A CASE FOR WATER UTILITIES AS COOPERATIVES AND THE UK EXPERIENCE

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This article explores the creation of consumer cooperatives as a means of privatizing water utilities. The first section examines the structure of ownership and sets out Hansmann's theoretical basis for determining which category of persons is most efficiently assigned ownership. The section extends the discussion of market contracting costs by considering the externalities and social costs associated with a water utility. The heart of the paper is the second section which applies the theory of efficiently assigned ownership to the case of water utilities. The third section briefly reviews the literature on the relative efficiency of private and public utilities and also succinctly applies the theory of the firm to the question of vertical integration in the case of water utilities. The fourth section discusses the UK's experience with water utilities. The final section draws together the paper's conclusions.

The application of Hansmann's general theoretical scheme for assigning ownership leads to the conclusion that water utilities should be consumer cooperatives. Consumer-owned utilities would confront lower market contracting and ownership costs, than would investor-owned utilities. Additionally, the social costs and externalities that are particular to water are better left to consumers who are more prone to take them into account in their decisions.

The privatization of public assets usually takes the form of selling them or franchising their operation. This article explores the creation of consumer cooperatives as a means of privatizing water utilities. The first section examines the structure of ownership and sets out Hansmann's theoretical basis for determining which category of persons is most efficiently assigned ownership. (Hansmann 1988) The heart of the paper is the second section where we apply the theory of efficiently assigned ownership to the case of water utilities. We extend the analysis of market contracting costs by considering externalities. The third section briefly reviews the literature on the relative efficiency of private and public utilities and also succinctly applies the theory of the firm to the question of vertical integration in the case of water utilities. The fourth section briefly looks at the UK experience with the privatization of water. The final section draws together the paper's conclusions.

I. OWNERSHIP AND A THEORY OF THE ASSIGNMENT OF OWNERSHIP

This section begins with a synopsis of Hansmann's theoretical framework and finishes by opening the analysis to include externalities. There are various forms of ownership. Most small firms have sole proprietors or partners who typically supply labor along with capital, while almost all large-scale enterprises are owned collectively by investors who supply capital. There are also many enterprises owned by their customers. These include mutual insurance companies, mutual banks, business-owned wholesale and supply cooperatives as well as consumer retail cooperatives. Worker-owned enterprises are commonly found in professional services such as doctor and dental offices, as well as law, accounting, architectural and consulting firms. Lastly many private sector human service agencies as well as enterprises engaged in the arts are nonprofits and have no owners.

Ownership

The owners of a firm are defined as those persons who have two formal rights in common: the right to exercise control over the firm and the right to appropriate the firm's net returns. The net

returns include not only after-tax current profits but also any net increase in the value of capital assets or other rights that the firm may own. The ownership right to control is a legal one that is often limited to the right to elect a board of directors rather than direct control for direct control arrangements would prove to be inefficient.

Firm ownership is almost universally associated with persons, or firms, who have some transactional relationship with the firm other than ownership alone because that transactional relationship is able to economize on some market contracting costs that would otherwise be incurred.[1] Following Hansmann, the term "patrons" describes the collections of individuals or other firms who transact with the firm. There are various classes of patrons: purchasers of the firm's output and suppliers to the firm of some factor of production including capital.

A Theoretical Basis for Assigning Ownership

There are contracting costs associated with securing factors of production and selling output. While market failures such as market power and asymmetric information impact these market contracting costs, how market failures affect contracting costs depend on whether a firm's ownership rests with investors, workers or consumers. Furthermore, ownership itself has costs, costs that vary with the assignment of ownership. Efficiency calls for that assignment of ownership to the class of patrons which minimizes the sum of both the ownership costs of that class of patrons and the various market contracting costs incurred transacting with the other patron classes.

Market contracting costs

This article, as does Hansmann, focuses on three of the various factors that can lead to costly market transactions: market power, "lock-in," and asymmetric information.

[1] The exception would be a firm all of whose capital needs are secured through borrowing, its other factors of production obtained through the market and its output sold through a market.

Market power held by one class of patrons can cause another class of patrons to incur considerable market contracting costs. Imperfect competition, or worse yet monopoly, in the output market, for example, imposes significant market transacting costs on the consumers unless they are the owners.

Lock-in problems arise when a patron class must undertake significant transaction-specific investments when transacting with the firm and cannot fully contract in advance all conditions that will impact the returns to that investment. The possibilities for opportunistic behavior are dependent on which class of patrons is the ownership class.

Finally, a firm's having substantially better information about its performance and/or output can result in significant contracting costs for its patrons. If, for example, a water utility is investor-owned then the safety of the water supply, which is not apparent to consumers, involves the costs associated with a water regulator's inspections or consumers paying lab costs to have their water tested.

Ownership costs

Hansmann assembles ownership costs into three categories: monitoring, collective decision-making, and risk-bearing.

Ownership gives owners the legal right to set policies and to direct the firm's management. There are, however, costs incurred by the owners in exerting their control. Monitoring costs include:(a) owners informing themselves about the firm's operations; (b) owners communicating among themselves; (c) owners seeing to it that managers carry out their decisions; and (d) the cost consequences of any managerial opportunism realized when monitoring is less than perfect.

A large class of owners requires a collective decision-making process. The degree of heterogeneity of the ownership's interests is often the major determinant of the decision-making costs. The more diverse owners' interests are, the more likely it is that their decision-making costs will exceed market contracting costs.

To the extent that the level of risk willingly incurred impacts rates of return, the risk-bearing disposition of the owners can affect their second right of ownership, namely the right to appropriate

the firm's net earnings. Investor- and consumer-owners of a water utility will probably view differently the risk, for example, of a water shortage.[2] Furthermore, particularly when long-term relationships are involved, other patron classes may find that risk is created when market contracting with a given class of patrons, risks that would not be present or would be different if another class of patrons were the owners.

II. PRIVATIZING A WATER UTILITY: INVESTOR- OR CONSUMER-OWNED

Hansmann uses his general theory of enterprise ownership to explain why some firms are investor owned, some worker owned, some consumer cooperatives, and others nonprofits. In this section we employ his theory to assess whether a government should privatize a public water utility by selling it to private investors or transferring ownership to a consumer cooperative.

Privatization

A government can terminate its ownership of a public utility by selling it or turning it over free of charge. It goes without saying that selling to private investors has been the option of choice of Western governments. Given the market value of a water utility, it is reasonable to assume that a utility's workers could not be expected to borrow the capital required to buy it. Furthermore, we would argue that even a socialist government would not find it politically feasible to hand over the ownership of a public utility to its workers, thereby creating an enormous economic windfall for a small collection of individuals. The economic transformations in Eastern Europe have given rise to various schemes

[2] Yorkshire Water, in the UK for example, decided to be optimistic about rainfall in 1995 and under invested in a system that could redistribute water more easily and in repairing more leaks. In 1994-95, the utility had record profits. The 1995 summer drought, however, resulted in some 60,000 Yorkshire customers being put on notice that they might be cut off on a rota basis in the winter. Meanwhile, the utility faced substantial expenditures hiring tankers to ferry water into the cities. (PSIRU, 1996). We have, of course, no assurance that customer-owners would have acted differently. There is, however, a real difference between being an investor-owner who experiences record dividends and no water shortages due to living outside the service area and being a consumer-owner who experiences low water rates while also enduring the shortages.

for giving away shares to citizens. Such free share distributions are not, however, unheard of in Western countries.[3]

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Public utilities are, in effect, held by the state in trust for the public. The assets of public utilities have been paid for by their consumers via their rates and taxes, when public funds have been invested. Furthermore, in the case of water utilities there is nearly a perfect one-to-one correspondence between the "public" and water consumers. Consequently, unlike the cases of natural gas and telephone utilities where there is only a partial correspondence between consumers and the public, it would be politically feasible for a government to hand over a water utility to consumers.[5] Such a handover removes the weighty practical problem of how water utility customers might organize themselves so as to raise the capital to purchase the utility.

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[3] In 1979, for example, the British Colombian government gave each resident five shares in its Resources Investment Corporation. (Vickers and Yarrow 1991)

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[5] The New Zealand government considered having new power companies give away some or all of their shares to their consumers. (Boston 1992)

We assume that, rather than allowing consumers to act as a collection of independent investors, a utility is turned over to consumers as a cooperative. In turn we further assume that: (1) members cannot sell, bequeath or otherwise transfer their ownership or membership; (2) when consumers leave a water utility's jurisdiction, they automatically forfeit their ownership without any compensation and, correspondingly, when consumers move into a water utility's jurisdiction, they automatically become members without any initiation fee. Domestic, commercial, and industrial users are classified as consumers.

In summary, the paper limits its analysis of potential owners of a privatized water utility to two patron classes: investors and a consumer cooperative. The next task is to contrast these two classes' market contracting and ownership costs.

Cost of Market Contracting: Market Power

It goes without saying that the distribution of water is essentially a natural monopoly.[6] This monopoly power imposes obvious and potentially very substantial market contracting costs on consumers when a utility is investor-owned and its pricing is unregulated. It has long been recognized that investor-owned utilities need price regulation. The costs of operating the regulation apparatus are market contracting costs. These regulation costs include not only the staffing, office, and so forth, expenses of the regulatory agency, but also the costs incurred by the utilities themselves in gathering information and making their price request cases. There are also the government and industry costs realized when pricing decisions are appealed.

Price regulation also involves other kinds of costs. When the regulator uses a rate of return criterion there is the potential for Averch-Johnson regulatory bias whereby utilities substitute capital for other factors of production so long as the allowed rate of return is greater than the cost of capital, but less than the rate of return if the utility were free to maximize profits. (Averch and Johnson 1962)

[6] Exceptions to water distribution's being a perfect natural monopoly include bottled water and users directly extracting water from rivers and wells.

Such investment decision distortions have market contracting consequences for consumers in the form of higher prices that must sustain a given rate of return applied to a larger capital base. They also impact utility workers in the form of lower employment. There are also market contracting costs when the regulator applies yardstick competition. Briefly, the principle of yardstick competition is to assign each utility a "shadow firm" whose costs are the average costs of the other water utilities and then to make price-setting decisions based, in part, on these presumed competitive operating costs. (Shleifer 1985) Putting utilities in competition with one another in this manner can have, and in the UK did have, the unfortunate consequence of discouraging utilities from sharing information relevant to solving technical and other problems and thus not allowing them to realize cost-cutting savings. (Sawkins 1995)

The regulation costs incurred when utilities are investor owned are avoided when utilities are cooperatives for they can self regulate. Auto-regulation is both efficient and effective. The efficiency comes in saving all the assorted rate setting regulatory costs.[7] Furthermore, consumers save the market contracting costs of the profit allowed an investor-owned utility in its regulated rate. The effectiveness of auto-regulation stems from the consumer-owners electing or defeating co-op boards of directors which have rate-setting authority. When a cooperative runs a profit, consumers will share in the distribution of such profits or the profits will be invested in the utility and thus reduce capital borrowing costs that would otherwise have to be paid out of future water rates. Thus the notion of the membership exploiting itself by monopoly pricing is not conceivable.

The nature of the distribution of water allows water utilities to engage in price discrimination. Price discrimination creates the possibility that some customers enjoy rates that are subsidized by

[7] The US experience makes it abundantly clear that cooperative utilities can set their own rates and serve their customers well. In 30 of the 46 states where there are electric distribution cooperatives, the cooperatives' rates are not under the jurisdiction of states' utility commissions. Additionally, in the majority of those states where cooperatives' rates are regulated, they are subject to a streamlined rate approval process, indicating states' confidence in the ability of cooperatives to self regulate. The case with water cooperatives is comparable.

others. When a utility is investor-owned there usually is an appeal mechanism that protects against abusive cross subsidization, so too there should be a comparable appeal mechanism in the case of self-regulating consumer cooperatives.

Another perspective on the ability to engage in price discrimination is that it can be seen as a form of locally exercised industrial policy.[8] A utility that has reached or is approaching its water collection limits may not "want" a water-intensive industry to move into its jurisdiction and might price water so as encourage new water-intensive industries to settle elsewhere. It is not clear that regulators have the mandate or authority to address such issues. A consumer cooperative has an interest in considering such broader policy issues imbedded in water pricing. Water pricing that reflects the longer-term market and social marginal costs of water will lead to a more optimal use of water resources and a more socially efficient use of water collection and treatment capital.

Water safety standards are matters of law or directive. Other water characteristics that impact water's taste, hardness, rate of corrosion of metal plumbing, rate of sediment buildup, and so forth, are generally ignored by regulators and leave consumers with individual costs that can include expenditures on bottled water, the installation (and servicing) of water softeners, and elevated plumbing maintenance costs. A consumer cooperative would allow for discussion of setting water standards beyond the minimum levels. While higher standards would increase water treatment costs, if the increase in centralized costs is less than the sum of the individualized costs, then a consumer cooperative has a market cost-savings advantage over a regulated investor-owned utility.

Consumers need to be protected from the termination of services as well as from arbitrary and capricious treatment, and "honest mistakes." (Goldberg 1976) Regulators, and in some cases

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[8] Hollas, Stansell, and Claggett (1994) found that electric cooperatives came closer to achieving absolute price efficiency than did municipalities. They also found that municipalities engaged in non-economic based price discrimination by favoring residential and commercial customers over industrial customers. An interpretation of this finding is that the price inefficiency of electric cooperatives may be explained by a desire to draw industrial customers as a means of spreading their high fixed costs by attracting large users. They may also be seen as providing "services" to their customers in the form of the employment opportunities created by attracting industrial firms to the service area.

legislation, set guidelines for such consumer protections. While cooperatives seek to maximize consumer service, nonetheless they should establish appeal mechanism for aggrieved members.

Both investor and consumer owners can be expected to have to contract with lenders. Regulated investor-owned utilities tend to be seen as nearly risk free. Consumer cooperatives, with their natural monopoly and price setting authority, should similarly be perceived by lenders as nearly risk free.[9] To the extent that interest rates correlate with risk, both patron classes should confront similar market costs when contracting with lenders.

Obviously investor and consumer owners must contract with labor. Issues of relative efficiency of investor and cooperative enterprises are discussed in the next section, but to anticipate that discussion, it is not clear that either ownership class has the advantage in its labor market contracting costs.[10]

Cost of Market Contracting: Lock-In

Water utilities are capital intensive and aside from investments in assets such as offices, office equipment, vehicles, tools and so forth, the investment in water utilities is highly transaction specific. Not only would the assets' alternative use yield significantly diminished returns but putting them into alternative use would involve enormous initial costs such as digging up trunk lines to deploy them elsewhere.[11]

Are the owners of water utility capital obvious candidates for opportunistic behavior on the part of the other patrons? A utility's natural monopoly means that consumers have no alternative but to transact with the utility and hence have no chance to engage in opportunistic behavior that would

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[9] Some managers of rural water districts in the US report that bank loan officers tend to show little appreciation of the fact that because the loans will be paid out of the water rates, that a utility's real "collateral" is its customer base. (Source: Conversations with rural water district managers.)

[10] Workplace conditions have private and public good aspects. To the extent that water utility consumers simultaneously are the citizenry, cooperatives may, for example, perform cost-benefit analysis of workplace safety based on assumptions that tilt the analysis in favor of safety. Efficient wage theory suggests that such a pro-worker bias will, in the end, prove to be less costly.

[11] Some water utility capital essentially has no second-best use. What alternative use does, for example, a water dam have?

impose market contracting costs on the owners. Utility workers, given the general market availability of their various skills, are not in a position to threaten withholding services and extracting rents. Investor owners could face opportunistic-like behavior on the part of the regulator. This is not likely to occur given the regulator's fundamental interest in seeing that utilities continue to operate and are able to attract capital. It is not evident how customers of a self-regulating cooperative could engage in opportunistic behavior relative to their transaction-specific investments.

Cost of Market Contracting: Asymmetric Information

The regulator is dependent on the utilities for cost and other performance data. This dependence makes asymmetric information an inherent and real problem for price setting and poses the risk of "regulatory capture." Investor-owned utilities have incentives to introduce an upward bias into their cost forecasts and after the fact it may be hard for the regulator to distinguish between improved efficiency performance and pessimistic cost forecasts.[12] Problems of asymmetric information do not occur when utilities are consumer cooperatives for they do not require price regulation. Furthermore, the cooperative principle of open books means that asymmetric information should not be an issue among consumer groups (e.g., domestic vs commercial customers) as they assess the rates set by the board they elected.

Water quality also involves asymmetric information for, short of engaging in costly water testing, consumers take on faith water's meeting safety standards. The literature on cooperatives agrees that in cases of asymmetry of information regarding product quality and of trust, goods and services are most advantageously provided by demand-side stakeholders. (Ben-Ner and Hoomissen 1991, Easley and O'Hara 1983) As suggested earlier, cooperative may find it efficient to set higher than minimum water quality standards.

[12] In a sense, the regulator faces a paradox for utility "success" means that a utility performs better than the regulator forecast and set prices for, while at the same time that same success can be seen as the regulator's "failure" to set a low enough price.

Ownership Costs: Monitoring

Whether a board acts for investor or consumer owners, there seems to be no *a priori* basis for expecting differences in the monitoring costs associated with a board's informing itself about the operation of the utility and communicating among board members. There may, however, be differences in the costs of bringing board decisions to bear on the utility's management and the costs of opportunism on the part of management.

Indirect evidence of relative monitoring costs is obtained from the literature on the efficiency and expense preferences (emoluments) on the part of managers at stock savings and loans and mutual savings and loans (MS&Ls).[13] In the US shareholders' control over the management of MS&Ls is a fiction, and thus theory posits that MS&Ls should evidence higher expense preferences than stock S&Ls.[14] However, the evidence on MS&Ls that converted to stock S&Ls does not support the hypothesis of improved efficiency. Carter and Stover (1990) found no significant change in expense preference variables due to conversion and conversion per se had little apparent impact on the perquisite consumption behavior of management. Carhill and Hasan's (1997) findings similarly contradict the hypothesized expense preference of mutuals. Blair and Placone (1988) discovered no evidence that mutuals were inherently prone to expense preference. Cebenoyan, Cooperman, Register and Hudgins (1993) applied cost frontier methodology and concluded that mutuals and stocks had similar cost structures and that inefficiency was not significantly related to the form of organization. Mester (1993) also applied a cost frontier approach to 1991 data and inferred that various measures of inefficiency showed that, on average, stocks were less efficient than mutuals. Hermalin and Wallace (1994) inferred that, in the absence of controls for lines of business, stocks were less efficient.

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[13] We resort to this companion body of literature because so far as we can determine the literature on utilities does not directly address issues of managerial efficiency and expense preference. For our present purposes it would be desirable to compare credit unions with S&Ls and MS&Ls, unfortunately the literature on credit unions only looks at relative performance within the credit union industry.

[14] American MS&Ls are characterized by (and have legal support for) self-perpetuating, rather than member-elected, boards.

While there are risks to drawing inferences from another industry, the literature reviewed above suggests that cooperative water utilities should not face higher monitoring costs than do investor-owned utilities.

Ownership Costs: Collective Decision-Making

The collective decision-making costs that are internal to boards are expected to be equivalent for investor- or consumer-owned utilities. The domination of cooperatives' boards by directors "representing" commercial customers and the lack of expertise on the part of domestic customer "representatives" are potential, but not significant actual problems. (Source: Conversations with managers of rural water districts in the US) The discussion that follows refers to the costs associated with boards of directors obtaining input from the shareholders or consumers.

Collective decision-making is less costly the more homogeneous the owners' objectives are. One potential source of efficiency of investor-owned enterprises is the owners' presumed singular focus on maximizing the net present value of earnings. Investor owners are heterogeneous, however, in their time horizons and rates of discounting. While voting by shareholders may produce decisions that are inefficient when there is a discrepancy between the mean and median shareholders' time horizons, in practice, boards rarely solicit shareholders' input for investment decisions. Instead, to the extent that institutional investors, with their reputed short-term time horizon, hold significant blocks of shares, boards and managers of investor-owned utilities will be biased toward investments with short-term returns. In a subsequent section we consider the impact a short-term view on investment may have on the externalities and social costs associated with a water utility.

Service, even in the case of water, has numerous facets and hence it is simplistic to say that a focus on maximizing consumer services makes consumers owners congruent in their interests. Consumer owners may not have homogeneous opinions regarding desired services. However, when consumer owners are approached as parents and grandparents, they are likely to have more homogeneous and longer time horizons than are investor owners. If this is the case, then it should result in consumer-

owner investment decisions that are closer to being optimal from a broader social perspective. Persuading cooperative members to take a long view is not likely to be a simple, much less a one-time task.[15]

When there are more consumers than investor-owners, then the market costs of soliciting and tabulating input from owners will be greater for a consumer-owned utility. However, aside from board member elections and other key matters, information may be efficiently collected from consumer-owners using sample surveys. (Giroux 1992)

Ownership Costs: Risk-bearing

Investor- and consumer-owners are likely to differ in their attitudes toward bearing risk. In the case of a water utility such differences are not particularly relevant for four reasons. First, water's natural monopoly nature and the presumption that the regulator will not behave, or be allowed to behave, in a capricious manner, offers a relatively risk-free investment environment. Second, water demand is relatively straightforward to forecast, thus investment in a water utility faces little demand-side risk. Third, changes in water technology are slow, and more importantly, because they are natural monopolies, water utilities face no investment risk associated with a competitor's adopting cutting-edge technology. Fourth, there is inconclusive evidence regarding the relative efficiency of consumer- and investor-owned utilities, hence relative efficiency should not suggest any differing risk consequences for lenders of capital.

Another aspect of risk bearing is the risk that may be created when one, as opposed to another, class of patrons is the owner. Additional market contracting costs will be incurred in the future when a water utility inappropriately postpones long-term investments. To the extent that investor owners have shorter time horizons and base decisions on market rather than social costs and benefits, investor-owned utilities have a greater risk of long-term under investing.

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[15] Managers of rural water districts in the US report that often customers have forgotten the utility's cooperative roots and have even come to regard it as a public/municipal service. (Source: Conversations with managers of rural water districts.)

Market Contracting and Ownership Costs: A Summary Comparison

When ownership assignment of a water utility is made on the basis of which patron class minimizes the sum of the market contracting and the ownership costs, then consumers should be allotted the ownership. This conclusion is fortified when, in the next section, the analysis is broadened to include social costs and the externalities that are particular to water.

In terms of market contracting costs, consumer cooperatives save the various costs associated with rate regulation. These costs include those of running the regulator's office and utilities' staff time devoted to interactions with a regulator. The savings also include those of associated with regulatory bias or the diminished sharing of technical information among utilities. Furthermore the problems of asymmetric information faced by the regulator of investor-owned utilities are non-existent when the utilities are consumer cooperatives. Similarly asymmetric information regarding water quality is not an issue when a utility is consumer-owned.

In terms of ownership costs consumer- and investor-owned utilities are alike. Risk-bearing considerations bring in the considerations of time horizon, social costs and externalities, and their impact on long-term investment decisions, a topic we discuss below.

The conclusion in favor of consumer cooperatives should be coupled with a reminder that there is nearly a one-to-one mapping between water consumers and citizens. It is reasonable for government authorities to turn over a public water utility to its consumers because water utility infrastructure has been paid for out of water rates and possibly taxes.

Social Factors, Externalities and the Actual Buyer

Water has characteristics that make it different from other utilities and result in its having important non-market qualities.

Social factors

Water tends to be viewed as an essential service rather than simply as a product. Scottish voters, for example, made it abundantly clear that they regard water as a public asset and as an essential public service when 94% of the 1.2 million voters in the 1994 Strathclyde Referendum voted to keep water as a public service.

Part of what makes water unique, as compared to other utilities, is that the lack of water has not only individual but public health consequences. Indeed it is hard to draw the line between "regulatory" and "public policy" issues. (McGowan 1995) Furthermore, problems can arise because the responsibilities for the social aims and obligations associated with ensuring access to water fall between three stools: the utilities, the regulator, and the government. (National Consumer Council 1993) Water consumers, given that they are the citizenry, should be capable of assuming the responsibility for determining the social aims and obligations associated with ensuring access to water. When the utility is a cooperative, then the utility, regulator, and "government" roles are subsumed by the one entity and hence there should be lower market contracting costs associated with a cooperative overseeing the access to water. There might also be fewer cases being missed that would otherwise have fallen between stools.

Externalities

Water collection, the treatment of sewage and grey waters, decisions about reducing leakages and the installation of water meters all have obvious and important environmental consequences. Thus there are significant externalities, social costs and social benefits associated with the investment decisions and the practices of water utilities. These externalities and social consequences merit consideration for it is best to broadly the frame the question of whether society is better served by a water and sewerage utility that maximizes profits or membership service.

Management of investor-owned firms, given the market for corporate control, tends to think in terms of next quarter's earnings and hence to look less favorably on long-term investments.[16] This is particularly true when long-term investments have externalities that may not enhance earnings even in the long-term. Investor-owned utilities that prove reluctant to make long-term investments may be pushed-- as they have been in the UK-- by the regulator into making them. Such an investment environment is not likely to maximize social welfare. Consumer-owned water utilities, on the other hand, should be more disposed to make long term investments that maximize social welfare for their goal is to maximize service, not profits.

When establishing environmental regulations, the regulator may include social costs and benefits along with market costs and benefits when performing cost-benefit analyses. Investor-owned water utilities have incentives to exclude social benefits and hence arrive at different cost-benefit analysis conclusions that are then used to challenge regulations and mandates. A profit-maximizing utility is not only motivated to reduce costs when meeting environmental directives, but may make compliance decisions after weighing the savings associated with regulation non-compliance against the expected value of the monetary penalties associated with getting caught.

The practices of water and sewerage treatment facilities can have substantial environmental consequences. The pollution track record of the ten privatized water utilities in the UK has not been a good one. Between 1997 and 1998, for example, all ten water companies have been found guilty by the courts of polluting and three of them were among the UK's Environment Agency's worst ten polluters, as measured by the size of the fines. (PSIR 1999)

Investing to expand metering, and hence to limit water demand, has implications for investments in water collection. Investments in water collection and reducing leakage are both complements and

[16] A study of electric utilities found that CEOs of not-for-profit utilities had lower turnover rates than did CEOs of for-profits. (Peters 1993) One interpretation of this finding is that CEOs of not-for-profit utilities have longer time horizons.

substitutes.[17] Investments and maintenance expenditures that diminish leakage not only have environmental implications but also have the social, nonmarket repercussions associated with the stewardship of scarce natural resources. The externalities associated with such stewardship tend not to enter into the cost-benefit calculus of investor owners and as a consequence the Office of Water Services in the UK has had to set guidelines and requirements to push the privatized utilities into certain investments.

When the water utilities are organized as integrated river-basin management authorities-- as they were in the UK in 1973-- this means that pollution created by a water utility impacts its own downstream facilities and consumers, not those of another utility. Under such an integrated water system consumers will be disposed, or experience will teach them, to take a long-term view of regulations and investments for the downstream consumers participate in electing the board. Under such an integrated water system investor owners are not likely to live downstream and hence their market-cost concerns are limited to the impact that their upstream pollution will have on their water purification facilities downstream. Consequently investor-owned utilities have less incentive not to pollute.

The actual buyer

When a government seeks bids for the sale of a major water utility it faces three problems. One, there are only about nine internationally active water companies. Two, there is not open competition among them.[18] (PSIRU 1996) The lack of competition can be expected to have price/bid limiting consequences. Three, the fact that in many cases the company or consortium with the winning bid is

[17] Investment in main trunk lines between water undertakings can also be an alternative to investment in water collection facilities.

[18] For example, Lyonnaise dex Eaux owns 25% of Aguas de Barcelona, consequently Aguas de Barcelona never bids against Lyonnaise. Alternatively the competition is limited by the formation of consortiums as happened in the case of Argentina in 1993 when the competition was limited to two bids: one from a single internationally active water company and a consortium of four. Furthermore, these companies are known to moved back and forth between bidding against one another in one country and bidding together as a consortium in another country. (PSIRU 1996)

based overseas adds a level of complexity to the issue of democratic control of a vital public service. The loss of democratic control is a considerable problem when customers/voters feel as strongly as did the 1.2 million voting in the Strathclyde referendum. The three problems simply do not arise when the utility is turned over to the consumers, which strengthens the case for creating cooperatives when privatizing.[19]

Social factors, externalities and the actual buyer: a summary

The social factors and externalities associated with the long term investments in a water utility consistently suggest that current and future generations stand to be better served by owners who are disposed to maximize member service and to take a broad, long-term view of investment. The significant problem of the loss of democratic control associated with selling a utility to investors is obviated with the creation of a cooperative.

The non market contracting costs and benefits further tilt the balance in favor of a consumer cooperative's being the optimal owner of a privatized water utility.

III. RELATIVE EFFICIENCY AND VERTICAL INTEGRATION

The choice between investor- and consumer-ownership should consider whether one form of ownership tends to be a relatively more efficient utility operator. Furthermore, a full discussion of the optimal ownership should also address the issue of vertical integration. After a review of the literature on relative efficiency, we apply the theory of the firm to the question of the vertical integration of a water utility.

Relative Efficiency

Two theoretical arguments are made for investor-owned firms being relatively more efficient than other ownership forms. First, when ownership rights are transferable, then efficiency gains will be

[19] Obviously the first two problems are replaced by the fact that the public coffers receive no compensation. However, as we pointed out earlier, it is the customers who have paid for the utility.

capitalized into the market value of the firm and that, in turn, such capitalized gains can be captured by the owners through the sale of their ownership rights. (De Alessi 1974) Second, the capital markets will impose discipline for if outsiders determine that a firm could be run more efficiently they may buy an ownership position that allows them to replace the directors and/or management. Theory suggests that because cooperative and municipal utilities' ownership is not transferable, they will not be as efficient as investor-owned utilities.

The literature shows the proposition that investor-owned water utilities are more efficient than municipal water utilities to be false. We report on investor-municipal comparisons because our review of the literature did not uncover any studies that compared cooperative water utilities to other ownership forms of water utilities.[20]

Crain and Zardkooi (1978) found evidence for publicly-owned utilities being higher cost than private utilities. Feigenbaum and Teeples (1983) utilized that same data set and came to the opposite conclusion. The difference in the studies' findings is explained by Feigenbaum and Teeples' inclusion of additional input variables. A major contribution of their paper was to show that empirical analysis of ownership efficiency is highly sensitive to specification bias that results from the exclusion of important inputs and/or the misspecification of the functional form of the cost structure and/or improper measurements of the variables. Teeples and Glyer (1987) discovered that cost differences may be correlated with, but not necessarily caused by, ownership forms. They noted that city water suppliers work in relatively high cost environments, and that public utilities are at least as efficient as private when one controls for city. Lambert, Dichev, and Raffiee (1993) used a linear programming approach and concluded that publicly owned utilities were more efficient overall as well as in the technical efficiency associated with the employment of inputs. Bhattacharyya, Parker, and Raffiee

[20] There is a broader literature on the relative efficiency of electric utilities, some of which looks at cooperatives. This literature is somewhat mixed in its findings, but more typically finds cooperatives to be less efficient.

(1994) found evidence that, on average, public water utilities are more efficient that private utilities, but that they were more widely dispersed between the best and worst practices.

Vertical Integration

Normally a water utility incorporates the functions of water collection, purification, and distribution. Treatment of sewage is also commonly integrated into a water utility. When a government privatizes a water utility it must determine whether to do so as a single unit or to break it into parts.

Vertical integration, or where to draw the boundary of a firm, matters when specific investments are required and the quasi rents from the investments cannot be fully apportioned in advance because it is not possible to write detailed long-term contracts. (Hart and Moore 1990) The inability to write complete contracts means that there is an optimal distribution of the rights of control, which, in turn, says that there is an optimal allocation of asset ownership. (Hart 1988) The optimal distribution of asset ownership hinges on a balancing of the costs of contracting and those of vertical integration. On the one hand, the lower an asset's appropriable quasi rents, the more likely it is that the firm will contract for the services of the asset rather than integrate the asset into the firm. On the other hand, the more specific an asset is and the more appropriable its quasi rents become, the more cost of market contracting tends to rise relative to the costs of vertical integration. (Klein, Crawford and Alchian 1978)

The benefit of vertical integration is the firm's being able to adapt to changing conditions without having to recontract. (Williamson 1979) The gains from not having to recontract must be traded off against the bureaucratic costs of managing the asset within the firm. The tradeoff favors vertical integration as asset specificity deepens. (Williamson 1988) Assessing the tradeoff is complicated by the fact that while integration alters the incentives for opportunistic and distortionary behavior, it does not necessarily remove these incentives. (Grossman and Hart 1986) Furthermore, the costs of integration may be different in kind from the benefits. (Moore 1992)

The investments required in water collection, purification, and distribution are highly transaction specific. Water distribution networks have no real alternative or second best uses. Water collection and purification assets could service another water utility but only after considerable investment in high-volume trunk lines. Because of the complementarity of water collection, purification, and distribution, if owned separately the surplus each generates is substantially dependent on access to the other two assets. Furthermore, if separately owned they will tend to trade only with one another. For these reasons, water collection, purification, and distribution assets should be controlled together. Investments in water collection, leakage control, meter installation are substitutes and are, therefore, most effectively coordinated when there is single ownership.

The treatment of sewage is a physically distinct function and is separable from water collection, purification, and distribution. It is, however, a complement with water purification when one sewerage facility's discharge impacts the water quality of another water utility. In the UK, where water utility service areas are defined by river basins, the integration of water and sewerage makes considerable sense for, aside from discharges into the sea, laxness on the part of one sewage treatment facility only adds to water treatment costs of a water treatment facility operated by the same utility. Furthermore, an argument for a water utility's being a consumer cooperative is the advantage of a single entity's making unified decisions that impact the environmental and social costs and benefits associated with water.

The functions of connecting new customers, maintaining pipes, maintaining utility facilities, collecting bills and other office functions can reasonably be franchised or contracted out. These service operations require little capital. On economic policy grounds, one could argue that when a utility is investor-owned that it should be reduced to its basic natural monopoly elements which are subject to regulation. This means that the non-monopoly functions should be franchised or contracted out and thus not fall under price regulation. On social policy grounds we would argue that, in the case

of a cooperative, these functions should not be franchised out so as to maintain the unity of the utility, regulator and "government" roles.

In summary, neither relative efficiency nor vertical integration give the edge to one form of ownership over the other. The empirical literature on relative efficiency is inconclusive and does not sustain the theoretical arguments that investor-owned utilities should be relatively more efficient. When a government privatizes a utility it should keep the collection, purification, distribution and sewage treatment functions within an integrated entity.

IV. THE UK EXPERIENCE

This section offers a brief overview of the recent history of water utilities in the UK. It also looks at the issues of pricing, metering, and other regulatory matters, as well as the state of consumer attitudes toward the privatized utilities.

Background and Structure of Water Utilities

In recent decades the water industry in England and Wales has undergone considerable consolidation. Until the mid 1950s there were over 1,000 water utilities. By the early 1970s there were 198 water undertakings, of which 64 were run by a local government, 101 were run by more than one local government, and 33 were private. In 1965 29 river authorities were created and given responsibilities for water conservation, land drainage, fisheries, control of river pollution, granting licenses for water extraction, including to water utilities, and regulation of discharges via discharge consents. The 1973 Waters Act brought about further consolidation by the establishment of nine regional water authorities in England and the Welsh water authority. The ten integrated river-basin management authorities provided logically defined zones, zones that connect water and sewage treatment by creating economic incentives that are internal to a water authority not to allow substandard discharges up river because down river it will have to treat those substandard discharges. When the local government water assets were turned over to the ten new water authorities the local

governments received no compensation, although local authorities were usually represented on new boards. The fact that the local governments were not compensated lends considerable weight to the earlier argument that a government could reasonably turn over ownership of a water utility to its customers without charge.

By 1989, when water was privatized, there were 31 water utilities, 21 of which supplied water only and had always been private. The ten consolidated water utilities created in 1973 were the ten privatized in 1989. They supplied water and sewerage services and accounted for approximately three quarters of the some 20 million domestic consumers.

Environmental control and enhancement functions of the National Rivers Authority, Her Majesty's Inspectorate of Pollution, Waste Regulation Authorities, and some parts of the Department of the Environment were brought together by the Environment Act 1995 that established the Environment Agency, a non departmental public body.

Pricing and Metering and Other Regulatory Matters

The Office of Water Services, commonly referred to as Ofwat, has jurisdiction over the water utilities. In the event of a dispute between a water utility and Ofwat, the utility can appeal its case to the Monopolies and Mergers Commission. Because pre-privatization there were a number of independent private water utilities the regulator had data that enabled applying yardstick competition in setting prices.[21] Furthermore, the price formula adopted by Ofwat promised the utilities future prices that annually would rise faster than the rate of inflation, provided that key investment objectives in each region were met.[22] Indeed between 1988/89 and 1993/94 water prices, on average, rose by

[21] In October 1996 the Trade and Industry Secretary blocked the first bid of one British water utility to buy another British water utility because he agreed with the Monopolies and Mergers Commission that such a merger would harm competition in the industry because the regulator uses comparisons between different utilities to set price levels. (*Financial Times* October 25, 1996, Section III p. 1, 18.)

[22] The formula for price increases includes the rate of change in the retail price index, the "K factor" that is intended to cover costs of providing particular service, especially investment costs necessary to meet water quality standards, and a factor that takes into account circumstances that are particular to a given utility and give rise to special costs.

62%, or roughly twice the rate of inflation. (National Consumer Council 1993) The cost of water to consumers has, however, risen less rapidly in recent years as a result of the price limits set in 1994.

Some 85% of domestic water customers do not have their water metered. Instead non-metered customers pay charges based on the rateable value of their home and the local water utility's rate per pound of rateable value. A problem with such scant reliance on metering is that very few customers face marketing signals that encourage them to economize on water usage. Indeed much of the expansion in water demand is not due to new connections, but rather to the general rise in the ownership and use of water-using appliances in the home and garden. (Ofwat 1993)

In the mid 1990s Ofwat directed the utilities to find an alternative to rateable values by the year 2000, and has been encouraging expanding the use of metering. With Ofwat's prodding there has been a substantial increase in the number of metered customers. While analysts expected meters to increase bills, due to the amortization of the meter cost, evidence suggests that metered households' bills are lower. (Public Works Online 1998) Ofwat has also been telling the water utilities that they must improve their leakage rates. Ofwat's pushing increased metering and attention to leakage suggests that the investor-owned utilities are performing their cost-benefit analysis on the basis of market costs while Ofwat is also considering social costs and externalities.[23] Consumer cooperatives would remove the tension between a regulator who takes a larger than market cost view and investor-owned utilities that are market cost driven.

There is customer discontent with the privatized water utilities. Customers have seen water bills go up by more than twice the rate of inflation and are further disgruntled when they learn of water

[23] "It is generally accepted that expenditure on leakage control should be increased to the point where the incremental costs involved are balanced with the incremental costs of alternatives for balancing supply and demand, for example resource development or demand management (such as metering), including environmental costs and/or benefits. ... He [the regulator] has yet to see, however, a practical and quantified example of the methodology which is seemingly so widely supported in principle." (Ofwat 1996 p.21)

utility profits rising and imagine their rates being paid out in excessive salaries and dividends.[24] Further evidence of customer disquiet is found in relative responses to the summer droughts of 1976 and 1995. In 1976 customers perceived themselves to be in common cause with the water utilities, while in 1995 that perception was gone. (Kay 1996) Even though water utility actions were essentially the same in both droughts, the 1995 drought set off a wave of hostility against the privatized utilities. In addition to customer perceptions of escalating prices giving rise to increased profits, the "deepest" problem of privatized water is its apparent lack of legitimacy. (Kay 1996) There is a sense among customers that the primary purpose of the privatized utilities should be to attend to their customers, to be accountable to them and not to regulators, and further that obligations to shareholders should only be to the extent needed to ensure that the utilities can satisfy their primary purpose. There would have been no loss of a sense of common cause and no issues of legitimacy and democratic control had consumer cooperatives been established.

V. CONCLUSION

The application of Hansmann's general theoretical scheme for assigning ownership leads to the conclusion that water utilities should be consumer cooperatives. Consumer-owned utilities would confront lower market contracting and ownership costs, than would investor-owned utilities. Additionally, the social costs and externalities that are particular to water are better left to consumers who will be more prone to taking them into account in their investment decisions and water practices. Investor-owned utilities apparently need to be pushed by a regulator to expand their otherwise restricted cost-benefit perspective.

In short, present and future consumers are likely to be better attended by a cooperative that seeks to maximize service than by an investor-owned utility that endeavors to maximize profits.

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[24] Before the 1997 elections the Labour Party, for example, talked about making the privatised water companies share future "excess profits" with consumers, in addition to imposing a windfall tax on past profits. (*Financial Times*, December 10, 1996, p. 9.)

Furthermore, it is realistic to imagine a government's turning over a public water utility to its citizens, the water consumers. Finally, a cooperative provides for democratic accountability.[25]

The empirical research on relative efficiency implies that there should be no loss of efficiency when the utility is consumer- rather than investor-owned. An application of the theory of the firm points to water collection, purification, and distribution being vertically integrated. There are arguments to be made for sewage treatment's also being integrated into the same utility.

Problems of customer discontent and the regulator's having to press the utilities on certain matters would have been avoided had water been privatized as cooperatives. In this connection, the UK structure of river basin management adds weight to the argument for cooperatives.

The water utilities in Scotland are not now in private hands, but rather there are twelve Regional and Island Councils that are responsible for water supply. The boundaries are administrative boundaries, not river basins. The inexorable conclusion to be drawn from this paper is that, if privatized, Scottish water should be handed over as consumer cooperatives with boundaries redrawn to allow for river-basin management. Such a move would provide an interesting and insightful experiment with fascinating comparisons with the investor-owned water utilities in England and Wales.

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[25] Rather than limiting voting to water customers, a cooperative could ensure greater by democratic accountability by having the board elected by voters in the service area and thereby including those who are not billable parties.

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