Viewpoint

The World Bank May 1996

Note No. 77

Regulating Water Companies

Michael Klein and Timothy Irwin

The water industry differs in two key respects from other network industries, such as gas, electricity, and telecommunications. First, there are fewer opportunities for introducing competition among suppliers, since the network of pipes is a major element of the total cost of water and can be operated efficiently only as a monopoly. Second, the quality of water is crucial, but hard for consumers to check. Together, these problems mean that getting the best performance out of water companies requires regulation by the government of the price and quality of water.

To regulate well, however, the regulator needs to have an idea of how much it would cost an efficient company to supply high-quality water. One way of generating that information is to auction the right to supply water every twenty years or so. Firms state the price at which they would be willing to supply water of a specified quality, and the firm offering the lowest price wins the contract. In between auctions, however, regulators need to use other methods to adjust the price in response to changing circumstances. No method is perfect; the best may be to increase the price every year by the rate of inflation, perhaps with an adjustment for expected productivity changes, and review the price every three to five years to ensure that the water company's profits are reasonable The importance of investments to maintain the quality of water means that regulators should be careful, when reviewing prices, to allow the firm to cover the costs of such investments.

Why regulate water companies?

When water is sold by street vendors, consumers have a choice of suppliers. As a result, water sellers have an incentive to sell water at a price not much higher than its cost and to take steps to show that the water is safe to drink. But the arrival of piped water changes everything. It is much, much cheaper than water sold by vendors, as table 1 suggests. In the Asian cities in the table, these lower prices are due in part to government subsidies. But even when the subsidies are taken into account, piped water is still at least 50 percent, and usually 75 percent, cheaper. At the same time, however, consumers lose the choice of suppliers that they used to have.

In the nineteenth century, water companies laid competing pipelines in towns in Canada, the United Kingdom, and elsewhere But it is usually efficient to have just one network of pipes, and as a result of either free competition or municipal regulation, the competing networks

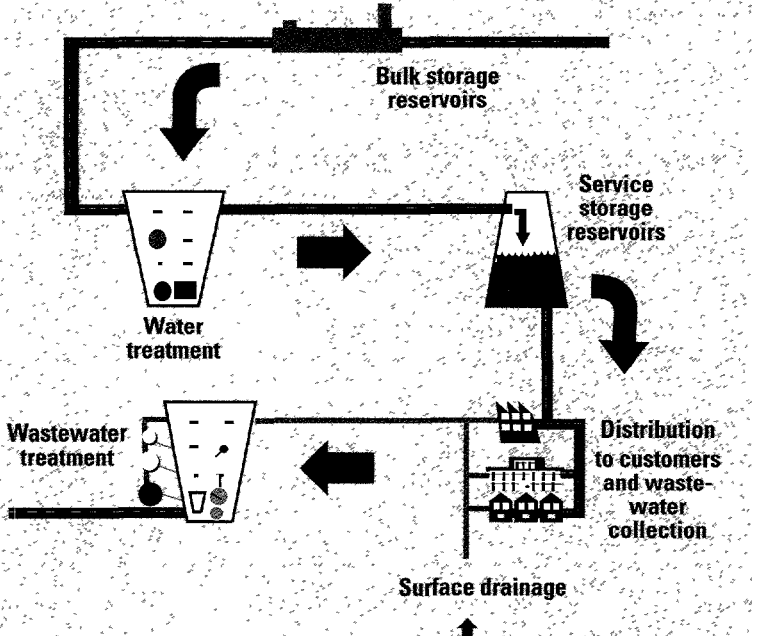
TABLE 1 PRICE OF VENDED AND PIPED WATER
(U.S. cents per cubic meter)

City	Vended	Piped
Bandung	616	10
Jakarta	185	17
Manila	187	11
Karachi	175	8
Ho Chi Minh	151	8

Source: Asian Development Bank, *Water Utilities Data Book—Asian and Pacific Region* (Manila, 1993).

of the nineteenth century soon turned into monopolies. Technically, the water supply system is a natural monopoly· the cheapest way to supply water involves just one firm owning a network of pipes. Water monopolies, of course, can and do exploit their privileged position In the worst case, they may even be able to charge as much for water as the street vendors, in which case all the benefits of piped water accrue to the monopoly

FIGURE 1 MAIN COMPONENTS OF WATER AND SEWAGE SYSTEMS



Source: North West Water, "The Advanced Water Cycle" (1994).

In some industries in which networks are important—gas, electricity, and telecommunications—governments have limited the scope of the natural monopoly problem by separating production from transmission through the network. Thus, competing electricity generators, for example, can send power to consumers using one network. Theoretically, this is possible in water too

Competing water "production" firms that own the bulk storage reservoirs and water treatment plants (figure 1) could sell water to a company that distributed it to consumers through one network of pipes Although such a system has recently been proposed in Chile, no one has yet succeeded in implementing this sort of competition The reason is probably that network-related costs are a larger proportion of total costs in the water industry than in gas, electricity, and telecommunications. The gains to be made from introducing competition in, say, water collection and water treatment are thus relatively small, and they have to be weighed against the coordination problems introduced by splitting up ownership of the system

Competitive water supply may be efficient near the boundary of two water companies' territories or in regions where water is very scarce and therefore the cost of the network is lower relative to the cost of the water. Competition is also possible for services peripheral to the main service, such as connecting new users to the system. But for the time being, most water will be supplied monopolistically, and society needs some way to encourage efficiency despite the monopoly.

The difficulty of regulating well

In villages, consumers can form cooperatives to run the water system themselves, since the producers are also the consumers in such a system, they have good reason not to charge too much for water or to be careless about its quality. But in larger regions, consumers need to delegate the problem of setting prices and quality standards to someone else. The traditional option is to delegate it to the government. Government ownership doesn't automatically solve the problem, however. Monopoly suppliers of all types are tempted to charge high prices or to lower quality And government ownership introduces its own problems, since the government, as an owner, usually exerts relatively weak pressure on firms to lower their costs.

Whether the water firm is publicly or privately owned, the key to achieving efficiency lies in the choice of a regulatory mechanism to over-

see the firm's performance. Good mechanisms protect consumers from high prices and low quality But they also safeguard the legitimate interests of the water companies, since, if the companies are to invest, they need to believe that the regulators will let them earn enough revenue to make a reasonable profit.

If the regulator had enough information—in particular, if it knew what it would cost an efficient water company to produce water of different *qualities*—it could simply rule that the actual water company had to sell water of a certain quality for a price equal to the efficient firm's cost of production. That price would be just high enough to allow an efficient water company to make a reasonable profit, but no higher. Neither the company nor the consumer would be exploited. And, as technology and demand changed, in this perfect system, the regulator would revise the price and the quality standard so that they were always at the right levels.

In fact, of course, the regulator cannot easily tell how much it would cost an efficient firm to produce water At best, it can observe actual firms' costs, but these can be concealed by clever accountants. Moreover, an important part of a water firm's cost is the cost of the financial capital tied up in the firm. Estimating the cost of that capital requires an estimate of the riskiness of the investment, complicating the regulator's information problem yet further. With imprecise cost estimates, there's always a risk that the regulator will set the price too high, hurting consumers and unnecessarily discouraging water use, or too low, encouraging the wasteful use of water and discouraging investment by water companies

In addition, because the regulator probably guesses what it would cost an efficient firm to produce water partly by observing the actual water company's costs, the water company no longer has such a strong incentive to produce efficiently. Since lower costs would lead the regulator to lower the price the company can charge, the company would not get all the benefits of cutting costs.

A big part of the regulatory problem, therefore, is to design rules that give the regulator access to better information about the appropriate price of water.

How to generate good information

Probably the best way of discovering the appropriate price is to establish a competitive system of tendering—or "auctioning"—the right to supply water The regulator says, for example,

A small town in France managed to cut the price of water from 3.0 francs per cubic meter to 1.7 francs when it decided in 1994 to auction the right to supply water

that it wants a firm to provide water of a specified quality. It then asks firms to propose a price for supplying the water The firm that proposes the lowest price wins the right to supply the district at that price (or perhaps at the price of the next-lowest bidder—the details of the auction can vary). In principle, the most efficient supplier of water will win the auction, and the resulting price will be appropriate.

Experience confirms the value of auctions In Buenos Aires in 1993, for example, the winning bidder offered to deliver water at a price about 27 percent lower than the price under state ownership Although the price later increased, it remained lower than it had been What's more, the new supplier agreed to invest US$200 million a year for the first five years, compared with annual investment of US$20 million to US$40 million in the preceding years. In another example, a small town in France managed to cut the price of water from 3.0 francs per cubic meter to 1.7 francs when it decided in 1994 to auction the right to supply water

Yet auctions are no panacea To keep up with changes in technology and demand would require repeating the auctions every couple of years—which is what happens, for example, with garbage collection in many cities Water companies, however, must make investments with a life of decades that have little value in other uses. Pipes, once laid, will last for years, and digging them up later to move them to a new site is prohibitively costly A water company that could easily lose its contract in an auction next year would therefore be justifiably cautious about long-term investments.

The problem is partially addressed by requiring a new winning firm to pay the old firm for the pipes and other immovable assets But working out the price the new firm should pay is difficult For one thing, the pipes are underground and their condition is hard to assess. To encourage valuable investments, then, auctions must be repeated only infrequently (every twenty years perhaps), or the incumbent must be given an advantage over other bidders But either way some of the benefits of the auction are lost First, an incumbent with a privileged position has weaker incentives to offer the lowest possible price at the next auction Second, technology and demand—and therefore the appropriate water price—change during the term of a twenty-year contract. Between auctions, the regulator must again try to estimate how the right price has changed.

How to adjust prices between auctions

How should regulators adjust prices between auctions? Over three- to five-year periods, the best option is probably to adjust them in a mechanical way Traditionally, regulators in the United States have adjusted prices so as to keep the company's rate of return on capital at a constant level. If the company's rate of return falls below that level, the regulator allows prices to rise The problem with this method is that it gives the company little incentive to limit its costs and, when the target rate of return is higher than the cost of capital, it gives the company a strong incentive to invest more—in anything at all

More recently, therefore, the United Kingdom has chosen to change the price by means of a formula, known as *RPI–X*, that increases the water price by the increase in the retail price index adjusted by a factor, *X*, to account for expected productivity gains and other changes. Under this method, the company has incentives to lower costs, since it keeps the resulting profits. The method can also be refined by choosing a price index that relates more specifically to the input price inflation experienced by water companies. Care needs to be taken, however, to avoid re-creating the problem of compensating the company for cost increases it could have avoided.

RPI–X price adjustments are probably better than rate-of-return price adjustments, but the difference between them is not as big as it might seem *RPI–X* formulas need to be reviewed every three to five years or so, since the regulator does not know exactly how large *X* should be and, in reviewing whether *X* was set appropriately, will take into account the profits being made by the firm: for example, if they are very large, *X* is probably too small In addition, the importance of quality means that regulators should allow firms to pass on the costs of reasonable investments that maintain water quality.

The undesirable incentive effects of both *RPI–X* and rate-of-return adjustments can be reduced by comparing the prices charged by other water companies in different, but sufficiently similar locations, as happens in the United Kingdom. If comparable companies can profitably sell water at lower prices than the company under examination, the regulator may be justified in keeping prices low despite low profits

Michael Klein, Manager, Private Sector Development Department (email. mklein@worldbank org), and Timothy Irwin, Private Sector Development Department (email. tirwin@worldbank org)