

**Why do Queensland Urban Water Entities  
Resist the Adoption of User Pays Pricing?**

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## **Why do Queensland Urban Water Entities Resist the Adoption of User Pays Pricing?**

**Chris Hunt and Keitha Dunstan**

### **Abstract**

This study is motivated by the apparent reluctance of Australian urban water entities to adopt the user pays pricing formula despite strong encouragement by Australian Governments to do so. Elements of contingency theory, political cost theory and transaction cost economics are employed in developing an empirical model to explain the differences between those Queensland urban water entities which have been persuaded to accept Government policy and those which have not. The Queensland urban water entities most resistant to adopting the user pays pricing formula were found to be those which faced the greatest potential economic wealth transfers combined with a less certain revenue base. The findings highlight the potential strategic uncertainty and political nature of the pricing of water and that this policy friction poses for government and regulators attempting to encourage the voluntary adoption of more efficient pricing formulas.

### **Key Words:**

Uncertainty; Political costs; Transaction costs; Commercialising public sector; Water, User pays pricing policy.

## *Why do Queensland Urban Water Entities Resist the Adoption of User Pays Pricing?*

### **1 Introduction**

The National and State Governments of Australia have been promoting the adoption of a user pricing formula of water by urban water entities for more than a decade (COAG, 1994; DLGP, 1997). In Australia, the control and management of Urban Water Entities (UWE) is predominantly vested in the public sector. This predominance of UWE public sector control and management prevails internationally (NCC, 1997). In Australia, the promotion of this major commercialisation strategic initiative of user pays pricing adoption by UWEs is driven by two fundamental issues, the increasing demand for the scarce resource water, and, the improved management of this scarce resource. Despite the fact that Australia is the driest inhabited continent on earth (NWC, 2005) with a continually growing population and economy, the existing urban water pricing formulas utilised have traditionally not considered the true cost of the supply of those services (NCC, 1997). Claims of underpricing of water in Australia are supported by the academic literature (DNR, 1986; Ng, 1986 and 1987; Dixon and Norman, 1989, DCILPG, 2000a). International support for the adoption of efficient urban water pricing practices predominates the academic literature (Officer, 1981; Bruggink, 1982; Dinar and Subramanian, 1998; Jones, 1998; Saleth & Dinar, 2000; Thanassoulis, 2000; Ballester, Alarcon, & Garcia-Bernabeu, 2002; Kucera, 2001; Dole and Bartlett, 2004).

Following the Tasman Report (NCC, 1997), the Australian Governments devised a two-pronged strategy for promotion of the user pays pricing formula adoption by UWEs under the banner of national competition policy (COAG, 1994; NCC, 1997; DLGP & DNR, 1997). The largest UWEs were mandated, through legislative change (*The Local Government Act, 1993*), to adopt the user pays' pricing formula. The remainder of UWEs were given a 'free choice' to adopt user pays. The 'free choice' group was also offered a staged incentives

package to encourage the adoption of user pays pricing. However, at expiry of the first stage of the incentives package on 31 July, 2000, only 36.3 % (DLGP, 2002; NCC, 2001) of Queensland urban water entities had adopted user pays. This study examines the water pricing policy adopted by 91 UWEs from the Queensland urban water industry to understand why the majority of UWEs have resisted government pressure to adopt user pays pricing.

Anecdotal explanations for the resistance to adopt user pays water pricing focus on the political sensitivity of the pricing of water services. In Australia, references to water pricing political sensitivity were noted in to the mid 1980s (PWD, 1984; DNR, 1988a & 1988b). Writers have gone so far as to claim that changes in water pricing policy contributed to the downfall of a Victorian state government (Miller, 1999; Dargan and Wilson, 1999). Internationally, writers also cite the issues of water supply pricing as highly politically sensitive (Reuters, 2001a and 2001b; BBC, 2002; How, 2002; IWRA, 2003; UN, 2003).

The absence of strong empirical evidence motives us to examine the political sensitivity as well as the practical factors that drive the monetary impact of changes in water pricing as possible drivers of the policy choice. At a practical level, the adoption of the promoted user pays pricing initiative represents a significant change in strategy choice for UWEs. The user pays formula underlying the strategy shift promotes a planning and operating horizon of up to 25 years and includes consideration of the long-term infrastructure needs to sustain service supply (DCILPG, 2000a and 2000b). From an accounting management control systems viewpoint this potentially represents a significant and more complex change. The level and complexity of that change would be reflective of the need to manage lowering degrees of certainty (increased uncertainty) if only to bridge the information gap between what is required to support management decision making and control under the existing pricing strategy and that required under user pays (Galbraith, 1973; Khandwallah, 1977; Miles and Snow, 1978; Chapman, 1997 and 2005). A further practical consideration is

due to the potential loss of grant and soft loan support by user pay adopting UWEs. The degree of potential wealth transfer loss would be expected to contribute to the degree of political sensitivity (Posner, 1974) surrounding any price rise due to user pays adoption by a UWE. Additionally, this represents the potential loss of a source of funding for adopting UWEs, could impact on UWE planning and management certainty (Chapman, 2005).

The critical political relationships for the user pays adoption choice are those that exist between the local government electorate, the local government council and the UWE management, and between these organisations and the consumers of water who makeup the local government electorate. The circular nature of these relationships adds to the complexity of decision making. At one level, the electorate are responsible for the appointment of councillors who act as their agents in managing the affairs of local government, including the appointment and oversight of UWE management. In turn, it is the council, in concert with UWE management who are responsible for ‘selling’, or not, user pays adoption to the electorate. Given that the promoters of the user pays pricing formula argue that it provides for more efficient and effective management of water resources and the provisioning of urban water services, there would appear to be positive reasons for adoption. The electorate, as primary stakeholders, may be swayed by these notions of more efficient and effective management of local resources and services, particularly given the ever-increasing pressures being applied to water resources in countries such as Australia. However, should the existing pricing policy be under-pricing water services as indicated by government (NCC, 1997), then implementation of the user pays formula may result in an increased price for the provision of those services.

INSERT FIGURE 1 ABOUT HERE

For the electorate, who also are the consumers, any increase in the price of services due to user pays adoption has the potential to raise mixed and competing motivations. These

motivations include the positive support for more efficient and effective management of resources and services and negative reaction to price increases potentially resulting in an electoral backlash for the elected councillors. The potential for any electoral backlash could give rise to UWE strategic uncertainty that cannot be ignored. For a UWE, the user pays pricing choice will potentially impact on a range of strategies. Those strategies directly affected include: the asset management and capital investment strategy; operational process and planning strategies; and, pricing strategies. These strategic implications will be discussed further in the next section where the user pays pricing formula is presented. However, it does highlight the potential range of strategic uncertainty that a UWE will be exposed to.

The strategic change required for adoption of user pays and the political sensitivity that has historically and anecdotally attached to water pricing in the Australian setting promotes adoption of a theoretical framework drawing on multiple theory support. To this end, in terms of examining the potential economic implications that might determine UWE choice to adopt, or not adopt user pays, the contingent internal choice considerations would be driven by the uncertainty which such change embodies and the associated management implications (Galbraith, 1973; Samuelson, 1999; Chenhall, 2005; Langfield-Smith, 2005). External considerations for the UWE must include the political cost/sensitivity associated with the strategy choice (Posner, 1974, Watts and Zimmerman, 1978 and 1979), an element of positive accounting theory when applied at the firm, or UWE level. Watts and Zimmerman (1978 and 1979) provide a link between the elements of these two theoretical approaches through identifying transaction costs (Williamson, 1979) as a basis for determining the degree of political sensitivity. Transaction-cost economics (hereinafter referred to as transaction cost theory) has also been successfully applied in management accounting control research (Covaleski, Dirsmith and Samuel, 2003; Spekle, 2001) and does provide a basis for assessing the degree of firm uncertainty that might arise from user pays adoption issues that can be

triangulated/compared with the externally generated levels of political sensitivity that might similarly be generated.

Accordingly the theoretical framework employed in this study is constructed using elements of contingency theory, political and transaction cost theories. The multiple theory approach adopted in this study is consistent with Chenhall (2003) recommendations in term of employing multiple theories in contingency-based research. This study also provides a potential basis for overcoming Chenhall's (2003) observation that management accounting research does not have access to the data sets that other accounting and accounting research does. An aim of this study is to examine the usefulness of accounting information in explaining and/or building understanding about the choices made by the UWEs concerning user pays adoption. This achieved by using the management accounting information reported by the UWEs being examined (DCILPG, 2002) in combination with other secondary data. A secondary motivation for this study is to examine whether or not a multiple theory approach to contingency-based studies may provide a means of addressing the Hartmann and Moers (1999) issue with poor hypotheses construction. Hartmann and Moers (1999) are critical of contingency-based researchers use of the null hypothesis with very few studies identifying the direction of association between independent and dependent variables.

A search of the literature reveals that there is no generally accepted positive theoretical framework for public sector policy review (Ball and Foster, 1982; Watts and Zimmerman, 1990; Mayston, 1993; Ashworth and Heyndels, 1997; Field, Lys, & Vincent, 2001; Gianakis and Wang, 2003). This study attempts to bridge that gap through using elements of positive theories to build understanding of the water pricing choices made by urban water entities (UWEs). Elements of contingency theory (Galbraith, 1973; Miles and Snow, 1978; Chapman, 1997; Chenhall, 2003; Langfield-Smith, 2005), political cost theory (Watts and Zimmerman, 1978 and 1979) and transaction cost economics (Williamson, 1979 and 1986 -

hereinafter referred to as transaction cost theory) are employed to construct a theoretical framework to examine a pricing decision made by commercialising public sector entities.

The remainder of this paper takes the following form. In the next section the available pricing formula choices are discussed. This sets the basis for development of the hypotheses in section three. The methodology and data set are then provided in section four, followed by a discussion of the study findings. The conclusions and discussion of study limitations complete this paper.

## **2 The Pricing Formula Choices**

The predominant pricing formula employed by UWEs prior to user pays was the ‘access charging’ formula. The access charging formula, superficially, does overlap with the construct of the user pays formula. However, an understanding of the development of the ‘access charging’ formula will assist in explaining this overlap and the differences between the two formulae that may give rise to user pays adoption friction and uncertainty – transaction costs.

Historically, the management of water resources and water services has been the purview of governments. Within the different tiers of Australia government (federal, state, and local), the management and provisioning of water services is primarily undertaken by local government. Until the 1980s, water services were funded under the general rate levied by local government based on land values to landowners (some cities such as Brisbane did apply a limited form of metering prior to this time (Tucker, 1989)). For rating consistency and equity purposes, the water rate was calculated on the same basis as the general/land rate. Using a form of land value as the basis for rate determination was argued to be equitable in the sense that persons who could afford more valuable land had a perceived capacity to pay more than those persons who could only afford cheaper land.



The pressures of population growth combined with drought periods during the 1980s led some councils to introduce a two-part water rate/tariff that included an ‘excess water charge’ additional to the base rate for water services (Tucker, 1989). The ‘excess water charge’ component of the rate for water services was politically determined in terms of the amount of water that could be consumed before the excess water charge could be applied and the amount per kilolitre of water to be charged. This base amount of water is also reflected in developing country water services pricing as a ‘life line limit’ and recognises constraints on user capacity to pay and the right to water (WHO, 1990; ADB; 1993; Gleick, 1998; UN, 2003). The lack of correlation between these charges for water and the actual cost of current and future water services in this current form of water services charge underlies the classification of this pricing formula, for the purposes of this study, as an ‘access charge’ for water services. The access charging formula takes the following general form:

$$R_{ac} = FBC + xVC_{exc} \quad (1)$$

Where:

$R_{ac}$  = Access charge revenue.

$FBC$  = Fixed Base Charge calculated as a politically determined percentage of unimproved/improved land value and, in some cases, a predefined service consumption allowance (life-line limit).

$x$  = the units of service consumed over and above the predefined service consumption allowance.

$VC_{exc}$  = A politically determined charge per unit of excess water services consumption.

The above elements of the general form of the access charge formula highlight the degree of political influence in determining both the base (fixed charge) and variable charge components. In doing so, it highlights a pricing formula that is unlikely to provide the funding necessary to operate and maintain sustainable water services. Further, the access charging formula components, with the possible exception of consumption, do not relate to

the management control and planning considerations needed in terms of current and future infrastructure investment, operations and maintenance.

Under the existing access charging formula, most capital works undertaken by local governments attracted state and federal government grants, subsidies and soft loans. Whilst the external funding assisted in reducing the funding control constraints imposed by the access charging formula in respect of future infrastructure investment, it did not avoid the community and user uncertainty over UWE management that was reflected in the politically sensitive rate jumps associated with new infrastructure investment (PWD, 1984). Where those state and federal funds did not meet the full cost of the works, the local council would need to raise those funds from their rate base. In the case of water services infrastructure, the funding shortfall would be met by the water users by way of a one-off rate increase and the rate would then be returned to near its previous level in the following year. Alternatively, the rate could be temporarily increased for a number of years as determined by the local council. The result of the charging spikes or rate jumps (PWD, 1984) were identified as being politically sensitive for elected council members and added weight to developing a form of rating that would assist in smoothing rate increases (Hunt and Staunton, 1990).

The inclusion of an excess water charge in the rating for water services represented a change in attitude toward water services charging. This change was driven by two factors, increasing pressure on water resources and the 'hidden' cost of supply of these services (NCC, 1997). The cost of supply issue is particularly reflected in the water pricing literature. The water industry financial and accounting focused research, over the past two decades, has primarily taken a management/supply focus in terms of examining the costing and pricing of services (Officer, 1981; Bruggink 1982; PWD, 1984; Ng, 1986 and 1987; Department of Natural Resources, 1988a and 1988b; Dixon & Norman, 1989; ADB 1993; WHO, 1994; Ogden, 1995; NCC, 1997; DNR, 1999a & 1999b; Thanassoulis, 2000; Sawkins, 2001,

DCILPG, 2000a and 2000b). A fundamental driver of these studies is an observed disconnect between the services pricing policy and the cost of the sustainable supply of those services. This consideration of sustainable supply includes infrastructure investment, operation and management, and water resources management. These studies raise uncertainty over the capacity of existing pricing formula to deliver future sustainable water services given the expected increases in the demand for water service and the resource water.

Intuitively, fundamental drivers of water services pricing sensitivity would be demand side issues. Demand side issues, particularly as they relate to the political sensitivity/cost of water services pricing, have not been researched either normatively or positively. Whilst some studies (Hunt & Staunton, 1990; ADB, 1993; WHO, 1994; Ogden, 1995 and Thanassoulis, 2000) incorporated financial accounting and water distribution supply side considerations they did not examine demand side, user considerations. Other studies such as those by Shaoul (1997), Walker, Clarke, & Dean (1999, 2000a, and 2000b) and Lee, Eddie, & Staunton (2001), focused on utility infrastructure asset valuation and reporting issues. Whilst Ogden (1997) examined stakeholder (customer/consumer) issues in relation to management of water service outcomes, he did not directly address all demand side issues that could give rise to pricing policy implementation friction and uncertainty for owners/users. Supply considerations still dominate the underlying construct of the Queensland user pays formula which, in accordance with the *Evaluation of Introducing and Improving Two-Part Water Tariffs for Local Governments in Queensland: Simplified Guidelines* (DCILGPS, 2000a) takes the following general form:

$$R_{up} = FC + xVC + r \quad (2)$$

Where:  $R_{up}$  = User pays revenue.

$FC$  = Fixed direct and indirect overhead costs for the supply of water services that are insensitive to the levels of supply (DCILGPS, 2000a: 13).

$x$  = Number of units of service consumed.

$VC$  = Direct and indirect variable costs per unit of service supplied.

$r$  = real rate of return (RROR) on infrastructure investment.

Given that the user pays formula promotes a long-run marginal cost approach, the variable cost ( $VC$ ) per unit of service component is:

$$VC = oam + os + a_{rra} \quad (3)$$

Where:  $oam$  = per service unit contribution toward operations and maintenance costs less depreciation, interest and other financing/non-cash charges (DCILGPS, 2000a: 13).

$os$  = per service unit contribution to operations support.

$a_{rra}$  = per service unit contribution to planned future asset renewal, replacement and/or augmentation (10 – 25 yrs planning horizon, 20 – 25 year horizon recommended DCILGPS, 2000a: 9 & 15).

The access charge formula is a politically determined formula with little relationship to water services supply and pricing issues whereas the user pays formula is designed to directly consider water service supply issues in determining the price of water services. The user pays pricing formula explicitly incorporates the management control considerations of: current infrastructure investment, operations and maintenance costs that are fixed ( $FC$ ); current consumption of services ( $x$ ); the variable costs associated with the consumption of those service and future sustainability costs of the services ( $VC$ ); and, a real rate of return required from the investment ( $r$ ) that also acts to cap the price of those services. The user pays formula attempts to drive a clear connection between the price of services and the management controls necessary to sustain the delivery of water services through their explicit statement and consideration in the pricing formula.

In addressing the issue of under-pricing (NCC, 1997), the potential also exists to not only address the sustainability of the required water services (Ng, 1986 and 1987; Dixon and Norman, 1989), but also provide a formal incentive for UWE management control systems to monitor and report on the strategies necessary for sustainable delivery of water services. A management control system focus more likely to exist only in larger and/or better resourced UWEs under the access charging arrangements.

The user pays pricing formula there provides the perceived potential for improved certainty over the future sustainability of the supply of water services. However, while the user pays formula, through RROR and service input considerations, attempts to place an upper pricing limit to minimise the charging of monopoly rents (Williamson, 1979; NCC, 1997; DCILGPS, 2000a; Johnstone, 2003), market demand considerations do not extend to issues such as capacity to pay (Posner, 1974; Hunt, 2000) and any uncertainty that that may generate for some UWEs.

A number of obvious differences exist between the access charge formula and the user pays formula. These differences are superficially reflected in the more complex structure of the user pays formula and the requirement for a planning horizon of up to 25 years. These planning costs are symptomatic of the higher governance costs associated with idiosyncratic investments (Williamson, 1979). The user pays formula includes in the variable cost component the consideration of future infrastructure/capital investments ( $a_{rra}$ ). A fundamental issue not taken up in the user pays adoption policy is the removal of state and federal government capital grants, subsidies and soft loans for such infrastructure investment. Under funding arrangements existing prior to the adoption of the user pays pricing formula, councils could apply to state and federal government for grants and soft loans to fund

infrastructure investment – systems renewal, replacement and/or augmentation. The user pays formula requires the inclusion of future investment costs in the determination of the current price for services. This represents a regulatory driven change in the relationship between water entities and federal and state governments.

According to Watts and Zimmerman (1978 and 1990), such an economic wealth transfer (the removal of opportunities for grants and soft loans) has the potential to negatively impact on managements' utility. This issue has the potential to be significant, in that, the degree of economic wealth transfer will need to be off-set by the users of the water services. For the UWE this represents a strategic complexity that is not considered under the existing access charging pricing formula. The level of complexity would be reflected through changes in political sensitivity and mirrored by changes management uncertainty. The degree, or level of change in complexity, political sensitivity and management uncertainty would be expected to be positively correlated to the level of transactions cost associated with the economic wealth transfer. The potential significance of this issue is signalled by the actions of the Queensland Local Government Association, the body responsible for urban water management, which sought and received confirmation from the State premier that there would be no negative financial implications for its membership from any of the national competition policy initiatives (Goss, 1995).

Given the potential for an increase in the price of services should user pays be adopted by a UWE, when combined with a potential economic wealth transfer, a convergence of management and electoral self-interest could be expected. An additional source of increased UWE user pays adoption uncertainty is raised because user pays adoption results in the loss of grant funding, soft loans and other subsidies relating to capital works that has the potential to create inequities in the treatment of UWEs. Should one UWE having exactly the same characteristics as another enjoy the benefits of capital works subsidies immediately prior to

user pays adoption and the other be required to undertake new capital works shortly after user pays adoption, the latter would be required to self-fund those capital works. The result would be significantly different pricing for services between these two UWEs post user pays adoption with no certainty of any external funding off-set to remedy any such inequity.

### **3 Hypotheses and Empirical Model Development**

For the purpose of hypothesis development there are two sources of factors likely to impact on considerations of the adoption of user pays pricing. First, consideration needs to be given to identifying factors that would directly impact on electoral decision-making and associated political costs. Second, the factors within the user pays formula that have the potential to increase prices need to be identified. The existing political cost/sensitivity literature will be used to identify the potential electoral factors. Identification of pricing formula driven uncertainty and associated transaction costs that have the potential to generate political costs will be identified through comparing the ‘winners’ and ‘losers’ under the access charging model with the potential ‘winner’ and ‘losers’ under user pays.

Whittred, Zimmer and Taylor (2000: 45) identify numerous factors considered to be associated with political sensitivity, size, nature of the industry, potential voters, geographical location, marginal versus safe electorate and impending elections. Given that all UWEs are natural monopolies operating in a strategically important industry under already significant and uniform reporting requirements, a number of these factors will be constant across the study data set. Factors such as strategic advantage, industry, capital intensity, and social responsibility disclosure are taken as being constant as they similarly apply to all data set entities. For the purpose of this study, three measures of political cost/sensitivity will be considered: users per service connection; tyranny of distance; and, electoral marginality.

These three measures will be considered in conjunction with the factors identified in terms of ‘winners and losers’ resulting from user pays adoption by a UWE.

A potential measure for political sensitivity is identified by Sydney Water where they state that future price increases will impact more on service connections having a greater number of users (Davies, 2004). This is consistent with the use by engineers of household numbers in predicting future water services demand levels for the purpose of future infrastructure planning and design (Hunt, 2000). Given that the user pays pricing determination adopts up to a 25 year planning horizon, population density estimates forms a significant estimation component for determining future service demand. The service demand estimate impacts directly on infrastructure investment planning and revenue planning and pricing (Hunt, 2000). Intuitively, higher population density would be associated with more users per service connection than lower population density would be. Should the adoption of user pays pricing be associated with a price increase then, the more users per service connection the higher any resultant electoral backlash – political costs. Additionally, higher population density associated with any level of growth would increase planning and control uncertainty for management. In these terms, the hypothesised user pays decision determinant effect of political sensitivity is expressed as follows:

***H1: The relative demand per service connection is negatively related to the user pays choice.***

In the context of this study management self interest is convergent with electorate self interest and the avoidance of any electoral backlash due to the adoption of the user pays pricing formula. The proxy that is used for the measure of relative demand per service connection is a ratio of the population density of the area serviced by the UWE to the number of connections provided by the UWE (*POPCON*). The sources of measures for this proxy are



the Australian Bureau of Statistics (ABS, 2003) and the Department of Local Government and Planning key comparative data (DLGP, 2002) respectively.

Tyranny of distance/geographical location as identified by Posner (1974), Tucker (1985) and Whittred, Zimmer and Taylor (2000) implies that the further an entity is from the centre of political power and control the more sensitive those entities are likely to be toward the adoption of policies and regulation generated by that political centre. Given that the user pays model has been centrally developed then the following hypothesis is proposed:

***H2: Urban water entity distance from the State capital is negatively related to user pays choice.***

The intuition underlying this hypothesis is that whilst a UWE might benefit from the adoption of user pays, the UWE management may choose to not adopt user pays due to electorate scepticism and the associated potential political costs attached to past experiences with the implementation of centrally developed policies. An implicit and/or explicit issue is the potential loss of planning control that the adoption of an externally developed strategy poses for UWE management. Accompanying any externally motivated strategic initiative is some degree of uncertainty. However, a potential confounding issue may arise whereby management perceive the user pays policy to be a more efficient and effective strategy for managing scarce water resources. In areas where water is scarce, the user pays mechanism could be perceived as a supplement to water restrictions in improving security and sustainability of supply. This variable (TYRDST) will be operationalised by dividing the data set into three regions, a region that includes the state capital, an adjoining region and one other region outside of these two regions using Bureau of Meteorology weather regions (BOM, 2004). This approach provides a basis for aligning UWE climatic and geographic similarities.

Electoral marginality was identified from the political costs literature and has the potential to act as a confounding variable. A perceived potential for the existence of free

riders through the influence of the power of electoral marginality may exist within the study operating setting. Electoral marginality was identified by Gaunt (1999) as being politically sensitive in terms of politicians targeting grant funding toward marginal electorates either to maintain the electorate or influence the electorate voting behaviour in their favour. It is argued here that urban water entities operating in marginal electorates will adopt the user pays model and take the associated incentives. This argument is based on the proposition that such entities know that they can exert the political sensitivity necessary to maintain the capital grant funding advantages of the existing access charging model. These urban water entities operating in marginal electorates are argued to be similar to the ‘free riders’ and accordingly the following hypothesis is proposed:

***H3: Electoral marginality is negatively related to user pays choice.***

The electoral marginality variable (ELECTM) will be operationalised using Gaunt’s (1999) four categories of electoral marginality. Gaunt identified those levels as being very marginal; marginal, safe, and very safe. Using state electoral two party preferred results, the winning difference between the winner and the runner-up can be determined and that margin can then be categorised according to Gaunt’s categorisation rankings. The data to operationalise this hypothesis is drawn from the QLD 2000 state election results (ECQ, 2001).

However, this measure has the potential to measure only one aspect of political costs – the electoral costs. The factors that have the potential to drive those electoral costs through their impact on transaction costs also need to be considered. These factors, in the context of this study, are more likely to emanate from within the user pays pricing formula.

In order to identify factors that have the potential to drive transaction costs, a comparison of ‘winners’ and ‘losers’ is made between the access charging formula and the user pays formula. This approach is considered to be consistent with the findings of Ball and

Foster (1982), Panchapakesan and McKinnon (1993), and Whittred, Zimmer and Taylor (2000) who claim that size is not the sole determinant of political costs.

Under the access charging formula the ‘winners’ were those users who have low land valuations and were high water service users. The ‘losers’ under this pricing regime are those users owning high value land and who consume less than the free service limit. However, the ‘losers’ under the access charging regime are potentially the winners under user pays pricing formula. The caveat of ‘potential winners’ is due to the implications of any economic wealth transfer associated with user pays adoption. Whilst infrastructure investment attracts significant subsidy under the existing access charging pricing formula, it is required to be funded directly by the users under the user pays pricing formula. Under these circumstances, the age of the existing infrastructure, future service growth potential, and the capacity of users to pay do have the potential to affect the pricing of services and increase transaction costs.

The older the existing infrastructure the sooner there will be the need to include the cost of replacement, renewal and/or augmentation of the supply infrastructure in the current price of services. However, whilst the age of current infrastructure assets is a potential driver of transaction costs, should an entity undertake a subsidised capital works immediately preceding the decision to adopt the user pays formula, this works investment could act to negate any immediate asset age implications particularly in the case of the works being completed post user pays adoption. Further, given that water services infrastructure has up to a 140 year life, newer infrastructure would also mean more recent planning and control information and more UWE certainty about potential user pays pricing implications. Under these circumstances, two hypotheses designed to capture any potential economic wealth transfer effects of user pays adoption will be tested. In the absence of specific asset age data, a readily available performance indicator that can be related to current asset age is annual operations and maintenance costs. Intuitively, as an asset ages, the level of operations and

maintenance (OAM) costs for that asset will increase. However, in order to control for ‘supply size’ (infrastructure investment level) differences between UWEs, and maintain focus on demand sensitivity the OAM costs need to be expressed in per service connection terms (i.e., measured on an OAM per service connection basis). Accordingly, **H4** is expressed as follows:

**H4: *Operations and maintenance costs per connection is negatively related to the user pays choice.***

The negative relationship predicted in **H4** is consistent with the notion that it will not be in either the UWE management’s self interest or the electorate’s self interest to support an economic wealth transfer away from themselves through adoption of the user pays pricing formula. The higher the OAM costs the more immediate would the impact of that transfer be felt. As stated above, the OAM variable will be operationalised in the ratio form of operations and maintenance costs per property serviced (OAMPPS). The source of this data is DLGP (2002). Given that water systems infrastructure can have up to a 140-year productive life, high current levels of capital expenditure will reduce the future investment cost considerations within the user pays pricing formula ( $a_{rra}$ ). With these considerations in mind **H5** is stated as follows:

**H5: *The capital expenditure ratio is positively related to the user pays choice.***

As stated above, the intuition being tested in **H5** is that UWEs incurring high levels of capital expenditure prior to the decision to adopt user pays being made are more likely to adopt user pays. To control for size implications across the data set, the variable will be operationalised in the form of a ratio of current capital expenditure in terms of current infrastructure investment (CAPEXR). The source of this data is DLGP (2002).

In terms of the issue of winners and losers, there are two additional pricing decision determinant considerations that have the potential to impact on transaction costs, user

‘capacity to pay’ and ‘service growth trends’. From a UWE management control perspective, the combined effects of capacity to pay and service growth trends have planning implications. Lower levels of user capacity to pay combined with a changing user base such as that which might be experience in regional and rural areas will have the potential to effect both planning and control. In terms of planning, lower user capacity to pay combined with varying user numbers may not only impact on UWE capacity to support existing infrastructure (planning and operational efficiency uncertainty – Galbraith, 1973; Amigoni, 1978; Samuelson, 1999) but also to consider arrangements with outside providers (loss of control and increased uncertainty – Donaldson, 2001). Further, capacity to pay, given that users are voters, has the potential to generate political/transaction costs (Posner, 1974; Williamson, 1979). Any price increase due to the adoption of user pays by a UWE will potentially have higher electoral backlash for those UWEs servicing higher levels of users with a diminished capacity to pay. Any transaction costs associated with a user base experiencing a diminished capacity to pay would be compounded by large average household numbers. This issue should be addressed in the testing of *H1* when testing demand sensitivity but does raise a potential issue for multicollinearity that will be considered in the results analysis phase of this study. In relation to capacity to pay and user pays adoption, the following hypothesis will be tested.

***H6: Capacity to pay is negatively related to user pays choice.***

The intuition underlying this hypothesis is that it will not be in the interest of the management of those UWEs servicing users who predominantly have low capacity to pay due to the potential electoral costs associated with any higher prices for service that might occur with the adoption of user pays. In this study, wherever possible management and financial accounting data is used. As previously stated, an aim of this study was to examine the relevance of accounting measures in extending public sector research. This approach is

argued to be supported by the management accounting performance measurement research literature (Brownell, 1987; Brownell and Hirst, 1986). Accordingly, the measure used is the ratio of revenue arrears to total water services revenues (ARREAREV). The source of this data is DLGP (2002).

Service growth trend has potential implications for mitigating the size measure of demand sensitivity and the future impact of any economic wealth transfer but it is potentially a ‘double edged sword’. For those UWEs experiencing positive user growth (a positive revenue base growth), a capacity to defray any increase in price under user pays across a growing connections base could exist. Having the capacity to defray costs would allow those costs to be ‘spread thinner’, providing the potential for the price effects of those cost increases to be mitigated. However, should the UWE be experiencing a static or declining revenue base then any user pays price increase effects have the potential to be more noticeable. In the case of UWEs experiencing negative revenue base growth, over time, any price increase effects due to user pays adoption will become increasingly more noticeable due to increasingly fewer users being required to bear the price increase burden. Service growth trend is expected to be a significant choice determinant also from a strategic adoption perspective. The user pays strategy requires consideration of all firm relationships and associated activities necessary to provide the sustainable delivery of water services. That is, the user pays strategy is the price determination enabling strategy for an adopting UWE. The success of any pricing strategy is contingent upon the consumption, or usage of the services that it prices. For UWEs the community it serves is its user base. Due to the natural monopoly operational setting constraints for UWEs, if the community base is declining then their revenue base is declining but they do not have the physical capacity to access other markets. In terms of service growth trend the following hypothesis will be tested.

***H7: Service growth trend is positively related to user pays choice.***

As it is the growth trend that is of interest, this variable (ANGRO) will be operationalised identifying only the category of service growth trend being experienced by a UWE: positive growth; static growth; or negative growth. The source of data for this measure is the Australian Bureau of Statistics (ABS, 2003).

The empirical model is summarised in Figure 2.

INSERT FIGURE 2 ABOUT HERE

#### 4 Methodology and Data Set

Given that it is the choice between two competing pricing formula that is being examined, a dichotomous dependent variable is used ('0' for choosing not to adopt user pays, and '1' for choosing to adopt user pays). When combined with a sample size of 91 cases, and the inclusion of both continuous and categorical independent variable measures, the binary logistic regression technique was selected to facilitate model analysis (Garson, 2004; Tabachnick and Fidell, 2001; Howell, 1997; Hair, Anderson, & Black, 1998). The study model is expressed in the following more formal binary logistic terms:

$$Y_{ppc} = A + \beta_1 POPCON + \beta_2 TYRDST + \beta_3 ELECTM + \beta_4 OAMPPS + \beta_5 CAPEXR + \beta_6 ARREAREV + \beta_7 ANGRO + \varepsilon \quad (4)$$

Where:

- $Y_{ppc}$  is the DV Pricing Policy Choice and takes a dichotomous form (0) for non-adoption of user pays and (1) for the adoption of user pays;
- $A$  is a constant;
- $\beta$  is the respective explanatory/predictor coefficient for each of the proxies identified prior to formalisation of the study model; and
- $\varepsilon$  is the error term.

In 2000, the Queensland Local Government was responsible for managing \$27.9 billion of the \$142.4 billion of net assets managed by Australian Local Government, receiving \$4.4 billion of the \$27.9 billion revenues generated by that net asset investment (DoTaRS, 2001). In 1995-96, water assets represented approximately \$50 billion of total Local

Government net assets in Australia (NCC, 1997). The water industry and local government in Australia and QLD have a significant economic impact.

The Queensland water industry is representative of the Australian urban water industry and the developed country non-privatised world water industry. Queensland water industry entities operate in a range of climatic conditions that include temperate, sub-tropical, tropical, semi-arid and arid covering some 1,734,560 square kilometers (approximately 23% of the Australian land area and 7 times the UK land area). These entities access ground and/or surface water sources in the supply of water services over a wide range of geographical conditions. The Queensland water industry has 125 UWEs. Reforms to implement user pays in Queensland were initiated in 1997 for the largest 17 (now 18) of the 125 local government authorities in Queensland through legislative amendments to The Local Government Act, 1993 (DCILGPS (2000a: i). Smaller councils were eligible for funding support to review the cost effectiveness of implementing user pays until the end of December 2000 (DCILGPS (2000a: i). This 2000 cut-off provides the basis for selecting the timing of study data as it also represented the original designated end of incentives for the adoption of user pays. The combination of all of these factors is argued to provide a diverse study population having greater potential for study finding's applicability to the wider urban water industry and the sample size more than meets the requirements of a minimum of 10 cases per variable (Garson, 2004).

The descriptive statistics relating to the study model independent variables are provided in Table 1 below. The descriptive statistics are divided in to two panels with Panel A providing information concerning model independent variables measured using continuous (scale) data and Panel B relating to categorical (nominal and ordinal) independent variables.

INSERT TABLE 1 ABOUT HERE



Column 2 of Table 1, Panel A identifies the number ‘n’ of sample data cases used in providing the descriptive data. The sample number ‘n’ is influenced by missing cell data for individual cases. The maximum number of cases available for study in QLD was 107, however, due to missing cell data this resulted in only 91 cases being suitable for binary logistic regression modelling. As is indicated in Table 1 Panels A and B, the number of cases for each independent variable ranges between 107 and 94. The ‘n’ disparity between 94 and 91 cases is a result of missing data elements between cases and varying between independent variables within cases. Study sample size is summarised as follows:

Total QLD Urban Water Entities with adoption choice	107
Entities missing data for at least one independent variable	<u>13</u>
	94
Entities missing data for at least two independent variable	<u>3</u>
Study sample size	<u>91</u>

In terms of the Panel A continuous variables, in all cases the data are skewed to the left but do reflect a wide range of cases in terms of political sensitivity (POPCON), asset age (OAMPSS and CAPEXR) and capacity to pay (ARREAREV) issues. However, in Panel B the categorical independent variable data spreads are mixed. The growth data are relatively evenly split between positive growth (48.6%) and negative growth (45.8%). Tyranny of distance measures are biased toward entities away from the state capital and South East Queensland (49.5% bordering the South East and 41.1% in remote and North Queensland). Historically, in QLD, a majority of the population has resided outside of the Capital. In the case of electoral marginality, approximately 53.3% (rounding) of electorates are identified as being safe (categories 0 and 1) with 46.7% of electorates identified as being marginal (categories 2 and 3). No interpretation of this electoral mix is made here. However, there is a

significant number of marginal seats and this marginal/non-marginal electoral split is worthy of future observation. Such a large number of marginal electorates could act to reduce marginal electoral power due to these seats no longer being a minority of occurrences and the additional competition for scarce resources that this proportion of electoral influence represents.

The descriptive statistics confirm that the data set size meets the need for at least 10 cases per variable with an 'n' of 91. Driving the choice of an appropriate statistical technique is the dichotomous structure of the dependent variable, choice of either the access charging formula or the user pays formula. To this end Tabachnick and Fidell (2001), Howell (1997) and Hair *et al* (1998) identify three potential techniques. These techniques include Discriminant Analysis, Multiple Regression and Logistic Regression. However, all indicate a strong preference for logistic regression for data samples of around 100 or less cases. Further the bi-modal nature of the data is prone to a non-linear plot taking the form of a sigmoidal cumulative probability plot. The logistic regression is designed to map a sigmoid shaped plot (Howell, 1997: 548 - 551). Further, the logistic regression provides a basis for statistically assessing the model explanatory/predictive capacity in terms of both the adoption and non-adoption outcomes (Garson, 2004; Malle, 2004) thus providing a potential to assess multiple motivation issues. For these reasons the logistic regression technique will be used in this study.

## **5 Results**

Table 2 provides an overview of the model results and the impact of the step-by-step omission of non-significant independent variables on the model R square and its statistical significance. Result 1 reports the testing of the full model and results in an R square of 29.2% that is statistical significant at  $\alpha = .05$ . The full model predicted 89.1% of those entities

choosing not to adopt the user pays pricing formula. Additionally, the full model predicted 68.6% of those UWEs choosing to adopt user pays. The overall model predictive capacity is 81.1%. However, whilst these results were encouraging, both the logistic regression correlation matrix and the Pearson Bivariate correlation matrix indicated the existence of multicollinearity driven by the measures relating to electoral marginality and tyranny of distance.

INSERT TABLE 2 ABOUT HERE

Result 4 represents the most parsimonious version of the model achieving an R square of 26.4% that is statistical significant at  $\alpha = .01$ . Whilst this represents a marginal decrease in the R square achieved in Result 1 and a corresponding marginal reduction in the model predictive capacity 89.1% to 85.5% for those entities choosing not to adopt user pays and 68.6% to 60.0% for those entities choosing to adopt user pays, and an overall model predictive capacity change from 81.1% to 75.6%, the level of model statistical significance increased from  $\alpha = .05$  to  $\alpha = .01$ . Additionally, the results of both forms of correlation matrix used to analyse multicollinearity issues for Result 1 indicated no evidence of Multicollinearity for Result 4.

Result 4 has further importance in terms of the study findings as this version of the study model relies significantly on measures using management accounting information. Driving Result 4 is the statistical significance of the measure of current asset age using operations and maintenance information (OAMPPS:  $p = .025$  at  $\alpha = .05$ ) and negative annual growth (ANGRO1:  $p = .026$  at  $\alpha = .05$ ). These results suggest support for the pre-stated expectation of the impact of wealth transfer (OAMPPS) and declining revenue bases (ANGRO1) on UWE choice from both internal contingency and external political sensitivity perspectives. Of interest was the performance of the measure for political sensitivity

(POPCON). Whilst political sensitivity was not found to be statistically significant, omission of the variable measuring political visibility reduced the model R square to 16.2% at  $\alpha = .05$ . In doing so, the model's capacity to predict those entities choosing not to adopt user pays was reduce below the level of a guess to 41.7%.

## **6 Conclusion and Limitations**

Our findings highlight the contingent and political nature of the pricing of water and the challenges faced by government and regulators in attempts to encourage the voluntary adoption of more efficient pricing formulas. A disappointment was the non-significance of the three political sensitivity variables relating user density, tyranny of distance and electoral marginality. Whilst user density, when removed from the model, did impact on the R square measure (26.4% down to 16.2%), multicollinearity led to the exclusion of the tyranny of distance and electoral marginality variables. A potential explanation for the non-significance of user density is that the pricing implications of an economic wealth transfer and a declining revenue base also absorb some of the political sensitivity. Given that the strategic shift is pricing policy focused and driven, pricing sensitivity does have the potential to overlap with political sensitivity. Future research might explore ways in which variable selection might test this potential sensitivity overlap.

A potential explanatory of the multicollinearity between tyranny of distance and electoral marginality might be explained by a significant number of marginal seats existing in regional areas. This issue is potentially Queensland specific given its history of the majority of the population residing outside of the city urban areas and should preclude consideration of these variables from future studies of this type. Management of UWE's with older assets and with lower service growth were less likely to adopt a user pays pricing formula. For these UWEs the adoption of a user pays water pricing formula would result in higher charges to

customers who would be expected to pay sufficient prices to enable to replacement of infrastructure assets.

The adoption of user pays represents a significant strategic initiative change for UWEs which has the potential to reduce management certainty (increase uncertainty). The transaction costs associated with the potential for wealth transfer away from UWEs, in combination with a declining revenue/customer base, through adoption of the user pays strategy are argued to be symptomatic and drivers of this uncertainty. In the absence of users paying for infrastructure, political pressure would be expected to result in grant funding or soft loans from state and federal governments to cover these costs. These results are consistent with the conclusion that management of the majority of UWEs have chosen to not adopt the user pays formula to avoid the loss of grant funding and soft loans as well as other economic wealth transfer implications and/or accept the uncertainty associated with a declining revenue base under such policy change.

These findings have implications for Governments and regulators that are trying to encourage user pays adoption by UWEs. One possible solution would be a phased removal of grant and soft loan funding. This approach would also have the benefit of avoiding any inequities between entities receiving such funding in the period leading up to user pays adoption and those who would be due to receive these subsidies had user pays not been introduced.

For those entities experiencing declining demand and revenue growth, other strategies need to be considered. These strategies could include the supplementation of the existing supply services with customer based tank storage and grey water treatment facilities. Alternatively, where practicable, the amalgamation of UWEs and/or the sourcing of bulk water delivery support may provide a basis for sustaining service provision to the UWEs

significantly affected by declining customer bases and water resource constraints. The issue of government funded decentralisation initiatives is not considered here.

The findings with respect to predicting those entities adopting the user pays formula are not as strong as for those entities choosing not to adopt the user pays formula. However, some insight may be provided through a comparative of the attributes UWEs choosing not to adopt user pays and those UWEs choosing to adopt user pays. *Ex ante*, this approach may provide a basis for overcoming the electoral marginality statistical non-significance in explaining any potential for ‘free riders’ and/or any tyranny of distance issues. At one level this should highlight to government and regulators that the progress of adopting entities should be monitored in terms of their capacity to sustain service delivery under user pays.

At another level it does raise an issue concerning the intuition underlying the construct of the model and also the issue of poorly specified or omitted variables. The contingent and self interest focus of the theoretical framework does not capture considerations of efficiency as a reason for user pays adoption. Further, the scope limitations of the study have limited uncertainty driven contingency considerations, through the medium of transaction cost considerations, to a triangulation role in assessing the alignment of UWE internally focused considerations with community and user based externally driven considerations. Arguably, contingency considerations have led to identifying potential infrastructure efficiency issues that might arise where a UWE is experiencing combined low user capacity to pay and changing user levels. Further, those UWEs that operate in the water constrained regions may be prone to adopt user pays to improve the efficiency of water resources management and the delivery of water services even though there are potentially high political costs considerations. Under these circumstances, the need for water services may act to override any cost of supply issues potentially arising out of user pays adoption.

Whilst not convincing, the study findings would appear to support Chenhall's (2003) observations of the need to employ support from other theoretical frameworks when conducting contingency-based research. Further, it is felt that this approach has assisted in providing a basis for exploring ways of addressing the Hartmann and Moers (1999) hypotheses construction issue in contingency-based research. The use of such theoretical support as is potentially provided by transaction cost theory in being able to qualify and/or quantify either the degrees of uncertainty or political sensitivity would appear to provide some means of testing the direction of association. In doing so, providing a basis for strengthening hypothesis statement.

Further study limitations arise directly from the nature of the data set examined. The data set, whilst it may be argued to be representative of the Australian water industry, limits further generalisation of the findings. The Queensland water industry operates in a developed country setting thus limiting the generalisation of the results to a developing country setting. However, given the national and international sensitivity surrounding water and water services, the study limitations do identify areas for further research.

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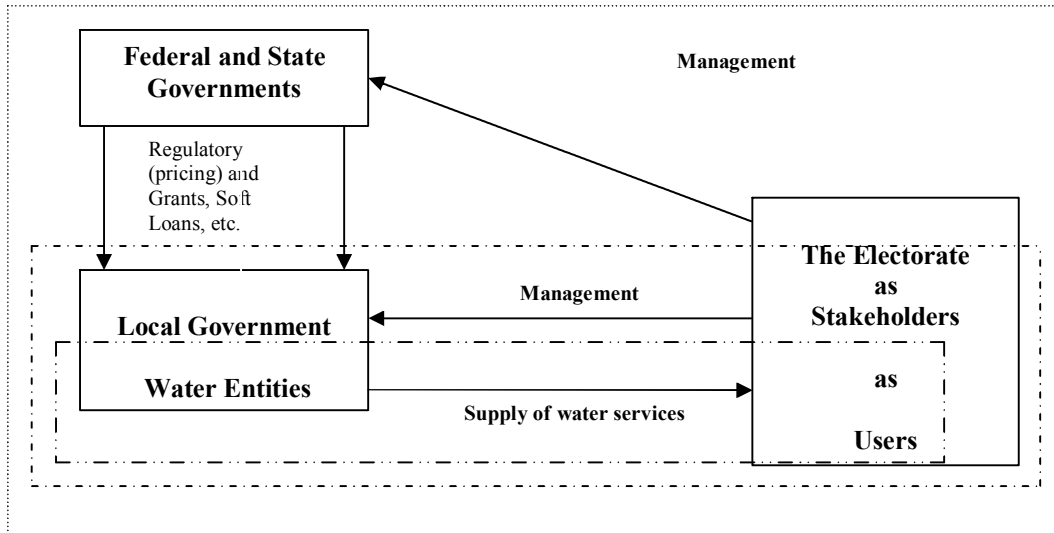
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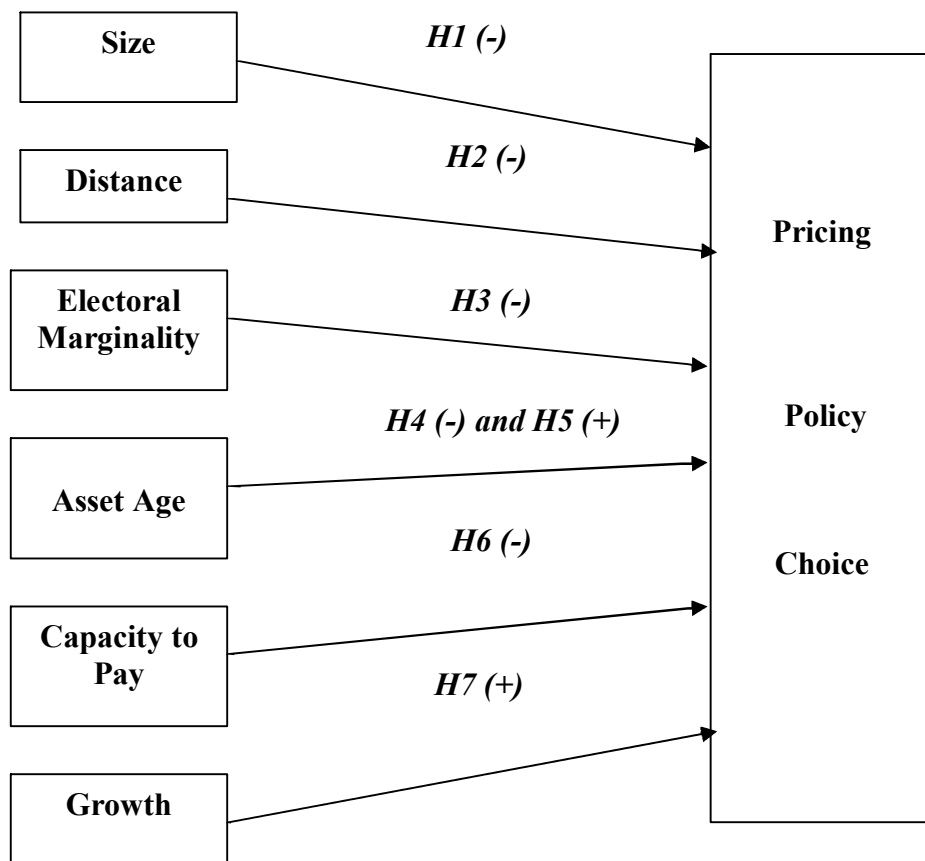
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**Figure 1 A Structural Map of the Decision Relationship**



**Figure 2 An Overview of the Empirical Model**



Note: The arrows are to interpreted as implying association and not cause and effect.

**Table 1 Panel A - Summary of Descriptive Statistics of the Study Model  
Continuous Independent Variables**

	<b>n</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Deviation</b>
<b>Political visibility</b> (POPCON)	94	.000000	.078484	.00275763	.00975677
<b>Asset Age:</b>					
<b>Maintenance</b> (OMAPPS)	95	119	2643	532.72	340.685
<b>Capex</b> (CAPEXR)	98	.00	6.17	1.4470	.99490
<b>Capacity to Pay:</b>					
<b>Arrears</b> (ARREAREV)	98	.568	38.351	7.22743	6.270178

Variable definitions: *POPCON* is the ratio of population density to the number of service connections for each case; *OMAPPS* is the operations and maintenance costs per property serviced for each case; *CAPEXR* is the ratio of capital expenditure to net assets for each case; *ARREAREV* is payment arrears expressed as a percentage of total service provision revenue for each case.

**Table 1 Panel B - Summary of Descriptive Statistics of the Study Model  
Categorical Independent Variables**

<b>Categorical Variables</b>		<b>Frequency</b>	<b>Percent</b>
<b>Growth:</b> (ANGRO)			
<b>Valid</b>	<b>-1</b>	49	45.8
	<b>0</b>	5	4.7
	<b>1</b>	52	48.6
<b>Total</b>		106	99.1
<b>Missing</b>		1	100.0
<b>Distance:</b> (TYRDST)			
<b>Valid</b>	<b>0</b>	10	9.3
	<b>1</b>	53	49.5
	<b>2</b>	44	41.1
<b>Total</b>		107	100.0
<b>Marginality:</b> (ELECTM)			
<b>Valid</b>	<b>0</b>		
	<b>1</b>	47	43.9
	<b>2</b>	10	9.3
	<b>3</b>	29	27.1
<b>Total</b>		21	19.6
		107	100.0

*ANGRO* is a measure of the direction of growth for each case using a categorical variable where *-1* represents negative growth; *0* represents no, or static growth; and, *1* represents positive growth. *TYRDST* is a categorical variable classifying entity groupings by distance from the State capital Brisbane where: *0* represents no distance influence; *1* some distance influence; and, *2* entities most influenced by the tyranny of distance. *ELECTM* is the variable for electoral marginality in respect State electorate influence over an entity where: *0* identifies very safe electoral influence; *1* identifies safe electoral influence; *2* identifies marginal electoral influence; and, *3* identifies very marginal electoral influence.



**Table 2 Pricing Policy Choice Determinants for the Qld Urban Water Industry – Full Model**

$$Y_{ppc} = A + \beta_1 POPCON + \beta_2 TYRDST + \beta_3 ELECTM + \beta_4 OAMPPS + \beta_5 CAPEXR + \beta_6 ARREAREV + \beta_7 ANGRO + \varepsilon$$

Variable	Dir (+/-)	Result (1)		Result (2)		Result (3)		Result (4)	
		Coeff.	Wald <sup>a</sup>	Coeff.	Wald	Coeff.	Wald	Coeff.	Wald
Intercept		.961 (.381)	.766	.541 (.571)	.322	1.189 (.162)	1.956	1.146 (.156)	2.011
Political visibility (POPCON)	-	-129.107 (.162)	1.955	-124.227 (.171)	1.874	-111.903 (.173)	1.857	-112.930 (.174)	1.851
Current asset age (OAMPPS)	-	-.002 (.061)	3.497	-.002 (.052)	3.773	-.003* (.025)	5.030	-.003* (.025)	5.040
Current asset investment (CAPEXR)	+	.372 (.222)	1.490	.359 (.235)	1.408	.313 (.267)	1.233	.308 (.270)	1.219
Capacity to pay (ARREAREV)	-	-.006 (.876)	.024			-.007 (.869)	.027		
Growth trend (ANGRO)	+		5.227		5.055		5.169		5.181
Negative growth (ANGRO (1))	-	-1.178* (.025)	5.001	-1.122* (.028)	4.828	-1.123* (.026)	4.944	-1.123* (.026)	4.937
Positive growth (ANGRO (2))	+	.364 (.804)	.062	.273 (.849)	.036	.241 (.863)	.030	.269 (.846)	.038
Tyranny of distance (TYRDST)	+		1.135		1.490				
Region 1 (TYRDST(1))	-	.526 (.582)	.303	.572 (.542)	.372				
Region 2 (TYRDST(2))	-	.599 (.297)	1.089	.651 (.230)	1.441				
Electoral marginality (ELECTM)	+		.779						
Safe (ELECTM(1))	-	-.513 (.462)	.540						
Marginal (ELECTM(2))	-	-.220 (.803)	.062						
Very marginal (ELECTM(3))	-								
<b>Nagelkerke R<sup>2</sup></b>			29.2%		28.2%		26.4%		26.4%
<b>Log likelihood</b>			98.501		99.294		100.778		102.025
<b>Model Chi-squared (sig)</b>			21.784 (.026)*		20.991 (.004)**		19.507 (.003)**		19.479 (.002)**
<b>No Change % Classified Correct</b>			89.1%		83.6%		85.5%		85.5%
<b>Adopt user pays % Classified Correct</b>			68.6%		65.7%		57.1%		60.0%
<b>Overall % Classified Correctly</b>			81.1%		76.7%		74.4%		75.6%

For ease of presentation, the categorical variables growth trend (ANGRO), tyranny of distance (TYRDST), and electoral marginality (ELECTM) have been grouped together in the table rows immediately preceding the overall model results. Variable definitions: The dependent variable  $Y_{ppc}$  is coded 1 when user pays is adopted and 0 when the existing pricing policy is retained; POPCON is the ratio of population density to the number of service connections for each case; OAMPPS is the operations and maintenance costs per property serviced for each case; CAPEXR is the ratio of capital expenditure to net assets for each case; ARREAREV is payment arrears expressed as a percentage of total service provision revenue for each case; and ANGRO is a measure of the direction of growth for each case using a categorical variable where ANGRO(1) represents negative growth, ANGRO(2) represents no growth, and because the logistic regression tests the change. ANGRO is a significant variable and therefore has not been omitted from the model during the parsimony tests. TYRDST representing 0 distance influence; TYRDST(1) some distance influence; and, TYRDST(2) entities most influenced by the tyranny of distance. ELECTM is the variable for electoral marginality in respect State electorate influence over an entity where, ELECTM identifies very safe electoral influence; ELECTM(1) identifies safe electoral influence; ELECTM(2) identifies marginal electoral influence; and ELECTM(3) identifies very marginal electoral influence. Dir. (+/-) refers to the hypothesised direction of the relationship between the independent and dependent variable,  $p$ -values are in brackets. The Wald statistic has a chi-squared distribution and tests the null that a coefficient is zero.

**Note:** \*\*\*, Significant at the 0.001 level (2-tailed), \*\*, Significant at the 0.01 level (2-tailed), and \*, Significant at the 0.05 level (2-tailed). Further, the categorical independent variables have been grouped separately for results presentation purposes only.