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PROCURING EXPERTISE: THE CASE OF LOCAL GOVERNMENT WATER AND SEWER RATE ANALYSES

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ABSTRACT. Local governments are often forced to purchase expertise for non-recurring analyses, such as rate setting for water and sewer services, because it is not cost-effective for these governments to maintain such expertise in-house or because independent analyses are preferred by watch-dog agencies or mandated by state statutes. However, like many ostensibly value-neutral analytical studies, these studies inevitably entail policy choices of which elected policy makers may not be aware. External analysts may not be aware of idiosyncratic factors, and they apply boilerplate perspectives that may not be responsive to local preferences. These perspectives limit policy options, although they may appear to be value-neutral. Policy makers must take an active role in these analytical studies in order to ensure that local preferences and specific factors are considered. Citizen committees comprised of residents with the necessary expertise, or experts from local colleges and universities may be able to provide the necessary oversight.

INTRODUCTION

Local governments, like most organizations, must often turn to markets to secure the technical, analytical, and substantive expertise demanded by particular projects that are undertaken only periodically. The idea is that it is more economically efficient to purchase such expertise only when it is needed, rather than maintain it within the organization where it may go untapped for extended periods. This is often the case with management consulting, software engineering, or

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financial analyses for bond issues. Short-term contracts negotiated through open markets allow organizations to purchase project-specific expertise at the lowest costs that markets will bear. However, long-term contracts in the form of employment contracts to secure in-house expertise may provide the organization with personnel with greater knowledge of the targeted and tangential policy areas as they manifest themselves in the organization's particular economic, cultural, and political history. At least potentially, the efficiencies to be realized through short-term contracts with external firms may be offset by the gains in the effectiveness of the targeted programs and responsiveness to local policy preferences yielded by long-term contracts with internal employees.

This paper reviews the development and implementation of a water and sewer rate study undertaken by a private firm under contract with a Florida coastal community of about 40,000 persons during the late 1990s. Much of this review is the product of a contract between the authors and the city to analyze the financial impacts that the completed rate structure had had on the citizens of the city. In an attempt to illuminate some of the issues introduced above, the paper begins with a brief review of the elements of principal-agent theory. An examination of some of the substantive issues involved in setting water rates follows; for this review the authors are indebted to Hanemann (1997). The authors' study of the fiscal impacts of the rate study – which ultimately extended beyond its initial mandate – is presented next, and this is followed by a summary of caveats that should be considered by local governments when they purchase expertise through short-term contracts.

PRINCIPAL-AGENT THEORY

Principal-agent theory attempts to reduce social life to a series of contracts between buyers of goods and services (principals) and the sellers of those services (agents) (Perrow, 1986). This approach has been employed to explain the origins of capitalism (Perrow, 1986), as well as the growth of corporations through vertical integration and the resulting eclipsing of markets by hierarchies (Williamson, 1975; 1980). The agent is contracted to take some sort of action on the behalf of the principal. However, the agent – indeed, all actors in this scenario – are motivated by self-interest, and the agent has the incentive, as well as the opportunity to shirk his duties due to the information asymmetries that

exist between the principal and agent. That is, although principals may know more about what they want their agents to accomplish, the agents know more about the specific tasks involved. The principals must increase monitoring of the agents or provide them with adequate incentives to reduce "agency costs", or the loss in efficiency due to information asymmetries (Pratt & Zeckhausser, 1985).

The idea that man is nothing more than a utility-maximizer with a propensity to shirk and cheat on contracts has been criticized as constituting a rather narrow view of human behavior (Terry, 1998). However, it serves here as a heuristic model to structure the relationship between the city (the principal) and the rate maker (the agent). The focus here is on information asymmetries *per se* rather than the opportunities to shirk or cheat that they make possible. The city contracts with the rate maker because it does not house the necessary knowledge to design a rate structure for its water and sewer utilities. Maintaining such a capacity in-house would constitute a long-term contract with an employee(s) who would exercise his or her expertise only periodically. Hence, the city enters into a short-term contract to purchase specific expertise. The contract specifies the tasks to be undertaken and provides a vehicle for the monitoring of the agent.

The agent in this case, as is often the case, has implied or explicit contracts with other principals. The rate maker has an implied contract with his or her professional association to meet certain professional standards or criteria for licensure. These do not necessarily conflict with the agent's obligations to the city, since it is this very professional expertise for which the city has contracted. The agent also has an implied contract with the prospective bondholders to ensure an adequate flow of revenue from the capital projects under consideration. Once again, the city shares the same ends. Information asymmetries are salient in this case because the technical tasks for which the city has contracted have policy ramifications of which the city may be ignorant, and for which the agent has no incentive to take responsibility. If the agent assumes responsibility for these policy issues, the firm increases its costs of complying with the contract. If the principal were knowledgeable regarding these issues, it would demand an increase in the size and scope of the contract and, thus, increase its own costs of establishing a rate schedule. Additionally, the city may be aware of other political issues that relegate those attached to the rate schedule to a secondary status.

The next section summarizes salient issues in water rate making in order to make the case more accessible. The analysis demonstrates why rate making is not simply a technical process, and it identifies some of the substantive policy issues involved in rate making.

ISSUES IN WATER RATE STRUCTURES

This section outlines some of the economic and equity issues that could be considered when structuring rates for potable water service. Once again, the authors are indebted to Hanemann (1998) for the analysis of the concepts presented here. Additional sources are cited within the section. Issues associated with wastewater pricing are not considered separately here, because wastewater services are usually billed as a function of potable water flow, although allowances are often made for heavy irrigation uses. However, this is not always the case, even within the State of Florida where some jurisdictions charge for wastewater service on the basis of number of bathrooms.

From the perspective of economic efficiency, four issues should be addressed: (1) the rate structure should yield revenues sufficient to cover the costs of providing the service; (2) the structure should provide price signals to consumers that may serve as incentives to use water more efficiently; (3) the resulting revenue stream should be stable; and (4) the administrative costs associated with collecting the revenue should be as low as possible. In reality, there are several definitions of costs, and many different rate structures can generate the same total revenue for a public water utility. For example, the total costs of providing the service can simply be divided by the number of units (gallons) that will be sold to arrive at an average price per unit. Alternatively, the rates can be structured so that the price paid for at least some of the water consumed reflects the costs of providing water from the most expensive sources. The former method optimizes revenue stability, while the latter sends price signals to consumers to encourage conservation by highlighting the cost of the next unit of water rather than the average cost of all of the water consumed. Equity issues focus on the identification and definition of costs, and the distribution of the burden of these costs through the rate structure.

The metering of water usage was unknown in the early twentieth century, and most urban water agencies were financed through fixed monthly charges, or a flat rate. Although these charges did not directly

reflect actual consumption levels, they did sometimes on the basis of characteristics that were assumed to be related to consumption levels. For example, all hotels of a certain size would be charged at a particular rate, or barbershops would be charged for water at a rate that was based on the number of chairs they contained. These efforts reflected the idea that customers should pay only for the water they consumed, but the measurement of actual consumption was not possible. As metering become more widespread during the course of the twentieth century, urban water agencies generally moved from systems of fixed charges that were partly comprised of basic flat charges and partly of charges that varied indirectly or approximately with the amount of water used, to systems that may have included a flat charge, but also would include a variable charge based on metered usage.

However, distinctions also exist among variable rate structures. A uniform variable charge is one where the amount paid per unit of consumption is the same over all units consumed. This is the average cost approach introduced above. A block rate is where the unit charge varies, either increasing or decreasing with the amount consumed. Until about 1980, decreasing block rates were common for large nonresidential accounts, if not for residential accounts. This approach reflected the idea that if the number of units consumed increases, the average cost per unit will decrease, so consumption was encouraged through decreasing (or declining) block rates. Federal subsidies reduced the costs of the capital investment necessary to expand water systems during this period. If the costs of expanding the system increase (for example, new sources become more expensive and the distribution system becomes more extensive) however, average costs will actually increase with expansion.

This is why declining block rates are now generally giving way to uniform and increasing, or inclining block rates. This reflects the idea that customers who use extensive amounts of water should pay the additional costs of providing it. It has also become increasingly common to observe rates that vary by season; charges are higher during the peak usage season than during the off-peak season. These are known as seasonally differentiated, or simply as seasonal rates.

Water agencies often levy additional charges. A connection charge (also known as a facilities charge or capacity charge) is a one-time charge to new customers when they are connected to the system. Once again, Federal aid kept the cost of water and sewer systems artificially low until the 1980s, and system development charges have become

increasingly common since that time as a way of providing for future capital needs. Many water agencies also have some special rates for particular classes of customers; for example, lifeline rates often offer low-income customers some initial amount of usage at reduced rates. Large irrigation users are also sometimes offered water at reduced rates, often on an interruptible service basis. These irrigation systems are metered separately so that the customer does not pay the wastewater charge that is often piggybacked on the potable water usage rate.

An effective rate structure will generate sufficient revenues for the utility to cover its costs. Public utilities are usually structured as enterprise funds; this is they are structured much like self-supporting private businesses. Public utilities are capital intensive, and in order to secure the lowest interest rates possible, the utility identifies a revenue stream through its fee structure and demonstrates that this revenue can only be used to support the utility. The resulting revenue stream should also be a stable one, in order to facilitate budgeting and planning (Chesnutt, McSpadden & Christianson, 1996). The rate structure also allocates the costs of the service to different users. It should reflect fairness, the definition of which is ultimately a function of private values and personal perspectives. A general definition of fairness may simply reduce to the principle that costs are allocated in a non-arbitrary manner. This end often requires more complex systems that may be more costly to administer. In addition, fairness also requires that the structure be transparent and understandable

The rate structure should also provide incentives for the efficient use of water, and encourage users to modify their water use behavior in certain directions. For this reason as well, the rate structure should be transparent to users, so that it provides a clear price signal to them. The rate structure should encourage the efficient use of water in terms of quantity used and the timing of use, as well as encourage an efficient pattern of growth in water use and an efficient pattern of system development over time. In order to optimize these ends, some analysts hold that the water rate should reflect the full private and social costs of supply, and the marginal rate should reflect the long-run (which considers even capital investments as variable costs) rather than the short-run marginal cost of water. In either case, the costs of providing water tend to increase as the demand for water grows, as new and more costly sources are utilized and the system expands from its center. When prices reflect the full costs of providing an additional unit of a good,

consumers can compare their preferences for additional units of goods and services in terms of these prices, and the overall efficiency of the production system is optimized.

In practice, these criteria may conflict, forcing water rate designers to make trade-offs among them. For example, revenue stability is maximized with a fixed monthly charge that would insulate revenues from fluctuations caused by changes in the quantity consumed. However, this approach would provide users with no incentives to use water sparingly. Also different parties in the rate setting process tend to weigh alternative criteria differently. The utility is concerned with meeting its revenue requirements and service demands, and the allocation of average costs appears to be the simplest and least expensive way of achieving these ends. The customers are focused on affordability and equity issues, and the transparency of the system and the use of average costs would be preferable from their vantage point. Society as a whole would value the pursuit of economic efficiency and conservation, and, hence, the use of marginal prices would be preferable. For these reasons, rate design is at least partly a political process.

The reliability of the water service in the face of highly variable demand schedules is an additional issue that must be considered. The provision of water service is a highly capital intensive endeavor, and supply cannot simply be altered on short notice. Hence, the water utility must maintain some level of excess capacity, and current users must pay for the capital investment necessary to maintain this excess capacity. Thus, the answer to the question of "how much does it cost to meet my water use needs" is not a straightforward one. It is very difficult to attach a monetary value to the reliability of the system. In short, it must be determined how much excess capacity should be maintained and whether the costs of this capacity will be factored into the average cost of providing a unit of water, or whether the cost to provide the last gallon will determine the cost of a unit of water. This also raises the issue of intergenerational equity in water rate structures, in that those who pay for the facilities are not necessarily those who will reap the benefits associated with them.

A fundamental dilemma of rate making is that average and marginal costs diverge and create an allocation problem with many possible solutions. Should the utility average all costs over all users, or try to structure their rates so that users are charged the marginal cost for at least some of their usage? Economic theory supports some version of marginal

cost pricing on the principle that all users draw on the system at the margin (that is, they all want that last gallon produced at that particular price) and should be signaled the scarcity value of the resource. If all units are priced at the average cost, however, then total revenue automatically covers total cost. When marginal costs exceed average costs (the usually case in water production) marginal cost pricing can yield an excess of revenues over costs. The latter scenario can become problematic politically in that revenues are extracted from the private sector and not necessarily employed to meet its immediate needs, as well as legally when the utility is structured as an enterprise fund with constraints on the size of its fund balance. However, many economic analysts believe that in pricing water production, the next unit of water consumed by customers should ordinarily be in a block costly enough to reflect long-term marginal costs, including future water needs.

One solution to the problem of excess revenues associated with using marginal costs in situations when these exceed average costs is to employ increasing block rates. The block in which most of the consumption is occurring is priced on the basis of marginal costs, and the earlier blocks (called the infra-marginal blocks) are priced below long-run marginal cost in order that total revenues match total costs. The blocks should be designed so that *all* customers face marginal prices for some portion of their use, so that the goals of conservation and revenue sufficiency are satisfied. However, this is not often practical. More typical is a rate where some customers pay a high price and some pay a low price, and, unless this is cost-justified, questions of equity will arise. Utilities that adopt increasing-block rates are often explicitly targeting high end users, because users at the high end often account for a substantial fraction of total use. Conservation efforts seek to change the behavior of this group rather than reduce consumption of all users.

In some cases, excess capacity and the cost of the necessary capital facilities are maintained to meet peak time or seasonal demands. Thus, the marginal price, or the cost of the last unit produced, may vary with different production times. This is the basis for peak-load pricing (which may vary by different times of the day or days of the week), which is often referred to as seasonal pricing when the variation occurs at different times of the year. When these variations are systematic and predictable -- such as increased irrigation usage during the summer months -- peak-load pricing is facilitated. Some of this variation will be random, however, such as the demand for water by the fire service.

Excess capacity is maintained in these cases in order to respond to emergencies and to maintain reliability. The excess capacity necessary to ensure reliable service in the face of random peaks should be a fixed "capacity" charge applicable to all customers

But would the adjustment of the peak period price to reflect the full cost of water service have much impact on consumption? The answer depends on the responsiveness of demand to price. The empirical evidence suggests that residential demand for water service during the summer months is more elastic than for winter, and water demand for outdoor use is more elastic still; other studies conclude that only agricultural use and consumption by some industries are truly elastic (Martin & Wilder, 1992; Merrified & Collinge, 1999). This would suggest that under-pricing service during the peak period could indeed have a significant impact on consumption. Thus, peak-period pricing serves both economic efficiency and equity, since off-peak users implicitly subsidize the consumption of peak users in the absence of peak-period pricing. However, the identification of daily peaks may not be feasible, because meters would need to record both the amount and time of use. Seasonal rates also represent a more complex and hence more expensive pricing formulation than one that does not use different rates for different periods, and the costs of design and administration should be weighed against the potential gains in efficiency.

It is becoming increasingly difficult to differentiate between water and wastewater treatment services. Wastewater disposal is oftentimes transformed into a production process in a reclaimed water system, and this system can have enormous implications for potable water usage. Reclaimed water systems yield benefits that extend beyond the immediate users in the form of conservation of potable water and decreased investment in potable water facilities, as well as environmental benefits. Conceptualizing reclaimed water systems as water production systems make it increasingly important for everyone in the community to be connected to the wastewater treatment system. Septic tank users usually escape the costs of wastewater treatment, and yet they reap the benefits of everyone else's "contribution." The case for treating water and wastewater treatment as separate systems is becoming increasingly weak, and they are often found in the same enterprise fund, which increases flexibility in cost allocation. There are public good characteristics in water and wastewater services − that is, the payer does

not necessarily receive all of the benefits of paying − and these must be considered in allocating costs.

The definition of the "best" rate structure for a given utility is ultimately a function of the goals of the political jurisdiction that houses it. Thus, the optimal structure cannot be determined through technical analysis alone. Technical analysis can be used to help determine a responsive rate structure after the appropriate policy makers have identified the goals they wish to pursue. In summary, the goal development process should consider the following:

1. Revenue Generation: the extent to which the utility is required to cover its costs, and the extent to which its revenue is permitted to exceed its costs.
2. Cost Allocation; how the rates will allocate costs among various types of uses and users and which costs will form the basis of the structure.
3. Incentive Provision: the extent to which the utility will try to influence the behaviors of customers in certain directions, such as conservation, by sending price signals through the rate structure.
4. Revenue Stability: the extent to which the revenue stream is stable and predictable over time and changing circumstances.
5. Administrative Costs: these should be balanced against the potential benefits of a more complex rate structure.
6. Transparency: the structure should be easy for users to understand so that it provides a clear price signal.
7. Reliability: the extent to which the excess capacity is maintained for peak usage and future growth.
8. Affordability: the extent to which the rate structure entails undue financial burdens for the public or particular groups, and the extent to which cross subsidies will be tolerated.

In order to encourage static efficiency in terms of the quantity and timing of water use, the water rate structure should reflect the full private and social costs of supply at the margin. That is, some of the water price should be based on the cost of producing the next gallon rather than the average cost of producing the current supply. In order to encourage the efficient growth and development of the water system − or the dynamic

efficiency of the system − the marginal rate should reflect the long-run rather than the short-run marginal cost of water supply. Statistics indicate that an average family contains three to four persons, each of whom consumes 60-80 gallons of water per day for personal use. Outdoor use varies greatly, but averages between 100-200 gallons per day. Thus, the average residential household consumes between 310 to 480 gallons per day. In order to stimulate conservation the second block should be set at 300-500 gallons per day. Residents must be made aware of the costs of "switching" from the first to the second block, and they should be educated in regard to conservation methods.

The ultimate criteria for the perceived fairness of the rate structure are its lack of arbitrariness, the cohesiveness of its basic elements, and consistency in application. These may be a function of the rate making process, itself, as much as they are characteristics of the rate structure.

Bauman and Boland (1998) describe a case in rural district in California that uses different infra-marginal blocks (or switch points) for different crops. The conservation goal can be pursued here because farmers are aware of their water use and aware of the cost implications of exceeding established switch rates. The average residential homeowner is less likely to be aware of the levels of usage as well as the costs of exceeding described blocks.

Tuscon adjusted its rates to make it more expensive to consume above-average amounts of water, but left water bills for customers using average or below-average amounts of water largely unaffected (Hanemann, 1998). Usage in the upper three blocks as a share of total residential usage declined from 8 to 6.6 percent. More importantly, average monthly usage in the peak summer months dropped 11% in four years. This clearly indicates that the rate structure was curtailing discretionary outdoor use during the peak season when the utility was most at risk for shortages.

In 1991, the City of Los Angeles faced a 15% shortfall in water supply relative to demand. A blue ribbon commission was established to recommend a new rate structure that would encourage conservation among high use customers. In order to demonstrate that this was not simply a ploy to collect additional revenue, the rate structure was designed to be revenue neutral during its first year. Seasonal rates were also adopted. The switch points were set so that the higher rates would also be plainly transparent to lower usage customers. Seventy-one

percent of the customers ended up with lower water bills, but a sewer charge increase instituted the same year was lumped with the water rate schedule in the perception of many customers, and the solution was controversial. The commission made some attempt to target the usage rates of specific classes of customers, but these proved to be varied and even within classes usage rates were very heterogeneous (Hanemann, 1998).

Mee (1998) also reviewed the history of the water rate structures in the City of Phoenix over a ninety-year period. These structures have changed almost continuously but incrementally over that time period. The present structure is composed of three seasonal periods, and two blocks. The initial block offers a lifeline rate based on minimal water usage, which recovers billing and meter reading only. When the rate structure was implemented, most bills increased during the summer months and decreased during the winter months, due to the extensive outdoor use typical in Phoenix. It was estimated that 3.8 million gallons of water per day were conserved, and this yielded a present value savings in operational costs alone of $7 million over the next fifty years. Clearly, the new system increased the number of customers aware of the need for conservation through price signals**.** Conservation was a major goal of the re-structuring. Mee (1998) concludes that the best rate structure is the one that meets community objectives; technical analysis and economic theory take a back seat to political decision-making and corporate culture in this process.

Other current issues being addressed by researchers include the revenue instability induced by conservation rates (Chestnut, McSpadden & Christianson, 1996), public-private partnerships in the production and operation of water utilities (Merrified & Collinge, 1999), as well as the use of water revenues as a general fund source since they are no more regressive than other local government revenues (Shanker & Rodman, 1996). Some utilities are adopting marginal cost pricing structures, but most still employ average cost approaches.

In conclusion, the establishment of a rate structure for water and sewer services entails something more than a purely technical process. There are a variety of structures that will generate the same revenue stream; each one optimizes specific goals, and each has political ramifications for equity in cost burden. Indeed, the very definition of costs cannot be determined on a purely technical basis. However, the rate specialist has a vested interest in defining the process in technical terms

because of the firm's specific area of expertise and its professional responsibility to the bondholders to ensure that the adopted structure generates sufficient revenue to support the bond issue. The public organization also has a vested interest in limiting the process to technical issues in order to reduce the transaction costs of establishing rate structure, particularly if it is not knowledgeable regarding the policy issues involved.

METHODOLOGY

The authors contracted with the city to review its water and sewer rate structure, in order to provide a substantive context for a new rate study. The authors were charged with identifying the fiscal impacts of the current rate study on the citizens of the city, reviewing financial documents and bond issues, interviewing the major actors in the previous rate study, including the rate specialist, and outlining the legal constraints on the city's options. The authors were instructed to submit policy options to the city council and to describe their ramifications for price equity and revenue stability. The methodology of this paper centers on the case study of the rate making process and its aftermath, which included the contract with the authors. This section describes the methodology employed in that project, because it is central to the case study.

The authors began by conducting a mailed survey of the citizens and businesses in the city. Fifteen hundred of the seventeen thousand water customers were selected through a random sample stratified by meter size (96% used three quarter inch meters). An additional one hundred businesses were sampled based on the likelihood that they were heavy water users (car washes, laundries, restaurants, hotels), because the stratification method resulted in only a small number of businesses in the sample. A survey was mailed to the selected customers with a stamped, self-addressed return envelope, and the response rate was 39%.

After the survey results were analyzed, they were presented to a focus group of customers, who were selected based on their survey comments. Twelve residents and twelve business owners were invited to participate in the group discussion held at a local community college. They were contacted by telephone and agreed to participate. In fact, only five residents and five business owners actually attended the meeting. The authors also interviewed elected officials who had participated in the

previous rate study, as well as the rate makers. We reviewed official documents, including the prospectuses from the two bond issues described below. Lastly, we identified twenty-one cities in Florida that were similar in size and physical locale to the city, and we compared the water and sewer rate structures of each.

THE CASE

A 1990 act by the Florida legislature required the city to cease discharges of treated effluent into an adjacent bay by July of 1995. The city was also found in violation of the federal Clean Water Act, and was assessed a fine of nearly $24 million (later reduced to $600,000 after a Consent Decree was negotiated). The State's Water Management District in which the city was located also required the implementation of a citywide reclaimed water program for the purpose of reducing the use of potable water for irrigation purposes. In 1994, the city issued $48,808,196 in bonds to fund the capital improvements necessary to meet these mandates.

Six of the 1994 projects were water projects accounting for approximately 17% of the total. Almost $25 million was allocated to wastewater related projects, or about 50% of the total bond issue. About $7.5 million went to reclaimed water projects, or about 16% of the total. Eighteen percent of the bond issue was allocated to projects grouped as miscellaneous. Thus, one half of the debt burden fell to wastewater customers. Since the reclaimed water was not billed (ostensibly in order to mitigate the overall financial impact of the projects on the citizens; an initial 3000 gallon water block was established at a low rate for the same reason) these projects also were funded through wastewater fees, because the city viewed the reclaimed water system as a wastewater disposal mechanism rather than an irrigation water production facility.

However, this segregation of systems was not necessarily legally required, because the potable water system, the wastewater treatment system, and the reclaimed water system were and still are all part of the same enterprise fund in the city. The city has approximately 3000 more water customers than sewer service customers. Thus, if a greater portion of the debt burden had been allocated to the potable water service, the average debt burden per customer would have been lower because a greater portion of the overall debt would have been allocated to a greater number of customers. A logical case could be made for this reallocation,

and the ambiguous role of reclaimed water would have been a good place to start. In this way, water customers with septic tanks – half of whom lived outside the city limits – would have assumed a greater part of the debt burden. The city council had also adopted a resolution that established that no free water or sewer services would be provided to any group, nor would preferential rates be adopted for selected users in the same class of users. The city has also historically maintained that new growth should pay for itself, and, thus, imposes water and wastewater connection charges, and these have been earmarked for future expansions of the systems.

This case focuses on the 1998 bond issue, which provided for the refinancing of the 1994 issue and the borrowing of additional funds for new projects. The rate consultant in the 1998 issue, which was the same firm employed in the 1994 issue, recommended in their financial forecasts that the city increase water and sewer rates by 3% each year for fiscal years 2000 to 2003. However, the city was not obligated to do so, and it enjoyed some discretion in determining future rate structures. The Bond Covenant stated that the city could not reduce revenue collections unless: it was not in default of debt payments; all required payments had been made in full; and the rate consultant verified that the proposed changes would provide adequate revenues in each of the succeeding two years. If it fell short of these requirements, the city was obligated to hire a rate consultant to design a structure that would meet debt service needs for the next five years. The authors were charged with identifying the fiscal impacts of the 1994 and 1998 rate structures, in order to provide information to support this decision making process.

The city's most significant contractual arrangement was with a nearby city, which it negotiated in 1994 in order to ensure that the city would have access to an adequate supply of potable water to meet demand through 2014. This was necessitated due to unanticipated underproduction from one of the city's two well fields. Under the agreement, the other city agreed to provide up to 3 million gallons per day of potable water to the city, and the city initially agreed to purchase at least 1.1 million gallons per day at a rate of $1.51 per thousand gallons. The inter-local agreement also contained an emergency water provision: if one of the cities is unable to provide sufficient water to meet demand due to system malfunction, the other city will provide water through a system interconnection (along with a 3.5 million gallon ground storage tank and booster pumps) that was constructed in May of 1996.

The term of the agreement was for ten years and the city could renew for perpetuity.

This method of providing back-up is strongly supported by the state and federal governments, as well as other federal regulatory agencies in order to avoid duplication of efforts and achieve economies of scale. However, the city must pay water impact fees (as if it were simply a customer of the other city) of $1.8 million and a balloon payment of $3.6 million was due in March of 2003. The impact fees raised the cost per gallon above that which was paid by city customers for water from city sources. As a back-up system the contract would seem to be highly desirable, but as a source of water it is superfluous in the short run and probably not cost-effective in the long run compared to the development of a third well field. In 1997 the city's total potable water demand was 4.55 million gallons per day, which was reduced by about .75 million gallons through the implementation of the reclaimed water system. Thus, the mandatory purchase from the other city amounts to 30% of daily usage. The city's consumptive use permits provide for the average daily withdrawal of 6.5 million gallons per day. The city is considering the acceleration of the development of a third well field.

The city's other significant "contractual" obligation is a product of a county effort to have the Florida legislature pass a "local bill" that mandates that municipal water and sewer systems must limit the surcharge levied on non-city users living in the county to 10% for potable water and 20% for sewer service. Since septic tanks are omnipresent in the unincorporated areas, the second charge is negligible. And since the city's residents must pay a 10% franchise fee that is not levied on unincorporated users, the surcharge yields no additional revenue to the city. The county will allow higher surcharges on the basis of a "special study" but this is not well defined. High surcharges will encourage annexation, and the county may have put these limits in place to mitigate annexation pressures. More users reduce average rates and surcharges reduce the burdens of residents. In 1993, the city charged outside water customers a 25% surcharge, and there was no surcharge for sewer usage. Another way to increase the number of sewer customers within the city is to create mandatory assessment districts for the necessary infrastructure, and then charge those who refuse to connect. Both of these options are allowed under current city ordinances, but this option is not politically feasible. However, septic tanks may become

the targets of future federal interest, and the city was encouraged to take a more proactive role in this issue.

FINDINGS

The citizen survey provided a wealth of demographic information regarding the utility's customers, most of which is not relevant here. The average water and sewer bill for residential customers was $53.72 during the summer months and $48.60 during the winter. Renters paid more than owners in every residential type (possibly due to the lack of incentive to act on leaks). Payments tended to decrease with lot size. Pool ownership, number of bedrooms, number of bathrooms, number of children and income were all positively related to costs incurred. About 42% of the respondents felt that their water bills were "about right," while 83% characterized their sewer bills as "too high." Only 8% indicated that they would increase water usage if the price were decreased by 10%, but 26% reported they would use less if the price were increased by 10%; these relationships held across income groups. Hence, there appeared to be few unmet needs for water, and only the heaviest users exhibited any elasticity of demand that could be targeted by conservation efforts.

The respondents were asked to rate the importance of water policy goals (conservation, reduction in costs, fairer distribution of costs, improvement in water quality, and providing for future water needs), and they thought all of them were "very important." There are conflicts inherent in the simultaneous pursuit of these goals, but the respondents apparently felt that conservation and future needs could be enhanced while lowering costs.

The Focus Group results were similar to the survey: namely, "it's the sewer rates, stupid." One of the participants had been part of a citizens group that had been assembled to give advice on the first rate study. He said that the group was largely ignored and the rate study consultants simply convinced the policy makers that there was only one way to structure the rates equitably and to ensure a sound revenue stream, and that rate structure was adopted. They appreciated the need for the bond issues, but they felt that the burden was unfairly distributed between water and sewer costs.

Most agreed that it was virtually impossible for a two-person household to keep its water use within the first 3,000-gallon block even

when practicing conservation measures. They believed that the block was designed to accommodate the needs of a two-person household, but each person requires about 70 gallons per day for personal use, and each household has additional irrigation uses. The other blocks are too large to serve as targets for conservation, and they contain a variety if income groups and family sizes. They felt that higher income persons in the second block with larger lawns with separately metered irrigation systems (not assessed a wastewater charge), and pools that are allowed one filling free of sewer charges are subsidized by lower income families in the same block.

One person complained that she was not afforded a reduction in her water bill that had resulted from a broken pipe underneath her business. Others in the group said that they had received consideration in similar circumstances on the basis of the city ordinance. City representatives explained the differences in circumstances that had made the first women ineligible for relief. Other issues such as septic tank users and out of the City users were discussed but no substantive views were expressed. The need to expand and charge for reclaimed water was put forward.

One of the commercial representatives said that his businesses used modern techniques that cause his sewer charge to be over estimated because it was based on his water usage; the new techniques reduce wastewater. This points to the idiosyncratic nature of commercial customers, and brings to mind the California city that charged farmers different water rates on the basis of the crops they were growing.

The tenor of the group was that the costs of funding the water and sewer capital improvements and the operating costs of the service agencies were not being fairly distributed, although the participants could not pinpoint exactly why they felt this way. They felt that they had been excluded from the decision making process, and the rate consultant had imposed a structure on the City. There was also widespread dissatisfaction with the city's utility accounts billing practices, and the director acknowledged that the city had had problems with its computerized billing system.

The Focus Group did not include a variety of viewpoints due to the low attendance. In retrospect, perhaps the larger businesses should have been contacted in person, rather than the researchers relying on the internal chain of command. Perhaps separate Focus Groups could have been conducted for residential and commercial users. The loss here

seems to be the issues regarding commercial users, because these did not emerge from the survey due to low representation. But, perhaps these are so idiosyncratic that they would be difficult to aggregate into guidelines for public policy decision-making. The Focus Group process points to the decision costs that must be incurred if technical studies such as the rate study are expanded to encompass corollary policy issues.

In the absence of an active exchange of policy views, however, substantive policy decisions are made by the technical expert by default. For example, the customers characterized the first block as a conservation block, but, according to the rate maker, it was actually designed to mitigate the financial impact of the bond issues on low-income households.

The comparative study confirmed the results outlined above. The initial block rate of the city was the lowest in the sample. The city's block structure inclined more steeply than the average, but, in general, the city's residential water rate was competitive among similar cities in Florida. The same held for the commercial water rates. The sewer rate in the city, however, was three times the water rate, while the sample averaged 1.5 times the water rate. The sewer rates in the city were higher than the sample averages in all blocks but the initial 3,000-gallon block (the city's blocks ranged from 0-3,000 gallons, 3,001-15,000, 15,001-25,000, and above 25,000).

The interviews with the council members and the mayor who had participated in the 1994 and 1998 bond issues yielded a general consensus that the city had been slow to respond to the state's challenge of its discharge into the bay due to staff shortages and several false starts. When the federal government fined the city $24 million dollars, the policy making process was accelerated. Necessary haste caused the city to defer to the rate maker on many occasions, particularly in the area of the allocation of capital costs. Their primary consideration was to mitigate the financial impact on their citizens (hence, "free" reclaimed water, the low initial block rate, the absence of seasonal rate discussions). The council members were also interested in implementing water conservation programs. The contract with the other city was characterized as necessary but unfortunate, because the city had to demonstrate to the potential bondholders that its system had the capacity to meet the city's needs for the next fifteen years. Once again, necessary haste limited policy options.

The rate consultant indicated that the priority of his firm had been to ensure revenue sufficiency in light of legal constraints and the political problems posed by the large increases in rates necessary to achieve this goal. The consultant recalled making nineteen alternative rate structures available to the city council, and he outlined the financial and distributional implications of each. He said that the policy makers selected the assumptions under which the present structure was developed. The reclaimed water portion of the capital improvement program had been assigned to the wastewater treatment bill because most of the reclaimed water was distributed to managed wetlands as a disposal process. He acknowledged that the initial block was constructed in order to protect low end users from assuming a larger portion of the capital costs than was justified by their usage. He was generally skeptical regarding the effectiveness of switching points as conservation mechanisms, because only high end users were in a position to cut back and people were generally unaware of what block they were in. When the authors pointed out that a series of smaller blocks with more steeply rising rates might send clearer price signals to users and make conservation efforts more feasible, he seemed to agree that such a structure might work. But he pointed out emphatically that the long-term goal of conservation posed a threat to revenue sufficiency and stability in the short run. This points to a conflict for the agent between the city as principal and the bondholders as principals.

The rate consultant was also not optimistic about the possibility of success in conducting a special study to exempt the city from the 10% limit on surcharges to customers outside the city limits. He pointed out that only a few customers were located outside the city limits; although this was presently true, the long-term trend pointed elsewhere. If the city were going to provide water service to an expanding suburban area, the long-term marginal costs to the city would increase and the rates paid by the citizens of the city would also increase. He implied that it was the city's obligation to provide water to these areas. Once again, the goals of the agent and the principal would seem to diverge.

We spoke at some length regarding the public good aspects of water and sewer service. The authors held that potable water would not be available to septic tank users inside and outside the city if the sewer users did not maintain a wastewater treatment capacity. Hence, the water-only users should assume a portion of the costs of the wastewater treatment function even if they are not direct users of the service. State law would

certainly allow the costs of the reclaimed water system to be shifted to the water users, because the system reduced the demand and thus the costs of water to all customers. Once again, the rate consultant reiterated that this would potentially destabilize the revenue stream to the bondholders unless the city charged for reclaimed water (which the authors recommended that it do) or increase water rates.

The authors closed their report to the city council with a series of recommendations regarding conservation, cost reduction, and equity. Although rate-making was not the authors' area of expertise, we recommended a multiple, steeply inclined block structure, with the last few blocks approaching true marginal cost. We recommended the study of seasonal rates, and the development of a third well field to make the contract with the other city superfluous.

CONCLUSIONS

Governments procure specific expertise in order to avoid long-term contracts for expertise, in the form of employment contracts, that is only required periodically. However, short-term contracts for specific expertise may have long-term ramifications in substantive policy areas. The governmental body may be unaware of these ramifications because it is not knowledgeable regarding the substance of the technical expertise it procured. The narrowly focused technical expert may not regard these policy implications as part of the contract.

The information asymmetry associated with a principal-agent relationship such as the one described herein holds the potential for the agent to not act in the best interests of the principal. This does not mean that the agent will cheat or shirk, only that the principal may not be aware of what those interests are or cannot connect the areas of interests to the specific expertise of the agent. On the other hand, the agent is contracted to perform a specific task, and he or she may be unaware of the policy interests of the principal or, once again, may not view these as a part of his or her responsibility to the principal. The relevant knowledge of the principal is the nature of the context in which the expertise will be applied; the relevant knowledge of the agent is, of course, the expertise, itself.

These potential problems may be exacerbated when the agent has contractual relationships with other principals. The governing body functions as the agent of the citizens of the jurisdiction. However, it is

not very likely that the members of the governing body will reach a consensus on what the interests of the citizens are in every policy area. In this case, the agent was also an agent of the potential bondholders, as well as an agent of his or her profession and the rules and regulations that define it. This variety of interests does not necessarily clash, but it does cause the principal and the agent to view salient problems and issues from different perspectives. In this case, the agent defined issues in terms of short-term financial impact, and was primarily oriented to the stability of the revenue stream made available to the bondholders. The members of the governmental body were concerned with equity in the distribution of the financial burden, and substantive policy issues such as conservation.

The long-term interests of the city included the effects of the rate schedule on economic development, the demographics of the city, and the composition of its revenue base. If the city is viewed as having the highest wastewater treatment rates in the state, property values will ultimately be affected negatively. The city's delay in addressing the need for capital improvements in water and sewer facilities admittedly left little time to consider these issues. The rate maker, however, clearly manifested a short-term perspective focusing on the interests of the bondholders. This is evinced by the fact that the nineteen alternative structures were presented in terms of their impacts on equity (the only substantive policy criterion presented by the city, but apparently defined narrowly by the rate maker), and the firm was primarily interested in revenue sufficiency and the stability of the revenue stream. The reclaimed water facilities were classified as part of the wastewater disposal system, despite the city's long-term interests in expanding the reclaimed water system in pursuit of conservation goals. For the rate maker, a customer was a customer, regardless of whether he or she was located inside or outside of the city limits. The rate maker was focused on the enterprise, and not on the city as a political jurisdiction. Thus, the council members and the citizens viewed the process as being driven by the rate consultant firm.

Clearly, there are policy concerns related to rate-making that cannot be ignored. Even if one adopts a strictly financial orientation to the process, there are policy issues attached to the very definition of costs. What can be done? First, the city as principal could write broader specifications for the contract which would include consideration of these policy issues; however, the city is still vulnerable due to its lack of

knowledge regarding the connection between rate schedules and policy area, and the professional orientation of the agent would likely dominate the decision making process. Second, the principal could make effective use of in-house expertise, but the neutrality of such expertise might become suspect if there is no consensus regarding desirable policy outcomes. Third, the city could procure "neutral expertise," such as citizen advisory groups comprised of residents with relevant expertise; another source of expertise might be local colleges as evinced by the role of the authors in this case; but such expertise should obviously be employed on an ex ante rather than ex post basis (as of this writing, the city is in the process of hiring a new rate consultant, and all of the bidders have expressed an interest in reviewing the authors' report). Although, this option would increase the decision-making costs, it holds out promise for more responsive policy making. Fourth, the principal should maintain the capacity to re-structure the rate schedule, and avoid long-term commitments to specific policies developed through short-term contracts; in this regard, the city got it right.

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