water should, in fact, face a lower marginal water tariff than low volume users. Moreover, this notion is implicitly supported by most of the economic regulators that, ironically, have approved IBTs for residential customers. More specifically, most regulated jurisdictions have endorsed a lower single volumetric charge for non-residential water customers on the basis that this is a more 'efficient' price signal (see, for example, ESC 2004;

ERA 2005). It is difficult to reconcile the inconsistency between the treatment of residential and non-residential customers against the standard conceptualisation of economic efficiency.

Crase, O'Keefe and Burston (2007) also question the extent to which IBTs are consistent with the equity and poverty alleviation criteria. Since there is no guarantee that water consumption mirrors other demographic or socio-economic variables with precision it seems likely that water users will face different marginal prices for water that are not consistent with the conventional standpoints on equity. For instance, wealthy low-volume water users can face a lower marginal price than poor high-volume users. This issue is considered in greater detail in the following section

3.0 Equity concerns

Economists often appear uncomfortable delving into the concept of equity, given that it extends beyond economics as a discipline. The result is that it receives relatively little attention in the economics literature (See, for example Tsur & Dinar 1997). However, economists are under general agreement that horizontal equity (treat like individuals the in a like fashion) and vertical equity (treat unlike individuals in an unlike fashion) are desirable end states. Moreover, in the context of water pricing policy, consideration of equity and fairness are political necessities, despite the heightened awareness of supply limitations and the attendant need to conserve the water resource. As Wolf (1989, p.30) suggests, "[M]ost public policy decisions are usually even more concerned with distributional issues (namely, who gets the benefits and who pays the costs) than with efficiency issues (namely, how large are the benefits and costs)". This pragmatic approach underplays the substantial tension between the aims of efficiency and equity that have consistently been identified in the literature on urban water pricing (See, for example Garcia-Valinas 2005 p. 197). However, the extent of this perceived trade-off varies according to the particular definition of welfare chosen by the analyst. For example, Moilanen and Schulz (2002) show that the choice of welfare function has implications for the 'best' pricing structure. For example, a classical utilitarian conceptualisation

views social welfare as a simple sum of individual utilities. Accordingly, a utilitarian social welfare function would maximise the consumer surplus of each household without regard for the distribution between households. More specifically, a utilitarian approach to welfare would see a coincidence of equity and efficiency aims manifest in long run LRMC pricing with a fixed component (Moilanen & Schulz 2002 p. 9). In contrast, they argue that a Rawlsian definition of welfare rests on the premise that a focus on the total utility without considering distributional aspects may violate fundamental human rights and freedoms that are inherently valuable (Moilanen & Schulz 2002 p. 5). This implies that individual utility should be maximised only insofar as it does not detract from any other individual's welfare, and that the worse off members of society should be made as well-off as possible. This is referred to as the Difference Principle (Rawls 1971). It results in a social welfare of the 'maximin' form which maximises minimum utility. In the context of water prices, this would imply a very small initial block at a very low (or free) price, with a large price (greater than LRMC) for the subsequent block (Moilanen & Schulz 2002).

The equity or otherwise in the provision and pricing of urban water can be considered as the impact of a policy on a particular income group, or alternatively on consumers with different demographic characteristics like household size, location or age. Whilst it is generally accepted that Australia's water prices are relatively affordable on a macro scale, questions arise to its affordability across groups, particularly those large households on low incomes. Interventions to address affordability can be classified into two broad forms: 1. tariff-related measures, that keep the bill low for certain groups (through refinement of the IBTs for example), and 2. income-support measures that address the customers' general ability to pay. (This group encompasses income assistance, tariff rebates, vouchers and the like).

It is also known that water consumption is relatively inelastic at low volumes (Mayer 2006), suggesting that households comprising a larger number of individuals are more likely to face a higher volumetric charge for water. Thus, the relationship between household income and family size may play an antecedent role in determining the relative progressivity (regressivity) of a given water tariff.

4.0 Alternative pricing arrangements

Despite their espoused advantages, concern about the potentially deleterious effects of IBTs on equity has culminated in some water utilities introducing modifications that are purported to make allowance for individual customer circumstances. This approach has been developed in California, largely in response to customer concerns about draconian water restrictions applied in California's last drought (Mayer 2006). These water rate structures are variously called 'water budgets', 'tailored rates', 'individualised billing', 'goal-based' and 'customer-specific' rates[1]. The concept of water budgets is, in reality a variant of multi-part pricing that encompasses a fixed charge to cover infrastructure costs, and two or more inclining block rates, similar to that of an IBT discussed in Section 2. It varies from the IBT approach favoured in Australia insomuch as it attempts to individualise the volumetric triggers for the different pricing 'blocks'. That is, the volume of the block is defined by one or more customer characteristics (land size, type of dwelling, number of persons in the household and the like). Under this regime 'excess' use of water is charged at higher rates although 'excess' is defined by the behaviour of the particular 'customer class'. High volumetric use of water *per se* does not attract a higher fee, rather it is the 'profligate' use that triggers a 'penalty' rate (Mayer 2006 p. 14). Profligate use is determined by reference to the 'average' use by households who fall into a similar class. In this context, a pseudo 'efficient' level of water consumption becomes a community-based normalising decision that is, at its best, based on both community expectations of service and amenity, alongside the reality imposed by water supply constraints.

According to Mayer (2006), this approach is capable of addressing the key concerns of resource conservation (including a balancing of externalities), application of cost of service principles (that is, no or limited cross-subsidisation), manageable administrative costs, public acceptance and perceived fairness (Mayer 2006 p. 14). Systems such as this have been successfully implemented in areas with

[1] For the purposes of this paper, the term 'water budgets' will be used.

limited supplies or shortages of water. Field evidence from Irvine, Otay and Capistrano Valley California shows that despite the magnitude of administrative costs, these rate structures are considered a fair and equitable way to share limited supplies while preserving some choice (Mayer 2006 p. 27).

The water budget approach employed in the US typically includes a landscape component that is based on the size of the land holding and the evaporotranspiration rate of vegetation of the area (Barta 2004; Mayer 2006). This represents an attempt to account for the higher marginal price and potential loss of amenity suffered by those with larger allotments under the standard IBT regime. Arguably, this may be counter to the poverty alleviation and vertical equity espoused by proponents of IBTs insomuch as those with larger allotments may well enjoy a higher capacity to pay.

In contrast, indoor water budgets typically fall into two categories for residential users: fixed or per capita. A fixed allocation is typically 22-32 kl per month for a single family customer. A per capita budget is individually altered to reflect the number of residents in the household - for example, a household of four with a budget of 315 litres per day would receive a water budget of about 38 kl per month (Mayer 2006 p. 18). An indoor budget for a non-residential customer is typically calculated by either the average usage for the class of consumer or by reference to historic usage.

Since the allocation of 'budgets' is dependent on a number of assumptions about customer characteristics, water authorities frequently build in some allowance to enable customers to request a 'variance', most typically for a larger than average landscaped area, more people in the household than estimated or special medical needs. Under this approach, the onus is on the consumer to request a more finely tuned tailoring of their water bill.

Notwithstanding the capacity to account for some individual nuances, these systems have been criticised for the administrative imperative to rely on 'average for class' consumption figures. The implication is, of course, that these systems cater to horizontal equity only to the extent that the

customer class comprises homogenous households. Whether vertical equity is achieved by these arrangements will depend on the extent to which the design of the customer groups reflects capacity to pay. As has already been noted, adjusting the water budget upwards to account for allotments size may *prima facie* be inconsistent with vertical equity.

Additional criticisms of the water-budget approach concern the difficulty of basing an allocation on previous use and the obvious potential to embed excessive water use. In addition, the application of such a system is not without substantial administrative costs, requiring the gathering of customer-specific data and communication of a complex system of rates to the public. Notwithstanding these limitations Chesnutt & Pekelney (2002) reports successful implementation in a number of areas.

In Victoria, Yarra Valley Water has investigated a similar form of pricing structure where a rebate is offered to large households. In this instance the water authority imposes an IBT and offers a rebate to low income customers (defined as those in receipt of a government welfare payment) in large households. Calculation of the rebate is based on the extra non-discriminatory water use for a household of six, and amounts to a rebate of approximately $20 per quarter. This rebate is financed from the authority's revenue and as such represents a small redistribution to large, low income households from those who pay higher water bills. Given that this system relies on households reporting their individual circumstances and is solely funded from the revenues of the water utility, this might be conceptualised differently: Namely, as a transfer from those with a lower penchant for sharing their details with the water authority to those, who in addition to satisfying the needs tests, are more predisposed to disclosing information to the water utility.

Nevertheless,, these billing systems ostensibly represent an attempt to balance the competing aims of water pricing, particularly paying attention to equity concerns, whilst simultaneously transmitting price signals to conserve the resource. The aim in these rate structures appears to be to maintain the political acceptability and perceived conservation messages of the IBT, whilst attending to the perception of an unfair burden on large households. Here water authorities are incrementally adjusting

the current system in the hope of maintaining the goodwill of consumers. However, it is possible that other approaches may potentially address the equity concerns expressed earlier about the implications of IBTs and achieve increased efficiency through the imposition of LRMC pricing. These are briefly considered in the following section.

5.0 Alternative approaches and implemention considerations

As we have already noted, concerns about equity implications frequently underlie opposition to the use of price as a rationing device to ultimately equate supply and demand, particularly in the context of water. To date, in Australia consumers have appeared amenable to the concept that at least water restrictions represent some sense of 'shared pain'. This is despite the fact that the outdoor emphasis of restrictions clearly has a discriminatory effect on garden owners. The IBT provides a 'feel good factor' in 'penalising' water wasters through the imposition of larger volumetric rates, whilst ensuring that water is affordable in the lowest tier of the block. Alistair Watson contends that "the every last drop rhetoric is being used to beat urban consumers over the head with crass advertising campaigns about water saving"(Watson 2005 p. 7) This system is further open to criticism on the grounds that it foists a heavy burden on large households who may or may not be low income earners. Despite the fact that larger households use less water per capita (Sibly 2006b), they could still find their consumption impossible to reduce to the lowest tier simply by virtue of their 'water for life' requirements.

Deming (1992) suggested a way to deal with such equity concerns by offering members of targeted low socio-economic groups access to a small volume of low cost or free 'lifeline' water. The problem is the larger the number of customers exempted, the fewer will be forced to face the full LRMC with attendant efficiency losses. Thus the 'lifeline' must be a very small volume.

More recently, John Quiggin (2007) has suggested the imposition of LRMC pricing but with a demogrant applied to each consumer. Demogrants are seen as an effective way of supplementing incomes without distorting the economy (Greene 1976 p. 2), although in this case its application

would provide a subsidy to the consumption of water, rather than a poverty alleviating mechanism. A demogrant of this nature represents a transfer payment made to families or individuals without regard to income or wealth and is based only on some demographic criteria. Put simply, this would involve providing a free allocation of a minimal quantity of water to each individual based on the 'water for life principle'. Any consumption above this level would simply be priced at LRMC.

Quiggin (2007, p. 45) suggests that instead of applying a multi-part tariff, a single volumetric rate of about $1.50 kL (equal to MC) should be charged with a free allowance of around 100 litres per person per week or 50kLs per year (2007, p. 45). He also proposes that the increased volumetric charge be balanced by a reduction in the access charge, since these charges can by their nature be regressive. In this way, the perceived burden on large households could be reduced.

Another possible solution that caters to both aims of water pricing is suggested by (Sibly 2006b). He also favours a single LRMC based price that sets the volumetric rate equal to the opportunity cost of water, but includes a fixed component (access fee) that charges different classes of consumer differently (p. 22). In this system, disadvantaged consumers (for example, those in possession of a health-care card) could pay a lower fixed charge. This approach accords with the traditional way of making a tax more progressive (less regressive) which is to exempt some of the base (Merrifield & Collinge 1999).

The transition from the *status quo* to either of the above approaches represents a non-trivial challenge. Moreover, it may be useful to consider modifications of this form against a broader institutional change framework. In this context Saleth and Dinar (2004) observe that "one of the key premises in the institutional economics literature is that institutional change occurs only when the transaction costs of reform are less than the corresponding opportunity costs of doing nothing" (2004 p. 13) . Thus, in order to understand the likelihood of invoking a pricing reform of this type several pieces of information are required.

1. Costs of the status quo

The efficiency costs of IBTs have been detailed in general terms in Section 2. In essence, efficiency costs arise from IBTs because the heterogeneity of customers makes it implausible that a uniform tariff design cannot 'target' each customer's discretionary water use. Recall that the aim of an IBT is to ensure that a portion of water consumption has a low price (below cost) to satisfy the 'water for life' requirement whilst guaranteeing that all discretionary water use faces the LRMC of water. The low-priced quantum of water will not be welfare distorting *per se* provided that the household's true discretionary use exceeds the threshold of the first step in the IBT and the upper block of the IBT is set at LRMC. Given the heterogeneity of customer demand this is implausible and some welfare loss will arise.

Obviously, the extent of this welfare loss is an empirical question which, to the knowledge of the authors, has not been investigated in Australia[2] . Moreover, the empirical analysis would need to be undertaken for specific instances, due to the wide variety of tariff structures currently in place. Nevertheless, it would be feasible to gains some understanding of the magnitude of the efficiency losses of IBTs to gain insights into this component of the opportunity cost of doing nothing.

A second 'cost' of the *status quo* pertains to the divergence of IBTs from their espoused equity and poverty alleviation goals. Estimating this component reduces to an understanding of the within-group and between-group heterogeneity of customers. In the context of vertical equity, the progressivity (regressivity) of an IBT regime depends in large measure on the correlation between income levels and water consumption. More specifically, if water consumption is perfectly correlated to household income an IBT will be progressive and in line with the poverty alleviation goal. Data seem to suggest that there is a broad correlation (Quiggin, 2007), although the extent to which an IBT is regressive or progressive is an empirical issue. This is unlikely to be resolved unless data on the relationship between household income and water consumption are considered for a number of different contexts.

[2] Donna Brennan has considered this issue in the context of the IBTs used in Perth and presented unpublished papers at the Australian Agricultural and Resource Economics Conference (2005).

An analysis of this type would also provide insights into the horizontal equity of an IBT since within-group heterogeneity would reduce the correlation between income and water consumption.

2. The transaction costs of change

Assuming that the costs of the status quo are non-trivial, any progress towards alternative pricing regimes would still require that the effort to support change was not too onerous. In this regard two broad design issues and their related costs need to be considered; first, the financing of transfers to beneficiaries and, second, the nature of the transfer itself.

The distribution of the net gain attendant upon the demogrant system proposed by Quiggin (2007) is determined by the structure used to finance the program. For example, if it is financed out of general revenue (i.e. via the tax base) one would expect redistribution in favour of large households. As long as most consumption was subject to its full cost at the margin, then such a system should deliver efficient price signals and accordingly encourage conservation. In a similar vein, the 'first best' financing approach for Sibly's (2006) proposed discounted access charge would involve funding from government's general revenue. Financing of this type is, by its nature, more progressive and government could compensate water authorities either in direct payments, or indirectly by accepting a lower than market rate of return from the water utility.

Whilst Sibly's (2006) proposed transfer mechanism is relatively straight forward, a number of options exist for the application of Quiggin's (2007) demogrant model. One the one hand households could have their water account automatically credited in line with the agreed 'free allowance' adjusted for household size. Alternatively, a monetary transfer to households could be devised along similar lines. The advantage of the latter is that it is likely to be more efficient insomuch as households would then have the discretion to assign the funds to the activities that derive the greatest individual welfare, although this may be counter to the ambition of supplying only water for sustenance. The latter approach may also have greater political appeal.

Clearly, each transfer mechanism and financing arrangement option is attended by different administration costs. Moreover, the costs to bring about the necessary changes in legislation and administration may themselves be formidable. Nonetheless, an empirical approach to these questions should not be dismissed.

6.0 Concluding Remarks

IBTs remain a major feature of the urban water pricing landscape in Australia. The popularity of IBTs can be traced to their purported capacity to discourage 'excessive' water use and simultaneously address the goals of equity and poverty alleviation. In practice, tariff structures of this kind are theoretically flawed - they frequently fail to send an efficient price signal and potentially result in perverse equity outcomes.

In response to these deficiencies, water utilities abroad have set about modifying IBTs to better account for customer heterogeneity. This approach has been common in the US and evidence of a trend towards similar modifications is beginning to emerge in Australia. The likelihood of these modifications adequately overcoming the inherent flaws embodied in IBTs is questionable.

In preference to modifying IBTs to accommodate heterogeneity, alternative mechanisms are available. Two approaches suggested to date involve the return to a single volumetric charge that reflects the cost of providing water services. In one application of this approach, equity and poverty concerns are addressed by modifying the water access charge. The second approach involves the use of demogrants to set equivalent to the cost of 'water for life'.

These approaches are similar and offer the prospect of enhancing the efficiency of water tariff design. The persuasiveness of arguments to encourage reform in this direction will invariably hinge on the relative costs of the status quo and the costs of overcoming inertia. In this context we advocate an expanded empirical research program in this field to inform policy formulation.

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