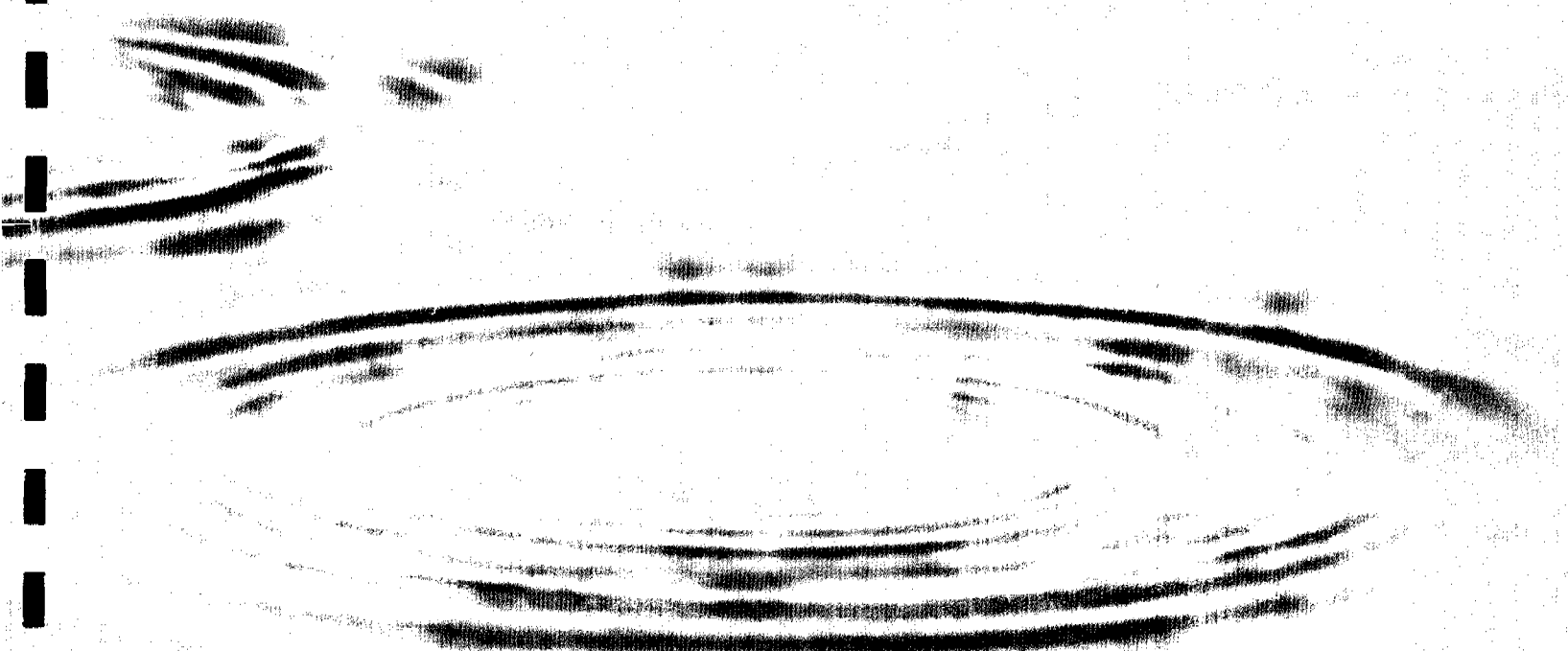


# Creating Performance Incentives Through Regulation and Benchmarking



1999  
**WATER** SUPPLY  
&  
**SANITATION** HUMAN

Quantifying Sustainability

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# Creating Performance Incentives Through Regulation and Benchmarking

**Moderator:** *Penelope Brook Cowen, Senior Private Sector Development Specialist, Private Sector Development Department, The World Bank*

**Speakers:** *Tony Ballance, Chief Economist, Office of Water Services, (OFWAT), (United Kingdom)*

*Warrick Smith, Manager, Private Sector Development Department, The World Bank*



**1999 Water Supply & Sanitation Forum**  
**April 8 – 9, 1999**  
**Water & Sanitation Division**  
**The World Bank**

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## Introductory Notes

More and more governments are turning to the private sector for assistance in improving the efficiency and coverage of water and sanitation services. But successfully engaging the private sector – and, in particular, persuading the private sector to take on commercial and investment risk in water and sanitation provision – depends on the broader policy and institutional environment in a country. This session will focus on a central element of this environment: the institutions put in place to monitor and regulate service providers.

Investments in water and sanitation networks and production/treatment facilities are highly capital-intensive, and typically amortize over long periods. They are also in large part what economists refer to as “sunk” investments – they cannot easily be picked up and taken elsewhere if business goes poorly, or if politicians intervene and change the rules of the game. Accordingly, private companies are unwilling to make substantial investments in water and sanitation unless they have confidence of making a reasonable return on these assets over their useful life. But this is a reality that combines poorly with traditional approaches to tariff-setting for water and sanitation in most developing countries. On average, tariffs in the sector in developing countries cover less than half the costs of delivering water services, and politicians are often highly resistant to increasing tariffs to cover costs, and to maintaining cost recovering tariffs over time. Governments seeking to encourage private sector participation in water and sanitation – and, in particular, private investments in the upgrading and expansion of services – thus often face the dual problem of raising tariffs to cost recovery levels before contracting, and putting in place regulatory arrangements that will credibly yield sufficient tariffs over the life of a private sector contract.

Giving investors a credible assurance that they will earn a reasonable return on their assets is, of course, just one side of the story. Regulators must balance the interests of investors against the interests of consumers – seeking both to protect the latter from potential abuses of monopoly power by service providers, and to create and maintain incentives on providers to pursue efficiency improvements in operations and in new investments.

In most developing countries, governments face serious problems in designing and implementing regulatory arrangements that are (a) endowed with sufficient capacity to operate effectively, and (b) viewed by both prospective investors and consumers as fair and credible. These problems are often particularly pressing in the water and sanitation sector (by comparison with other infrastructure sectors), because of such factors as the relatively high degree of decentralization of the sector, and frequently poor information about the state of sector assets at the beginning of PSP processes.

Governments have two main tools at their disposal in seeking to design regulatory regimes to achieve these broad objectives:

The powers that are conferred on regulators and the rules that are set out to guide regulatory decisions; and  
The design of the regulatory institutions themselves.

This session will focus on possible approaches to these two issues in the water and sanitation sector in developing countries. The first speaker, Dr Anthony Balance (Chief Economist of OFWAT), will talk about ways of designing and implementing regulatory rules to create strong performance incentives for service providers, including the use of benchmarking. The second speaker, Warrick Smith (Manager of the Private Participation in Infrastructure Group at the World Bank) will talk about options for designing regulatory agencies so as to reinforce their independence from political intervention, and in particular, options for developing credible regulatory regimes in decentralized systems. Commentary will be provided by a small panel of regulators from developing countries.

Penelope Brook Cowen  
Session Leader

## **Biographies**

### **PENELOPE J. BROOK COWEN**

Ms. Brook Cowen is a Senior Private Sector Development Specialist with the Private Participation in Infrastructure Group at the World Bank. She has been involved in advising on the design and implementation of private sector contracts in a number of countries, including Albania, Bolivia, Ghana, the Philippines, Slovenia, and South Africa. Her interests include the design of private sector participation to accommodate the needs of countries with severe governance problems, and the tailoring of private contracts and regulatory structures to ensure improved access for low-income households. She led the preparation of the Toolkits for Private Participation in Water and Sanitation, published by the World Bank in 1997. Before joining the World Bank, Penelope was an Associate Director in the Investment Banking Division of CS First Boston New Zealand. There, she was responsible for economic and commercial advice to government and private sector clients on regulatory reform and privatization, across a range of sectors. From 1988 to 1990, she served as a founding director of Trans Power New Zealand, a state-owned enterprise responsible for New Zealand's electricity transmission system.

Ms. Brook Cowen holds a masters degree in economics (first class honours) from the University of Auckland, New Zealand, and a doctorate in economics, specializing in public policy and industrial organization, from the University of Oxford. She is an Honorary Associate of the Centre for Energy, Petroleum and Mineral Law and Policy at the University of Dundee.

### **TONY BALLANCE**

Tony Ballance joined Ofwat in May 1993. He had previously worked as a senior economist at the International Wool Secretariat, the organization responsible for promoting the wool mark.

Mr. Ballance is an economist by background and was educated at the University of Wales, Aberystwyth, the University of Kansas and the University of Manchester (where he completed his Masters and Ph.D. in Agricultural Economics). He became Ofwat's Chief Economist in October 1996 and is responsible for the areas of competition policy, charging policy, and the supply/demand balance. He is a member of the Society of Business Economists.

### **WARRICK SMITH**

Mr. Smith is Manager of the Private Participation in Infrastructure (PPI) Group in PSD, and Co-chair of the PPI Thematic Group. Since joining the Bank in 1993, he has advised on a wide range of PPI issues in all infrastructure sectors and in all regions of the world. His work typically focuses on market reforms, the design of regulatory and institutional frameworks, and strategies for dealing with political

and regulatory risks. He has written widely on these topics, with a particular emphasis on approaches in countries with weak institutional capacity.

Before joining the Bank, Mr. Smith held several senior posts with the Australian Government. He was Secretary of the inquiry established by the Prime Minister to develop a policy, regulatory and institutional framework for introducing competition into Australia's infrastructure sectors; Principal Counsel responsible for international business law in the Attorney-General's Department; and Director responsible for international markets in the Department of Energy. He also spent several years working on international trade policy matters in the Department of Trade, as well as a period in private legal practice in the US and Australia. Mr. Smith is trained in economics, law and public administration, with degrees from the Australian National University and Harvard University.



**Creating Performance Incentives  
Through  
Regulation & Benchmarking –  
The UK Water Model**

Dr. A. J. Ballance  
Ofwat

# **Creating Performance Incentives Through Regulation & Benchmarking- The UK Water Model**

**Dr A J Ballance  
Ofwat, UK**

**Friday 9 April 1999**



# Agenda

- Water regulatory framework (England & Wales)
- Price cap regulation
  - a bit of theory
  - incentives
- Comparative competition
- Techniques for assessing efficiency
  - cost drivers
  - techniques
  - trade-offs
- Improving service performance
- The Ofwat package

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## 1. The water regulatory framework (for England and Wales)

- 27 water (and sewerage) companies in England and Wales
- Privatisation in 1989
- Licences of appointment (for 25 years)
- Geographic monopoly within specified areas
- Role of the Director General
- Customer Service Committees
- Quality regulators (EC, Government, DWI and Environment Agency)

3

## Water companies in England & Wales



WASC boundaries are based here on sewerage areas

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## Role of the Director General Statutory duties

- To ensure that companies carry out their functions
- To ensure that companies can finance their functions
- To protect customers
- To promote economy and efficiency
- To facilitate competition

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## The 1999 Periodic Review

- The K factor (5 year) price cap
- Comparative competition
- Cost of quality
- Appeals to the Monopolies and Mergers Commission (MMC)
- The business planning process
- Methodology

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## 2. Price cap regulation A bit of theory ....

- RPI-X is medium-term, incentive-based, price-cap regulation
- Higher profits are the engine of lower prices
- Using comparative competition to simulate a competitive market
- Strong incentives for improving cost efficiency and service performance
- Incentives are a mixture of rewards and penalties

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## Medium term etc. ....

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- **STABILITY** - Price limits set for five years
- **OUTPUTS** - Companies must know what has to be delivered and by when
- **RISKS** - Lion's share with company (but some carried by the customer as this is cheaper)
- **OUT-PERFORMANCE** - Goes to customers in the longer term

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## Strong incentives ...

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- Beat the Regulator's assumptions on costs and you keep the difference (at least until the next review)
- Lower cost base feeds through to lower prices periodic review to periodic review
- Brownie points for good service!
- BUT - PR timetables promote game playing
- Cost savings must be possible

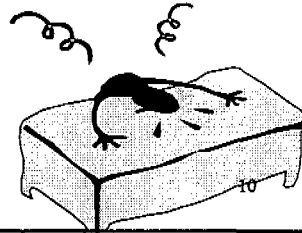
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## Rewards and penalties ...

- Must deliver service & outputs or sky falls in (...Yorkshire Water in 1995!)
- Try to get incentive balance right -
  - high performance = high returns
  - good performance earns cost of capital
  - low performance = trouble on all fronts



VS



## Track record so far ....

- 1989 settlement too easy - a one way bet for owners and companies!
- 1994 determination
  - corrected imbalances
  - turned out rather softer than we thought
  - **but** did deliver on cost reductions & improved service!
- 1999?

## Incentives are about ...

- Creating the right climate for **future** efficiency improvements in all companies
- Removing barriers and distortions that might affect cost-effective decisions
  - capex / opex trade-offs
  - reduce potential for regulatory gaming
  - minimising the PR timetable hiatus
- Clear & consistent regulatory rules

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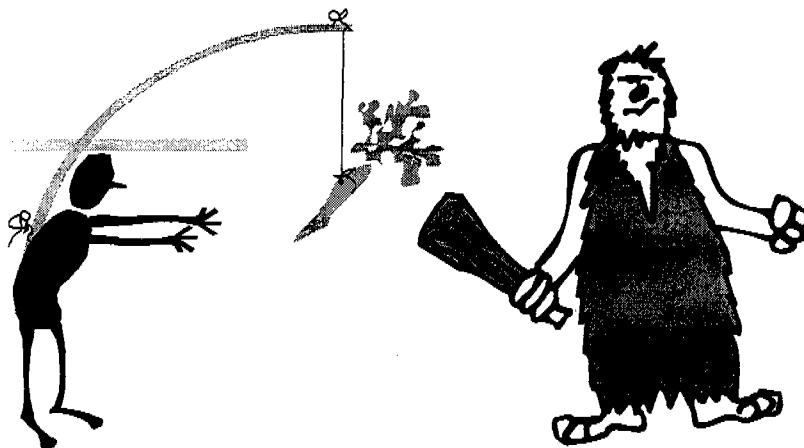
## Incentives not helped by...

- Feather-bedding
- Leaving barriers and distortions that affect proper decisions
- Changing the goalposts
- Inconsistency policies review to review
- Too much uncertainty about how the next review will be carried out

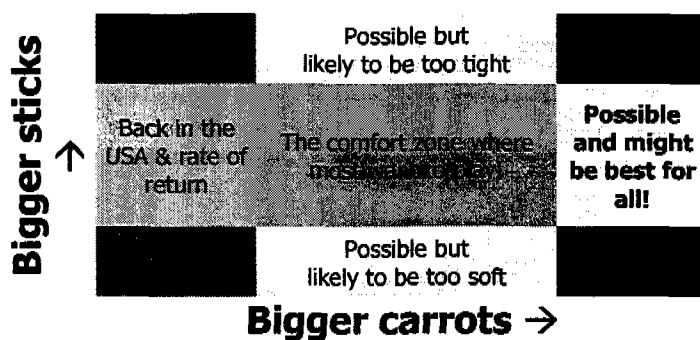
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# So it is all about carrots and sticks



## Carrots & sticks?



### 3. Comparative competition

- Where market competition is limited (eg the water industry in the UK)
- Comparisons cover costs (allowing for differences in operating environments) and performance (particularly service to customers)
- Publication of league tables of costs and performance

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### Comparative competition continued

- Role of the City
- Significant number of independent comparators
- Role of mergers
- Cost/output matrix

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## 4. Techniques for assessing efficiency - cost drivers

- Identification of cost drivers:
  - base service level
  - quality
  - balancing supply & demand
  - enhancing service levels
- Cost elements:
  - opex
  - capital maintenance (depreciation)
  - return on capital
  - tax

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## The framework for setting price limits

- $K \rightarrow P_o - X + Q \pm V \pm S$
- Where,
  - $P_o$  - passed out-performance
  - $X$  - future efficiency gains
  - $Q$  - quality standards
  - $V$  - enhancements to the security of supply (balancing supply & demand)
  - $S$  - enhanced service levels

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## The price cap

- Incentive regulation and efficiency
- Measuring past efficiency gains -  $P_0$  (or a "glide path")
- Estimating future efficiency -  $X$
- Profit sharing and benefit sharing
  - formal
  - voluntary
- The period between price reviews

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## Techniques for assessing efficiency

- Econometric analysis applied to:
  - operating costs
  - capital maintenance expenditure
- Unit cost analysis
  - cost base analysis
  - applied to capital maintenance expenditure and capex enhancement

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## Techniques for assessing efficiency continued

- Benchmarking
  - metric
  - process
- Total factor productivity
- Capping of allowable costs:
  - use of the regulatory capital value
- Economic appraisal techniques
  - least cost approach to balancing supply and demand

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## The use of econometrics

- Explaining differences in costs
- Differences in operating environments
  - climate
  - geology
  - topography
- Positive correlation between efficiency rankings and subsequent efficiency savings

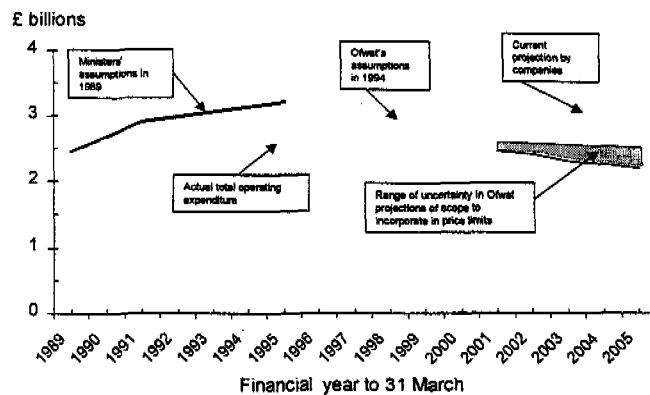
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## Procedure for developing models

- Expert review of potential cost drivers
- Data collection and validation
- Identification of atypical expenditure and exceptional items
- Revised data for statistical analysis
- Generate plausible conceptual models
- Statistical analysis to develop robust relationships
- Expert (external) review
- Preliminary assessment of relative rankings
- Review of further company specific arguments
- Final models

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## Prospects for Prices Operating costs



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## The use of the cost base

- Identification of standardised costs
- Data collection
- Check for consistency between standard costs and company estimates of real costs
- Use standard costs to adjust real costs
- Frontier or lower quartile?

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## The frontier -v- catch-up

- Distinctions between movements in the frontier and the speed of catch-up are important ones to recognise
- Movements in average efficiency are a combination of the two
- Issues of fairness and incentives
- Speed and size of catch-up are important

27

## Relative efficiency -v- yardstick competition

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- Ofwat has applied relative efficiency models
- Offer has primarily adopted a yardstick model approach
- Could yield similar short-term benefits to customers
- Financing of companies' functions?
- Excess returns?
- Incentives?
- Stimulating the market?

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## Trade-offs

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- Capex-opex trade-off
- Capital maintenance/quality
- Lower-higher service
- Headroom (judgement about overall price cap)

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## Comparators

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- Number of comparators
- Use of international comparisons
- Use of other industries

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## 5. Improving service performance

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- Annual monitoring
- Publication of league tables
- Setting service standards
- Guaranteed standards
- Customer charters
- Compensation arrangements
- Market competition?

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## 6. The Ofwat 1999 Periodic Review Package

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- $P_0$  adjustment
- Returns at (market) cost of capital
- Regulatory capital value - actual expenditure
- Roll-out of cost savings (& incentives)
  - capex
  - opex

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## The Ofwat 1999 Periodic Review Package continued

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- Movement to efficiency frontier
- Cost of quality
- The profile of prices ('V' or 'L')
  - customer views
- Balancing supply and demand
- Service performance adjustment

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## The 1999 solution .....

- Is a combination "carrots" and "sticks":
  - right approach to past out-performance
  - challenging assessment of scope for improvements reflecting relative efficiency
  - take account of service performance
  - adequate certainty about PR2004
  - clear minimum outputs & no deterioration in service

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## And our sensible package?

- $P_o$  evolving into a "low altitude" glide path for both capex and opex out-performance
- Tough and challenging "X" factors
- Clarity of "Q" [& "S"] outputs **but** subject to tough cost reduction targets
- Paying for growth rules OK re "V" factor
- Lower cost of capital but will be bankable!

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Website: <http://www.open.gov.uk/ofwat>  
[tballance@ofwat.gtnet.gov.uk](mailto:tballance@ofwat.gtnet.gov.uk)

PUBLIC POLICY FOR THE

# Private sector

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, wa-

ter 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.

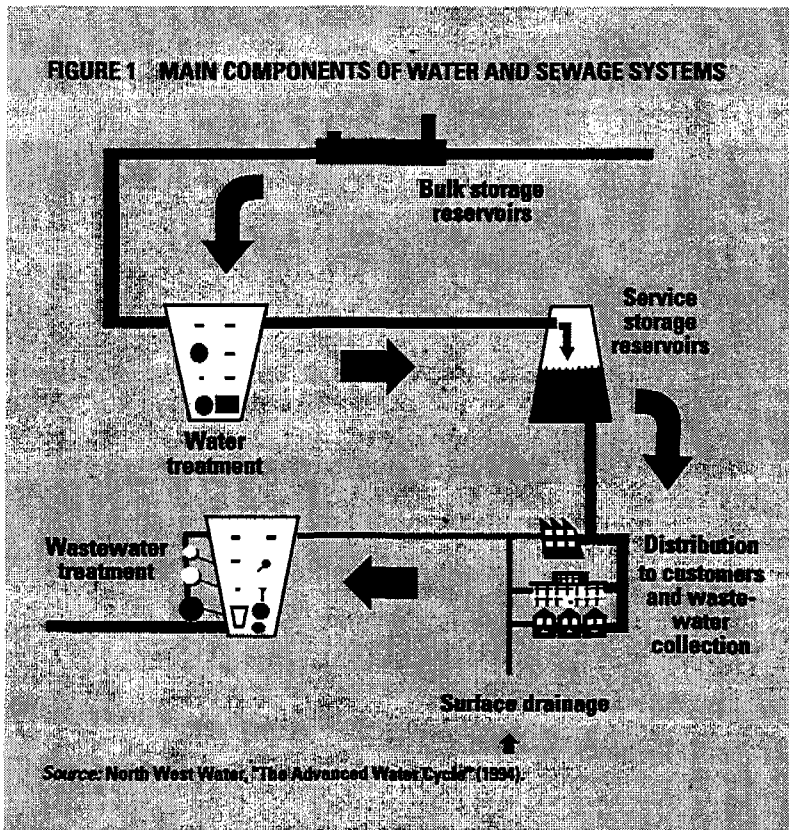
plants (figure 1) could sell water to a company that distributed it to consumers through one network of pipes. Although such a system has recently been proposed in Chile, no one has yet succeeded in implementing this sort of competition. The reason is probably that network-related costs are a larger 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-



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

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 com-

pany 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)*

The Note series is an open forum intended to encourage dissemination of and debate on ideas, innovations, and best practices for expanding the private sector. The views published are those of the authors and should not be attributed to the World Bank or any of its affiliated organizations. Nor do any of the conclusions represent official policy of the World Bank or of its Executive Directors or the countries they represent.

Comments are welcome. Please call the FPD Note line to leave a message (202-458-1111) or contact Suzanne Smith, editor, Room 68105, The World Bank, 1818 H Street, NW, Washington, D.C. 20433, or Internet address [ssmith7@worldbank.org](mailto:ssmith7@worldbank.org).

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PUBLIC POLICY FOR THE

# Private sector

Note No. 127

October 1997

## Utility Regulators—The Independence Debate

*Warrick Smith*

The global trend of utility privatization has pushed regulatory issues to the fore, among them the role of regulatory agencies. These agencies have a long history in the United States, and creating or strengthening them has become a central goal of reforms around the world. But many issues remain contentious, particularly the notion of agency independence. Some governments are reluctant to surrender political control over regulatory decisions. And even those who agree on the desirability of independent agencies may question whether they are feasible or appropriate in all country settings. This Note considers the debate over the independence of utility regulators, focusing on the position of developing countries.

### Independence—What and why?

*Independence* is subject to different interpretations. Some use it interchangeably with *autonomy*; others perceive greater or lesser differences in meaning between the terms. This Note defines independence for utility regulators as consisting of three elements:

- An arm's-length relationship with regulated firms, consumers, and other private interests.
- An arm's-length relationship with political authorities.
- The attributes of organizational autonomy—such as earmarked funding and exemption from restrictive civil service salary rules—necessary to foster the requisite expertise and to underpin those arm's-length relationships.

The rationale for giving regulators independence as broadly defined here lies in the special challenges posed by utility regulation, including the critical role of regulatory discretion.

### Regulatory challenges

Utility regulation has three main aims: to protect consumers from abuse by firms with substantial market power, to support investment by protecting investors from arbitrary action by government, and to promote economic efficiency. While there is growing recognition that competition can reduce the need for regulation in utility industries, most industries contain some areas of monopoly where the benefits of regulation potentially outweigh the costs.

Regulating utilities is complicated by three related considerations. First, prices for utility services are usually political. There are no votes in raising utility prices, and history is replete with examples of justifiable price increases being withheld at the expense of investors and the long-term interests of consumers.

Second, investors are aware of these pressures and of the vulnerability of their usually large, long-term, and immobile investments. Unless a government has made a credible commitment to rules that ensure an opportunity to earn reasonable returns, private investment will not flow. Weak credibility will be reflected in higher capital costs and thus higher tariffs. In privatization, this translates into smaller proceeds from sales of existing enterprises and higher financing costs for new projects.

Third, the long-term nature of most infrastructure investments makes creating credible commitments difficult. Highly specific rules, if considered sustainable, can provide assurance to investors and lower the cost of capital. But they make it difficult to adjust regulation to unforeseen developments, including changes



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in technology and market conditions. They also make it difficult to tailor responses to situations and to provide incentives for efficiency. There is thus an important tradeoff between reducing the risk of expropriation, and with it the cost of capital, and retaining the flexibility to pursue efficiency and other objectives.

In designing regulatory systems, then, policymakers need to resolve two fundamental challenges: How much discretion should regulatory systems contain? And how should that discretion be managed to reduce the risk of misuse and thus the cost of capital?

#### **How much discretion?**

The discretion in regulatory systems differs widely among countries and industries. At one extreme, U.S. laws typically delegate broad discretion to regulators, often vaguely defining pricing standards as “just and reasonable” and limiting other powers only by reference to broad public interest criteria. At the other end of the spectrum, some countries implement regulation through tightly specified laws or contracts that seek to eliminate discretion. They attempt to deal with all contingencies foreseen at the time an arrangement is finalized, usually relying on detailed cost-based formulas for tariff adjustments. This approach—sometimes called “regulation by contract”—is often favored by investors who perceive a high risk of misuse of discretion by the government or regulator. Adjustments to the initial arrangement will require renegotiation, which can be difficult if the bargaining power of the parties changes once the investment is made.

Most regulatory systems lie somewhere between these extremes. Key policies and principles tend to be defined in laws, licenses, or contracts, which carefully delimit residual discretion through reference to criteria, factors, and objectives. Greater flexibility and discretion are usually more important in industries in which there is rapid technological change, in which the introduction of competition requires continuous adaptation of rules to changing market conditions, and in which high priority is placed on providing incentives for

efficient operation. Discretion is thus typically more important for telecommunications than for toll roads. Another consideration is a country's stability and reputation for respecting private property rights: the higher a country scores on these criteria, the more discretion it can retain without significantly increasing the cost of capital. This consideration is especially relevant for reforming and developing countries, many of which lack a long track record of good performance in these areas.

#### **How to manage discretion?**

When discretion is retained on tariffs or other issues of concern to investors, the challenge is to manage it in a way that minimizes the risk of misuse. The exercise of discretion needs to be insulated from short-term political pressures and other improper influences and to be based on competent analysis.

Entrusting discretion to ministers will not meet these tests, particularly when the state continues to own utility enterprises. In this case, there will be no arm's-length relationship between the regulator and the firm, and there may be concerns that, in exercising discretion, ministers will favor the state enterprise over rival private firms. But even if the state has no ownership role, ministers will still be subject to short-term political pressures, and changes in government can lead to abrupt changes in regulatory policy. Restrictive civil service salary rules in many countries also make it difficult for ministries to attract and retain well-qualified professional staff. What is required is an agent at arm's length from political authorities, utilities, and consumers. Organizational autonomy helps to foster the requisite expertise and preserve those arm's-length relationships.

#### **The quest for independence**

Creating an independent agency, no easy task in any setting, is even more challenging in countries with a limited tradition of independent public institutions and limited regulatory experience and capacity. The two main elements of independence—insulation from improper influences and measures to foster the

development and application of technical expertise—are mutually supporting: technical expertise can be a source of resistance to improper influences, and organizational autonomy helps in fostering (and applying) technical expertise.

There is strong consensus on the formal safeguards required:

- Providing the regulator with a distinct legal mandate, free of ministerial control.
- Prescribing professional criteria for appointment.
- Involving both the executive and the legislative branches in the appointment process.
- Appointing regulators for fixed terms and protecting them from arbitrary removal.
- Staggering terms so that they do not coincide with the election cycle, and, for a board or commission, staggering the terms of the members.
- Exempting the agency from civil service salary rules that make it difficult to attract and retain well-qualified staff.
- Providing the agency with a reliable source of funding, usually earmarked levies on regulated firms or consumers.

Formal safeguards of this kind are especially important in countries with a limited tradition of independent public institutions. But they are not enough. Persons appointed to these positions must have personal qualities to resist improper pressures and inducements. And they must exercise their authority with skill to win the respect of key stakeholders, enhance the legitimacy of their role and decisions, and build a constituency for their independence.

Some argue that governance traditions in some countries make independence illusory—“If the Palace calls, the regulator will comply.” Certainly, adopting even the most sophisticated law will not magically transform the basic institutional environment. Nevertheless, for several reasons, creating such agencies is worth the effort, even in more challenging environments.

First and foremost, independence must be understood as a relative rather than an absolute concept. In any system, the goal can only be

to reduce the risk of improper political interference, not to provide ironclad guarantees. Progress must be measured at the margin—and relative to the outcome of ministers retaining direct control over regulatory decision-making. Second, the ability of independent agencies to sidestep civil service salary restrictions and to have access to earmarked funding makes it possible to recruit and retain better-qualified staff and to hire external consultants. This can improve the technical quality of decisions and thus enhance the agency’s authority. Adequate salaries can also help to reduce concerns about corruption. Finally, even if there are reasons to doubt that an agency will exercise truly independent judgment in the short term, that may change in the longer term. Concentrating expertise in a body with a specialist mandate sharpens commitment to professional norms, which can be an important source of resistance to improper influences. And as the regulator enters the fray, it will have the opportunity to build a constituency of its own, increasing insulation from political interference.

### **Reconciling independence with accountability**

Independence needs to be reconciled with measures to ensure that the regulator is accountable for its actions. Checks and balances are required to ensure that the regulator does not stray from its mandate, engage in corrupt practices, or become grossly inefficient. Striking the proper balance between independence and accountability is notoriously difficult, but the following measures to do so have been adopted by a growing number of countries:

- Mandating rigorous transparency, including open decisionmaking and publication of decisions and the reasons for those decisions.
- Prohibiting conflicts of interest.
- Providing effective arrangements for appealing the agency’s decisions.
- Providing for scrutiny of the agency’s budget, usually by the legislature.
- Subjecting the regulator’s conduct and efficiency to scrutiny by external auditors or other public watchdogs.
- Permitting the regulator’s removal from office in cases of proven misconduct or incapacity.



### Possible paths of transition

Resistance to independent agencies is breaking down. Ministers once adamant about maintaining political control over tariffs and other regulatory matters increasingly see the benefits of creating such agencies, which include improving offers from investors, helping to sustain reforms, and shifting responsibility for unpopular decisions to someone else. But what if the government resists?

The choice can be stark. Governments can reduce discretion by adopting highly specific rules, forfeiting flexibility and other advantages. Or they can retain discretion, pay investors risk premiums, and accept reduced proceeds from privatization, higher tariffs or both. In either case, ministerial structures will usually make it difficult to develop expertise to deal with regulatory problems arising after privatization.

But several options lie between the traditional ministerial model and the delegation of broad discretionary authority to a fully independent agency. These options can form a path of transition to greater independence and delegation of discretionary authority. First, a dedicated regulatory unit can be created within a ministry, to coordinate regulatory activity and foster the development of technical skills and professional norms. The autonomy of the unit can often be enhanced by placing it under the responsibility of a minister other than a sectoral minister—particularly important if there is potential for conflict between private firms and state enterprises under the purview of the sectoral minister. Once such a unit has been created, governments can increase the transparency of regulatory processes and approximate an independent agency in other ways. Exempting staff from civil service salary rules will usually be more problematic, but concerns about technical competence can be addressed by contracting out certain tasks to consultants.

Second, an agency can be created with many of the attributes of an independent agency, but with one or more ministers taking part in

decisionmaking (as in Colombia). This approach can improve the technical quality of regulatory decisionmaking, particularly compared with the first option. But as long as ministers retain significant influence, the risk of misuse of regulatory discretion remains.

Third, a more truly independent agency can be created, but with some or all of its powers limited to making recommendations to the minister (as in Hungary). A variant is to give the agency decisionmaking authority but have appeals go to the minister rather than another independent authority (as in Argentina). This approach reinforces the separation of professional and political considerations in decisionmaking and usually provides the agency with greater insulation than under the second option. Political considerations are not excluded from the regulatory process, but the agency can build a reputation for professionalism and balanced judgment, enhancing its authority and reducing the likelihood of being overruled. Models can also be devised in which the minister is permitted to depart from the agency's recommendations or decisions only in narrowly defined circumstances.

Even where the minister has withdrawn completely from regulatory decisions, a transition strategy may still be appropriate. Delegating broad discretionary powers to an untested agency poses risks, particularly in countries with limited regulatory experience and capacity. The broader the agency's authority, the more enticing a target it will be for those with incentives to undermine its independence. And lack of detailed standards—like those that have taken more than a century to develop in the United States—can create uncertainty and risk for investors. The prudent course is to take the time to carefully define a new agency and ensure that it has access to adequate resources and other support. These issues are examined in two companion Notes.

*Warrick Smith (wsmith3@worldbank.org),  
Private Participation in Infrastructure Group*

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PUBLIC POLICY FOR THE

# Privatesector

Note No. 128

October 1997

## Utility Regulators—Roles and Responsibilities

*Warrick Smith*

Creating independent regulatory agencies has become a key element of utility sector reforms around the world. As discussed in a companion Note, these agencies are intended to insulate decisionmaking from improper pressures and foster technical expertise. This Note focuses on the defining of responsibilities of such agencies, particularly in developing countries. It considers the scope of agencies' industry coverage, their role relative to ministers, and their role relative to other regulatory objectives and bodies.

### Industry coverage

Specialist utility regulators can be organized on three main bases:

- Industry-specific, in which there is a separate agency for each industry—such as gas, power, water, and telecommunications—as in the United Kingdom.
- Sectorwide, in which there is an agency for each more broadly defined sector, such as the energy regulator in Colombia and the transport regulator in Canada.
- Multisector, in which there is a single agency for all or most utility industries, such as the state-level regulators in Brazil and the United States, and the national regulators in Costa Rica and Jamaica.

### Advantages of multi-industry agencies

Making an agency responsible for more than one industry offers several potential advantages.

**Sharing resources.** Economists, financial analysts, and other professionals can work across industries, and administrative staff and facilities can be shared. This is particularly important in countries where regulatory expertise is scarce.

**Facilitating learning across industries.** All utility industries have unique features, but the main issues in their economic regulation are substantially the same: administering tariff adjustment rules, managing the introduction of competition into traditionally monopolistic industries, and managing relationships with stakeholders. Having a single agency aids the transfer of insights and experience between industries.

**Reducing the risk of industry capture.** A key challenge in utility regulation is to guard against the agency's capture by the regulated industry. If the industry and the regulator develop too close a relationship, the industry may be able to divert regulatory effort to promote its own interests rather than the public's. The broader responsibilities of a multi-industry agency help to reduce this risk.

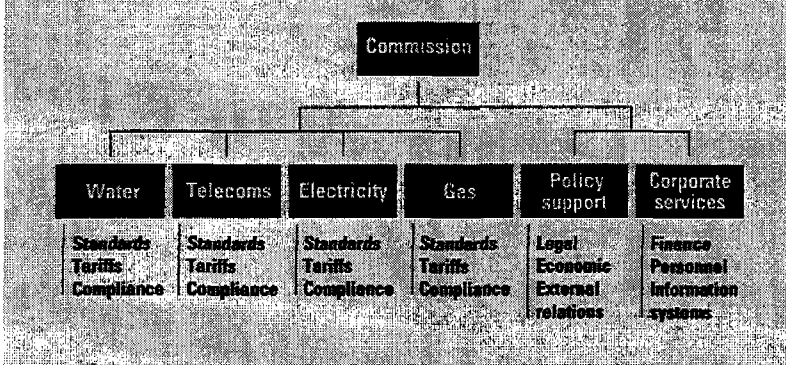
**Reducing the risk of political capture.** Agencies intended to operate at arm's length from political authorities remain vulnerable to interference from them. Placing responsibility for several industries in one agency may make it a more attractive prize for political authorities. But there are two reasons why a multi-industry agency might be exposed to less risk of political capture rather than more. First, the agency's broader constituency raises the stakes of political interference: interfering in a decision on, say, water tariffs will be seen as a threat to all industries regulated by the agency. Second, an agency responsible for more than one industry can develop greater independence from sectoral ministries. Political pressures are unlikely to have effect unless they come from higher-level authorities, who can consider the repercussions of short-term actions from a broader perspective.



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**FIGURE 1 MULTISECTORAL AGENCY—ILLUSTRATIVE ORGANIZATION**



**Reducing the risk of economic distortions.** All industries compete for investment capital, and there is direct competition between some utility industries in meeting consumer needs, such as between gas and power or among different transport modes. Some regulatory issues are unique to specific industries and thus warrant different approaches. But many issues, such as the valuation of capital and the treatment of inflation, are common to all industries. Inconsistent approaches to these issues in competing industries can create economic distortions. Having a single agency makes it easier to adopt consistent approaches.

**Dealing with blurred industry boundaries.** Traditional boundaries between utility industries are rapidly blurring. Gas, power, water, and railway firms are entering telecommunications markets. Gas utilities are entering the power industry, and water and power utilities are merging. Such developments can pose important regulatory challenges. A firm involved in several industries may be able to exploit differences in the rules that apply to its activities in different industries. And regulatory decisions on one industry can affect other industries. Multi-industry agencies can deal with these challenges in a coordinated way.

**Offsetting disadvantages?**

Proponents of industry-specific agencies often argue that multi-industry agencies have weaknesses or limitations that offset their advantages. One concern is that a multi-industry agency may lack sufficient industry-specific expertise or focus. This concern can be ad-

ressed in several ways. Industry-specific departments can be created within the agency, but with a cross-sectoral decisionmaking body and cross-sectoral departments for pooling expertise and managing shared resources (figure 1). The agency can also draw on advice from industry-specific advisory groups.

A second concern is that placing responsibility for several industries in one agency is tantamount to “putting all your eggs in one basket”—the agency’s failure would have costs for all industries. Although industry-specific agencies help to diversify this risk, they do so at the expense of the strength of a single agency, increasing the risk of failure.

A third argument is that having a number of agencies allows experimentation with different approaches. However, industry-specific experiments are still possible in multi-industry agencies.

Finally, it is sometimes suggested that multi-industry agencies are appropriate only for very small economies. Certainly, the arguments for such agencies are especially strong in these cases. Yet California’s Public Utilities Commission is responsible for gas, power, water, transport, and telephony in an economy with a population of more than 30 million, a GDP and utilities that dwarf those of most countries, and no evident shortage of trained professionals.

**Creating multi-industry agencies**

The preferred approach to creating a multi-industry agency is usually to set it up as one from the outset, adding industries to its jurisdiction as they undergo reform. If an industry-specific agency already exists, it may be possible to expand its mandate to cover additional industries.

The alternative strategy—creating a series of industry-specific agencies and later merging them—has disadvantages. It delays such benefits of a multi-industry agency as fostering learning between industries, which are particularly important during an agency’s early years. And the obstacles to later merger should not

be underestimated. Industry-specific regulators will have incentives to resist merger, not least because of the implications for their jobs. Regulated firms may also resist, often out of concern that they will have less influence over a multi-industry agency. Mergers thus usually require substantial political will and effort.

The main challenge in creating multi-industry agencies is to ensure an effective coordinating mechanism during their design and establishment. Because advisers with industry-specific responsibilities have little incentive to propose multi-industry approaches, leadership usually must come from a central ministry.

### **Role relative to ministers**

One of the most sensitive relationships for a regulatory agency is that with the relevant ministers. It is sometimes suggested that the ministry is responsible for policy and the agency for regulation. But this distinction is unhelpful in practice, because the dividing line between the concepts is fuzzy at best, and agencies with significant discretion clearly have a policy role.

Four main considerations generally determine the allocation of responsibilities between agencies and ministries. The first is whether the matter in question is judged to be appropriate for decision on political or technical criteria. Such judgments can change over time. For example, while political control over tariffs was once considered the norm, there is now growing recognition that, once the key policy principles or rules are established, society's interests are best served by delegating responsibility to an independent agency. Tax and subsidy issues, by contrast, are still widely regarded as the province of political rather than independent bodies.

The second consideration is whether collocation of particular functions could create significant conflicts of interest. For example, responsibility for actively promoting investment in a sector often conflicts with a regulatory agency's role as an impartial arbiter of investor and consumer interests, as well as dilute its focus.

The third consideration is which body has the expertise for a task and whether having related tasks performed by the same body yields any economies. Once created, an agency usually becomes the main repository of public sector expertise on the industries it regulates. If the ministry is subject to restrictive civil service salary rules and the agency is not, the ministry may find it difficult to maintain expertise. This often justifies giving the agency an advisory role on matters remaining under ministerial control.

The fourth consideration is the degree of confidence political authorities have in the agency. Agencies tend to be given greater authority once they have proved their reliability.

Based on these considerations, there is general consensus that ministers should retain responsibility for broad sector policy, including public investment, privatization, sector restructuring, taxation, subsidies, intergovernmental relations, and the legislative framework. But even in these areas, agencies may be given advisory roles.

There is less consensus on where responsibility for granting licenses or concessions should lie. Much depends on the criteria governing the award of licenses: the more objective and technical the criteria, the stronger the case for delegating the responsibility to an agency.

Most systems give agencies responsibility for administering tariff adjustment rules, elaborating detailed standards, monitoring compliance with norms, and facilitating the settlement of disputes. In some systems, the power to impose sanctions for noncompliance with norms is reserved for the courts. In most, however, the agency performs this role, although major sanctions—such as cancellation of licenses—may require ministerial decision.

### **Role relative to other regulators**

Utility regulators' main focus is economic regulation of firms with monopoly power. But utilities, like other firms, are subject to regulation to meet a raft of other objectives, including safety,



antitrust, and environmental aims. How should a utility regulator's role be defined in relation to these objectives and to other regulators?

A sound general rule is to avoid a proliferation of agencies. Creating numerous agencies can dissipate expertise, forgo the economies in having one entity perform related tasks, create coordination demands, and introduce additional complexity. But as with most general rules, there are exceptions. Separate agencies may be required to avoid significant conflicts in the mandate of a single agency. When an existing agency responsible for, say, environmental regulation is performing well, immediately transferring its responsibilities in utilities to a new utility regulator is usually inadvisable. And there are inescapable tradeoffs between cultivating expertise, economies of scale, and coordination in utility regulation and doing the same in environmental or other regulation for the economy as a whole.

There is one rule that should have no exceptions: If more than one agency is involved in regulating utilities, the role of each should be defined as clearly as possible to avoid duplication, jurisdictional uncertainty, and turf disputes.

#### **Service quality issues**

Customer service standards are usually the province of the utility regulator. The allocation of responsibility for safety and environmental regulation can vary widely, even between sectors in a single country. Two main issues warrant consideration.

**Standard setting.** Quality standards have a direct impact on utilities' costs and thus on prices. If the utility regulator is not responsible for determining standards, it may have a role in providing advice to the agency that is responsible.

**Tariff adjustment.** Because changes in quality standards affect costs, they may require tariff adjustments. When different agencies are responsible for regulating tariff and quality parameters, coordination issues can arise. These

issues can be addressed in several ways, including through tariff rules that permit certain cost increases to be passed on automatically.

#### **Antitrust matters**

Antitrust regulation includes prohibitions on certain anticompetitive agreements and mergers and on the misuse of market power. In countries with modern antitrust regimes, these matters are usually entrusted to a specialist agency with economywide jurisdiction. How should a specialist utility regulator's role be defined relative to the antitrust agency? There are two main issues.

#### **Clarifying the interaction between regimes.**

There may be overlap between utility and antitrust regulation in some areas—for example, between industry-specific regimes governing access to networks and economywide rules governing the misuse of market power. The interaction between the two regimes should be defined clearly from the outset.

**Exploiting complementary expertise.** Utility regulators and antitrust agencies have complementary expertise. Both agencies may be involved in reviewing proposed mergers or allegations of anticompetitive conduct in utility industries. In some cases, a member of the antitrust agency is also made a member of the utility agency, or the agencies make formal submissions to proceedings conducted by the other. Antitrust agencies may also be given special roles in utility regulation, such as hearing appeals of decisions by the utility regulator.

Decisions on the responsibilities of a utility regulator have important implications for other aspects of the agency's design, including its decisionmaking structure, its resources, and the start-up strategy. These and related issues are considered in a companion Note.

*Warrick Smith (wsmith3@worldbank.org),  
Private Participation in Infrastructure Group*

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PUBLIC POLICY FOR THE

# Privatesector

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October 1997

## Utility Regulators—Decisionmaking Structures, Resources, and Start-up Strategy

Warrick Smith

Governments creating specialized regulatory agencies must make decisions on a wide range of issues. Questions relating to the independence and responsibilities of such agencies are considered in two companion Notes.<sup>1</sup> This Note focuses on a third set of issues, relating to decisionmaking structures, resources, and start-up strategy. Like the other two Notes, it emphasizes the situation of developing countries.

### Decisionmaking structure

The design of an agency's decisionmaking structure encompasses issues relating to the number of decisionmakers, the basis for selecting them, the roles accorded to stakeholders, and the regulatory and appeals processes.

### Number of decisionmakers

Many countries entrust decisionmaking authority to a commission or board of three to five members; others prefer a single individual. Each approach has its strengths and weaknesses, and the choice often depends on a country's traditions and conditions (table 1). Agencies responsible for several industries usually choose a commission.

### Selection of regulators

When agencies are to be independent, the goal should be to select regulators with the personal qualities needed to exercise independent judgment and resist improper pressures or inducements. The selection is critical, particularly for new agencies that have yet to establish a reputation for competence and reliability.

Qualifications and disqualifications for appointment are usually set out in the law establishing the agency. Disqualifying factors generally include having a financial interest in regulated firms, which creates a conflict of interest and, in some countries, being related to the president or ministers. A common qualification required is significant experience or training in economics, finance, law, public administration, or industry.

It is sometimes suggested that some or all appointees should have industry-specific technical expertise or long experience in the regulated industry. But this requirement is unnecessary and in some cases undesirable. It is unnecessary because such technical expertise will be available from agency staff or consultants. It is undesirable if it ends up excluding professionals

**TABLE 1. DECISIONMAKING STRUCTURES—INDIVIDUAL VERSUS COMMISSION**  
Strengths and weaknesses

Characteristic	Individual	Commission
Speed of decisionmaking	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Accountability for decisions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Resource demands	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Predictability of decisions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Invulnerability to individual preoccupations	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Invulnerability to improper influences	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Potential to reflect multiple perspectives	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Potential to stagger terms to enhance stability and weaken links with particular governments	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Note: The / indicates which structure is stronger on each characteristic.





with broader perspectives relevant to economic regulation or if it unduly restricts the pool of candidates. It is particularly inappropriate for multi-industry regulators, because requiring expertise in each industry be represented on the commission could crowd out appointees with broader perspectives. It could also result in the expert for each industry becoming the de facto regulator for that industry and thus the loss of the potential benefits of a commission approach.

Another view is that the decisionmaking body should be composed of representatives of consumers and regulated firms rather than technical experts. Although it is important for stakeholders to participate in the regulatory process, there are several reasons why including them on the decisionmaking body is inadvisable:

- In most industries, attempting to identify single representatives of consumers and the industry is not feasible. Residential, industrial, and rural consumers all have different and sometimes conflicting interests, and interests are likely to vary within these groups across regions or income classes. Regulated firms can also have different and sometimes conflicting interests in regulatory decisions. So, a representative approach can result in pressures to create very large decisionmaking bodies, which would increase delays and reduce individual accountability.
- Decisions of representative bodies hinge on their composition and voting rules. If the composition and voting rules favor one interest over another, decisions can be expected to be biased accordingly. If the interests of consumers and utilities are equally balanced, and the casting vote is left to a representative of the government, short-term political considerations can be expected to dominate regulatory decisionmaking.
- Representative bodies internalize bargaining and the exchange of concessions between interests, at the expense of a more open and transparent evaluation of competing social interests.

The executive branch usually plays the dominant role in the appointment process, but the

legislature often also has a role, such as in confirming appointments. Involving both branches of government is especially important in systems in which the executive does not necessarily control the legislature; it provides a check against partisan appointments and helps to legitimize regulators' authority.

#### **Stakeholders' roles**

To ensure that a regulatory agency makes decisions that are well informed and accepted as fair and legitimate, consumers, regulated firms and other stakeholders must have the opportunity to present their views. For the reasons noted above, their participation in the decisionmaking body is inadvisable. But there are several other options.

**Open regulatory processes.** Those with a significant interest in a regulatory decision are usually permitted to present their views to the agency before the decision is made. In the United States, the process for doing so is usually formal hearings, often criticized for being too legalistic, costly, and slow. Regulators in the United Kingdom initially adopted much more informal processes, but the trend now is toward greater formality. Countries such as Argentina and Bolivia are experimenting with open processes that more closely reflect local traditions.

**Consultative or advisory bodies.** Some countries have created special consultative or advisory bodies, usually organized on an industry-specific basis, to advise the regulator and other public authorities. These bodies are usually part-time and composed of representatives of consumers, utilities, and industry experts. Special consumer councils can be especially important in countries that lack effective advocacy of consumer interests.

#### **Regulatory process**

Decisionmaking processes range from formal hearings, as in the United States, to more informal processes, such as those in the United Kingdom. Wherever the balance is struck, the

focus should be on transparency in decision-making, which reduces opportunities for improper influences and underscores the fairness and legitimacy of decisions.

The regulatory process usually involves three main steps: providing people with an interest in a decision opportunity to present their views, publishing the decision and the detailed reasons for reaching that decision, and providing stakeholders an opportunity to challenge the decision through an appeals process.

The appeals process is important to ensure that the regulator does not stray from its mandate and that it remains accountable. Two closely related issues need to be considered in designing an appeals process.

**Appellate body.** If the regulatory agency is to be independent, the appellate body should also be independent. In most countries, appeals of regulatory decisions go straight to the courts. But, in some countries, there is an intermediate step in which appeals go to a body that is expected to have more technical expertise than the courts and that may also be able to respond more quickly. In the United Kingdom, for example, the antitrust agency hears appeals relating to license amendments. In Bolivia, a special superintendency hears appeals from sector regulators.

**Grounds of appeal.** The grounds of appeal are usually limited to errors of fact or of law, including failure to follow a required process. Appellate bodies are generally not permitted to reconsider the merits of the decision and substitute their own judgment.

## **Resources**

An agency's effectiveness is determined largely by the adequacy of its resources, both human and financial.

### **Human resources**

Utility regulation requires personnel with a mix of skills in such fields as economics, finance,

law, and engineering, and the character and integrity to resist improper pressures and inducements. People with these attributes are scarce in many reforming countries, and those who do have them will often receive attractive job offers from privatized utilities. So, to attract and retain well-qualified staff often requires exempting agency staff from restrictive civil service salary rules.

There is no magic formula for determining the number of staff required by an agency. It all depends on the responsibilities of the agency, the climate in which it must discharge those responsibilities, and its strategies for performing those tasks. In the United States, staff size ranges from less than 40 in the public utilities commissions responsible for multiple industries in the smaller states to more than 1,000 in the Federal Energy Regulatory Commission. As a general proposition, "small is beautiful." Overstaffing can dilute an agency's professional focus and increase the direct costs of regulation. It can also increase the indirect costs of regulation if staff make unnecessary demands on utilities to justify their jobs. For these reasons, a sound general principle is to keep the permanent agency staff as small as possible, engaging consultants to assist with specialized tasks.

Regulatory agencies increasingly contract out tasks to private firms or consultants, such as the analytical work underpinning tariff adjustment and similar decisions and the compliance audits of regulated firms. But the agency must retain—and be seen to retain—responsibility for its decisions, to avoid undermining the legitimacy of its actions. It must also ensure that the contractor is not subject to improper influences or inducements from regulated firms or other sources.

### **Funding**

Regulatory tasks, like other government functions, were traditionally funded from general tax revenues. Now, most regulatory agencies obtain their income from levies on consumers. These levies may be charged to consumers di-



rectly, but are more often collected indirectly by imposing a levy or license fee on regulated firms and allowing them to pass the cost on to consumers through tariffs. In OECD countries, this approach is usually seen as part of a cost-recovery strategy: it reduces demands on general tax revenue and imposes the financial costs of regulation on the primary beneficiaries (consumers). In many developing and transition economies, by contrast, earmarked funding is often viewed primarily as a means of ensuring that agencies have a reliable source of income and thus as a safeguard of agency independence.

To prevent levies from becoming too burdensome, the law establishing the agency usually sets a cap on levies, often defined by reference to industry turnover or some other indicator. The cap is 0.5 percent for telecommunications regulators in Argentina, Peru, and Venezuela; 1.0 percent for the energy regulator in Colombia; and 2.0 percent for the water regulator in Peru. The cap establishes the maximum levy, and actual levies are set each year to cover a budget approved by the legislature. When an agency is responsible for more than one industry, a different levy is usually set for each industry that covers the costs of its own regulation and contributes to costs shared across industries.

### Start-up strategy

Utility regulators should be established as long before privatization as possible, even if their formal powers do not come into effect immediately. This allows regulators time to familiarize themselves with their new responsibilities, to establish their offices, and to undertake any necessary training. It also provides assurance to consumers that their interests will be protected after privatization and gives potential investors an opportunity to assess the regulatory system before formulating proposals.

Most new regulatory agencies can expect a challenging infancy. Besides mastering complex technical issues, regulators must define new and often difficult working relationships

with political authorities, regulated firms, consumers, and other stakeholders. In countries in which the requisite skills are scarce, regulatory experience is limited, and there is little tradition of independent public institutions, the challenges can be daunting. And life is not made easier for a regulator if privatization remains politically contentious and if the first public evidence of its effects is a price increase allowed by the regulator.

To meet these challenges, regulators must have adequate training—not only in such traditional disciplines as law, finance, and economics, but also in negotiation analysis, media relations, and the like. Regulators may also need technical support during the first months in office. Such support is often provided by consultants acting to some degree as “shadow” regulators.

No less important, newly appointed regulators benefit from contacts and exchanges with more experienced regulators from other countries. Some of these contacts occur on an ad hoc basis, through visits and participation in conferences. But there is also an encouraging trend toward systematizing such contacts, for example, through a “twinning” arrangement between a new regulator and a more experienced foreign regulator. These arrangements can provide a basis for exchanging staff and materials or providing other forms of support and advice. There has also been a recent trend toward creating “networks” of regulators, such as the International Forum for Utility Regulation sponsored by the World Bank.

<sup>1</sup> Warrick Smith, “Utility Regulators—The Independence Debate” (Viewpoint # 127, October 1997) and “Utility Regulators—Roles and Responsibilities” (Viewpoint # 128, October 1997).

*Warrick Smith (wsmith3@worldbank.org),  
Private Participation in Infrastructure Group*

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Country Dept. I  
Latin America and the Caribbean Region

## **Economic Notes**

### **Regulating Brazil's Infrastructure Perspectives on Decentralization**

*Warrick Smith  
Ben Shin*

*September 1995*

The World Bank

This series presents the findings of work in progress. They are prepared or sponsored by LA1 staff to address immediate policy concerns identified through the dialogue with governments and they reflect the views of the LA1 Department. This note was prepared by Warrick Smith and Ben Shin (PSD), under the general direction of Antonio Estache (LA1IN). Questions and concerns should be addressed to Mr. Estache, telephone number (202) 458-1442, email address: [aestache@worldbank.org](mailto:aestache@worldbank.org).

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## REGULATING BRAZIL'S INFRASTRUCTURE: PERSPECTIVES ON DECENTRALIZATION

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*Warrick Smith and Ben Shin*

*Brazil is currently undertaking a fundamental shift in the role of government in infrastructure provision. Governments will retreat from the role of owner and operator of infrastructure services and place emphasis on their role as regulator of services provided by private firms. This shift will require a strategy for defining and implementing regulatory frameworks for Brazil's infrastructure industries. As in the case of other countries with federal systems, a special challenge in Brazil will be the establishment of regulatory and related institutional arrangements that reflect the proper roles of national, state and municipal tiers of government.*

*The purpose of this note is to provide decisionmakers in Brazil with a framework for thinking about the important connections between decentralization and regulation, with a specific emphasis on the implementation of regulatory arrangements at sub-national tiers of government. Section 1 provides a brief overview of the key tasks and challenges of infrastructure regulation. Section 2 reviews the main considerations affecting the assignment of regulatory responsibilities between tiers of government. Section 3 considers the special challenges associated with designing and implementing regulatory arrangements at sub-national tiers of government. Section 4 presents a brief conclusion.*

### 1. Regulating Infrastructure: Key Tasks and Challenges

Regulation affects most aspects of life in modern societies, and has many economic, social, and political objectives. This note focuses on regulating infrastructure — predominantly power, gas, water, telecommunications, and transport — where

regulation seeks to avoid the potential inefficiency and other ills arising from the natural monopoly characteristics of segments of these industries.<sup>1</sup> The central — and most controversial — regulatory task is controlling prices or profits in monopolistic segments, whether these be final prices to consumers or prices and other conditions affecting competitors' access to network facilities. Other important regulatory tasks are defining and enforcing compliance with concessions or similar arrangements, including adherence to service quality, investment levels, and technical standards. Environmental and antitrust regulations affecting these industries may also require definition and enforcement.

Designing and implementing regulatory arrangements for these sectors pose a number of challenges for policymakers.<sup>2</sup> On the one hand, regulated firms have incentives to manipulate the regulatory process to increase their profits and are assisted in doing so by the inevitable information asymmetry between firms and regulators. On the other hand, setting prices for most infrastructure services has a political dimension, and governments face strong political pressure to use regulation to keep prices below the long-run costs of supply. Potential investors in infrastructure activities are aware of this risk and of the vulnerability of their usually large, long-term and highly-specific investments once they have been made. Governments need to be able to commit credibly to regulatory policies to provide

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<sup>1</sup> An activity can be characterized as "naturally" monopolistic if a single supplier can meet all market demand at least cost. It is now recognized that a growing number of infrastructure activities, including power and gas production and marketing and cellular and long-distance telephony, do not exhibit this feature, and a growing number of countries are introducing competition in these activities.

<sup>2</sup> See Smith & Klein (1994).

investors with assurance of a fair return on their investment. This condition is necessary both for attracting initial investment at reasonable cost and for encouraging efficient operation of that investment once it has been made.

Increasingly, the main strategy governments are adopting to commit to their regulatory undertakings is to establish a regulatory framework that limits discretion in regulatory rules and places responsibility for the exercise of residual discretion in an agency with the requisite expertise and independence. "Independence" in this context includes measures to protect the regulatory decisionmaking process from being "captured" by short-term political pressures and by the regulated industry or other special interest groups.<sup>3</sup>

The most appropriate means of implementing this strategy will vary from jurisdiction to jurisdiction. In jurisdictions with stable political and legal institutions and an established reputation for treating private firms fairly, perceptions of lower regulatory risk may reduce investors' demands for safeguards against the misuse of regulatory discretion, such as rigid and specific rules and independent agencies. More flexible rules will, in turn, enhance regulators' capacity to pursue efficiency goals and to adapt regulation to changing economic and technological conditions.

In jurisdictions with less conducive conditions – which include the overwhelming majority of developing and reforming countries – the trade-offs can be stark; investors respond to increased risks by insisting on greater safeguards or demanding higher returns on capital. The less comfort provided by the regulatory system, the higher the risk premium required to attract investment. Another trade-

off also arises: the lower the confidence in the regulator's independence, the greater the emphasis on specific, rigid rules and hence the constraints on using regulation to pursue efficiency goals.

## 2. Assigning Regulatory Responsibility

The basic challenges and trade-offs involved in infrastructure regulation are inescapable, regardless of whether regulation is a national, state or municipal responsibility. However, several factors will influence the most appropriate assignment of responsibilities.

### Arguments for Decentralizing Responsibility

Four main arguments can be made for assigning regulatory responsibility for infrastructure to lower tiers of government:

- It enables regulatory objectives and approaches to be shaped by local conditions, priorities and preferences. For example, the "optimal" form and content of regulation for Para may be entirely inappropriate for Parana.
- It can reduce the information asymmetry between regulators and firms by bringing the regulatory authority closer to affected firms. For example, a regulator based in Recife will be much better placed to monitor a local concessionaire than a regulator located in Brasilia.
- It can improve the responsiveness and accountability of the regulator by bringing the regulatory authority closer to users. For example, consumers in Recife may feel more confident that a local regulator will take their concerns seriously than if they had to petition a more remote authority.
- It can foster experimentation with more innovative approaches to regulatory problems. For example, allowing sub-

<sup>3</sup> For a useful discussion of the theory of regulatory capture and its implications for the design of regulatory policies, see Neven, Nuttall & Seabright (1993).

national jurisdictions the freedom to develop more flexible arrangements may lead to more positive social outcomes than if a single template were imposed by national authorities.

The last argument is sometimes characterized as a benefit of "regulatory competition." According to this view, governments compete against each other to attract mobile factors of production -- including workers and private investment in infrastructure -- through their regulatory regimes. This competition creates incentives for governments to improve the quality of their regulation and to emulate the approaches of successful governments.<sup>4</sup>

#### **Possible Limits to Decentralization**

Arguments of the kind outlined above are often considered sufficient to support a strong presumption in favor of decentralizing regulatory responsibility. Depending on the industry, jurisdictional units, and regulatory issue in question, however, decentralized approaches may have weaknesses.

*Spillover Effects.* Decentralized regulators have weak incentives to take account of spillover effects on other jurisdictions. This may result in insufficient production of a good or service that generates positive externalities or excessive production of a good or service that generates negative externalities. A classic example of the latter is inadequate environmental regulation of water systems that affect downstream users in another jurisdiction.

In principle, affected jurisdictions can negotiate coordinated responses to these problems without transferring regulatory responsibility to a higher tier of government; some countries

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<sup>4</sup> The notion of competing governments and jurisdictions was introduced by Tiebout and has been a popular idea ever since. For strong proponents of this view see Siebert & Koop (1993) and Easterbrook (1983). For a critical view of the application of this theory to the regulation of different utility sectors within one tier of government see Helm (1994).

have established special mechanisms to facilitate approaches of this kind. In practice, however, such negotiations tend to be slow and laborious, and incentives to comply with the resultant agreement may be weak.<sup>5</sup> In these circumstances some centralization of regulatory authority may be desirable. Many constitutions in federal systems, such as those in Argentina, Australia, Canada, and the U.S., address these concerns by assigning responsibility for "interstate" matters to the national government, although it often remains contentious as to what degree of interstate impact is required to invoke national jurisdiction.

*Inter-jurisdictional Trade.* While not strictly spillovers, a number of regulatory issues may affect inter-jurisdictional trade and have impacts beyond a single jurisdiction in this way. In some cases, efficient inter-jurisdictional trade may require harmonization of key technical standards. For example, adoption of different railway gauges between jurisdictions can impose practical restrictions on interstate rail transport, as can some standards affecting trade in gas, electricity, water, and telecommunications. Similarly, regulatory policies that create subsidies for local producers or maintain local monopolies may distort or restrict inter-jurisdictional trade. For these reasons, matters affecting interstate trade are typically regulated at the national level, including the terms and conditions of access to inter-state networks such as pipelines and transmission grids.

*Jurisdictional Size & Economies of Scale.* Many infrastructure activities require large capital investments and exhibit significant scale economies. Some jurisdictions may be smaller than the minimum efficient size for particular activities. For example, it may not be efficient for small jurisdictions to procure and regulate their own power systems, and some municipal-based water systems may be too small to attract private investors. In these cases, several jurisdictions may need to collaborate in

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<sup>5</sup> See Neven, Nuttall & Seabright (1993).



elaborating and administering a common regulatory framework, which may increase costs and weaken the credibility and effectiveness of the regulatory regime.

Some of the potential difficulties in this area are illustrated by the attempt to grant a private concession for a water system in Caracas. Twenty-three municipalities had to cooperate to form a concession area of sufficient size to attract private investment. The difficulty of establishing a credible regulatory framework under these circumstances has been identified as one of the reasons that no responsive bids were received.<sup>6</sup>

*"Destructive" Competition.* It is sometimes suggested that regulatory competition between decentralized jurisdictions might be destructive. One concern is that strong bargaining pressure from foreign investors, coupled with limited mobility of citizens, may lead sub-national jurisdictions to bid-up subsidies or regulated rates of return or bid-down taxes or other obligations to attract investment. Evidence on this issue is mixed, but concerns of this kind may contribute to pressures for jurisdictions to adopt coordinated approaches.<sup>7</sup>

*Constrained Regulatory Capacity.* Regulation of infrastructure industries is a complex and demanding task. Depending on the detail of the regulatory regime, staff with specialized economic, financial, and legal skills may be required. Moreover, if the regulatory entity is intended to be independent, decisionmakers must be able to resist improper inducements or pressures from regulated firms, political authorities, and other interest groups. Such resources are scarce in many reforming and developing countries and often have a high opportunity cost. The resource pool typically becomes much shallower as one progresses to lower tiers of government, while closer

proximity to firms and to consumers may increase the risk of capture. The special challenges this may pose for establishing and maintaining effective regulatory arrangements at sub-national tiers of government is considered in Section 3.

### Striking a Balance

The optimal balance between national, state and municipal regulation cannot be determined in the abstract. Much depends on the characteristics of the industry, jurisdictional units, and the regulatory issue in question, as well as the broader legal and political environment. In the latter regard, it is important to acknowledge that in many cases the assignment of regulatory responsibilities will be established in constitutions or other political compacts, and hence may not allow much flexibility in the near term. It is nevertheless instructive to examine some of the main mechanisms that can be employed to manage the policy trade-offs involved.

*Division of Policy Determination and Implementation.* In the simplest model, regulatory policy is determined and implemented by a single tier of government. In practice, however, it is quite common to find regulatory policy set by one tier of government and for implementation to be delegated to a lower tier. The degree of discretion conferred on lower tiers of government can vary considerably.

At one extreme, policy administration can be delegated to a subordinate entity that has little independent discretion. For example, national antitrust policy in countries such as Australia and Canada is administered in part by regional offices of national regulatory agencies; they operate according to identical rules and policies and are expected to adopt a consistent national approach. This limited form of decentralization may still improve responsiveness to consumers and help to ameliorate information asymmetries between regulators and firms. At the other

<sup>6</sup> See Triche, Mejia & Idelovitch (1993).

<sup>7</sup> See Siebert & Koop (1993) for an evaluation of the findings of empirical studies on the impact of inter-jurisdictional tax competition.

extreme, broad regulatory goals and objectives may be determined at the national level but implementation details left largely to the discretion of lower tiers of government. One example is product standards in the European Union: Member States often have substantial discretion over how to achieve the minimal requirements specified by European Union Directives.<sup>8</sup>

Between the two extremes, national governments may delegate certain responsibilities to sub-national governments, but do so subject to certain conditions intended to achieve a degree of national consistency and coherence. A variation on this approach is for regulatory policy to be determined at the national level, but with provision for sub-national jurisdictions to create exemptions. For instance, federal antitrust laws in Australia, Canada, and the U.S. permit states to create limited exemptions in accordance with local policy preferences.<sup>9</sup>

*Division of Different Regulatory Tasks.* In the simplest model, all questions of regulatory policy concerning a particular industry are set by a single tier of government. In practice, however, different aspects of one industry are often regulated by different tiers. In Canada, for example, primary responsibility for regulating water utilities falls on municipal authorities; environmental regulation is largely the responsibility of the Provinces; and antitrust regulation is enforced at the Federal level. Similarly, electric utilities in Germany are subject to economic regulation by municipalities (granting of concessions), Länder (rates), and the Federal government (antitrust laws). In many countries, a single firm may be subject to environmental regulation at the municipal, state, and federal levels. Approaches of this kind place a premium on

mechanisms to coordinate regulatory requirements.<sup>10</sup>

*Formal Responsibilities vs. Induced or Cooperative Approaches.* In the simplest model, regulatory responsibilities for particular activities and objectives are rigidly assigned between tiers of government by a constitution or some other political compact. In practice, however, constitutions and other arrangements are subject to differing interpretations and applications over time. No less important, the assignment of regulatory responsibility is often blurred by induced or cooperative approaches between jurisdictions. In many cases, national governments induce sub-national authorities to pursue national goals or policies through funding arrangements. In the area of roads, for example, the Australian and U.S. federal governments have a long history of using conditions imposed on federal road funding to influence decisions on planning and regulatory policy.

As noted above, sub-national authorities may also work together to establish common regulatory approaches to address shared problems, even without inducement from federal authorities. In some cases, special intergovernmental forums have been established to facilitate cooperative arrangements of this kind.<sup>11</sup> The European Union can be seen as a more advanced model of the same approach, where national sovereignty is pooled according to a formal treaty with an elaborate institutional apparatus to facilitate joint decisionmaking.<sup>12</sup>

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<sup>10</sup> For a criticism of existing arrangements in the U.S., see Phillips (1993).

<sup>11</sup> In Australia, for example, the Council of Australian Governments comprises the heads of the Federal, State and Territory Governments. It meets approximately twice a year with an agenda advanced by working groups of officials. There are also a number of other formal and informal inter-governmental groups dealing with policy coordination on specific issues.

<sup>12</sup> See Keohane & Hoffmann (1991).

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<sup>8</sup> See Gatsios & Seabright (1989).

<sup>9</sup> See Government of Australia (1993).

### 3. Confronting Constrained Regulatory Capacity

Most of the policy considerations relevant to assigning regulatory responsibilities between tiers of government are identical across countries, developed and developing alike. However, constrained regulatory capacity is especially important in many developing and reforming countries, and is likely to be a key issue in Brazil. The principal concern is the relative scarcity (and high opportunity costs) of qualified regulatory personnel at lower tiers of government, with this concern exacerbated by the greater risk of regulatory capture flowing from closer proximity to consumers (voters) and firms. These concerns affect the design of regulatory arrangements and of strategies to strengthen the regulatory capacity of decentralized regulators.

#### Designing Regulatory Arrangements

As noted in Section 1, the main strategy for handling the contracting problems associated with infrastructure regulation is to circumscribe the discretion contained in regulatory rules and to allow an entity with the requisite expertise and independence to exercise residual discretion. The scarcity of skilled regulatory personnel and greater exposure to industry and consumer pressures must be taken into account in designing regulatory arrangements. Some of the main design issues are considered below.

*Discretion and Independence.* In this environment, potential investors are likely to be especially sensitive to discretion in regulatory arrangements, and have a strong preference for detailed and rigid rules and standards. To the extent that discretion is tolerated -- and as a practical matter, it is virtually impossible to remove all discretion -- a premium will be placed on measures that safeguard the independence of the regulator. These measures may range from procedures affecting the appointment process and security of tenure to

procedures ensuring transparent decisionmaking and the review of decisions. To the extent that these conditions are not met, investors will demand higher rates of return to offset the regulatory risks they perceive.

*Sectoral Breadth of Authority.* Entities charged with regulating infrastructure can be organized on one of three main bases, depending on the sectoral breadth of their authority.

- *Industry-specific.* Separate agencies are responsible for telecommunications, gas, water, electricity, rail, and so on. Examples of this approach include the United Kingdom and national level regulators in Argentina.
- *Sector-specific.* Separate agencies are responsible for sectors comprising a group of related industries, such as an energy regulator for electricity and gas, a transport regulator for rail, roads, and ports and a communications regulator for telecommunications, post, and broadcasting. Countries which use sector regulators for energy include Colombia, Hungary, and the national-level regulators in the United States and Canada. Sectoral regulators are being established in Russia and are being advocated as a reform option in the United Kingdom.<sup>13</sup>
- *Multi-sectoral.* A single regulatory agency is responsible for all or most infrastructure sectors. Examples include state-level regulators in the U.S., Canada and Australia, as well as national-level arrangements being implemented in Jamaica and Bolivia.

Establishing a regulatory agency with a broad industry base offers a number of advantages over industry-specific agencies, particularly in

<sup>13</sup> See Helm (1994).

countries with limited regulatory capacity and experience. These advantages are even more important when sub-national regulators are involved. The advantages include:

- Opportunities to share regulatory resources – for example, economists, financial analysts, and lawyers can work across sectors, and administrative personnel can be shared.
- Greater resistance to industry capture – the agency's broader constituency weakens the influence of any one industry.
- Greater resistance to improper political interference – the broader constituency and higher political profile increase the stakes of inappropriate political intervention.
- Application of consistent approaches across industries -- this has two main benefits. First, it contributes to greater predictability (and hence reduced risk) for investors. Second, it reduces the risk of market distortions that can arise when services that are subject to substitute competition -- such as gas and electricity or different transport modes – are subject to inconsistent regulatory treatment.<sup>14</sup>
- Easy translation of lessons and experience gained in one sector to other sectors – this can be particularly important in relation to the design of efficient tariff structures and some of the new regulatory challenges associated with managing competition in network services such as telecommunications, electricity and gas.

Three broad strategies can be adopted for establishing multi-sectoral regulatory frameworks. First, a multi-sectoral framework can be established at the outset, with each sector brought within the regime at the time of or before privatization. This will usually be the preferred approach, and has been adopted in

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<sup>14</sup> This phenomenon is referred to "regulatory arbitrage"; see Helm (1994).

countries including Bolivia. Second, if an industry-specific regulator already exists, new industries may be brought within its jurisdiction rather than creating additional entities. The feasibility of this approach will depend on how easily the structure and operation of the initial institution can be modified to meet a broader mandate. Third, regulators can be established on an industry-specific basis but consolidated over time through mergers. This happened in many states in the U.S. and pressure is mounting to merge industry-specific regulators in the U.K., Argentina and Chile. This strategy has a number of weaknesses, however, including the likelihood that existing entities will resist merger and that the benefits of a broader perspective will not be available during the critical early phases of a new regulatory system.

One of the main challenges in establishing multi-sectoral agencies is to ensure that specialized knowledge or understanding of particular industries is not unduly sacrificed. This challenge can be addressed by ensuring that internal organizational arrangements foster the development of industry-specific expertise, such as by establishing strong sector-specific departments. This approach has been adopted by many state-level regulators in the U. S. and is being emulated in Bolivia.

*Functional Breadth of Authority.* The question may arise whether the entity responsible for economic regulation of an industry should also have responsibility for safety, environmental, anti-trust and other regulation for the infrastructure industry. While international experience is mixed, three general principles are widely accepted:

- Where regulatory capacity is limited, the fewer the regulatory agencies involved in supervising the industry the better.
- Where several regulators are involved, the jurisdictions of each should be defined as precisely as possible to reduce uncertainty, duplication, or conflict.

- Where two or more regulators are responsible for closely related aspects of the same industry – such as water quality standards set by an environmental regulator and water rates set by an economic regulator – effective coordination will be essential to ensure proper regulation.

*Minimization of Regulatory Demands.* If regulatory capacity is limited, this limitation must be taken into account in designing all aspects of the regulatory system. Regulatory discretion can be limited and residual discretion can be tempered by clearly articulated criteria. Administrative procedures intended to make regulatory decisionmaking transparent should avoid excessive legalism, a criticism often leveled at regulatory processes in the U.S. The burden of supervising compliance with rules can be reduced by ensuring that penalties are clearly defined and set at a level that will provide appropriate incentives for firms. It may also be feasible to enhance the role of consumers in monitoring firm behavior by providing incentives to report non-compliance. For example, in addition to fines, consumers may receive rebates if a firm has failed to meet clearly defined performance obligations: New Zealand and the U.K. are adopting this approach in telecommunications.

*Contracting-out Regulatory Tasks.* Another way to reduce demands on regulators is to allow them to contract-out particular tasks. For example, some of the analytical work associated with price regulation could be contracted-out to consultants, and external arbitrators could be used to settle certain types of regulatory disputes. Similarly, some regulatory tasks may be delegated to regional or national agencies. In each case it will be important to ensure that the proposed arrangements do not raise concerns over capture or otherwise weaken the legitimacy or effectiveness of regulatory decisionmaking.

### **Strengthening Regulatory Capacity**

Even where regulatory arrangements have been designed to reduce regulatory demands, nascent regulators will typically require assistance in a number of areas, including training in specific regulatory functions. This type of assistance will usually exhibit significant scale economies, as training programs and other materials may be shared by several decentralized regulators. A number of strategies exist for delivering assistance of this kind.

*Assistance Through National-level Agencies.* A national policy favoring decentralization of regulatory responsibility may be complemented by technical assistance channeled through a national-level agency. For example, such an agency could organize training programs for regulators, provide model contracts for concessions, or provide technical advice on specific regulatory problems. It may also act as a focal point for disseminating lessons of experience among sub-national regulators.

*Mutual Assistance Through a Regulatory Association.* An alternative or complementary strategy is to establish an association of regulators. Sub-national (and national) regulators can interact in this forum and share lessons of experience. The association may also reinforce professional norms (and hence reduce vulnerability to improper influences) while providing a group of peers to respond to charges of improper political interference. It could also provide a framework for the joint development of training programs and research on common regulatory problems. The National Association of Regulatory Utility Commissioners in the U.S. provides a possible model.

*Twinning Arrangements.* A third vehicle for supporting nascent regulators is establishing "twinning" relationships between sub-national regulators and more experienced regulators, whether from foreign or national jurisdictions.

Arrangements of this kind can provide a source of ongoing institutional support, technical advice and exchange and training opportunities. A growing number of U.S. and other OECD regulators have experience in participating in these relationships with regulators in reforming and developing economies.

#### 4. Conclusions

Selecting the most appropriate assignment of regulatory responsibility for infrastructure between tiers of government in Brazil will call for complex policy judgments, often made in a sensitive political environment. This choice cannot be made in the abstract or by appeal to general slogans: careful consideration of the particular industry, jurisdictional units, and regulatory issues is essential. In many cases the most appropriate response may involve a division of responsibilities between policy formulation and implementation, and between different regulatory tasks.

While most policy considerations are identical across countries, constrained regulatory capacity is of special concern in a reforming country such as Brazil. This constraint must be given due weight in framing any privatization and decentralization strategy, and when considering the detail of regulatory and institutional arrangements. In particular, sub-national governments may need to find ways to resist the pressures that can arise for each industry to have a separate industry-specific regulatory agency. Thought will also need to be given to strategies for strengthening regulatory capacity at all tiers of government.

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## BOOK REVIEWS

# DEREGULATED PRIVATE WATER SUPPLY: A POLICY OPTION FOR DEVELOPING COUNTRIES

*Penelope Brook Cowen and Tyler Cowen*

## The Privatization Alternative

Many citizens in developing and transition economies are excluded from enjoying safe and reliable water supply. In many cities, 30 to 60 percent of the population has no formal water hook-up at all, but rather must resort to wells, buckets, supply by tanker-trucks, and physical transport of water through human labor and beasts of burden.

A few simple facts illustrate the serious nature of this problem. In Jakarta, 75 percent of the population has no formal connection; in Maputo 65 percent. In Madras, the percentage served is around 50 percent; and even in relatively prosperous Manila, 29 percent of the citizenry has no connection. When individuals must resort to nonpiped water sources, prices are often at least 10 to 20 times higher. In Luanda, where the price for piped supply is around nine cents per cubic meter, households can pay as much as \$16.00 per cubic meter for tanker supply. Table 1 portrays some connection rates and price differentials.

The fundamental problem is institutional rather than technological. Tariffs set by governments at levels below cost recovery fail to encourage inclusion. In developing countries, water utilities recover on average around 30 percent of their total costs (World Bank 1994). As a

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TABLE 1  
PRICES FOR PIPED AND VENDOR SUPPLIES IN SELECTED  
DEVELOPING COUNTRIES

City and Year	Percent without Connections	Price for Piped Water (US cents/m <sup>3</sup> )	Price for Vendors (US cents/m <sup>3</sup> )
Bandung (1991)	61	9.9	616
Jakarta (1991)	75	17.2	185
Manila (1992)	29	10.5	187
Karachi (1992)	17	7.5	175
Ho Chi Minh (1991)	35	7.6	151

SOURCE: Asian Development Bank (1993).

result, utilities have no incentive to deliver services to large sectors of the population, almost always low-income households. Incentives for research and development are similarly weak, given that the price-controlled monopolist cannot capture the full benefits of a new product idea.

The human costs of these institutional arrangements have been very high. According to one estimate (the World Health Organization, cited in Cooper 1997), contaminated drinking water accounts for 80 percent of disease in India, including a sizable share of the 500,000 Indian children who die each year from diarrhea. Around the world, diarrheal diseases kill more than 3 million people annually, and cause approximately 900 million episodes of illness (World Bank 1992).

We propose that unregulated privatization be considered as one means of limiting these tragedies. To date, the world has experimented with four kinds of institutional regimes: outright public provision of water (common throughout the world), government-supported natural monopoly with regulated price (the English model), government-supported natural monopoly with regulated rate of return (the American model), or a government-controlled franchise, lease, or concession agreement (the French model and its variants). We add a fifth possibility: complete privatization of water assets and unregulated natural monopoly. This scenario involves no price regulation, no rate of return regulation, no residual government ownership of assets, and no surreptitious regulation through antitrust law.

The rationale for unregulated privatization is straightforward. An unregulated private monopoly would have an incentive to bring as many potential buyers into the system as possible, so as to maximize profit. Unregulated private monopolies could thus significantly

increase the number of water connections in developing countries. If unregulated privatization could produce hook-ups for currently neglected low-income customers, the poor would end up with higher real incomes, better water service, more time for other endeavors, and a greater probability of a long life. London water supply in the early 18th and 19th centuries, which was private and relatively unregulated, had a favorable record for extending the number of connections (see Dickinson 1954: 102-3).

While standard theory emphasizes the output-restricting nature of monopoly, water utilities will use price discrimination and fixed hook-up fees (Oi 1971) to capture as much profit as possible, thereby increasing supply in the process. Unlike the governmental and regulated alternatives, a private unregulated monopoly also would have strong incentives to hold down costs and supply an optimal quality of product. Our main point is that this monopolistic alternative deserves serious consideration.

In a comparative institutional context, the more heavily regulated alternatives may end up excluding more potential buyers. Developing or transition economies, regardless of their historical background or geographic locale, tend to share common problems with their governments. These governments have relatively low levels of credibility, weak track records, and very short time horizons. The government performs especially poorly as an owner or regulator, partly through lack of experience and partly through improper incentives and corruption.<sup>1</sup>

In Guinea, for example, progress under a water lease has been hampered by problems in defining and implementing the regulatory function, and by continuing disputes between the government-owned water holding company and the private water operator over who is responsible for failures in service expansions and water loss reductions. While the lease contract has increased the number of connections and improved water flows, progress has fallen short of expectations (Brook Cowen 1996).

Unregulated privatization has received little serious attention, and has generally been rejected or dismissed, albeit without serious analytical consideration. Few sectors have been classified as market failure more universally than the supply of water to households and residences. Throughout the world, water systems are characterized by extensive government ownership or thorough regulation and control. Water supply typically is regarded as a natural monopoly, and therefore a poor candidate for unregulated market provision. In the technical

<sup>1</sup>See, for example, Zajc (1996) on the incidence of these problems in transition countries and their implications for water privatization.

literature, Guislain and Kerf (1996) restrict their discussion of infrastructure privatization to concessions and divestitures accompanied by a regulatory license. Klein (1996) takes as a starting assumption that the weakness of competitive pressures in the water sector creates a need for at least some form of regulation. Breyer (1982: 17) considers a price-discriminating natural monopolist briefly, but does not explore the unregulated alternative in depth. Loeb and Magat (1979) attempt to replicate private price discrimination through regulation; their scheme has the government award monopolists for the consumer surplus they generate. Armstrong, Cowan and Vickers (1994) essentially argue that if competition is not possible, regulation will be necessary.

In the remainder of the paper, we provide an analysis of potential sources of inefficiency in water markets, explain why government ownership and regulation have failed to provide fully satisfactory results, discuss how unregulated privatization might resolve the efficiency problems that plague regulation and government ownership, consider the ability of an unregulated monopolist to price discriminate when selling water to residential users, and focus on some residual problems with the proposed policy option of unregulated private natural monopoly. We find that the case for unregulated privatization is not conclusive, but that the proposal deserves serious consideration.

## Sources of Efficiency Loss

The relevant natural monopoly problem comes from the distribution of water rather than from water itself. Water, considered apart from the problem of distribution, satisfies the traditional definition of a private good—nonrivalry in consumption. If one person consumes some water, another person cannot use the same water. While there are public health benefits to a clean water supply, the private benefits of clean water are high as well, giving individuals a strong incentive to pay for water quality. Consistent with the private-good nature of water, we observe the efficient private supply of water in a variety of circumstances. We buy bottled water at the supermarket, and private, for-profit car washes supply water to clean our cars. The private sector has had considerable success in supplying and running wells, at least where wells are a reasonably efficient means of water delivery.

The construction and maintenance of water distribution networks presents the difficult problem, and the potential cause of market imperfection. Once a system of water pipes is built, the owner of the system has a monopoly advantage in the market. If only one set of pipes exists, the owner of those pipes can exercise market power and

charge a price for water in excess of its marginal cost. As discussed above, other means of obtaining water, such as water delivered by tanker-vendors, typically involve costs from 10 to 20 times higher than buying water through a piping system. Alternatively, we might imagine a system of competing pipes, or competing pipe systems. Such systems did occur in Canada and the United States in the 19th century, and do still occasionally arise when water of different qualities is being supplied. For example, in Hong Kong seawater pipes supply flushing water (Klein 1996). In this case, however, consumers ultimately must finance both piping systems. The high prices needed to recoup the costs of multiple piping systems will imply a restriction of water output, just as the monopoly did. Furthermore, the stability of market equilibrium is problematic when multiple, competing suppliers own networks with high fixed costs (Bittlingmayer 1982). Competition will tend to force prices back down to marginal cost, but at marginal cost no supplier can break even and recover the fixed costs spent on constructing the piping system.

Some treatments emphasize market means of overcoming the natural monopoly problem. Under one proposal, water is distributed through a club-owned network, with different suppliers competing against each other to win contracts with consumers. Either the suppliers or the consumers themselves own or control the club. We see merit in this idea, but for the purposes of exposition we assume that the natural monopoly problem cannot be overcome so easily. The potential ability to make the market competitive, however, would only favor our basic proposal.<sup>2</sup>

Assuming that competition is not possible, the fundamental problem involves the construction of a distribution network with fixed costs that are high relative to marginal costs of supply. The problem behind the private provision of water thus resembles analogous problems with the sale of cable television services, electricity, and natural gas.

Institutional regimes for water provision face three kinds of efficiency problems: inefficient levels of output, inefficient levels of cost, and inefficient levels of product quality. A non-price-discriminating monopolist, in the absence of regulation, will set price above marginal

<sup>2</sup>We also see some problems with the club proposal. Even if many suppliers compete by selling water services through a single pipeline, the fixed costs of the pipeline still must be covered somehow. Competitive pricing allows no means of financing the pipeline and allowing each company to break even. Presumably some kind of Ramsey pricing is necessary, where inelastic demanders face the highest mark-ups, but this introduces some of the welfare losses of market power. Along other lines, Demsetz (1968) analyzed ex ante competition "for the market." In this proposal utilities offer competitive bids to communities for water supply; see below for a discussion of franchising.

cost and restrict output, compared to a first-best social optimum. That is, consumers would be willing to pay more for additional units of output than it would cost society to produce them. The monopolist does not expand output, however, because the extra units of output could be sold only by lowering the price for all units and thus reducing profits.

Regulators have found it difficult to address this problem of monopoly without inducing other distortions. One approach grants private ownership but places a cap on price (the British model for water provision). Placing a cap on price, however, gives the private supplier an incentive to skimp on service and product quality. As with all price controls, the supplier will raise the real price to its desired level by lowering the quality of the product. Not only will quality decline in the short run, but long-run investments in system maintenance will be suboptimal. As discussed above, this problem is particularly drastic in developing and transition economies.

An alternative method of regulation, common in the United States, uses rate of return caps to limit the profits of the private monopolist. In practice, rate of return regulation usually involves price caps as well, whether implicitly or explicitly, and in that regard also leads to skimping on service and product quality. Furthermore, rate of return regulation brings a new set of distortions in the form of higher costs. As rate of return regulation is practiced, firms typically are guaranteed a minimum as well as a maximum rate of return. Without the minimum guarantee firms would not participate in the arrangement, given that they have sacrificed upside potential for profit. Firms therefore can use cost increases as a justification for price increases; not surprisingly, the incentive to keep down costs is low. The end result is high costs and a lower level of water consumption than is optimal.

Leasing and concession agreements, in their various forms, provide yet another attempt to overcome the basic problem with natural monopoly. These institutional arrangements, however, do not avoid the fundamental problems associated with regulation. Leasing and concession agreements typically regulate prices and rates of return to various degrees, either implicitly or explicitly. In this regard they involve the welfare losses associated with price and rate of return regulation. Leasing and concessions may provide for a looser or more informal kind of regulation, given the ongoing relationships between the water company and the relevant government, but in the final analysis either the supplier is free to adjust its prices or it is not. If prices can be set freely, we return to de facto unregulated natural monopoly (of course this may be an advantage of concessions, as will be discussed below). If prices and rates of return are not free to adjust,

we return to the distortions of regulation and the weak incentives to expand the number of system hook-ups. Particular problems arise where concession contracts mandate expansions into low-income areas, while also mandating "life-line" (below-cost) tariffs for low-income consumers.

Leasing and concession agreements involve further distortions through the government's role as residual asset owner. As the leasing or concession agreement nears an end, the private concessionaire has an incentive to cease maintenance or even strip the water assets. Leasing works poorly when the company faces a short time horizon. The government can alleviate these problems by promising a forthcoming renewal of the lease, or by offering comprehensive provisions for compensation upon contract termination, but if these promises are credible, leasing and concessions do not differ greatly from asset privatization with regulation. If the promise is not credible, we return to poor incentives for maintenance<sup>3</sup>.

A fourth proposal involves outright government ownership of water assets and full governmental control. The record of governmental provision in this sector, however, is extremely poor. In developing countries, where government ownership has been the norm, tariffs are routinely set well below cost recovery levels, routinely less than half of supplied water is actually paid for, and large segments of the population go without formal services (World Bank 1994). For political reasons, governments have weak incentives to reduce costs, price water at marginal cost, maintain water systems, introduce innovations, and cut staffing to efficient levels. Not surprisingly, countries around the world are moving away from the government ownership option, and embracing various forms of private sector participation (Rivera 1996). Table 2 shows examples of private sector contracts that are now in place.

### Sketch of an Unregulated Natural Monopoly for Water

Consider a scenario where a government allows complete private sector ownership of all water system assets, including the impounding of bulk water, water treatment, and distribution. The private sector would own all water system assets (which may or may not be vertically integrated) just as the private sector owns the assets in the automobile industry or the computer industry. Furthermore, suppose that the

<sup>3</sup>Zajc (1996) provides a comprehensive survey of the efficiency problems with concessions and leases.



TABLE 2  
 EXAMPLES OF PRIVATE SECTOR ARRANGEMENTS IN WATER AND  
 SANITATION

Contractual Type	Water	Sanitation	Water and Sanitation
Management Contract	Colombia Gaza Malaysia Turkey	United States	Puerto Rico Trinidad and Tobago
Lease	Guinea Italy Senegal Spain		Czech Republic France Poland
Build-Operate-Transfer	Australia China Malaysia Thailand	Chile Mexico New Zealand	
Concession	Côte d'Ivoire Macao Spain	Malaysia	Argentina France Philippines
Divestiture	England and Wales		England and Wales

SOURCE: World Bank (1997).

owner of the water assets could set prices and quantities without regulatory interference. Water suppliers and customers would rely solely on contract to set the terms and conditions of water delivery, and the courts would agree to uphold any contracts which are written. The absence of regulation, as defined in this paper, also implies a credible *laissez-faire* antitrust policy with regard to pricing and output decisions. If water companies set their prices with an eye to avoiding charges of "anticompetitive behavior," or "price gouging," we would return to an implicit form of price regulation. The *laissez-faire* antitrust policy also would allow complete freedom of merger and cooperative relations across differing firms.

Our use of the term "unregulated" refers to the absence of a set of government regulations found in today's regimes—specifically, restrictions on asset ownership, pricing, service delivery, etc., and exclusivity arrangements. Under *laissez faire*, the provision of services is regulated by market forces and economic incentives. In this sense

our analysis compares one kind of regulation to another, rather than comparing regulation to an unregulated state of affairs. Furthermore, all regimes possess an implicit form of government regulation through ex post liability law. In the scenario we consider, private water suppliers would remain liable to lawsuits for breach of contract, fraud, or provision of water of dangerous quality. Nonetheless we continue to use the word "unregulated" for purposes of expositional simplicity and for lack of a more accurate descriptive term.

The forces for natural monopoly within a single geographic area would be strong in an unregulated environment. Experience suggests economies of scale in the operation of distribution networks for populations of at least 50,000 to 100,000 people. Economies of scale in system management as a whole are more extensive (evidence from Britain indicates that managerial economies of scale are exhausted at populations of 500,000 to 1 million). The natural monopoly may be limited at certain margins, such as when industrial users develop their own wells. At the residential level, some households may find it more profitable to dig wells, or to collect and store rainwater for at least some uses. For the typical residential user, however, we envisage a situation where water can be obtained at lowest cost from a single dominant supplier within that geographic region.

We expect suppliers to offer standard packages to their consumers. If an individual is building a house, the water supplier will offer to outfit the house with pipes for some fixed sum, perhaps based on the value of the house and the neighborhood. Where real estate developers are responsible for installing household connections, they routinely use this approach. If a house is already in place and already possesses a hook-up (perhaps as a legacy from a previous, regulated regime), the water supplier will offer so many units of water at a given price, so many more units at another price, and so on. Households will either accept or reject these offers, depending on the promised bundle of price and service.

The water company has strong incentives to set initial offers that will be accepted. The company will try to capture as much surplus from each household as possible, but the company also wishes to ensure that each household signs up to purchase water. Given the initial assumption of natural monopoly, the company can serve subsequent households at relatively low marginal cost. Note that in the polar case where the company has perfect knowledge of household demands, and can precommit to a series of price offers, a "first-best" result will obtain. The water company will extract all of the consumer surplus associated with water purchases. We do not present the first-best as an attainable real world outcome; the relevant comparison is

between imperfect markets and imperfect government regulations. Nonetheless, presentation of the first-best illustrates some basic incentives behind unregulated monopoly and also serves as a foil, by contrast allowing us to see ways in which unregulated monopoly falls short of an ideal outcome.

The relevant consumer surplus can be extracted in either of two ways. The company may charge a fixed fee for a hook-up, and then sell remaining water units at marginal cost over some specified period of time. Both the fixed fee and the subsequent per unit prices would be determined by initial contract; Oi (1971) has analyzed the efficiency of this arrangement. Alternatively, if the hook-up is already in place, or if it is too costly to bargain over the hook-up fee, companies will simply supply the hook-up and then sell water at some price above its marginal cost of production.

This situation, if it can obtain, solves all three of the efficiency problems discussed above. First, the supplier will produce a socially optimal amount of output. For any unit whose value exceeds its marginal cost, the supplier will produce it and offer it on the market. With perfect price discrimination, a supplier never increases profit by withholding output from the market. Second, the supplier has first-best incentives to engage in cost reduction. Any reduction in costs translates into a one-to-one increase in profits. Suppliers therefore will reduce their costs to the point where the social benefits of cost reduction equal the social costs. High costs cannot be socialized but rather eat directly into profits. Third, a perfect price-discriminating monopolist has first-best incentives with regard to product quality. The supplier captures all of the consumer surplus in the form of profits. That same supplier will therefore offer the product qualities that maximize consumer surplus, net of the cost of production.<sup>4</sup>

The ability of a natural monopolist to perfectly price discriminate may be problematic, under a variety of assumptions. For that reason the first-best results may not strictly hold. Nonetheless an unregulated, privatized natural monopoly obtains first-best results under the basic assumption that the water company succeeds in maximizing its profit. Even in a second-best setting, the monopolist may produce a greater quantity and quality of water outputs than do today's highly regulated alternatives. In most developing and transition economies the key problem is to get users some minimal amount of clean water, not to satisfy all optimality conditions.

Note that the potential efficiency of price discrimination also indicates why leasing and concession agreements, and divestitures with

<sup>4</sup>Philips (1983) provides an overview and survey of the economics of price discrimination.

a license, may sometimes result in first-best or near first-best outcomes. If the company holding the concession has sufficiently cozy relations with the host government, that company may be given latitude to replicate the efficient price-discriminating natural monopoly outcome. Quantity and quality decisions will again be optimal, if the "unregulated" outcome can be obtained under the guise of regulation. In practice, however, governments frequently impose uniform tariff rules, or otherwise restrict price discrimination by regulated private water companies.

### The Feasibility of Price Discrimination for Water

Price discrimination is most feasible when four primary conditions hold. First, the seller must hold some degree of market power. Second, the product cannot be vulnerable to low-cost resale from low-price buyers to high-price buyers. Third, the seller must be able to make good estimates of buyer demands. Fourth, the supplier must be able to commit to initial price offers. Each of these assumptions characterizes the water market to some degree.

We take the presence of market power as given, and as following from the natural monopoly assumption. If somehow no market power were present, price discrimination would be impossible, but a regime of unregulated private water supply would in any case prove effective.

The absence of cheap resale from low-cost to high-cost buyers also follows from the natural monopoly assumption. By construction of the example, it is much cheaper to sell the water through a system of pipes than through bottles, wells, and buckets. Even if some resale were possible, however, market demands would shift without changing the fundamental nature of the problem. Assume, for instance, that in the absence of resale low-valuation buyers would be charged \$20 and high-valuation buyers would be charged \$100. Now consider resale, which is profitable at any price above \$80 to the high-valuation buyers. The high-valuation buyers will refuse to pay more than \$80, and the price-discriminating monopolist must lower prices accordingly, presumably to just below \$80. Even at this lower price an optimal quantity of output is still produced, and the monopolist still has full incentives to economize on costs at the margin. Optimal quality cannot be guaranteed, since the monopolist cannot necessarily reap the full benefits of a quality improvement (higher prices for quality improvements may be undercut, implying that the innovator cannot reap all of the new consumer surplus that is produced), but some incentives for quality improvement remain nonetheless.

The third and perhaps most problematic condition for effective price discrimination is whether the seller can predict the market demands of the buyers. The water supplier will estimate two differing features of water demand: how much a given buyer values having any water connection at all, and how much a given buyer values subsequent units of water. We envisage a market where the water supplier sets price by examining the previous use patterns of the water buyer, the value of the water buyer's property, and the wealth of the neighborhood. In wealthier areas the supplier may consider the number of bathrooms in the house, whether the water buyer has a lawn, and other pieces of ancillary information, such as the water buyer's age, job, or credit record.<sup>5</sup> Insofar as water demand is closely correlated with observable characteristics of the property and the buyer, effective price discrimination will be relatively easy. The water supplier will run information on the buyer and the property through its "pricing office," which will respond with a suggested price offer, both for initial service and for successive units of water use. In Los Angeles, for example, the water department has the capacity to customize base tariffs across consumers, according to such factors as lot size, temperature zone, and size of household (Mann 1996).

Price discrimination will inevitably be imperfect in practice. Prices sometimes will be set too high, thereby excluding buyers from either participation in the piping network or from the purchase of additional units, even when the social benefits of added output would exceed the social costs. While some inefficient exclusion will occur, water supply may well be higher than under most current regimes in developing economies.

Even when suppliers make pricing mistakes, they need not exclude buyers altogether. To the extent that monopoly power is considerable, price will exceed marginal cost by a large amount, and the profits of water sales will be large. Each excluded buyer represents a chunk of foregone profit. Consider the position of a water company which believes that a given buyer values regular water use at, say, \$1,000, and where the company can produce those same water services at a cost of \$300. If the company knows that the buyer's valuation is in the neighborhood of \$1,000, but the company is not sure about the exact valuation, the company will more likely price the services too low rather than too high. If the company charges \$1,001, it loses \$700 of potential profit. The expected return to guessing low will tend to exceed the expected return to guessing high. The microeconomic

<sup>5</sup>Since U. S. public utilities routinely run credit checks, this need not involve a significant loss of privacy.

intuition here is simple: individuals or institutions which face a good chance of capturing a significant prize will behave cautiously when they are within range of winning the prize. For similar reasons, monopolistic firms in other contexts will choose high levels of product safety, reliable service, and easy access to their product, all in the desire to protect their monopoly profits (Klein and Leffler 1981).

The excluded buyers will tend to be those whose valuations do not much exceed the marginal cost of producing water services. If the marginal cost of production is \$300, and the buyer values service at \$320, the firm has less marginal profit to lose by trying to squeeze out all of the buyer surplus. Some of these buyers may end up excluded, since the firm will sometimes guess incorrectly and offer a take-it-or-leave-it price above \$320. Even when exclusion results, however, the welfare costs of this exclusion tend to be relatively low. In the example, the buyer valued the product only slightly more than its marginal cost of production. When expected profit, and expected social surplus, are low, fewer resources will be spent trying to capture that profit and some potential gains from trade may be foregone.

If such resulting instances of exclusion prove unacceptable, perhaps for reasons of fairness or equity, a government may decide to intervene in the market and require service to low-income buyers at prices they can afford. In this case our proposal would cease to be purely unregulated, and would involve the costs of price controls, at least for some buyers or some neighborhoods. This outcome, however, represents a worst case scenario for our proposal, which still appears to provide superior overall performance, compared to a regime with full regulation across all contracts and all buyers.

Many cases of harmful exclusion will come in the form of overpriced marginal units, rather than overpriced fees for basic hook-ups. Companies often will choose price discrimination in the form of a schedule, where the prices for water services vary with the quantity consumed. Assume that a buyer values the first unit of water services at \$100, the second unit of services at \$60, and the third unit at \$30. The company will try to offer a price schedule that matches these demands exactly, but if the company calculates demand incorrectly, it may offer, for instance, a schedule of \$100-\$60-\$40, thus excluding the buyer from the third unit of water services. The buyer will take shorter showers than would be socially optimal, but some amount of safe water will still be supplied.

Fragmentary data and lack of experience with unregulated privatization prevent us from offering an empirical assessment of the relative magnitudes of these exclusion costs across institutional regimes. Nonetheless we see no prima facie case for dismissing the unregulated

alternative. The unregulated monopoly has a continual incentive to reduce exclusion problems, whereas the regulated monopoly does not, and may even have an incentive to increase costs and therefore prices, such as under rate of return regulation.

The foregoing discussion has assumed that water companies make single, take-it-or-leave-it offers, which customers must either reject or accept. The analysis becomes more complex if the company must engage in bargaining with its customers.

Bargaining with customers may have either positive or negative effects on welfare, compared to the take-it-or-leave-it alternative. When bargaining is present, some of the initially excluded customers may receive price reductions until they are no longer excluded. Low-valuation buyers face a lesser danger of complete exclusion. On the negative side, consumers may hold out for excessively low prices, if they cannot observe the marginal cost of the firm. If the marginal cost is \$30 and an individual values the service at \$40, the individual may nonetheless hold out for a price of \$20, in the mistaken belief that marginal cost is \$19. Since customers probably cannot observe the marginal cost of the firm with great ease, the potential for such losses exists. Furthermore, some quantity of real resources will be consumed in the bargaining process. Customers may delay buying hook-ups or may try to masquerade as low-valuation buyers, for instance, or the company may invest in signaling its resoluteness as a bargainer. All of these real resource investments are made for the purpose of receiving transfers, and thus violate first-best efficiency.

We expect that bargaining costs will be a significant issue only for very large users, such as large businesses or perhaps condominium developments that buy their water services collectively. We envisage the water company as being able to commit to a price offer to individual users, rather than having to bargain on a house-to-house basis. Most unregulated large-scale suppliers of household services offer their wares on precisely such terms. If a city has only a single newspaper, for instance, that newspaper may be sold at a price above marginal cost. Yet the newspaper company does not bargain with each household, but rather can precommit to a given schedule of prices, and then sell papers to interested subscribers. We expect a similar practice to develop with water. Bargaining over prices is most likely when the purchase is occasional, rather than repeated, and when the item has significant value, such as an automobile, a home, or an expensive painting. Even in these cases, such as with automobiles, bargaining is often largely a ritual of convergence on a publicly available "book price."

Those institutions that can bargain with the water company, such as large businesses or developments, will consume some resources in

the form of bargaining costs. Longer-term rent-seeking costs may arise as well. Individuals will be more likely to live in large condominium developments, for instance, if such decisions hold the promise of reducing their water bill. Residential decisions will be made inefficiently, as the search for transfers from the water company will lead to too many cooperative developments and too few stand-alone houses. In these regards an unregulated privatized monopoly will again fall short of a first-best optimum.

## Further Issues

We see three other potential problems with unregulated privatized monopolies in the water sector: equity and distributional objectives, rent-seeking costs, and the imperfect ability of governments to pre-commit to a laissez-faire regime. We consider each problem in turn, and how privatization might be structured to overcome the relevant objections.

### *Equity*

Commentators often find the distributional implications of perfect price discrimination to be disagreeable. If the water company succeeds in price discriminating, it will capture all of the produced social surplus for itself, and leave consumers with very little benefit. We do not regard this as a decisive objection to unregulated privatization for two reasons. First, it is possible to structure privatization in such a way as to prevent wealth transfers away from consumers. Second, water policy may be an inefficient means of realizing distributional objectives.

If the distributional implications of price discrimination were objectionable, the income transfer could be reversed by giving water customers an equity stake in the water company itself. The government could privatize water company assets using a Czech-style voucher plan, and send the vouchers to potential water customers. High company profits would then imply high values for the shares, thus reversing the initial transfer of income or social surplus. As long as the company continued to maximize profit, an efficient quantity and quality of water would be produced, without objectionable distributional consequences.<sup>6</sup>

<sup>6</sup>The firm may deviate from profit maximization if enough of its shareholders are customers as well. The customers, if they have enough voting power, may eschew direct profit maximization and instruct the company to mimic the price and quantities of a perfectly competitive firm. Even in this (unlikely) case, however, the water monopolist will produce a first-best outcome.



The water market could even be used to redistribute income toward the poor, if the government distributed especially high numbers of shares to the poor (we are not necessarily recommending this policy, however). Even if a foreign company were supplying water, the government could require that company to set up a local subsidiary, and the government could then purchase shares in that subsidiary for its poor. Alternatively, the government could demand that the company distribute such shares for free, as part of the payment for being allowed to market water in the country. The government also could charge the foreign company an entry fee, up to the size of the expected profits (adjusting for risk), and rebate these funds to disadvantaged groups. Even in the absence of rebates or voucher-style privatization, the distributional consequences of unregulated privatization are unlikely to be strongly negative, and may even be positive.

To the extent that clean, potable water brings external benefits, the community will gain under price discrimination, even if the monopolist water company extracts the full consumer surplus for each individual. Each individual would fail to reap surplus from his or her water purchase decision, but the community as a whole would receive the external benefits of the additional supply. The widespread provision of clean water would help break the well-known cycle of disease, poverty, and poor sanitation that plagues so many parts of the world. From the community's point of view, the potential status of clean water as a good with positive externalities strengthens the case for unregulated natural monopoly. If water is a public good, from the community's point of view it becomes less important how much consumer surplus is retained by buyers, and more important to increase the absolute number of hook-ups as rapidly as possible.

Developed countries also are unlikely to experience significant distributional problems with unregulated natural monopoly. Households currently purchasing water from tankers are likely to face lower per unit prices once they receive a piped connection, even with price discrimination. A government also could offset any undesired distributional consequences of its water policy by changing tax rates or by using the numerous other policy instruments that influence the distribution of wealth.

Using water policy to implement distributional objectives has had an undistinguished track record. Governments often have required water companies to set price below marginal cost to achieve distributional objectives. Fortunately, such practices are now almost universally discredited, even though they continue in practice. Using pricing to achieve distributional objectives has caused many water utilities to be insolvent, and has brought unfavorable long-run distributional

consequences as well, again as discussed above. For the same reasons that we reject the distributional argument for pricing below marginal cost, we do not accept the distributional critique of unregulated privatized monopoly.

### *Rent Seeking*

A regime of unregulated privatized monopoly may involve significant rent-seeking costs if firms can compete for that monopoly position. In traditional rent-seeking models, the resources expended on capturing a monopoly position are exactly equal to the monopoly profits at stake. If the water company would earn an expected \$500 million in profits (in present value), companies would be willing to invest up to \$500 million dollars to earn that position (Tullock 1967). The more successfully a monopolist could price discriminate, the greater the corresponding rent-seeking costs. Unregulated privatized monopoly could cease to serve as a first-best optimum. We see rent-seeking costs as a potential problem for unregulated privatized monopoly. Nonetheless the transition to privatization could be structured to keep rent-seeking costs to a minimum. The theory of rent seeking implies only that the would-be monopolist will pay a sum equal to the available rents; this sum make take the form of a transfer rather than the consumption of real resources. Assume, for instance, that the government is selling or auctioning off existing water assets to private companies. The winning company will be willing to bid a sum up to the expected profit, adjusted for risk. So if expected profits are \$500 million, companies will bid some sum just short of this amount (again adjusting for risk), and transfer the funds to the government. Rent seeking takes the form of a pure cash transfer and consumes no real resources. In fact, the transferred funds could be used to satisfy distributional objectives, such as cash rebates to low-income water customers, as discussed above.

Rent seeking for monopoly positions will consume real resources only when cash transfers are not available. We can imagine water companies which court the local politicians, engage in expensive advertising campaigns, and send costly signals of their trustworthiness. In all these cases the search for a monopoly position will lead to real resource consumption, and in fact we do observe all of these phenomena in the contracting process. Nonetheless, both the government and the water company will attempt to replace costly signals and investments with pure cash transfers, simply because the latter are both cheaper and of greater value to the recipient. Rent-seeking costs also can be limited by noncompetitive procurement practices. If one company stands in a favored position to win a given contract, that

company need not invest large sums of real resources to capture the subsequent rents. When rent-seeking costs are potentially high, governments may obtain superior results by limiting entry into the profitable activity. The winning company will still be able to serve the entire market, and other companies will be dissuaded from investing resources to capture that position. In sum, we see rent-seeking costs as a potential problem for unregulated privatization, but not necessarily a decisive problem. A comparative analysis also must consider the rent-seeking costs involved with various forms of government ownership and regulation. These costs may be quite high, given the profits at stake.

### *Government Precommitment*

The imperfect ability of governments to precommit provides perhaps the most serious problem for the unregulated privatization of water. By construction of our policy proposal, water companies and customers are free to set whatever prices and quantities they can agree to. The analysis so far has simply assumed that governments would honor and enforce these contracts with credibility. In reality, governments often do a poor job of enforcing contracts. Many governments are too incompetent to enforce contracts efficiently, or political pressures intervene and the government deliberately voids or rewrites certain contracts. Even in developed countries governmental interference into the contracting process is common. In the context of an unregulated water market, we can imagine the government rewriting a contract where buyers promise to pay high prices in return for an expansion of capacity or additional hook-ups. Once the hook-ups have been made, political pressures might induce the government to regulate or cap prices. Knowing this in advance, the water company might be reluctant to conclude certain kinds of contracts with potential water buyers. In particular, they will be reluctant to conclude contracts that require them to sink significant amounts of capital. (The water sector typically is the most capital intensive of the infrastructure sectors.) The absence of government credibility will limit the gains from trade.

To a considerable degree, imperfect government credibility simply mimics or recreates the costs of regulation. The costs of forthcoming regulation resemble the costs of having regulation now. In this regard the initially unregulated alternative should not produce inferior performance, compared to regulation. In some cases, however, the initial absence of regulation may create more risks for companies than if regulation were already in place. If a water company knows that future regulation is forthcoming in any case, the company may prefer to know the nature and extent of regulation upfront. Transactions costs

may be lower if regulation is present from the onset. Although we regard this problem as a serious one, we do not see regulatory risk as a decisive argument against unregulated privatization. First, an initially unregulated system will not necessarily imply more regulatory risk than a system with initial regulation. Even when initial regulation is present, the water company and its customers always face the risk of additional regulation. A non-credible government cannot make policy risk disappear or even diminish by instituting regulations today. In fact the appearance of regulation may be a signal that more regulation is forthcoming in the future. Typically we expect greater credibility from governments which are willing to experiment with market solutions, even if those governments cannot precommit in absolute terms. Today's world exhibits a significant positive correlation between a government's willingness to allow the private sector to operate and the credibility of that government. Starting with a laissez-faire experiment may increase rather than decrease a government's credibility, as it has in Singapore, New Zealand, Chile, and other countries in a variety of (non-water) contexts. Experimenting with unregulated privatization thus might lower regulatory risk, rather than increase it.

The regulatory risk argument also proves too much. We could, for similar reasons, argue that the government should regulate every economic sector immediately, to reduce the uncertainty about subsequent regulation. Yet successful economies do not typically approach regulation in this fashion. Rather, a responsible government first attempts to discover what a good policy might be and then implements that policy. It should not shy away from good policies for fear that the policy might later be abandoned.

Furthermore, a policy "proposal" is precisely that—a proposal about what would work, not a prediction about what will be adopted. Governments might be unwilling to embrace credible commitments to favorable policies, but policy analysts nonetheless should continue to hold such commitments as an ideal or aspiration (Philbrook 1953). Credibility is, in part, a function of what a government, its citizens, and its advisors believe. By attempting to persuade and to change beliefs about what will work, policy analysts themselves manufacture credibility for policies. To argue that a policy will not have credibility is to assume what is at stake in the policy debate itself.

## Conclusion

The need for water policy reform is pressing, given the stakes in terms of economic development and human health. The lack or very high cost of access by the poor to safe sources of water has devastating

social and economic consequences. We have considered unregulated, privatized monopoly as a potential policy improvement. Under some conditions, this policy can approximate a first-best solution across the quantity and quality of output. While we do not expect this first-best result to hold, laissez-faire in water may nonetheless result in a significant increase in the number of water hook-ups. Given the number of individuals who have no access to clean, safe water, this factor should weigh heavily in our evaluation of the policy. The unregulated natural monopoly will bring problems of partial exclusion, bargaining costs, rent-seeking costs, and imperfect government credibility, but in comparative terms we do not see a knock-down argument against unregulated private provision in this context. Unregulated privatization should join the roster of plausible policy alternatives for the water sector.

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