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The Water and Wastewater Industries:

What is the Market? What are its Mechanisms?

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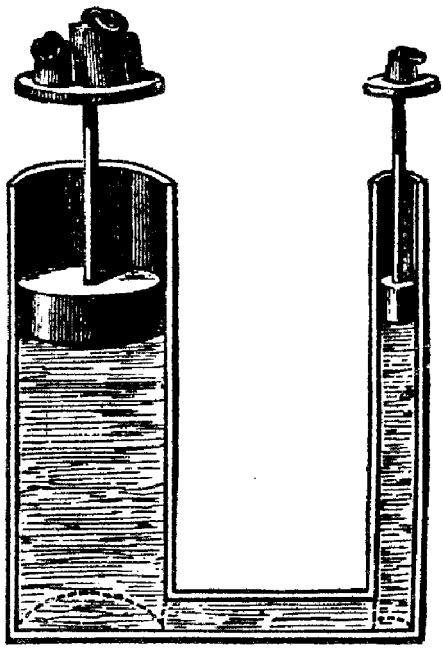

Pascal's Principle

ABSTRACT

Is the water business the last of the quintessential natural monopolies? Is it different from other businesses? Whether it is or is not, can government regulators (both economic and environmental) utilize market based mechanisms and regulatory incentives to bring about more efficient, economical means of serving consumers with a safe water supply?

So far, water regulators in the USA have not applied the lessons learned from the deregulation of other formerly fully regulated, suppos-

edly natural monopoly industries, or even those learned from the privatizations of water utilities throughout the world. Furthermore, the fact that governments own the bulk of the industry in the United States complicates matters, because a government agency may not react to incentives or market mechanisms in the same way as a private company.

The water and wastewater industries may now spend almost as much on capital expenditures as the electric utility industry, despite little growth in volume. Consumers face an endless round of price increases (and, in some places, water shortages) unless the industry and the regulators can find innovative and efficient alternative means of serving consumers.

Right now, in an odd way, the water business resembles a combination of the nuclear power industry before its fall, the corporate business in its heyday, an old line manufacturer that discovered neither outsourcing nor the Internet, and an underfunded public health agency trying to prevent this year's flu epidemic with the vaccines for last year's strain of flu.

Until now, the industry has done a credible job of supplying safe water at low prices. It should continue to do so in the future, although at higher prices. But the industry has to face the challenges of aging infrastructure, more stringent environmental rules and the allocation of a finite supply of water to different sectors of a growing economy.

It could meet those challenges more efficiently by incorporating into its plans and processes the lessons learned from the re-engineering, reorganization and refinancing of the energy utilities, another supposed natural monopoly different from all other businesses.

COMPETITION

Policymakers throughout the world have introduced (or reintroduced) competition to all of the formerly regulated public utility or transportation industries. Of those industries, water and wastewater, though, has undergone the least restructuring and remains the most regulated.

The Thatcher government dreamed of competitive water transfers over pipelines throughout Britain. Instead, the British ended up with

competition at the margin: suppliers vied to put in place water projects to serve selected large customers. In other countries, water supply operators compete to obtain multi-year contracts or concessions, but that competition ends with signature of the contract.

In truth, the UK water regulator has shown less interest in promoting competition than his counterparts for other industries.

> Competition in the water industry… has not traditionally been a regulatory priority… The emphasis was on the facilitation of competition rather than its overt… promotion.[1]

Water suppliers could compete to serve large new customers and existing customers that take 250 megaliters per year (about 80 million gallons). This so-called "inset appointment" has introduced a modicum of competition to the business. Promoting common carriage of water has proven an even bigger problem, because the directors of the local utility (that carries the water) are responsible for the safety of the water, and can go to jail if the water does not measure up.

In the USA, state regulators have dealt with investor-owned water utilities in the same way for almost a century: with rate of return regulation. That type of regulation encourages capital intensive solutions and encourages efficiency only through regulatory lag. The investor-owned utilities usually hold monopolistic franchises.

Of course, in the USA, governments own most of the water supply and wastewater entities. Basically, neither the state nor the federal government exercises economic regulation over those entities, which incidentally operate as unregulated monopolies, in the sense that only their owners regulate their prices.

One could argue, however, that consumers, who are voters, too, can exercise more effective regulation than regulatory agencies, because voters can vote out the government officials that exercise authority over the government-owned utilities. One could argue, too, that the creditors of those government utilities, and the bond rating agencies also act as reactors, requiring that the utilities maintain solvency.

In any case, regulation (whether by state agency or by owner) focuses on getting enough revenue in the door to cover costs, not on setting prices that reflect the costs of individual services or that encourage efficient production and usage of the product. Regulated and politically set prices (possibly one and the same), in fact might not cover costs

because the regulators or owners do not properly measure costs.

The flap about the need for proper measurement of depreciation in municipal utility accounting is a sign of a problem of measurement. The recurrent rupture of old water mains in certain cities, and the reliance on old pipes makes one think that some owners are milking their utilities, hoping that the disaster and the subsequent price hike take place after the next election.

But why have policymakers steered clear of introducing competition in these businesses?

For one, they are not sure how to do it, and they must also deal with these arguments against competition:

- **The utility has a huge fixed asset base**. Duplication would require tearing up streets, and involve competitors in disputes over rights of way, covering vast tracts of land with reservoirs, and fights to use resources owned by none of the disputants. A network built to support all inhabitants but serving only a fraction of those inhabitants would have to charge high unit costs in order to survive.

  (One could, however, divide the region into parts, give each part to a different owner-operator, and then set up a pricing system that rewards the local monopolist that does the best job, as measured by service levels or costs.)

- **Other deregulatory schemes make use of the concept of a utility that acts as common carrier for competing suppliers to the customer**. That works well for carriage of natural gas and electricity. Basically one supplier's electricity or gas is the same as another's. Mixing water from different suppliers, though, could create a health problem, because contaminants in the water provided by one supplier could affect the purity of all the other supplies with which it was mixed. (Presumably, though, stiff licensing requirements and penalties would ensure uniform quality. The old argument that you can't mix the products because people drink water makes no sense. People also eat food, a product that mixes ingredients and processing from many firms.)

- **Prescriptive federal health and environmental rules** determine too much of industry activity and costs, so the introduction of competition would have only a marginal impact on costs or opera-

tions. (A competitively oriented utility, however, might seek to find more cost-effective ways to accomplish those health and environmental goals.)

- **Water and wastewater utilities already run efficiently**. They do not need the stimulus of competition. (That is what they all said, before deregulation. Every industry undergoing deregulation found ways to reduce costs.)

We will leave out that old saw that water is too heavy to transport far, which leads the industry to local monopoly. (You could say the same for cement.)

In looking at the lack of real progress to date in introducing competition to the water business, with the exception of competitive inserts and bidding for concessions or contracts, should we conclude that water really is a natural monopoly in all respects, or that the interested parties are not clever enough to see how to do it, or that the low price of water discourages potential entrepreneurs, or that, in the United States, the predominance of government ownership discourages potential competitors?

And make no mistake about the latter point: the highly capital intensive nature of the water business combined with favorable tax treatment for government debt makes unlikely the exit of governments from the business.

If we put aside the creation of a competitive water business, though, we still can change the regulatory structure, corporate organization and pricing to bring the industry's actions closer to those that we would expect in a competitive model.

Regulation and Pricing

Let's start with regulation. Supposedly, in a regulated market, the regulator attempts to act as a proxy for a competitive market. In other words, the regulator sets prices at levels that a competitive market would reach, at which point firms earn no more profit than is justified by the risk undertaken. All that competition, of course, forces industry participants to reduce costs to the minimum in order to remain competitive or make a better profit than their opponents.

Somehow, the American regulatory system got off the track. Instead of attempting to simulate the actions of a competitive market, the regulators focused on the profit, setting an acceptable profit at a given return on investment.

They added that allowed profit to the costs of operation, to derive the required stream of revenue. The regulatory regime incentivized the regulated utility to add to its investment (as long as the allowed return more than covered cost of capital) but did not incentivize the utility to reduce non-capital costs, because the utility could collect all those costs from customers.

That is not the way a competitive market works.

(Admittedly we have simplified. The system does have efficiency incentives in the sense that rate cases take time. The utility facing rising costs cannot collect additional revenue to cover those added costs until the end of the rate case. For that matter, when costs are falling, the utility does not have to reduce prices to reflect the lower costs until the end of the rate case. And, finally, regulators have a long record of disallowing unreasonable or imprudent expenses.)

The municipal utility operates in a similar fashion. It must earn enough to cover the debt service charges, and possibly have something left over to distribute to its owner. The utility may operate efficiently or it may act as an employer for an excessive number of the politically connected.

The utility, no doubt, wants to keep the price of water below a politically sensitive level, but neither the owners nor the users have an objective means of determining that the utility runs as efficiently as possible. The utility does not have to meet competitive pressures, and neither do any of the utilities against which it could be benchmarked.

There is no market test, here, for management. Furthermore, since the owners focus more on total revenue than on any of the prices, price need not serve the purposes it does in a competitive market.

James C. Bonbright, the legendary regulatory economist, defined two roles for price in an unregulated market:

> In the first place, the rate of output of any commodity will so adjust itself to the demand that the market price will tend to come into accord with production costs. But in the second place, competition will impel rival producers to strive to reduce their own production costs in order to maximize profits…[2]

Bonbright then declared that utility regulation brings prices and costs together, then he asked, "Where is the efficiency-incentive counterpart?"[3] and he concluded that regulatory incentives "are very ineffective in comparison with the stimulation of direct and active competition."[4]

THE PRICING SYSTEM FOR THE UTILITY (WHETHER PUBLICLY OR PRIVATELY OWNED) SHOULD:

- **Reflect the economic costs of production of each product produced—**Otherwise, consumers will take too much of the product sold below cost, and too little of the product sold above cost, thereby wasting society's resources. Not to mention the fact that the consumers that have to buy the above-cost product subsidize those that can buy the below cost product. Pricing each product or service in line with costs, however, presupposes knowledge of those costs.

- **Provide the utility with incentives to operate more efficiently—**The pricing system should encourage the utility to supply its product using the most economical combination of resources. The only way to do that is to focus on the price of the product, rather than on return earned or cash flow produced, and set a price formula for a lengthy enough period to allow the utility management to think ahead. In order to insure that the utility does not cut corners, the regulator should set standards for service, with penalties for falling below the standards.

- **Provide sufficient revenues to cover legitimate expenses, remunerate capital, and attract new capital to the enterprise—**These are the old public utility standards, but the water business still fits that mold, especially given the major capital expenditures required to replace ancient plant and meet new water quality standards.

TO GET THE RIGHT PRICING SYSTEM, WE NEED SEVERAL INGREDIENTS:

- **Proper allocation of operating and capital costs between functions within the water utility—**In other words, if the utility does

not know its costs, broken down by function, it cannot properly charge those users who use those functions.

- **Time of use metering—**Admittedly, water customers should not require the sophisticated systems that electricity consumers will require, but time-of-day, time-of year and volume do matter from a cost standpoint. Proper metering, furthermore, is a prerequisite for the introduction of competition in the future.

- **A price cap formula that takes into account the peculiarities of the water business**—Price cap regulation, as the British experience shows, does a wondrous job of encouraging the utility to reduce operating costs. Unfortunately, as shown by British and American experience, it encourages the utility to reduce service levels (because doing so cuts costs) and to minimize capital expenditures (because the utility cannot raise prices just to earn a return on the new capital investment).

  Furthermore, if the regulator does a bad job setting the price for the multi-year period, the utility could end up earning a sub-par profit for years on end, which would hurt its ability to raise capital, or it could earn an excessive return that no regulated monopoly deserves. But, as demonstrated by models developed by Ingo Vogelsang of Boston University, it is possible to develop a hybrid price cap formula with rate of return safeguards.[5]

Thus, even if we accept the idea that the water and wastewater industry should remain as a regulated monopoly, we believe that changes in the regulatory and pricing system would permit it to operate as a more efficient, and flexible regulated monopoly. To the extent that the owners of government utilities want to encourage more efficient operations of their utilities and want to encourage consumers to use water more efficiently, these same principals should apply to them.

PROBLEMS WITH THE GOVERNMENT SECTOR

Proponents or opponents of public participation in the water sector often get bogged down in ideological polemics that categorize all government-owned utilities as inefficient, or that assert that private enter-

prise should not mess around with organizations so vital to public health. Leaving aside the ideologies, publicly owned enterprises (as presently constituted) present problems for the introduction of competitive elements into the water business:

First, they have no obligation to cover costs, as long as the government owners are willing to subsidize them. As it is, they might not even know costs, given that they did not have to book a real depreciation number, and won't until Government Accounting Standards Board Statement No. 34 (GASB 34), issued in June 1999, kicks in.[6]

Second, governments borrow money at lower rates than investor-owned companies, and they do not pay taxes and do not have to earn a compensatory return on equity. Investor-owned entities look upon this tax advantage as a subsidy conferred on their potential competitors, and that advantage probably deters competitive activity from non-government entities. Furthermore, the difference in costs, as reported and as used in calculating prices, means that benchmarkers have to determine how much of the price differences come from better operations and how much from tax advantages.

As a final point, government agencies that look upon borrowing costs as the cost of capital, and then conclude that their agencies have lower costs of capital, and that customers will benefit from that lower cost may have done their calculations wrong. Cost of capital is determined by the risk associated with the project in which the capital is invested, and as noted by Wirick, Borrows and Goldberg:

> The discount rate applied to future streams is intended to adjust for risk; risk is not reduced merely because the interest paid is low.[7]

To put it simply, a government agency that incorrectly calculates the risk can dump the cost of the error on the consumers or taxpayers. An investor-owned organization does not have that luxury. Not even regulated monopolies have the right to pass on all costs to consumers.

Thus, we have to face up to the fact that the predominance of government-owned utilities makes it difficult to introduce real competition, and that the government-owned utilities will not go away, so we have to find other ways to introduce market discipline to the water and wastewater industries.

Breaking Up

Okay, how does one introduce more efficiencies into the business? As a start, perhaps policymakers should determine which functions are natural monopolies, which gain from execution on a large scale centralized basis, and which do not.

In other words, if someone else can perform the same function on a decentralized basis for less, why should the monopolist do it? As a hypothetical and heretical example, suppose that it will cost $4 billion to build a central filtration plant to serve 4 million customers (and you all know that the facility will take longer than expected to build and cost even more money), which equals $1,000 per customer, but that water filters placed on faucets cost $200 per customer.

Why do it centrally? Why should the utility do it at all? One should begin with the premise that, as a matter of public policy, the monopolist should do only what only a monopolist can do better.

Then we move to another dirty word, "outsourcing." Water people have their own euphemism, "privatization," but it is outsourcing. No organization should keep activities in house that somebody else can do more effectively.

Does the local utility really need its own payroll, accounting or billing department, as an example?

"Privatization" in other industries (and in the water business in many countries) has meant the sale of the publicly owned entity to a privately owned firm. In the American water business, nowadays, it means the continued government ownership of the water utility's assets, but the outsourcing of some or all of the operating functions, or possibly the leasing of the assets to an operator for an extended period of time.

Presumably, the private firm has the skills needed to operate the entity more efficiently, and the contract shares some of the savings with the government owner of the facilities. This form of privatization, however, could create a conflict between the interests of the owner and the

operator. The former wants the assets well maintained whereas the latter wants to keep down operating costs.

This is not a formula for optimal decisionmaking.

The supposed savings from the contract might be offset by deterioration in plant. Of course the contract would spell out the condition of plant required at the end of the contract, but who wants to fight an expensive lawsuit?

Breaking up the integrated water supplier might help to determine what parts of the business should remain in the hands of the monopolist, and force each part of the business to stand on its own. For instance, why should the water utility distributor own the water source, or the long distance pipeline, or the treatment plant? Those are different functions than local distribution. An operator that specializes in one of those functions might run it better than the local utility, and might even achieve economies of scale by running the same function at numerous water utilities.

In times of shortage, water utilities either seek voluntary compliance with conservation rules, or take coercive action (in concert with the government) in which they allocate the shortage to different parties. In the rest of the economy, those who want a product in short supply the most pay the most for it.

People who do not want to pay up do not want the product as much, and they believe that they would be better off spending the money on something else. Okay, we know the objections: "Water is vital to life. You can't have people die of thirst because they can't afford water."

But it turns out that the tiny price people can and do pay for drinking water is much higher than the value of water for other purposes. If people are willing to pay more for water, why shouldn't those with lower-value uses have the opportunity to sell the water to the drinkers? Wasteful water use would dry up if the wasters (low value users) had a way to sell to those who really needed the water.

The other objection is this: "People don't care what water costs. They won't reduce consumption when the price rises. You just have to build the new facilities and bring in new supplies."

That, basically, is what nuclear power plant builders said when they finally realized the high cost of nuclear power. They were wrong.

Consumers cared, and when prices went up to cover the costs of those plants, demand did not reach expected levels. All water consum-

ers might not react to price, but some will, especially if their businesses were built on consumption of below-cost water.

Finally, has anyone ever thought about applying antitrust laws and concepts to big water entities that acted in a manner to throttle competition through their pricing of bottleneck facilities? Regulators made sure that the telephone company did not stifle the entry of competitors that had to use some of the telephone company's facilities in order to reach their customers.

Now regulators are working on how to make sure that electricity transmission owners do not prevent competitors from using their lines. Does any agency anywhere watch to make sure that government and private water utilities do not act in an anti-competitive manner? That might help.

Conclusion

All the other deregulated public service companies, it seems, claimed that they were natural monopolies, that deregulation would bring chaos, that the public would suffer, and that they had already done everything possible to ran in the most efficient manner. Maybe water is different.

Maybe not.

But even without introducing competition, we need a pricing system that provides incentives to encourage more efficient utility operation and more efficient use of a precious resource. Doing so, though, requires less prescription and more encouragement to find the most economical solutions.

And we need to encourage markets for water, as if it were just another commodity, so that capitalists will store it, trade it, transport it to where it is needed, transfer it from owners who do not want it to those who do at the lowest possible cost.

End the water monopoly?

Who knows?

Make the business more efficient and responsive and waste less water?

For sure.

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