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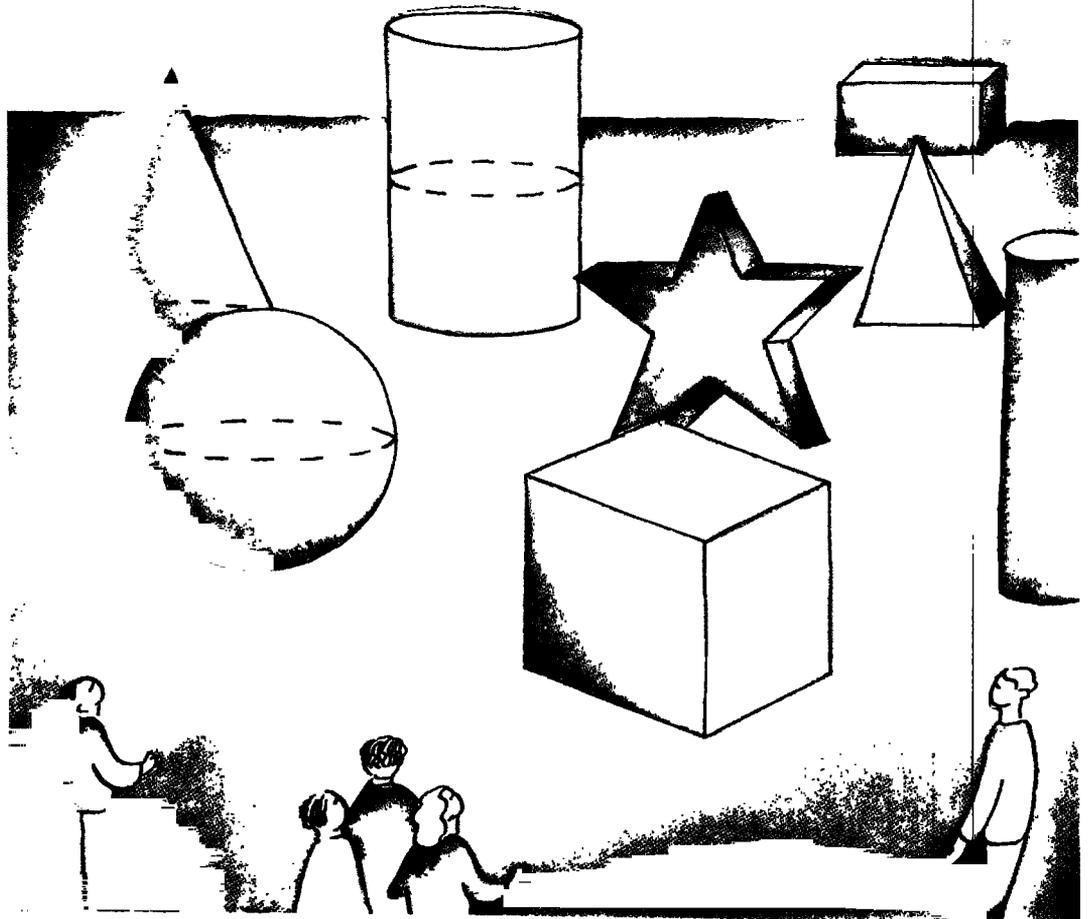
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Dear Readers

In this issue we include an annual update from the World Bank's Private Participation in Infrastructure Project Database showing that in 1990–99 the private sector undertook more than 1,900 infrastructure projects in developing countries for a total investment of about US\$560 billion. The database also shows that over 80 percent of low-income countries have some form of private participation in at least one infrastructure sector.

A special focus in this issue is the regulation of infrastructure service standards and how it can affect access to service for the poor. This is a fairly new topic for economic policymakers—so far most of the debate about improving access has centered on price, not quality. We hope to have more on this subject in later issues.

Finally, as you can see we have a new layout. Over the coming months the Web site will also be revamped—in particular the site will have a better search capability.

Suzanne Smith
Managing Editor

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FINANCE



5 Private Infrastructure: Private Activity Fell by 30 Percent in 1999

Ada Karina Izaguirre and Geetha Rao

This Note, which draws on the World Bank's Private Participation in Infrastructure (PPI) Project Database, provides an overview of recent trends in infrastructure projects with private participation in developing countries. Three main trends have emerged during the past decade. Private activity in infrastructure grew dramatically between 1990 and 1997, but declined because of the financial crises of 1998–99. Most developing countries have some private activity in infrastructure, but Latin America and East Asia dominate investment.

9 Private Infrastructure: Are the Trends in Low-Income Countries Different?

Melissa Houskamp and Nicola Tynan

This Note, based on the World Bank's Private Participation in Infrastructure (PPI) Project Database, reviews trends in infrastructure projects with private participation in low-income countries. Four main conclusions arise. Surprisingly, the proportion of countries with at least one project—81 percent—is higher among low-income than middle-income countries. As in middle-income countries, most investment has been in telecommunications or energy projects. However, in low-income countries, well over half the projects are greenfield. And the scale of private participation in low-income countries lags far behind that in middle-income countries.

QUALITY AND CHOICE



13 Access to Infrastructure: Let Competing Firms Offer a Mix of Price and Quality Options

Bill Baker and Sophie Trémolet

In many developing countries, the regulation of infrastructure service standards is too rigid and makes services too expensive for the poor. The current wave of liberalization of infrastructure is an opportunity to address this problem. Debate on expanding access under such reform has so far centered on price, not quality. This Note proposes a new regulatory framework where large- and small-scale providers compete to supply a range of services at prices better aligned with consumer willingness to pay.

17 Utility Reform: Regulating Quality Standards to Improve Access for the Poor

Bill Baker and Sophie Trémolet

The current wave of privatization of infrastructure services is commonly accompanied by stricter enforcement of quality standards, which pushes up costs, maintaining or worsening the exclusion of the poor. The poor could get easier access to service if the main provider was permitted to deviate from this uniform standard, offering poor consumers a service in which an acceptable relaxation in quality led to a lower price.

21 Micro Infrastructure: Regulators Must Take Small Operators Seriously

Bill Baker and Sophie Trémolet

Small-scale providers of infrastructure services are proving to be more responsive than utilities to needs of poor consumers. They might be delivering water services by tanker, transport services by minivan, or electricity through mini-grids or household solar panels. They make their services affordable to the poor by using cheaper technology or permitting flexible payment. Regulators are customarily hostile to these alternative providers. The interests of the poor would be better served if regulators treated them as valid service providers and brought them under a regulatory umbrella.



25 Water Concessions: Who Wins, Who Loses, and What To Do About It

Caroline van den Berg

Water concessions create value by boosting service coverage and quality, and by improving the efficiency of utility operations. Who wins, who loses, and by how much from these concessions depends on how the contract is designed and regulated. This Note proposes a simple exercise in modeling the distribution of benefits before a contract is awarded as a way to avoid later problems with skewed distribution of benefits.

29 Does Reform of Energy Sector Networks Improve Access for the Poor?

Stephen Powell and Mary Starks

A central goal of the reform of electricity and gas networks, now occurring in an increasing number of developed and developing countries, is to provide incentives to reduce the costs of producing energy and getting it to consumers. New technologies in electricity are drastically reducing costs. But transmission costs are still a major hurdle to expanding networks in isolated or thinly populated areas. As a result it is the urban poor who stand the greatest chance of benefiting from network reform. For the rural poor, alternative solutions, including mini-grid and off-grid services, may be required.

37 Scorecard for Subsidies: How Utility Subsidies Perform in Transition Economies

Laszlo Lovei, Eugene Gurenko, Michael Haney, Philip O'Keefe, and Maria Shkaratan

During the early 1990s, it became clear that without subsidies, many households in Central and Eastern Europe and the former Soviet Union would have difficulty paying their utility bills. Governments started to experiment with various subsidy schemes. This Note describes the main ones and provides a checklist for governments designing subsidies to decide which scheme is likely to be the best fit for their country.



43 Multiservice Infrastructure: Privatizing Port Services

Lourdes Trujillo and Gustavo Nombela

Ports have become increasingly capital intensive. Economies of scale have led to larger, more specialized ships. And competition between ports has started to grow. As a result, governments are rethinking the way ports are run and permitting more private ownership and service delivery. Because ports provide multiple services, if governments are to design an efficient legal and regulatory framework for private participation it is important to study all these activities to evaluate the best approach. Moreover, because these activities must take place in a small space, it is important to study how they are best coordinated.

47 Port Concessions in Chile: Contract Design to Promote Competition and Investment

Juan Foxley and José Luis Mardones

The objective of Chile's port reform is to encourage investment in better port equipment, in the hope that this will lead to more efficient service, in part by attracting larger, more modern ships. The first four major concessions, under which integrated terminals are run exclusively by private companies, started operations in January 2000. The integrated approach to port services replaces a system of free entry of multiple stevedoring companies. This Note reviews how the concessions were designed: the criteria for the winning bids, the rules to prevent concessionaires' abusing their monopoly power, the rules to encourage investment, and the provisions for redundant workers.

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Private Infrastructure

Private Activity Fell by 30 Percent in 1999

5

Ada Karina Izaguirre and Geetha Rao

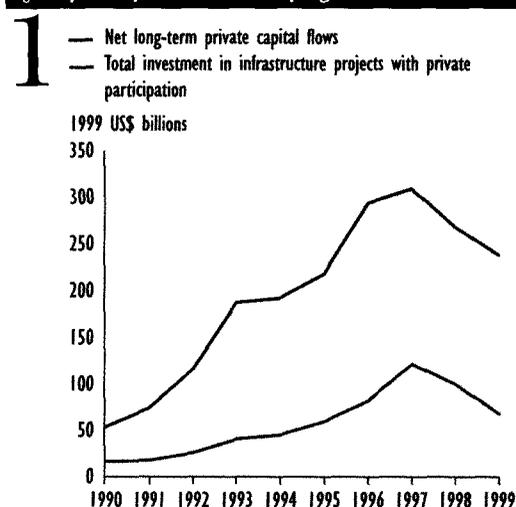
This Note, which draws on the World Bank's Private Participation in Infrastructure (PPI) Project Database, provides an overview of recent trends in infrastructure projects with private participation in developing countries. Three main trends have emerged during the past decade. Private activity in infrastructure grew dramatically between 1990 and 1997, but declined because of the financial crises of 1998–99. Most developing countries have some private activity in infrastructure, but Latin America and East Asia dominate investment.

As liberalization and privatization policies have swept infrastructure activities in developing countries throughout the 1990s, the private sector has become an important financier and long-term operator. Analysis of projects in the PPI database shows that during 1990–99 the private sector undertook the operating or construction risk, or both, of more than 1,900 projects in developing countries, a total investment of almost US\$580 billion.¹ Of this amount, more than two-thirds went to facility construction, expansion, and modernization, and the remaining third went to the government as sale proceeds (divestiture revenues, license fees, or canon commitments).²

Effects of the economic crises

Private activity boomed in 1990–97, rising from less than US\$16 billion to more than US\$120 billion (figure 1). It then declined by roughly 20 percent in 1998 and 30 percent in 1999. As the financial crises

Figure 1 Net long-term private capital flows to developing countries and total investment in infrastructure projects with private participation in developing countries, 1990–99



Source: World Bank 2000 and PPI Project Database.

The PPI Project Database tracks infrastructure projects newly owned or managed by private companies that reached financial closure in 1990–99 in energy (electricity and natural gas transmission and distribution), telecommunications, transport, and water. See page 6 for more information on the database.

Box PPI Project Database: project criteria and database terminology

- I Database coverage:**
- Projects that have reached financial closure and directly or indirectly serve the public.
 - Projects in electricity, natural gas (transmission and distribution), telecommunications, transport, and water sectors, but not movable assets, incinerators, stand-alone solid waste projects, and small projects such as windmills.
 - Low and middle-income developing countries in 1999, as defined and classified by the World Bank.

Definition of private participation. The private company must assume operating risk during the operating period or assume development and operating risk during the contract period. A foreign state-owned company is considered a private entity.

Definition of a project unit. A corporate entity created to operate infrastructure facilities is considered a project. When two or more physical facilities are operated by the corporate entity, all are considered as one project.

Project types

- **Operations and management contract.** A private entity takes over the management of a state-owned enterprise for a given period. This category includes management contracts and leases.
- **Operations and management contract with major capital expenditure.** A private entity takes over the management of a state-owned enterprise for a given period during which it also assumed significant investments. This category includes concession-type contracts, such as build-operate-transfer, build-lease-operate, and build-own-operate-transfer. Investments are supplied by external financing.
- **Greenfield investment.** A private entity invests in a new facility or venture within a state-owned enterprise. This category includes build-own-operate-transfer, build-own-transfer, build-own-transfer-lease, and build-own-transfer-lease-operate.

- **Divestiture.** A private consortium buys an equity stake in a state-owned enterprise. The private stake may or may not imply private management of the company.

Definition of financial closure. For greenfield projects, and for operations and management contracts with major capital expenditure, financial closure is defined as existence of a legally binding commitment of equity holders or debt financiers to provide or mobilize funding for the project. The funding must account for a significant part of the project cost, securing the construction of the facility. For operations and management contracts, a lease agreement or a contract authorizing the commencement of management or lease service must exist. For divestitures, the equity holders must have a legally binding commitment to acquire the assets of the facility.

Recording investments. Investments, privatization revenues, license fees, and canon commitments generally have been recorded on a commitment basis in the year of financial closure (for which data are typically readily available). Actual disbursements have not been tracked. Where privatizations and new investments are phased and data were available at financial closure, they are recorded in phases. When license fees and canon commitments were due over the concession period, their net present values were recorded in the year of financial closure.

Source: World Wide Web, <http://www.worldbank.org/ppi/>, International Infrastructure Development, Operations, and Regulatory Agency.

Web site: <http://www.worldbank.org/ppi/>

Project: This database is maintained by the Private Financing Advisory Network, which is part of the World Bank. For more information, contact the Private Financing Advisory Network at ppin@worldbank.org.

curbed the growth rate of developing economies, their demand for infrastructure fell. The annual GDP growth rate of developing countries, excluding transitional economies, decreased from an average of 5.4 percent in 1990–97 to 1.6 percent in 1998 and 3.5 percent in 1999 (World Bank 2000). Private capital flows to developing countries also declined. Net long-term private flows to developing countries in 1999 were only three-quarters of what they had been at the peak in 1997 (see figure 1). The surviving resources for private infrastructure were mainly directed to projects with political risk insurance or guarantees from multilateral development banks.

Latin America and East Asia were worst affected. In Latin America and the Caribbean investment fell from a high of US\$71 billion in 1998 to US\$36 billion in 1999 (table 1). Activity in 1998 was sustained by the Brazilian telecommunications privatization, which was severely afflicted by the crisis. In 1999 the lack of any major privatization program and the delay of greenfield projects reduced activity in the region. In East Asia and the Pacific private activity decreased from US\$39 billion in 1997 to less than US\$10 billion in 1998 (see table 1) due to the cancellation or postponement of many high-profile projects in the crisis countries and reduced

Table Investment in infrastructure projects with private participation in developing countries by sector and region, 1990–99 (1999 US\$ billions)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Sector											
Telecommunications	6.7	13.3	8.1	11.0	19.6	24.0	29.9	42.8	54.3	39.2	249.0
Energy	1.6	1.2	12.1	14.6	17.0	24.1	33.7	47.9	25.7	14.9	192.8
Transport	8.0	3.1	4.2	7.7	8.2	10.1	16.5	22.4	17.6	8.4	106.1
Water and sanitation	—	0.1	1.9	7.5	0.7	1.7	2.2	8.9	2.6	5.9	31.4
Region											
East Asia and Pacific	2.6	4.1	8.9	16.2	17.7	23.4	33.4	38.8	9.5	14.1	168.6
Europe and Central Asia	0.1	0.3	1.3	1.5	3.9	8.6	11.6	15.1	11.5	8.7	62.5
Latin America and the Caribbean	13.2	12.6	15.8	18.5	18.9	19.4	28.8	51.1	71.0	36.3	285.6
Middle East and North Africa	0.0	—	0.0	3.4	0.3	0.1	0.4	5.3	3.5	2.4	15.3
South Asia	0.3	0.8	0.1	1.3	4.0	7.6	6.1	7.1	2.3	4.0	33.5
Sub-Saharan Africa	0.1	—	0.1	0.0	0.7	0.8	2.1	4.5	2.4	2.9	13.6
Total	16.3	17.8	26.1	40.9	45.5	59.9	82.3	121.9	100.2	68.5	579.3

— None.

Note: 0.0 means zero or less than half the unit shown. Data may not sum to totals because of rounding.

Source: PPI Project Database.

activity in China. However, there was a significant recovery to US\$14 billion in 1999.

While all infrastructure sectors have been affected, the impact has been worst in energy and transport, in which private activity in 1999 was about one-third that in 1997 (see table 1). In contrast, private activity in telecommunications and water has started to recover. If the US\$19 billion proceeds from Brazil's Telebras privatization were excluded, private activity in telecommunications would have been 10 percent higher in 1999 than 1998. This recovery is driven by a strong demand in mobile services and equipment suppliers who are financing a significant portion of the network expansion. Private activity in the water sector also grew to US\$6 billion in 1999 from US\$2.6 billion in 1998.

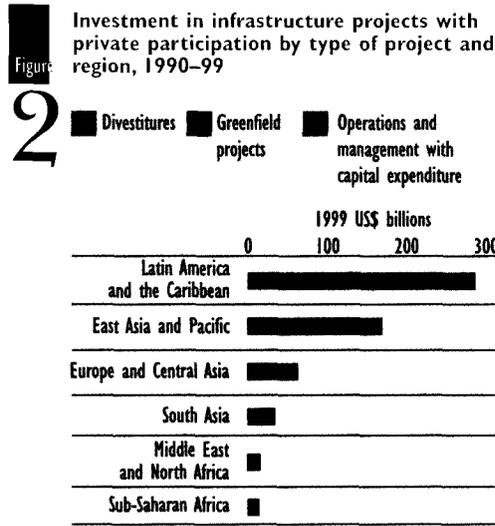
Regional trends

Latin America and the Caribbean and East Asia led the growth in private infrastructure activity in the 1990s. Latin America and the Caribbean accounted for almost half of the investment commitments in infrastructure projects with private participation, while East Asia captured 30 percent and Europe and Central Asia, in third place, captured about 10 percent. Investment in those regions was mainly concentrated in telecommunications and energy, which together accounted for 75 percent of private activity in Latin America, 67 percent in East Asia, and 92 percent in Europe and Central Asia.

Approaches to private activity in infrastructure have differed among the leading regions. Latin America and Europe and Central Asia have mainly carried out divestitures as part of broader sector reforms aimed at creating competitive market structures. In these regions, divestitures accounted for more than half of the regional activity (figure 2). East Asia focused on asset creation through greenfield projects to keep pace with demand growth, but with limited attention to reform of underlying sectors. Greenfield projects represented more than half of investment commitments in that region in 1990–99. The downsides of the Asia approach (unresolved sector deficiencies, demand risk left with the government, contingency liabilities created by take-or-pay agreements or traffic guarantees), which were exacerbated by the financial crisis in the region, have made governments rethink their strategy. In 1999, for the first time, private activity in divestitures exceeded that in greenfield projects in the region.

Country trends

During 1990–99, 121 developing countries had some private activity in at least one infrastructure sector, and 20 had private activity in all four. Fifty of these countries were lower-income, 48 lower-middle income, and 23 upper-middle income. However, the upper-middle income countries attracted most of the private activity (60 percent),



Source: PPI Project Database.

followed by lower-middle income countries (20 percent). Of the low-income countries, China, India, and Indonesia have attracted most of the private investment.

Investment in infrastructure projects with private participation has been concentrated in a few countries, but it is spreading. The top 10 countries accounted for 97 percent of all private activity in infrastructure sectors in 1990, but they accounted for 70 percent by 1999. This decrease indicates that more developing countries are starting to embrace private participation. Since the mid-1990s, more than 50 developing countries have had new private activity in at least one sector each year and more than 10 have had new activity in three to four sectors each year.

Looking ahead

Private infrastructure activity in developing economies will revive as they recover from the economic crises of the late 1990s and the fundamental reasons for long-term private activity—increasing demand for infrastructure, sector inefficiencies, and public budget constraints—continue. Private activity in the coming decade, however, will differ from the pre-crisis activity in four ways. First, new capacity requirements will be smaller: it is predicted that growth in developing countries (excluding transition economies) will be slower in 2002–08 than was predicted before the crises (World Bank 2000). Second, private activity in East Asia, particularly in energy and telecommunications, will take

place in more competitive environments as countries reform their regulatory systems, create competitive market structures, and privatize their state enterprises. The combined effects of lower growth rates and efficiency gains from competitive market structures may reduce new investment requirements in Asia by between 25 and 30 percent in 1998–2005 compared with pre-crisis estimates (Asia Development Bank 1999). Third, private activity in Latin America, which will concentrate on greenfield projects and additional investments in privatized companies, will occur in more competitive markets as countries improve their regulatory systems, reduce entry barriers, and finish privatizing state enterprises. Fourth, infrastructure financiers will be more cautious and focus more on project quality and long-term project risks than they did during the 1990s. Overall, the financial crises have allowed governments and private sponsors to refocus on the fundamentals. This should lead to more efficient and self-sustainable infrastructure sectors, reduced political and regulatory risk, and less exposure to the consequences of government planning errors and state enterprise inefficiency.

Notes

1. All dollar amounts are in 1999 US dollars. PPI Project Database figures for project investments refer to total investment, not private investment alone.
2. This figure excludes license fees that are calculated as a percentage of revenues (revenue-sharing arrangements). These arrangements have been widely used in East Asia for telecommunications projects.

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Private Infrastructure

Are the Trends in Low-Income Countries Different?

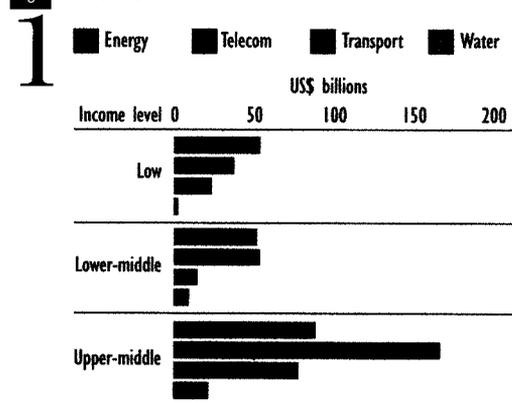
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Melissa Houskamp and Nicola Tynan

This Note, based on the World Bank's Private Participation in Infrastructure (PPI) Project Database, reviews trends in infrastructure projects with private participation in low-income countries. Four main conclusions arise. Surprisingly, the proportion of countries with at least one project—81 percent—is higher among low-income than middle-income countries. As in middle-income countries, most investment has been in telecommunications or energy projects. However, in low-income countries, well over half the projects are greenfield. And the scale of private participation in low-income countries lags far behind that in middle-income countries (figure 1).

Since 1990, a growing number of low-income developing countries have encouraged private operators in infrastructure.¹ This applies even to those lowest-income countries (such as Angola, Nepal, Tajikistan, and Zambia) with a per-capita GNP of less than US\$365 (US\$1 per day). More than 80 percent of these lowest income countries implemented at least one project with private participation between 1990 and 1999, a proportion higher than for either the lower- or upper-middle income groups (table 1). Developing countries, in the aggregate, have experienced a great deal of private participation in infrastructure in recent years.² But do low-income countries share the same experiences and trends?

Figure 1 Cumulative investment in infrastructure with private participation in developing countries, 1990–99



Source: PPI Project Database.

The PPI Project Database tracks infrastructure projects newly owned or managed by private companies that reached financial closure in 1990–99 in energy (electricity and natural gas transmission and distribution), telecommunications, transport, and water. See page 6 for more information on the database.

Table Percentage of developing countries with infrastructure projects involving private participation, by income group and region, 1990–99

Income group	1							All regions
	Sub-Saharan Africa	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia		
Low	76	100	85	100	100	67	81	
Lower-middle	67	70	86	81	67	100	77	
Upper-middle	80	50	80	73	80	N/A	76	
All income groups	76	77	86	79	73	75	78	

N/A Not applicable.
Source: PPI Project Database.

Growth across all income groups

Between 1990 and 1999, the proportion of low-income countries with at least one private infrastructure project grew from nearly 20 percent to more than 80 percent—50 countries (table 1), exceeding the percentage of lower-middle-income countries (77 percent). Investment in projects with private participation in low-income countries rose almost every year during the 1990s and peaked in 1997 at US\$33.6 billion, almost as much as the US\$35.1 billion invested in lower-middle income country projects that year.

After 1997, investments fell, mainly because of the financial crisis in East Asia. Although investment in projects with private participation in upper-middle income countries continued to rise in 1998, partly lifted by the major telecommunications privatization in Brazil, by 1999 investment was below its peak for all income groups (figure 2).

Greenfield projects predominate

The average project size is in many cases smaller in low-income countries (table 2). Greenfield projects predominate in developing countries, particularly in lowest-income countries. They account for 65 percent of projects in low-income countries compared with 37 percent for developing countries as a whole, mainly because low-income countries have so little infrastructure in place.

Greenfield projects are common in the telecommunications sector, especially for new wireless technologies, and the energy sector, where non-sovereign guarantees encourage private investment in new infrastructure. Recent studies show that the energy sector has the highest percentage of households connected to a formal network. Because some networks already exist,

greenfield projects (primarily generation) in the energy sector offer higher returns than non-network projects in other sectors (Komives, Whittington, and Wu 2000).

In low-income countries, only 21 percent of projects involve operations and management contracts with major capital expenditure—a small proportion compared to upper-middle-income countries—and more than half such projects are in China. There are also fewer divestitures and operations and management projects in low-income countries, though twice as many low-income as upper-middle-income countries have at least one operations and management project.

Fastest growing sectors

In low-income and middle-income countries, private participation is concentrated in telecommunications and energy. If all developing countries with at least one project are taken as a group, telecommunications receives a higher percentage of total investment than energy. In low-income countries, however, the percentage invested in energy is higher (46 percent) than telecommunications, and in lowest-income countries it is higher again at 50 percent (see figure 1).

Investment in the energy sector in low-income countries increased rapidly during the 1990s, exceeding that in lower-middle-income countries but not in upper-middle-income countries. Only nine lowest-income countries have energy projects with private participation, even though energy receives 50 percent of investment in this income group. The number of low-income countries implementing private telecommunications projects rose from 3 in 1990 to 40 (65 percent of this group) in 1999. Of the 29 lowest-income countries, 19 had pri-

Figure 2 Total investment in infrastructure projects with private participation in developing countries, by income group, 1990-99



Source: PPI Project Database.

private telecommunications projects by 1999. Most of these projects use low-orbit satellites and wireless technology.

Private water and sanitation projects have been rare in low-income countries: 30 such projects were implemented in six countries (four in Africa, two of which are in the lowest-income group) in 1990-99 with a total investment of US\$1.8 billion (only 2 percent of projects with private participation in low-income countries). Most of the earliest private water projects were operations and management contracts involving little or no investment risk on the part of the private operator. (Private operators play a significant role in small-scale water and sanitation projects in a number of developing countries, but because they do not operate under formal government contracts and they are small they are not included in the PPI Project Database.)

In the transport sector, 20 low-income countries (32 percent) implemented over 190 projects with total investment of US\$23 billion between 1990 and 1999. Eighteen were in lowest-income countries with a total investment of US\$594 million. China, with 116 projects, accounts for 75 percent of private transport investment in low-income countries (US\$17.2 billion).

Four countries dominate

Countries in Latin American and the Caribbean invested nearly US\$300 billion in projects with private participation from 1990 to 1999. Only three of the countries involved were low-income and none were lowest-income. By contrast, Sub-Saharan Africa has the largest number of low-income countries (78 percent are low-income and 43 percent are lowest-income) and received only 2

Table 2 Average size of infrastructure projects with private participation in developing countries, by income group and region, 1990-99 (US\$ millions)

Income group	Sub-Saharan Africa	East Asia and Pacific	Europe and Central Asia	Latin America and the Caribbean	Middle East and North Africa	South Asia	All regions
Low	61.71	238.12	68.09	30.37	113.84	312.5	216.29
Lower-middle	489.33	397.61	64.28	186.43	497.01	126.87	185.72
Upper-middle	144.7	789.84	296.02	510.56	108.82	N/A	488.25
All income groups	116.47	357.4	133.84	416.29	403.86	297.6	306.88

N/A Not applicable.

Note: The average in each category is the investment in that category divided by the number of projects.

Source: PPI Project Database.

percent of investment. Nevertheless, three-quarters of low-income countries in Sub-Saharan Africa have implemented at least one project since 1990 (see table 1).

About two-thirds of investment in low-income countries went to the two largest countries in the group, China and India. Figure 2 compares the trends in investment in 1990–99 for the whole group and for the group excluding China and India. The difference is particularly striking in 1997, when investment continued in China but fell in other East Asian countries because of the financial crisis. Investment in China and India fell sharply during 1998, but started to rise again in 1999. Two other low-income countries, Indonesia and Pakistan, also exhibit levels and types of investment similar to middle-income countries. These four countries are among the ten developing countries, of all income groups, with the highest investment in projects with private participation in 1990–99.

Conclusion

Most low-income countries (81 percent) have some form of private participation in at least one sector, and the proportion is even higher among lowest-income countries. The general pattern of activity in terms of sector and project type in low-income countries is similar to that in middle-income countries. More than 75 percent of investment in projects with private participation in developing countries has been in telecommunications or energy projects, and this concentration is even more marked in low-income countries. Greenfield projects are common in all developing countries, but clearly outnumber other types in low-income countries. Much scope remains for extending private participation to transmission, distribution, and retailing.

Four low-income countries stand out as being most like developing countries in the aggregate. China, India, Indonesia, and Pakistan all have projects with private participation in at least three infrastructure sectors (India and Pakistan do not have projects in water and sanitation) and together account for 91 percent of investment in low-income countries. Countries that have experimented with private participation in one infrastructure sector now need to allow greater private entry to reap the efficiency and service rewards

being reported for projects in many developing countries.

Notes

1. Income groups are defined in World Bank 2000 in terms of 1998 GNP per capita: low-income, US\$760 or less; lower-middle income, from US\$761 to US\$3,030; upper-middle income, from US\$3,031 to US\$9,360; and high income, US\$9,361 or more.

This Note defines another group—lowest-income countries—as those whose 1998 per-capita GNP was less than US\$365. They are: Angola, Bangladesh, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Kyrgyz Republic, Lao People's Democratic Republic, Madagascar, Malawi, Mali, Mozambique, Nepal, Niger, Nigeria, Rwanda, Sierra Leone, Tajikistan, Tanzania, Togo, Uganda, Vietnam, Yemen Republic, and Zambia. For a full breakdown of all countries by income group classification, see World Bank (2000), pages 290–91.

2. Refer to <http://www.worldbank.org/html/fpd/notes/> for more publications on the Private Participation in Infrastructure Project Database.

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Access to Infrastructure

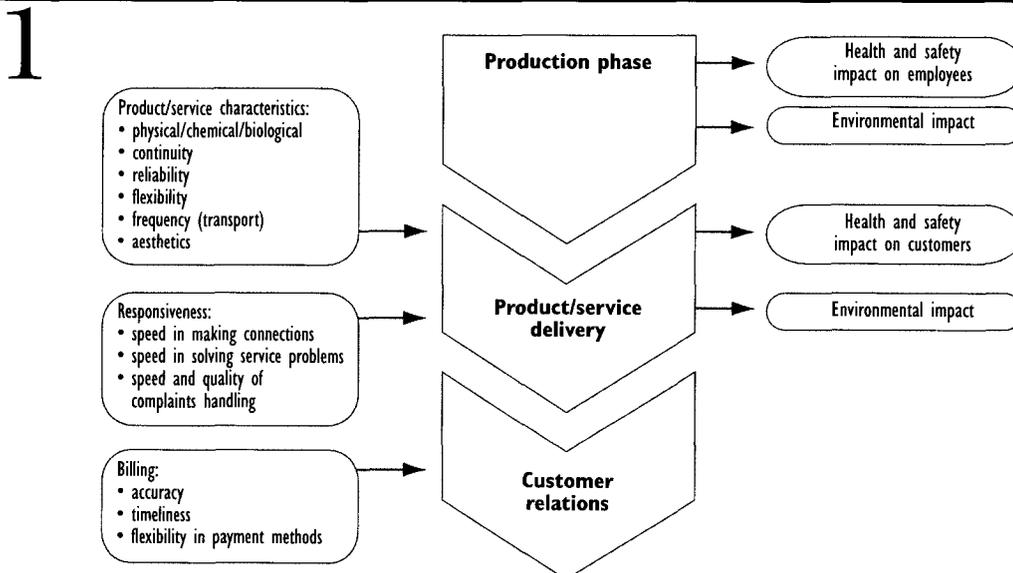
Let Competing Firms Offer a Mix of Price and Quality Options

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Bill Baker and Sophie Trémolet

In many developing countries, the regulation of infrastructure service standards is rigid and makes services too expensive for the poor. The current wave of liberalization of infrastructure is an opportunity to address this problem. Debate on expanding access under such reform has so far centered on price, not quality. This Note proposes a new regulatory framework where large- and small-scale providers compete to supply a range of services at prices that better reflect consumer willingness to pay.

Figure Quality dimensions of infrastructure services



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One size does not fit all

The regulation of infrastructure services standards has many dimensions. For some, such as the effects the services have on public health or the environment (the right-hand side of figure 1), standards can be publicly defined relatively objectively. For example, consumers do not expect drinking water to make them sick. Bus passengers do not expect to be injured.

For requirements above the minimum, or for other service dimensions such as customer relations (the left-hand side of figure 1), quality is more a matter of consumer choice. Offering different levels of quality for these services is equivalent to changing the economic value of the service, and could therefore be expected to elicit a different willingness to pay from each customer or group of customers.

Such flexibility in the setting of quality standards is rare. Consumers are often unaware of the potential for service quality differentiation and utilities unwilling or unable to explore it. Standards are typically set by governments with centralized infrastructure provision in mind, often using developed countries' standards. They are usually above what would be acceptable to the poor and socially optimal. They rarely take into consideration affordability or the costs and benefits of different quality standards. By increasing the price of service, they invariably limit access for the poor.

Why does well-intentioned regulation have this effect and what can be done?

When regulation of quality is justified

Regulation can be justified, in principle, by market failures such as market power, the imperfect sharing of information, and the existence of broadly beneficial effects such as reducing disease and pollution. The fact that most infrastructure services are jointly provided and consumed over a network leads to risks for the quality of the good or service delivered. For example, some infrastructure services have natural monopoly characteristics, due to economies of scale (one network is more economic than two) and scope (coordination is often cheaper within one organization than using a transfer price between two organizations). It is typically the case of water or gas dis-

Box How governments regulate quality

I Governments can respond to market failures with a range of instruments:

- Licensing and certification rules, to regulate market entry.
- Minimum quality standards.
- Provision of information to consumers.
- Encouraging quality signaling by private providers, such as the establishment of reputation through brand names or the setting up of self-regulating producers' associations.
- Laws making suppliers liable for unsatisfactory goods or services.

The choice of instrument should depend on the market failure being addressed and the instruments' associated costs. Market power can be reduced by encouraging competitors to enter the market. The granting of a license to enter could be made conditional on certain minimum quality requirements. Information asymmetries can be reduced by improving consumer education and publishing information on service quality. Private providers may publish quality information voluntarily, as a signal to their customers and to enhance their image. Laws making suppliers liable to consumers for unsatisfactory service can be effective, but because such redress is costly and time-consuming, and requires reliable courts, it is seldom relevant to the poor in developing countries.

tribution networks, for which installing pipe networks in parallel inevitably raises costs. A monopolist might choose to give customers lower service standards or to make savings on system maintenance, which would affect supply reliability in the long run. This can be harmful for customers who do not have alternative sources of supply at realistic cost.

Imperfect information can also justify regulation. Consumers cannot know the quality of most infrastructure services until they have received them. This problem is critical when health and safety are at stake. For example, consumers cannot easily determine whether the water they are consuming is contaminated. So there is a case for government efforts to provide information about the quality of the services to consumers or to impose standards on suppliers.

Regulation in the event of such market failures is justified (see box 1 for mechanisms), but only if it can achieve a better outcome than the market alone, with all its imperfections.

Adapting quality regulation to serve the poor

The drawback of supplying poorer areas is that they are more expensive to serve because they are often less accessible, their low consumption does not cover the cost of connection, and the risk of fraud or non-payment is higher.

Regulators need to recognize these realities and to allow for the delivery of various price and quality bundles. If a private provider wants to serve the poor and remain profitable, it must diversify its pricing or supply arrangements, or both. This can involve charging higher prices to the poor to reflect the real supply costs (which might not be politically acceptable) or finding alternatives, such as group supplies or lower quality levels, to reduce costs. While data on poor consumers is scant, studies suggest that they are willing to pay a higher percentage of their income for infrastructure services than the rich—a measure of their desire for service.

Figure 2 suggests how, by using a low-cost solution with reduced quality, the provider could adapt to poor consumers' willingness to pay. Both the high and low cost options include "regulatory" costs, such as monitoring. The figure assumes these costs could be lowered for the low-cost option through the use of self-monitoring by the provider. (If the price were still too high for poor consumers, a subsidy might be needed, as shown in figure 2.)

In almost every country traditional utilities provide a standardized product, aiming for relatively high quality, and exploiting economies of

scale and scope in production. Where there are alternatives to the main provider, providing different price or quality, governments generally regard them as temporary. There are good reasons for preferring network supply in the long run, but alternative providers, given the chance, can grow, evolve, and compete with the main provider to drive down prices or improve quality. Yet governments often ban new entrants or alternative providers from the market by granting exclusive concessions to private operators. Further, when a regulator is set up, as is usual when a utility passes into private hands, it generally concentrates on the main provider, paying little attention to alternative providers.

Table 1 shows how the current regulatory approach can be adapted to facilitate service quality differentiation and thus to improve access for the poor. As a first step, in the legal and regulatory framework countries should set quality standards according to their own circumstances, taking into account the costs and benefits of the target level of quality, and enforce these standards properly, instead of setting unachievable objectives at developed countries' levels that will not be met. Quality standards should be reviewed to see whether a lower minimum requirement would be acceptable to the poor and would allow the fulfillment of social objectives. Providers should be free to compete on quality above the minimum standards in order to meet the needs of other market segments, especially for business needs.

Figure Service can be adapted to willingness to pay

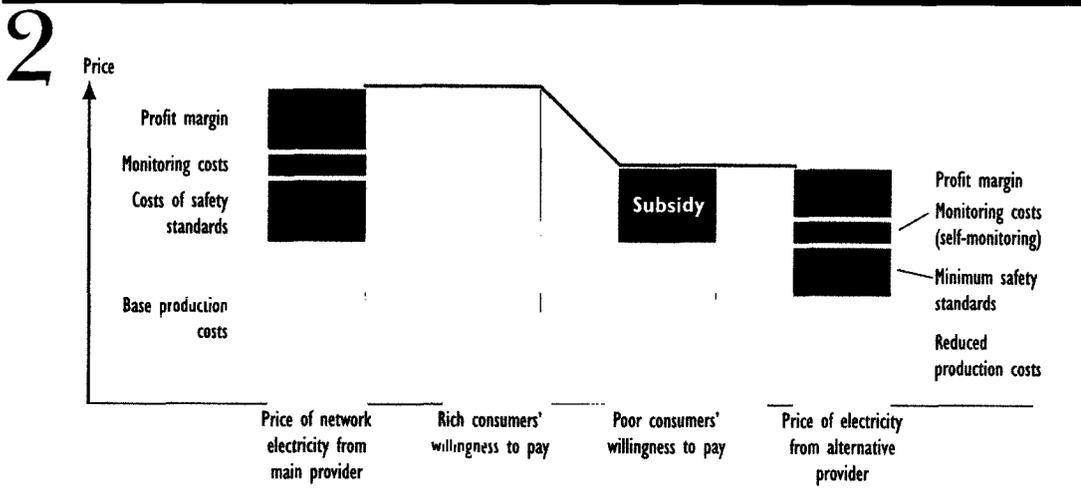


Table Pro-access rules for regulation

Policy decision	Common approach	Recommended approach
Legal framework	Quality standards set on basis of developed countries.	Assess which quality aspects could be improved by regulation (market failures) and whether minimum standards can be defined, above which private providers can compete.
Privatization of main utility		
Market structure	Exclusivity granted to main operator for natural monopoly activities. Competition introduced for activities with no natural monopoly (electricity generation, telecommunications).	Analyze current market structure and services by alternative providers. Formally allow competition in all areas—consider quality explicitly in the definition of rules for market entry.
Level of quality standards	Uniform quality standard, limits access by the poor. Set on basis of developed countries' examples (relatively high level).	Examine whether quality objectives and payment options can be differentiated by service area—if so, reflect in contract obligations. Set on basis of willingness to pay and costs of supply alternatives (including low-cost provision). Develop methods for identifying group preferences.
Regulation of alternative providers	Mostly informal status. Neglect (no regulation) or clampdown and repression, if they cannot fulfill standard quality rules.	Realistic quality objectives, can be lower than main provider Focus regulation on correcting market failures: information gathering and publication, output standards simple to monitor.
Regulatory institutions	Regulatory agency is set up in parallel with privatization, mostly dealing with the main private operator. Design regulatory institutions with a view to minimize regulation costs. Limited institutional capacity to enforce.	Set up agencies expert in regulating services for the poor (experience of low-cost alternatives, community contact for encouraging community level regulation) Self-monitoring, publication of quality performance, community and NGO regulation, compensation schemes for consumers.
Regulatory instruments	Input standards. Little consideration of quality signalling by private providers. Poor enforcement.	Output or outcome standards: leave flexibility to private operators. Quality signalling recognized as substitute or complement to government intervention, diffusion of information Tighten enforcement of minimum standards.

When private participation is being introduced exclusivity clauses should be avoided. Alternative providers should be allowed to evolve, through a gradual tightening in service standards for example, with some incentives for them to enter the formal sector and upgrade their service in the long run. Governments should allow the main provider to offer different quality levels to different customer groups. For areas not reached by the main provider at the time of privatization, the government should consider granting licenses to alternative providers (for example, independent power distributors in rural areas) to accelerate access for poor. The main provider could be allowed to

tender for these licenses, so long as the process promotes competition, not exclusivity.

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Utility Reform

Regulating Quality Standards to Improve Access for the Poor

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Bill Baker and Sophie Trémolet

Privatization of infrastructure services is often followed by stricter enforcement of quality standards, which pushes up costs, maintaining or worsening the exclusion of the poor. The poor could get easier access to service if the main provider was permitted to deviate from this uniform standard, offering poor consumers a service in which an acceptable relaxation in quality led to a lower price. This Note reviews the legal basis of quality standards, the technical challenges for quality diversification, and early results from efforts by utilities to diversify services.

An important reason for reforming or privatizing public providers of infrastructure services is the need to improve the efficiency and quality of service. But when private participation is introduced to a sector, the tendency of governments is to focus on the service provided by the main utility. Private participation also goes hand in hand with setting up independent regulatory agencies. These agencies have better capacity for monitoring and enforcing quality arrangements than the government bodies previously in charge. As a result, governments tend to become tougher on standards and the costs of quality usually go up (even if the quality standard itself has not been modified).

Such quality standards, defined in law or the private provider's contract, can cover production (resource management), product and service delivery (chemical and biological,

continuity), and customer relations (flexibility in payment methods). These quality targets for private provision can be set through a variety of legal instruments. The choice of instrument depends on the frequency with which the standard will need to be changed and the number of parties involved in agreeing changes to the standard, among other things.

Health, security and environmental requirements (such as the regulation of drinking water quality standards, or the quality of sewage discharges) have a significant impact on mortality and morbidity, and on the utility's costs, and should preferably have foundations in primary legislation. The process for modifying laws is usually more complex and difficult than for secondary legislation or bilateral contracts. If consumers and third parties see laws protecting their interests, they will be more likely to accept

the private participation as legitimate. If the provider is satisfied that these rules are not going to be modified overnight and that it would be duly consulted in the process for modifying them, this can lower its perception of risk and ultimately reduce the cost of service through a lower cost of capital.

For standards requiring greater flexibility, regulations (founded in laws), that can be more easily amended by the regulatory agency might be more appropriate. Less fundamental aspects of quality, which may need to be changed frequently (for instance, when pricing conditions are reviewed), are better expressed in contractual clauses (for example, customer service standards, such as the delays for responding to an enquiry by mail or by phone).

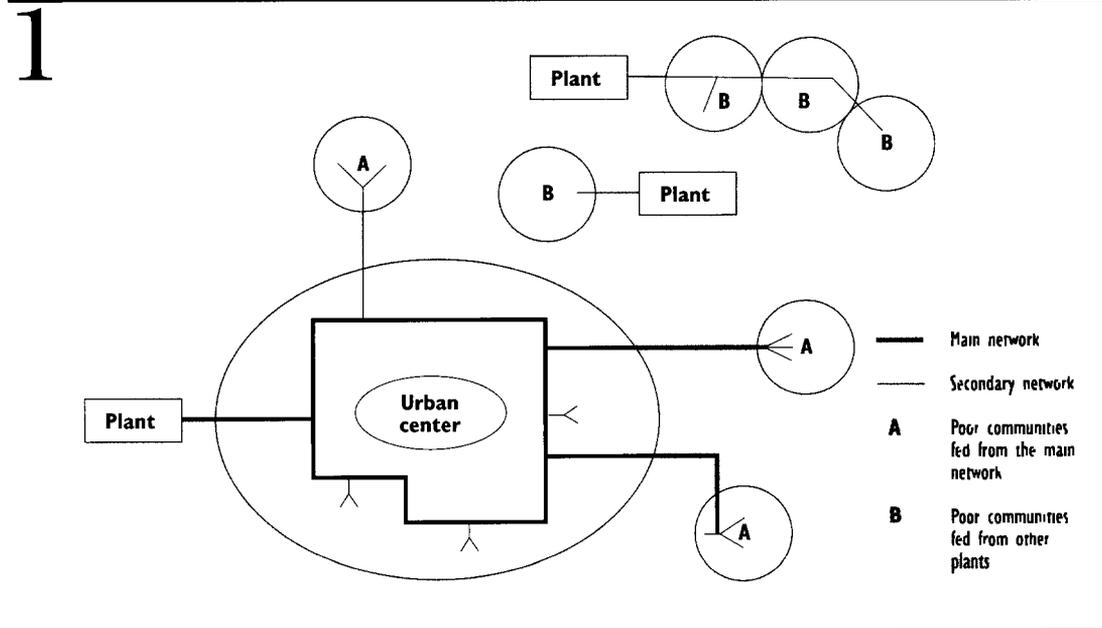
Why quality standards are often set high

There are three main reasons why quality standards tend to be set high for main utility providers in developing countries. First, such providers have often inherited operating structures and tariffs from large-scale operations not used to considering low-cost options or alternative provisions at the community level. The culture in such big organizations is often to derive “professional pride” from top quality uniform service, not from bold innovations in low cost alternatives.

Second, investment designs are often based on developed countries’ standards. Quality standards are often driven by engineering specifications, such as standards for the installation of electrical wiring in houses or the minimum depth for pipes underneath roads. Usually, these engineering norms were designed in developed countries and, in the absence of anything more relevant, exported as is to the regulatory handbooks in developing countries. The expectations of the elite in developing countries also push towards the adoption of developed countries’ standards of service. While lower-cost alternatives do exist in developed countries, they are no longer the norm so they are not necessarily considered when setting standards in developing countries. For example, in-house septic tanks are still often in use in rural areas in France or the United States

Third, large private utility providers tend to focus on high-margin customers, and often have no financial incentive to develop low-cost provision. They have generally entered the market through international tender processes, to carry out large-scale investments. In some utility markets, however, the optimal scale of production has declined and even main providers now consider small-scale low-cost alternatives much more seriously.

Figure Potential for diversification of infrastructure service varies



Practical challenges for diversification

As explained in the Note on pages 13–16, high standards of quality result in higher costs, limiting access to the service for the poor. Regulators could make services more accessible, if they allow diversification of quality, making it legal to offer poor consumers a service in which acceptable reductions in quality reduced the price. One way to achieve this diversity is to end the main provider's monopoly, permitting alternative providers to meet the needs of poorer consumers at a lower price (see page 21).

Another is to permit the main provider to diversify its quality, especially since network supply often remains cheaper in the long term than decentralized supply. Electricity supplied through a network, for example, is potentially of much higher quality than electricity from solar panels or diesel generators. Networks' economies of scale and scope make their prices likely to be lower in the long run.

However, there will sometimes be technical limits to quality diversification. For infrastructure services which tend to be jointly consumed (such as water or grid electricity), it can be technically difficult to vary the quality of service for different social groups or service areas. Figure 1 shows a main production plant feeding into the network for the whole of the urban center. Some poor areas (A) are fed from this main network, so quality characteristics such as voltage consistency or drinking water quality cannot be differentiated easily for these peripheries. Only characteristics such as reliable hours of service, payment methods or customer services could be differentiated for these areas. For other areas (B) which are supplied by other plants (which might belong to the main provider or alternative providers), quality of supply could be varied more extensively.

Another difficulty is that cost differences driven by quality differences might be difficult to reflect in tariff terms. If quality differentiation affects the level of initial capital costs, it can be relatively easy to relate quality differences to tariffs by varying the connection charge. However, if quality variations lead to differences in marginal production costs, these might be more difficult to reflect by varying the volumetric charge. In some cases, variations in the quality of service provided through the network are likely to have a relatively

Box Cheaper is not always better

I According to a report by the Energy Sector Management Assistance Program, managed by the World Bank, the costs of labor and materials for building a three-phase line can be cut from between US\$8,000 and US\$10,000 per kilometer to US\$5,000 per kilometer (and to US\$4,000 per kilometer for single-phase lines) by using higher voltage, using higher quality poles to reduce life-cycle costs, and properly sizing and placing transformers (ESMAP 2000). Single-phase lines are often sufficient to carry the type of loads used in rural areas, and are more suited to business uses than alternatives to network supply, such as solar or diesel generation. However, the study emphasizes that not all construction savings are necessarily efficient. "An initially inexpensive line that needs frequent maintenance, overhauling, and upgrading can require considerably greater investment during its lifespan than a line that has been adequately designed from the outset."

small impact on operating costs, and the administrative cost of reflecting these cost differences in tariffs might be higher than the savings. For example, if lower quality means restricted supply hours, sophisticated meters would need to be installed so that consumers could be charged different prices at different times of the day.

In addition, identifying the target group for lower-quality lower-cost service might prove difficult. There is little socio-economic data in most customer registers. Poor customers may sometimes live in well-defined areas as in figure 1, but they are often mixed with very rich ones within the same administrative unit. As in the allocation of subsidies, the important issue then becomes to deliver the lower price (and the associated lower quality) to the population that is most in need.

Some efforts to diversify quality

Despite these difficulties, some main providers have varied service quality in an attempt to make their services more affordable for poor customers. This diversification can take several forms: through the provision of more flexible customer service arrangements or through the use of low-cost technologies to reduce the cost of service, at the expense of quality. Consumers may also agree to receive the service during a reduced number of hours every day in exchange for a dis-

counted price. In the United Kingdom, for example, electricity and gas utilities have for some years offered pre-payment cards to their customers. This means that supply can be interrupted if the payment is not made. Continuity of service suffers but it allows customers to control their expenses even though the costs may be high.

In some cases, diversification of quality has required entering into agreements with alternative providers or community organizations, which tend to be more specialized in the delivery of low-cost services. For example, Aguas Argentinas, the concessionaire of water and sanitation services in Buenos Aires since 1993, worked in partnership with a low-income community, an NGO and local government when taking over the low-cost system in the Barrio San Jorge. In this barrio, the community had experimentally developed a double system of water provision: one system connected to the existing network to provide small volumes of potable water, and another which can draw on groundwater sources, too salty for drinking but good enough for washing and bathing. The sewerage system was based on a combination of cesspits within each household and a small-bore pipe network. Aguas Argentinas took over the operation, maintenance and repair of the system and the residents pay it a fixed rate for these services. The company has since introduced the low-cost sewerage system to other poor areas of the city. The double water system, however, proved too expensive to develop and did not go beyond the experimental stage. To increase the network expansion rate, Aguas Argentinas also takes over networks built by communities at lower costs (but which respect the minimum quality standards) in exchange for which customers receive a discount on the price of the service.

Interesting cases of collaboration between the main providers and small-scale entrepreneurs have emerged in the telecommunications sector through the development of public telephone booths. In Senegal, for example, small private operators run telecentres and rent lines from SONATEL, the national operator privatized in 1998. These telecenters have grown very fast, and produce about four times more revenue per line than individual lines run by SONATEL.

Conclusion

To increase access for the poor, the regulator of service quality should allow the main provider to diversify the quality of service, and should also allow alternative providers to operate. It should be left to the consumer to decide whether to accept the lower-quality service from the main provider. When regulating service quality for the main provider (privatized or not), governments should allow the delivery of different quality levels to different customer groups, to be identified on objective criteria and enforced. This would help with the problem of under- or over-supply of quality. This possibility should be explicitly allowed in the contract, so that penalties are not unduly paid for sub-standard quality. Flexible payment options should also be explicitly allowed, such as the capacity to phase the payment of the connection charge over a number of years. Main utility providers should also be encouraged to work with alternative providers in order to combine service options. If individual choice is difficult and costly to organize (for example, for service characteristics that are jointly consumed), ways of identifying group preferences should be defined in order to vary service quality at the level of well-identified groups. Several methods for measuring group taste can be considered: the transfer of experiences from other locations, deliberate experiments (for instance, voluntarily varying the quality of service in a number of locations and measuring relative customer satisfaction), group and community consultations, and survey studies.

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Micro Infrastructure

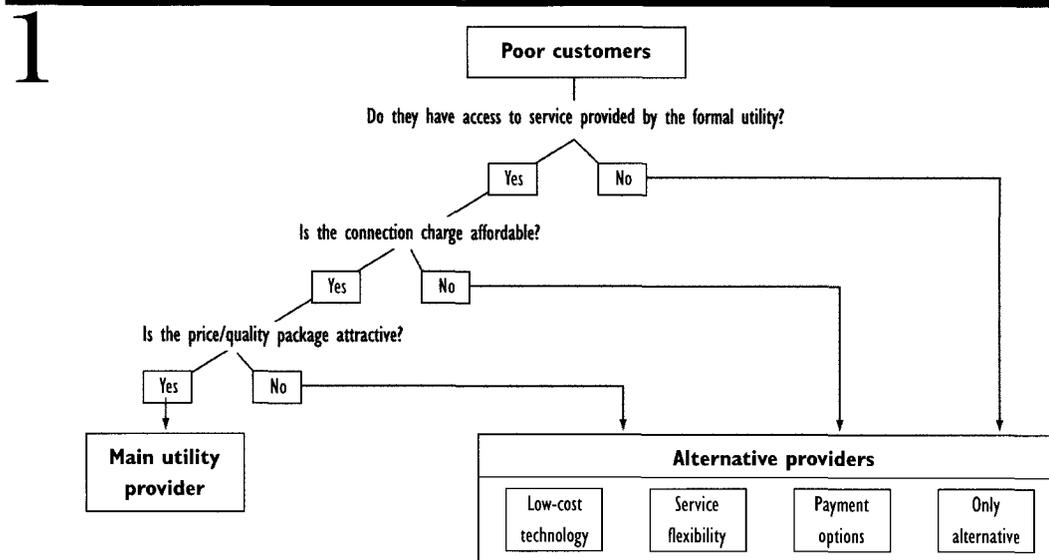
Regulators Must Take Small Operators Seriously

21

Bill Baker and Sophie Trémolet

Small-scale providers of infrastructure services are proving to be more responsive than utilities to needs of poor consumers. They might be delivering water services by tanker, transport services by minivan, or electricity through mini-grids or household solar panels. They make their services affordable to the poor by using cheaper technology or permitting flexible payment. Regulators are customarily hostile to these alternative providers. The interests of the poor would be better served if regulators treated them as valid service providers and brought them under a regulatory umbrella.

Figure Why poor customers choose alternative providers



Market share for small providers

Small scale providers operate where traditional network utility providers fail to provide access at conditions of price and quality that satisfy the needs of the poor or other well-defined segments of the population. There are many types of such providers. Some produce services themselves (small independent power producers, or water suppliers with their own wells), others buy services from the main utility provider and retail them (vendors of water from trucks or by the bucket). Their institutional structure may vary greatly, from community-based businesses and NGOs to commercial entrepreneurs.

These providers often take up a large share of the market, especially when access to main providers is relatively low. For example, it is estimated that between 20 and 30 per cent of urban dwellers in developing countries buy water by the bucket, either from licensees of standpipes owned by businessmen (as in Nairobi) or from traditional water carriers.

Alternative providers have proved to be more responsive to the poor than main providers, providing services that correspond more closely to their demand patterns and ability to pay. Unlike the main providers who mostly provide a one-size-should-fit-all service, they recognize the range of circumstances and markets in which the poor might resort to alternative providers and provide price and quality bundles to match (figure 1).

For consumers who do not live on a service network, or for those who do but cannot afford a connection, alternative providers may be the only option. Many alternative providers allow connection charges to be paid in installments. Even consumers who are connected may not use the service much if high quality standards make prices too high.

Low-cost technology, high flexibility

Some alternative providers make their service affordable by using low-cost technology or offering lower quality than the main provider. Others do so by offering more flexible customer services (in particular, more flexible payment methods and low or no connection charges).

An example of cheap technology is the building of sewerage systems using cheaper, shorter

pipes than the main provider, not buried as deep. The Orangi Pilot Project run by an NGO in Karachi, Pakistan developed a cheap technique for providing low-income households with in-house sanitary latrines, household sewers and connection to underground sewers in adjoining lanes and streets. This innovative system cost \$100 per household, instead of the \$1000 required for installing a sewer connection in the traditional way and was quickly extended to connect 600,000 people in the urban area of Karachi.

In Brazil, condominial sewers have been introduced in shanty towns as a form of lower-quality affordable sewerage system. These sewers run through backyards instead of the street. Sewers can be placed at a shallower level, and the length of sewer required to connect each household is reduced. Households receive lower quality service, because it is not a separate household connection. In addition, communal cooperation for maintenance of sewers is essential, because individual connections are no longer independent of each other.

Alternative providers also provide services needing no network, such as local electricity generation or cellular phones. More consumers in rural Kenya get electricity from household solar cells than from the official rural electrification program, which is constrained by limited resources. For low power loads, this solution is cheaper than other solutions, such as grid connections, isolated generators, kerosene or drycell batteries.

Examples of flexibility in customer service are smart cards that allow prepayment for water or power, pre-paid telephone cards, and load limiters that keep electricity consumption to affordable levels. Prepaid cellphone services have proved very popular with consumers and providers. The user is assigned a number to receive calls, and can buy recharges to make calls. He pays no connection or rental charges but would typically pay a higher usage fee. Those who would not otherwise be able to afford or qualify for normal telephone services can do so. Providers have lower costs because prepayment relieves them of the cost of collecting debts. Some even introduced lower-cost prepayment schemes, with activation costs lowered by 80 per cent and usage costs by 40 per cent.

Regulators are hostile or indifferent

Regulating the quality of alternative providers is difficult, because they are diverse, numerous, and often outside the formal sector. The authorities are often reluctant to try, hoping the alternative providers will disappear as soon as service from the main provider becomes accessible. The official attitude ranges from hostility (banning alternative providers, or granting an exclusive concession to the main operator) to neglect.

Regulation is often limited to construction standards, through licensing requirements, and enforcement is often weak. A policy of active encouragement is rare. Most aspects of price and quality are left to market forces, but this means that alternative providers can be harmful for customers' safety and the environment. Some attempts at self-regulation by providers are evident, possibly to enhance reputation (but possibly also to organize cartels).

The authorities often accuse alternative providers of causing harm. Informal urban transport providers are often blamed for much of the pollution and congestion in the cities of the developing world. Governments ban them repeatedly, overlooking the fact that they provide an important service option for the poor. For example, the Indonesian government once banned cycle rickshaws, saying they were dangerous and created traffic congestion.

Informal providers are also accused of delivering sub-standard and dangerous services, such as dirty water, unsafe electrical wiring or dangerous transport, although hard evidence of inappropriate quality levels being delivered is not easy to document, which is unsurprising given the lack of regulation and consistent enforcement. But there is some evidence that informal urban transport is often less safe than formal transport, because drivers compete for customers. For example, in Delhi, private buses were 0.15 percent of registered vehicles in 1995, but they were involved in 11 percent of accidents.

When alternative providers charge high prices, official hostility is sometimes to blame. High prices can be contrived by a monopoly or cartel, but they also arise because providers that operate under the threat of expropriation will invest only in technologies with low capital

costs, even if this involves high operating and maintenance costs. A survey in the Kenyan city of Onitsha found that vendors of water from tanker trucks there seemed to be able to charge excessive prices. But in many other developing countries water vending seems to be a competitive industry in which prices are determined by market forces. The survey report attributed the high prices in Onitsha to the fact that a project for developing water supply, funded by the World Bank, had been announced (and repeatedly delayed) and had created uncertainty about future profitability of tanker truck vending, deterring the vendors from productivity-enhancing capital investments.

Exclusion of existing alternative providers also takes place when governments try to secure a dominant position for the main operator. Examples include concession arrangements with international private providers. The contract for the La Paz-El Alto water concession in Bolivia specifies that new water and sewer connections must always be in-house connections and gives an exclusivity agreement to the concessionaire, which results in the elimination of all communal standpipes, even though they are low-cost alternatives to in-house connections. By contrast, in the Manila water and wastewater concession, such exclusivity rights were not granted to the concessionaires. Any licensed pre-existing private provider was allowed to remain in place, operating in "pockets" within the service area, with the concessionaire able to compete to extend service to those areas if customers there are willing to pay the concessionaire's price. Also, for new developments within the concession area, the concessionaire can obtain a license to supply the service only if it can do so at a cheaper price than any competing third-party supplier. Non-piped suppliers are not specifically regulated (they do not hold a license) but they are not banned either. Indeed, much of the population still buys water from them.

Self-regulation by association

Confronted with a lack of formal regulation and in search of the advantage of signaling quality, some small private providers have chosen self-regulation as a way to enhance their

reputation and secure a consumer base. In Benin, SIBEAU, a private firm which disposes of about 60 percent of latrine waste from its local area, and 10 other sewage collection firms have formed an association to standardize collection procedures and prices.

Route associations play a significant role in organizing informal urban transport markets. They exist at all levels of private urban transport services in the developing world, and are formed to bring order and avoid inefficiencies and redundancies within a spatially defined service area. For example, they would prohibit members from stealing customers by running ahead of the pack, a practice known as “head-running” which is very common in the developing world. They would levy a fee on their members in order to finance their activities, and hire field agents, to ensure orderly behavior at pick-up points, along routes and at major traffic intersections. As income levels rise, route associations tend to be more formal. The most developed and organized ones are in Latin America and the Caribbean, for example in Puerto Rico, Mexico City and Buenos Aires.

Regulation of a continuum

There are a number of reasons why governments prefer infrastructure services to be provided by centralized networks rather than alternative providers. Building high quality networks may be cheaper in the long term than if the network has to be upgraded several times. Economies of scale and scope attached to network supply mean that the prices of network supplies are also likely to be lower in the long run. But given that public funds are usually not available to develop the entire network at once with the level of quality required for long-term investments, alternative providers must be allowed to co-exist with the main provider and provide low-cost solutions at acceptable levels of quality.

If given the chance, some alternative providers can consolidate into networks and provide healthy competition for the main provider. For example, there are approximately 400 *aguateros* in Paraguay—small private water suppliers operating their own wells and providing piped water to households in areas usually not served by the public operator. These

providers evolved from being truckers a decade ago, and switched to pipe supply because it was cheaper and more efficient. They are entirely privately financed and appear to be more efficient than public suppliers. Government agencies regularly test the water, and an *aguatero* can be shut down if its water fails the test. *Aguateros* compete with each and with the municipal water companies, which offer subsidized prices.

The issue for regulation thus becomes one of transition between service levels: in the first instance, alternative providers should be allowed to complement the main providers. As possibilities for network provision increase, alternative providers can compete with the main provider for the supply of network services best suited to customers’ needs. Alternative providers should be allowed to evolve to avoid the risk that their customers are locked into a “poverty trap.”

One solution might be what is often adopted for privately-owned main providers: a gradual tightening in minimum service standards, with some incentives placed on alternative providers to enter the formal sector and upgrade their service in the long run. For example, this could be done through giving financing facilities to those alternative providers that want to expand their activities, on the condition that they would fulfill licensing or operating quality requirements.

Such an approach would treat alternative providers as a valid long-term solution to be considered in full alongside other options and to be taken into account when designing institutional structures and regulatory mechanisms for quality and price.

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Water Concessions

Who Wins, Who Loses, and What To Do About It

25

Caroline van den Berg

Water concessions create value by boosting service coverage and quality, and by improving the efficiency of utility operations. Who wins, who loses, and by how much from these concessions depends on how the contract is designed and regulated. This Note proposes a simple exercise in modeling the distribution of benefits before a contract is awarded as a way to avoid later problems with skewed distribution of benefits. The Note uses data from Argentina where failure to anticipate the distribution of benefits meant some transactions went sour or had to be renegotiated.

Argentina was a pioneer in utility reforms in the 1990s. The water reforms started in the capital, Buenos Aires, with the concession awarded to Aguas Argentinas in May 1993. Operations and service improved rapidly, there was a tenfold increase in capital investment, and 1 million new consumers gained access to the system in the next five years. A series of smaller transactions in the provinces followed. Private concessionaires now operate 11 provincial and municipal utilities (not including cooperatives), serving about half the urban population. Most of these concessions have brought significant improvements.

However some concessions have run into problems, largely because design flaws were left undetected before the contract was awarded. It was assumed that if concessions were tendered competitively with clear service quality and coverage expansion targets, and supervised by a cred-

ible regulator, investors would earn market returns on their investment, and the bulk of the benefits would accrue to customers. Contract design did not specifically address the distribution of benefits. As a result, in Buenos Aires, for example, it turned out that a tariff structure favorable to existing users and skewed against new connections created difficulties in expanding services to the poor, and the contract had to be renegotiated to meet its coverage targets. A skewed concession—which disadvantages a major constituency of stakeholders—is not a good long-term business for anyone. Most likely, over the 25 or 30 years of the contract, the regulator and concessionaire will come under pressure (as happened in Buenos Aires) to amend the contract terms or tariff structure. However, amending existing contracts is a contentious and risky process, which may at the extreme lead to

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termination (as in Tucuman province), loss of credibility of the regulator, or at least entail large legal and process costs. It is better to start with a more balanced contract.

Winners and losers

A number of stakeholders can claim the value created by concessions.

The government's treasury

Before privatization, national and local governments in developing countries tend to be large net contributors to their water utilities. They may provide explicit operating or investment subsidies, hold equity on which they do not expect dividends, or backstop multilateral loans without pricing the guarantee—and they rarely collect corporate income tax from public water undertakings. When deciding to award a concession, most governments terminate these supports, and often expect that the utility will quickly become a contributor to their budgets.

Treasuries can also claim future benefits through the bidding process for the concession. Recent provincial concessions in Argentina have been awarded to the bidder offering the highest annual concession fee (*canon*) or the highest one-off entry fee. And in some provincial concessions, regulatory fees levied from the concessionaires are quite high (as much as 6 percent of gross revenues).

It is not unreasonable for governments to expect a return on investment in assets they devolve to concessionaires, but this means that users will pay more and, if the treasury's cut exceeds the value created by the winning bidder, may end up worse off than before the reform.

Downstream water resource users

Governments are rarely effective in regulating themselves, so publicly-run utilities in developing countries often infringe environmental law, especially on wastewater discharge, without incurring penalties. Although most countries in Latin America have strict effluent regulations, about 90 percent of municipal sewage flows are discharged raw. Concessions often come loaded with wastewater investment mandates and tight deadlines for environmental compliance, while penalties are more likely to be enforced. These mandates,

however necessary to protect the resource, drive up capital expenditure early in the contract, and may create significant incremental expenditure in operating new wastewater plants and sludge disposal schemes. The environmental benefits accrue mainly to society at large, or to river and coastal area users downstream, not to the utility's direct users who have to meet the costs.

Existing versus new customers

If customers "win" as a group, different categories of customers may still see different outcomes, depending mainly on the service expansion targets and standards, exclusivity of license and alternative modes of getting the service, and the tariff structure. In Buenos Aires, the concession was awarded to the lowest tariff bidder, resulting in an immediate benefit to existing users. However, the connection fee remained high—in fact unaffordable to low-income households—because it included an "infrastructure charge" meant to finance not just the connection, but the incremental cost of expanding the secondary water distribution and sewer networks. Elsewhere ambitious coverage expansion targets in a contract, if the cost of expansion is not borne by new users, can put pressure on a utility's cash needs and drive up charges for existing users. Benefits to new users may be overstated in the analysis of a concession, by ignoring the fact that some already had acceptable service from alternative sources (through private wells, or small providers).

Some groups have neither benefits nor losses: for instance, if municipal ordinances prevent the utility (public or private) from hooking up households who live on untenured land, the concession will make no difference to them, and the adoption of "universal" coverage rates in the contract may lead to legal difficulties at the end of the contract period. At least one significant group of customers always loses from a more effective commercial management: those who were able to dodge payment (fraudulent users, or users who are delinquent in paying their bills).

Legacies

The distribution of benefits is not determined by privatization alone. Governments could decide (and have in many developed coun-

Table Modifications to the concession structure

<p>1. Connection costs: Connection costs were reduced.</p>	<p>Connection costs were reduced.</p>
<p>2. Service charges: Service charges were reduced.</p>	<p>Service charges were reduced.</p>
<p>3. Water charges: Water charges were reduced.</p>	<p>Water charges were reduced.</p>
<p>4. Sanitation charges: Sanitation charges were reduced.</p>	<p>Sanitation charges were reduced.</p>
<p>5. Other charges: Other charges were reduced.</p>	<p>Other charges were reduced.</p>

tries) to improve public utilities' environmental performance, and authorize them to increase their tariffs accordingly. Likewise, the way the tariff structure shares the costs of system development between users has nothing to do with a decision to privatize per se. However, these decisions are perceived by the public (and often by the designers themselves) as one "reform package." Some issues that remained latent under public operation can emerge more strongly after privatization. High charges for new connections matter little in a public utility which does not expand coverage, but they are binding for a reformed operation driven by contractual expansion targets with penalties.

Stakeholder analysis

To predict problems in the proposed concession structure of the second generation of water concessions, the World Bank developed a model which differs from those used by most financial advisers, which focus only on the viability of the transaction and on its fiscal impact. This new model determined:

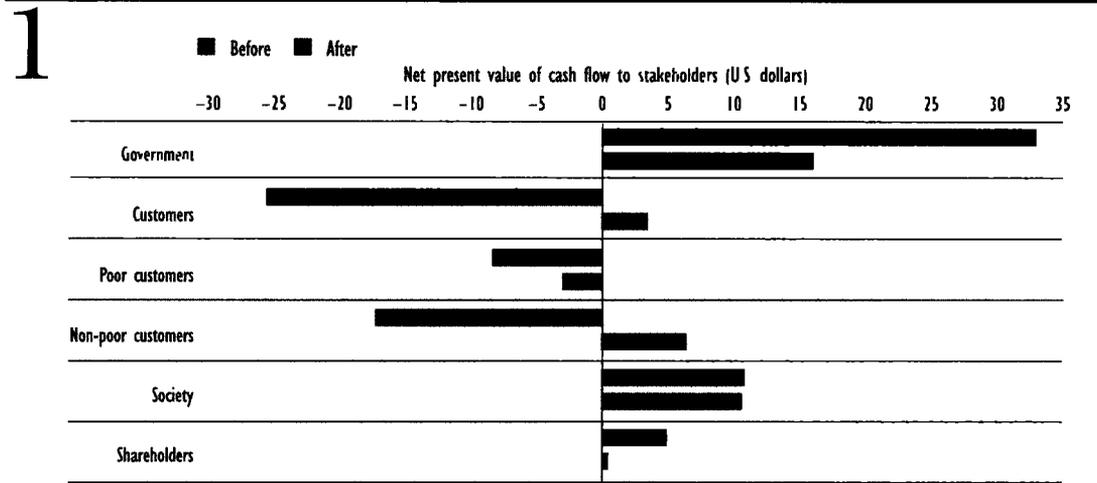
- The overall net benefits from utility reform.
- The impact of utility reform programs on the different stakeholders.
- Whether the proposed reform model was likely to attract private operators.

The second-generation concessions in Argentina are much smaller than the first, with customer populations between 25,000 and 250,000, and starting annual revenues between US\$2 million and US\$11 million. Most of them are in the poorer regions, which require special care in designing concessions.

The modeling was based on draft concession documents. Four major stakeholder groups were identified: governments (federal, provincial and local); the existing and future utility customers; residents who are not necessarily customers of the water utility, but would benefit from environmental improvements; and the shareholders of privatized utilities.

The analysis was applied to three provincial utilities, with no change in their tariff structures (tariff levels, tariff groups and blocks, and connection policies). The data indicated that in all cases reform would benefit society, with high economic rates of return between 24 and 54 percent, because the incumbent utilities are grossly inefficient. However, a closer look at the distribution of the benefits showed that the stakeholders would not share the cost and benefits of reform equally. The government came up as the sure winner, at the expense of consumers. In two of the three utilities, consumers would lose from the proposed reform. Features of the current tariff structure, such as high connection costs

Figure 1 Winners and losers: before and after adjustments to the draft concession contract in Paraná



Note: The model shows that, in the case of Paraná, further work on the tariff structure (which this simple simulation tool does not include) is required to make the concession design more pro-poor. The internal rate of return on shareholder returns is still 12 percent after adjustments in the draft concession contract. Whether that is a sufficient risk premium for the shareholders will be reflected in a trade-off with canon paid to the government.

and mandatory obligations to connect to networks, combined with several features of the proposed concession contract, such as the use of canon payments to award concessions, made consumers unlikely to benefit. Concessionaires would have little incentive to serve new customers, as most of the rewards of the concession came from serving the existing customer base more efficiently. If the investments were separated into rehabilitation (or efficiency improvement) and expansion investments, the former would result in large benefits, whereas the latter would largely be a loss-maker for the concessionaire under an unchanged tariff structure.

After seeing these simulation results the provincial and local authorities decided to modify the design, producing a more balanced and probably more robust contract. In one of the contracts, the new design (with re-balancing of infrastructure charges alone, and use of canon revenue to subsidize social connections), would not be enough to create positive benefits for customers—a better design could be achieved only by further change within the tariff structure and possibly a slower sequencing of proposed environmental improvements.

The changes to the three contracts are summarized in table 1. Figure 1 shows the distribution of gains for key stakeholder groups, in the original and the modified design for one of the three

contracts. Under the initial design, the total loss to consumers from the concession design was US\$25 million over the 30-year concession in Paraná. After the redesign, consumers gain by US\$3 million, or about US\$49 per connection.

Conclusions

Although the move to private sector provision offers an opportunity to address inefficiencies, the Argentine experience shows that many incentive distortions carried over into the concession contracts may make it difficult to provide services effectively, particularly to the poor. Also, distortions may become more conspicuous as the utility’s service objectives become embedded in an “arm’s-length” contract (rather than the softer undertakings which exist between a public corporation and its government owner).



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Does Reform of Energy Sector Networks Improve Access for the Poor?

Stephen Powell and Mary Starks

A central goal of the reform of electricity and gas networks, now occurring in an increasing number of developed and developing countries, is to provide incentives to reduce the costs of producing energy and getting it to consumers. New technologies in electricity are drastically reducing costs. But transmission costs are still a major hurdle to expanding networks in isolated or lightly populated areas. As a result it is the urban poor who stand the greatest chance of benefiting from network reform. For the rural poor, alternative solutions, including mini-grid and off-grid services, may be required.

Electricity reform is based on the premise that market mechanisms supply electricity much more efficiently than central planning can.¹ But how will the poor, who have the least purchasing power, fare in a competitive electricity market? Will those without access continue to be denied it as electricity supply changes from a public service to a profit-seeking business? And will the poor who have access suddenly find it unaffordable?

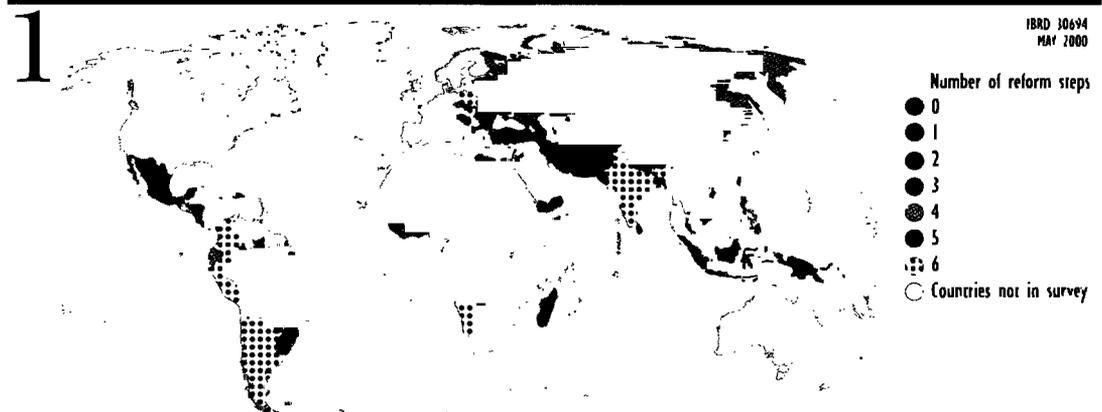
One response to these general concerns is that a well-functioning power sector is crucial to macroeconomic stability and growth. It is precisely because poorly run, state-owned electric utilities have been such an impediment to growth that so many countries are trying to reform them. For those who believe that the best way to make the poor richer is to make everybody richer, that is how electricity reform helps the poor.

However, this Note concentrates on the micro-economic effects: whether reform will make electricity cheaper for the poor who already have access to it, and provide it to those who do not. It analyzes the fundamental costs of generating electricity and distributing it through a grid to rural and poor populations. It describes how electricity reform and technological developments have reduced these costs in recent years and discusses institutional arrangements to ensure that lower costs are passed to customers. It examines whether reform will increase access to electricity for poor households and comments on policies to further the interests of the poor in the context of electricity reform.

As context for this discussion, map 1 shows the extent of power sector reform in developing countries. Network reform is most advanced in Latin America, least advanced in Africa, and is quite

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Map Scorecard for power sector reform in developing countries, 1998



This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply on the part of The World Bank Group any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.

The World Bank surveyed power reform in 115 countries to see which of the following six reform steps had been taken:

- Corporatization.
- Laws permitting divestiture and unbundling.
- Regulations.
- Vertical and horizontal unbundling.
- Laws permitting concessions or greenfield investment.
- Privatization of existing assets.

Note that:

- The score does not indicate the quality of reform or the sequence of steps taken.
- For simplicity, success in one region counts as success for the country.
- Sectors under private ownership for 10 years are not considered part of the current reform movement and are omitted from the survey.

Source: Bacon 1999.

mixed in Eastern Europe and South and East Asia (also see Izaguirre 2000 for private participation in energy by country).

Generating and selling electricity: the costs

The provision of electricity through a grid involves four functions:

- *Generation*: converting primary energy into electricity.
- *Transmission*: the high-voltage, long-distance transport of electricity.
- *Distribution*: the low-voltage transport of electricity from the high-voltage system to the user.
- *Supply*: the selling of electricity to users—metering, billing, and so on.

This Note's main concern is with reform of the transmission and distribution systems—"the grid"—but it also discusses the innovations in electricity generation that made reform possible.

Box 1 summarizes the cost characteristics of the four functions. It has been estimated that in England and Wales generation accounts for about 65 percent of the total cost of electricity, transmission 10 percent, distribution 20 percent, and supply 5 percent (Newbery and Green 1996). These

proportions vary in different systems. In particular, the start-up costs of a grid are high and fixed, which means that grids have big economies of scale, in terms of both the number of households connected and the amount of energy transmitted. Thus for grid systems in developing countries, one might expect transmission and distribution costs to be a greater proportion of the total.

There are two key points here. First, physical factors make the fixed costs of transmission and distribution particularly high for grid extensions to remote rural populations. The population density in rural areas is typically low, which means that the fixed costs are shared among relatively few people.

Second, the poor tend to have very low demand for electricity, which means that the average cost per unit consumed will be high because the fixed costs are divided among few units. Furthermore, for the rural poor, this demand tends to be concentrated at peak times (mainly in the evenings as people switch on lights). Since the fixed costs of transmission and distribution depend in part on peak demand, this demand pattern results in still higher costs for poor rural populations.

1 Generation
 The costs comprise fixed capital costs and variable operational costs including fuel. Because each type of plant has a different balance between fixed and variable costs, for each type the optimal size—giving the maximum economies of scale—is different.

Transmission

Transmission costs cover building and maintaining the transmission system and operating it (dispatching plant and maintaining voltage and frequency within predetermined limits). The cost of building and maintaining the system depends on physical factors such as its size and the terrain. The cost of extending it depends on the expected peak demand, but once the grid is built, the cost is sunk and so does not vary with the number of users or the volume of electricity transmitted. The high fixed costs make it unprofitable for more than one transmission system to compete in an area. Furthermore, the technicalities of minute-to-minute balancing of supply and demand together with the high cost of system failure mean that the natural monopoly extends over the whole integrated system.

Distribution

As for transmission, the high fixed (and low variable) costs depend primarily on the physical coverage of the system (both distance and terrain) and the level of local peak demand. However, because the operating function is much simpler (it does not involve generator dispatch), the economies of scale are not as great. A country that supports only one transmission system can support a number of (non-overlapping) distribution systems.

Supply

Many supply costs, such as bad debts and the costs of payment collection, vary with the number of customers. These costs are disproportionately high for low-income households, which are more likely to experience payment difficulties and suffer disconnection. But some supply costs are fixed: once supply has been extended to a village, the extra cost of reading another meter in that village is low. Supply costs vary with the distance of customers from the nearest demand center. The more remote and dispersed the customers, the more expensive it is to administer meter reading and bill collection centrally.

These points are illustrated in table 1, which gives indicative figures for the relative distribution costs of connecting different numbers of rural households at different distances from the transmission system. The central column shows the unit costs of distribution. The right-hand column shows the unit costs including generation and high-voltage transmission.

As the demand for electricity increases, the fixed costs can be spread. In developing countries, however, it takes time for demand to grow once access is provided: people have to wire their houses and buy electrical appliances before they start to buy electricity. Demand for electricity entails both a switch (not necessarily complete) from other fuels for cooking, heating, and lighting and new demand for electrical appliances such as televisions. Over time, as incomes rise, loads will increase, and load factors will also rise as people buy appliances with constant loads such as refrigerators. However, this progression is difficult to predict and therefore the returns to investment in extension of electricity grids to rural and poor people are uncertain.

To summarize, providing access to electricity for low-income households—in particular the extension of the grid to rural areas—depends critically on the balance between the fixed and variable costs

of transmission and distribution. The fundamental cost characteristics of grid provision do not favor the provision of access to rural and poor populations. Can reform make any difference?

Buying electricity: why it is getting cheaper

The recent wave of electricity reform was facilitated by innovations in technology.

Generation

Until the 1980s the electricity industry was viewed as a unified natural monopoly that produced and delivered electricity. For decades economies of scale had increased in electricity generation, reinforcing the view that it was a natural monopoly.

In the 1980s improvements in turbine technology were imported from the space program and materials science and the price of gas fell (in part because of gas market liberalization in developed economies). This had a radical effect on the economics of generation: the fixed cost of installing a combined-cycle gas turbine (CCGT) plant in the early 1990s in the United Kingdom was around US\$600–650 per kilowatt, compared with US\$750–800 for oil-fired plant, US\$900–1,200 for coal plant, and US\$2,250 for nuclear. Falling gas prices reduced the variable costs as well.²

Table Effects of line length and consumption levels on the relative costs of electrification in Indonesia (US cents per kilowatt-hour)

Cost Component	Unit cost by component	Total unit cost
Generation and transmission	18	
Medium-voltage extension and low-voltage distribution		
3-kilometer spur line, 20 households	45	55
3-kilometer spur line, 50 households	20	30
1-kilometer spur line, 20 households	15	25
1-kilometer spur line, 50 households	7	17

Note: These costs are indicative averages for most developing countries with relatively flat terrain. A few countries are now adopting new, lower-cost network designs.
Source: World Bank 1996, page 50.

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Combined-cycle gas generating units of 50–100 megawatts could by the 1990s be built and run economically—at one-tenth the size of the thermal plants (1,000 megawatts or more) of the 1980s (figure 1). This meant two things. First, generation could be a competitive activity even in relatively small electricity systems. Second, developers other than the state monopoly utility began to want to build power plant—large industrial users as well as independent power producers (IPPs).

Competition and private participation have had further effects on costs. Rather than buying equipment from a favored national supplier, as state-owned monopoly generators had done, new entrants import it if that means lower cost. In turn, this has increased competition between equipment manufacturers, and thermal efficiency has increased, further pushing unit costs down. The thermal efficiency of CCGT stations is now nearly 60 percent (compared with 30 percent or more for other thermal stations), and the cost of installing the latest CCGT technology is now about US\$375–450 per kilowatt.³

Thus generation market reform should cut costs and reduce prices for customers. Following the introduction of competition in generation and the establishment of a bulk power market in Argentina, bulk electricity prices have fallen fairly consistently (figure 2).

In other cases there have been difficulties, however. In England and Wales, for example, anticipated reductions in bulk electricity prices failed to materialize after competition was introduced and the bulk power market established, even though primary fuel prices were falling (figure 3). This has been blamed on the manipulation of bulk power prices by the larger generators. In other words,

competition was not fully functioning. Trading arrangements intended to eliminate such behavior are planned.

Some developing countries have also had difficulties in harnessing the full benefits of IPPs. A key question in generation reform is how to set up a bulk power market that delivers the benefits of reduced costs while still attracting private investors. Offering long-term power purchase agreements to IPPs attracts investors, but the greater the security (in terms of guaranteed purchase volumes and prices) offered by the contract, the less sharp the incentive for cost reduction and the less scope for the power purchasing agency to adjust its purchasing to achieve least-cost dispatch.⁴

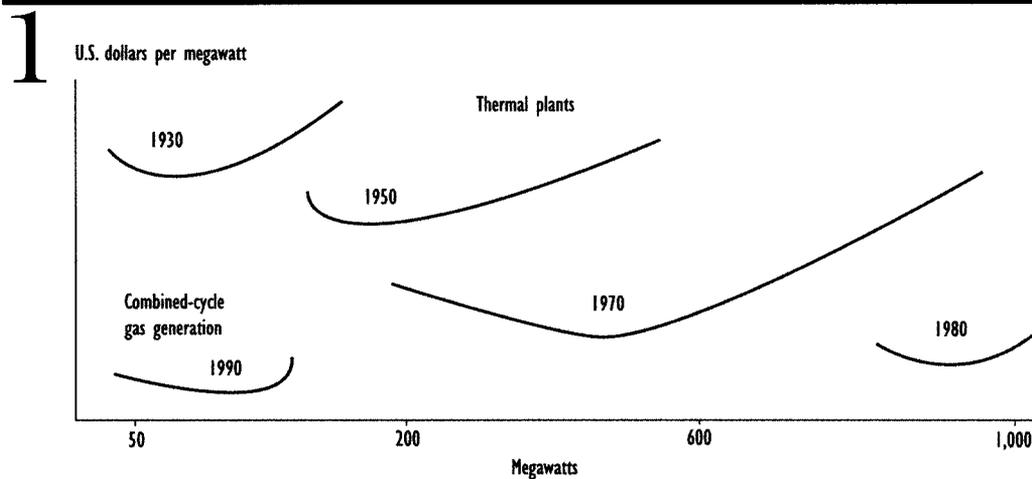
To ensure that the full benefits of competitive generation reach customers, it is necessary to introduce competition in supply. If supply is provided through the local monopoly distribution company, customers cannot shop around for cheaper electricity. The monopoly distribution company can shop around, but has no incentive to do so as it can pass on generation costs to its captive customers. However, competitive suppliers will need to purchase power as cheaply as possible, thus ensuring that lower generation costs are passed to retail customers.

Transmission and distribution

Having recognized that the electricity industry comprises a number of distinct functions, governments have begun to separate transmission, distribution, and supply.

While transmission and distribution have in many cases been separated, and distribution split among a number of companies, both functions retain their natural monopoly characteristics in

Figure Cost curves showing optimal plant size, 1930–90



Source: Hunt and Shuttleworth 1996.

any one area because of their high fixed costs. However, the introduction of private participation through competitive tendering for concessions (to identify the least-cost provider) has captured many benefits in terms of lower costs.

Increased competition in the equipment markets has reduced the price of many of the fixed cost components. Installation has also proved cheaper when done by private contractors rather than utility employees.⁵

More generally, the private sector is simply more efficient as a consequence of its profit seeking. For example, when private distribution began in Buenos Aires there was a dramatic reduction in theft. Since theft was particularly prevalent in slum areas, this reduction in theft cut the difference between the cost of supplying these areas and the electricity tariff and enabled the distributor to supply slum areas with reduced subsidies (Albouy and Nadifi 1999).

Equipment costs can also be reduced by relaxing equipment specifications and adopting international standards. In the United Kingdom, for example, over the past five years the cost of electric plant in real terms has fallen by 10–15 percent (Fairbairn 2000).

However, transmission and distribution remain local or national monopolies. This means, first, that incentives to reduce costs are not as sharp as they would be under competition (although the profit motive supplies some incentive), and second, that savings that are made will

not be freely passed to consumers. Therefore, where these monopolies are privately owned, regulation is necessary.

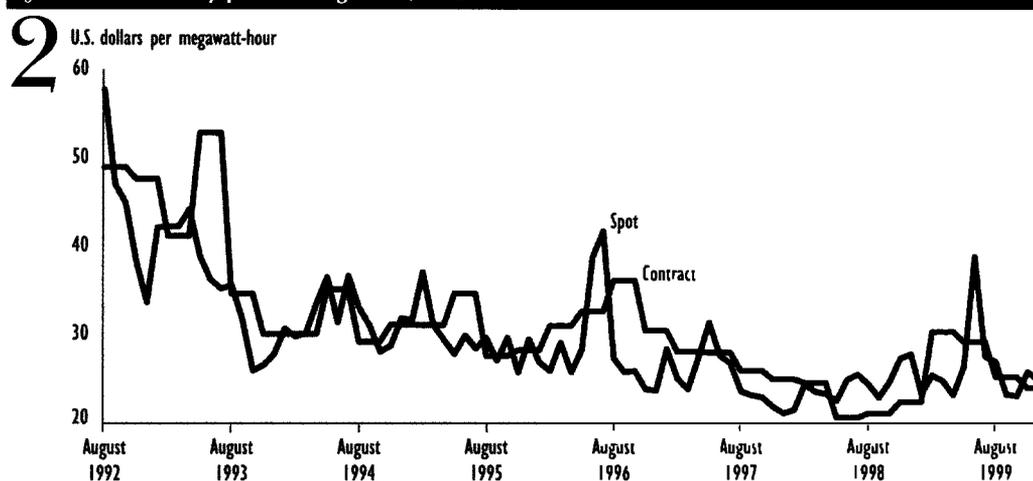
Incentive-based regulation, such as the CPI-X price cap methodology, involves a balance between giving utilities the incentive to reduce costs and ensuring that cost reductions are passed to the consumer. The utility keeps some of the savings, but must pass the rest to the consumer.⁶ In the United Kingdom incentive-based regulation has been broadly successful in reducing prices to domestic consumers, even though bulk prices have not fallen (figure 4).

Supply

The potential for competition in supply, which, with relatively low fixed costs, is not a natural monopoly, has been recognized and is being acted on in many countries (partial opening of the market to supply competition is a requirement of the European Union directive on the single market for electricity, for example). As a result of competition, in the United Kingdom the cost of meters has fallen by 39 percent over the past five years.

However, competition in supply is so far confined largely to more developed markets, where companies can offer a number of supply services (such as electricity and gas) together and can differentiate themselves by service quality and brand. In developing countries the costs of supply can be reduced in other ways, notably through increased local involvement. Employing someone to read

Figure Bulk electricity prices in Argentina, 1992–99



Source: CAMMESA 2000.

meters in a village is cheaper if that person does not have to travel a long distance from the nearest town. Local participation in bill collection and maintenance can also be effective. For example, in Bangladesh locally managed cooperatives buy power from the grid and distribute it locally. They have a better record on billing, maintenance, and reducing losses than that of the main power utility in charge of urban distribution (World Bank 1996).

Does cheaper mean better?

Cheaper generation has reduced the total cost of providing electricity. That should mean lower prices for the poor who are already served by a grid. Reductions in the fixed costs of transmission and distribution equipment, and innovations to reduce the costs of supplying remote areas, improve the prospects that grids will be extended to rural areas.

However, there are two important caveats. First, for the poor to benefit, lower production costs must be passed on as lower prices. In many developing countries tariffs have risen following reform as subsidies have been withdrawn (despite cost reductions). In many respects this benefits the poor,⁷ but it does make access to electricity less affordable. One solution is to direct electricity subsidies much more precisely to the poor, for example, through the introduction of lifeline tariffs.⁸ More generally, the design of the tariff system is crucial in determin-

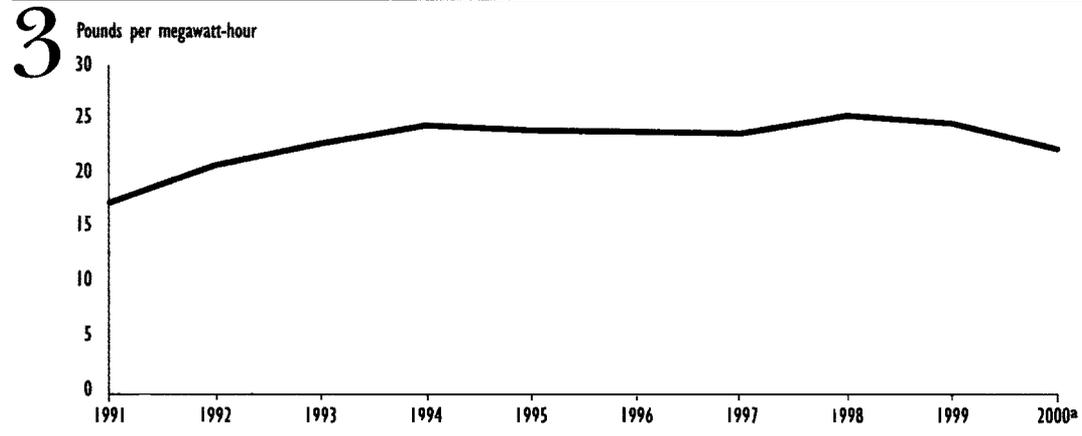
ing how the benefits of electricity reform (in terms of lower costs) are distributed among different customer classes. If electricity reform is to benefit the poor, tariff policy must be designed with their needs in mind.

Second, the fixed costs of transmission and distribution equipment have not fallen enough to make it profitable to extend the grid to all areas. Given the huge difference between cost of supply and (socially or politically) acceptable tariffs for some rural populations, extensions of the grid to these people must be subsidized if they are to happen at all. There are two ways in which this can happen: within the utility by cross-subsidy from profitable customers (under an obligation to extend service) or with subsidies from outside the utility, for example, from a rural electrification fund.

Conclusion

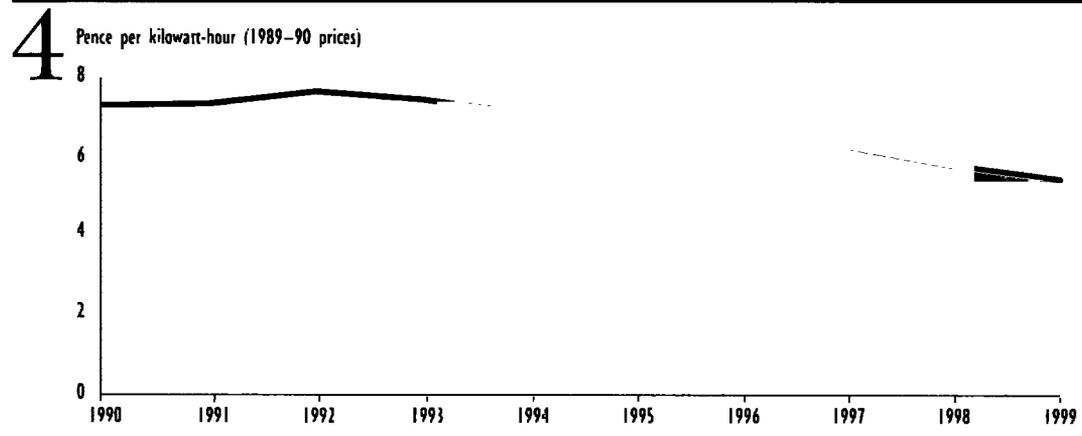
Reform of grid-based electricity provision will not revolutionize access by the poor. The cost structure of grid provision, so unfavorable to extending access to rural populations, is not fundamentally altered by electricity reform. However, reform unambiguously moves the overall level of costs in the right direction. At the margin, cost reductions imply both increased affordability of grid services and increased viability of grid extensions. As long as the introduction of competition and profit-seeking private participation is combined with regulation and tariff

Figure Average annual demand-weighted Electricity Pool of England and Wales purchase price, 1991-2000



Note: The years refer to fiscal years, ending in March.
 a. Average for April to October 1999.
 Source: Electricity Pool of England and Wales 2000

Figure Electricity price for standard domestic tariff customers in the United Kingdom, 1990-99



Note: The years refer to fiscal years, ending in March.
 Source: U.K. Department of Trade, Statistical Office 1999.

design that is sensitive to the needs of the poor, electricity reform is a positive step.

Notes

1. Reform of grid-based energy services has concentrated on the generation and distribution of electricity. Electricity networks are far more extensive than gas networks in most parts of the developing world and reform of gas networks has been less widespread. This Note therefore discusses electricity reform, although many of the important points apply to both industries, given the parallels in terms of network economics.

2. Although the widespread adoption of CCGT as the new technology of choice was linked to the fall in the price of gas, the technology can run on diesel. This discussion therefore also applies to countries with no access to gas.

3. The cost estimates are from Richard Fairbairn of PB Power Ltd.

4. For a more detailed discussion of this issue see Bacon 1995.

5. This is one reason why employment in the electricity industry has fallen dramatically following reform. This is a controversial social effect of reform and one that has direct implications for the poor. However, the subject is beyond the scope of this Note.

6. CPI-X achieves this by fixing allowed prices for a given period, during which the utility can retain the profits arising from any cost reduction. At the end of this period the price cap is reviewed to ensure that over the long term the benefits are passed to consumers.

7. Since energy subsidies are a larger proportion of GDP in many developing countries and benefit the well-off more than the poor (because the well-off use more energy, particularly electricity), reductions in subsidies will tend to benefit the poor in fiscal terms, particularly if the funds are redirected toward social policies. For further discussion of energy subsidies see World Bank 1996 and International Energy Agency 1999.

8. Lifeline tariffs essentially involve subsidizing electricity only at the very low levels of consumption typical of poor households. The subsidies apply to very small amounts of electricity and do not cost too much. This policy has been successful in Thailand; see Tuntivate and Barnes 1997.

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ESMAP





Scorecard for Subsidies

How Utility Subsidies Perform in Transition Economies

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Laszlo Lovei, Eugene Gurenko, Michael Haney, Philip O'Keefe, and Maria Shkaratan

Unlike the poor in many developing countries, those in Central and Eastern Europe and the former Soviet Union are highly connected to network utilities. During the early 1990s, it became clear that without subsidies, many households would have difficulty paying their utility bills. Governments started to experiment with various subsidy schemes. This Note describes the main ones, scores their performance, and provides a methodology for governments designing subsidies to decide which scheme is likely to be the best fit for their country.

The scoring system

The performance of a subsidy can be measured in several dimensions. Key is its success reaching the poor, and the amount of purchasing power it transfers to them. However, the evaluation of any subsidy mechanism should go beyond the amount of support provided to the poor. Subsidies have a cost that needs to be financed from somewhere. For a given level of purchasing power to be transferred to the poor, this cost depends on the targeting efficiency of the subsidy mechanism. Some subsidy mechanisms are highly unpredictable (which tends to invite corruption in countries with poor governance). Some subsidies distort price signals and other incentives resulting in the waste of resources. Certain types of subsidies demand sophisticated institutions or technology to administer them while others are simple. Thus the following criteria are used to score the subsidy schemes:

- The extent to which the poor are being reached (that is, coverage).
- The share of the subsidy that goes to the poor (that is, targeting).
- Predictability of the benefit for the poor.
- The extent of pricing distortions and other unintended side-effects.
- Administration cost and difficulty.

Not all criteria are of the same importance. A financially strapped government may assign top priority to reducing the leakage of the subsidy to the non-poor. Another with limited administrative capacity may value simplicity more. Few mechanisms perform well on all the criteria—for instance, high coverage is usually associated with low targeting. Furthermore, not all subsidy mechanisms are applicable or perform equally well across the full range of utility services. Lack of water meters, for example, may pose a problem for lifeline tariffs. It

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Table Scoring subsidies

	Coverage	Targeting	Predictability	Administration		Aggregate score ^a
				Pricing distortion	cost and difficulty	
No disconnection	1	1	0	-2	0	2
Across-the-board price subsidy	1 to 2	0	2	-2	0	2 to 4
Lifeline tariff with 2 blocks	1 to 2	0	2	-1	0	3 to 5
Lifeline tariff with 3 blocks	1 to 2	2	1	-2	0	5 to 7
Lifeline tariff with "floating" blocks	1 to 2	1	2	-1	-1	4 to 6
Pricing discount for privileged consumers	1	1	2	-1	-1	4
Burden limit based on actual utility expenditure	1	0	1	-2	-2	-1
Burden limit based on utility expenditure norms	1	1	1	0	-2	3
Other earmarked cash transfer	1	2	1	-1	-2	4
Non-earmarked cash transfer	1	2	1	0	-2	5

a. Calculated with double weights to first two criteria.
Source: World Bank staff calculations.

is therefore impossible to rank subsidy mechanisms independently of time, place and sector.

It also matters who has to cover the cost of the subsidy. The discussion of each subsidy mechanism below includes a brief assessment of their financial impact on those who will have to pay: taxpayers, non-household consumers (businesses), and the supplier utilities. The methodology leaves important issues open. It does not cover the interaction between various utility subsidy mechanisms—for example, the combined effect of a lifeline tariff and a burden limit—or between utility subsidies and other sector-specific subsidies—for example, housing and food subsidies. Furthermore, it does not provide practical guidance how to make the selected subsidy mechanisms perform better, or how to adapt these to changes in utility ownership and regulation. These issues represent an agenda for further research.

The variety of subsidies

There are seven main types of utility subsidies in Central and Eastern Europe and the former Soviet Union:

- *No Disconnection.* In several countries in the region, utilities are pressured by governments not to disconnect households who do not pay their bills. Non-payment by residential (and many other) consumers has remained particularly widespread in the Balkans and the former Soviet Union.

- *Across-the-board Price Subsidy.* At the beginning of the 1990s, it was commonly believed in all transition countries that real wages would start growing in the near future. Many governments postponed the realignment of utility prices and costs, hoping to minimize the associated social costs and political repercussions. Most countries in Central and Eastern Europe have abandoned across-the-board price subsidies by now, but governments in the former Soviet Union have not, although residential tariffs have been brought closer to costs than they were in the early 1990s.
- *Lifeline Tariff.* Restricting the price subsidy to the initial block of consumption (called the basic need level) offers a less costly alternative to across-the-board price subsidies while preserving their politically attractive universal protection feature. Not surprisingly, many governments in the region introduced lifeline tariffs for utility services with metered or relatively easily estimated consumption, such as electricity and gas. This option will also apply to water as water metering expands.
- *Price Discount for Privileged Consumers.* The Soviet Union operated a system of utility price discounts between 25 and 100 percent, not to reduce poverty, but to reward certain occupations (police, firemen, judges, and so on), and to compensate for birth defects, hard labor, war, or man-made catastrophes like Chernobyl. Afraid of popular discontent, few newly inde-

I The scores assigned to each subsidy mechanism were determined the following way:

- **Coverage** ratios below 33 percent scored zero, between 33 percent and 66 percent scored one, and higher than 66 percent scored two. A number of subsidy mechanisms scored “one to two,” since the share of the poor who are connected (and can be reached) varies greatly from one utility to another.
- **Targeting** ratios below that attainable by random selection scored zero, above that ratio scored one, and above twice that ratio scored two
- For **predictability**, no-disconnection, the most unpredictable mechanism, scored zero. Mechanisms that provide benefits with high certainty (across-the-board price subsidy, two-block and “floating”-block lifeline tariffs, and privileged discounts) scored two. The remaining subsidy mechanisms scored one.
- For **pricing distortion**, the two subsidy mechanisms that do not affect the effective price of the last unit of consumption

(non-earmarked cash transfer and the burden limit based on utility expenditure norms) scored zero. Mechanisms that distort the effective price for most households (across-the-board price subsidy and three-block lifeline tariff), or greatly distort this price for the beneficiaries (no-disconnection and the burden limit based on actual utility expenditures) scored two. The remaining subsidy mechanisms scored one.

- For **administration cost and difficulty**, subsidy mechanisms that can be administered by the utilities with little extra effort (no-disconnection, across-the-board price subsidy, and two-block and three-block lifeline tariffs) scored zero. Mechanisms that require significant extra effort (“floating” lifeline and privileged discounts) scored one. Subsidy mechanisms needing a network of offices to administer the income tests scored two.
- Scores for the last two criteria were given a negative sign to facilitate the calculation of aggregate scores.

pendent republics dared to overhaul this system (the Baltic states are the most notable exception). A few parliaments even extended the privileges. As a result, some level of privilege is enjoyed by one third or more of the population in several former Soviet states.

- **Burden Limit.** An alternative to limiting prices is to help selected households to pay their bills—limiting the burden on household budgets. The burden limit typically varies from 15 to 30 percent of income. In Ukraine, for example, the burden limit was set at 20 percent in 1998. The subsidy is calculated on the basis of actual utility bills, and household income must be verified by employers, the social security office, or the tax authority. In a few cities in Russia and the Kyrgyz Republic, the calculation of the subsidy is based on utility expenditure norms as opposed to actual utility bills in order to reduce the leakage of the subsidy to the non-poor.
- **Other Earmarked Cash Transfers.** An alternative way to reduce the burden is to provide a subsidy calibrated to ensure a certain level of income after paying for rent and utilities. The Bulgarian government and most Latvian municipalities operate such schemes. The Energy Fund in Hungary that operated in 1997–98 was another earmarked cash transfer scheme. It applied a complex formula to calculate the size of the subsidy to individual households in order to remain within its total endowment.

- **Non-earmarked Cash Transfers.** General social assistance payments can also help households to pay their utility bills, even though the money is not designated for that purpose. In countries where utilities do cut off non-payers, surveys have indicated that households place a high priority on paying their utility bills (right after paying for food and rent). However, for politicians these payments may lack the appeal of introducing specific relief from utility bills at the same time as utility prices increase.

Findings

The performance of these subsidy mechanisms was analyzed using household survey data and information provided by various government agencies in Central and Eastern Europe and the former Soviet Union. Table 1 sets out the scores for each type of subsidy by the performance criteria. Box 1 describes how the scores were calculated.

All the subsidy mechanisms reached at least one-third of the poor. Two mechanisms—across-the-board price subsidy and lifeline tariff—reached more than two-thirds of the poor, but only for electricity and water, since at least one-third of the poor do not have access to gas, district heating, and sewerage in most countries in the region.

Targeting ratios for the across-the-board price subsidy, two-block lifeline tariff, and burden limits based on actual utility expenditures were below that attainable by random selection. For no-

disconnection, the two-block “floating” lifeline tariff, and burden limits based on utility expenditure norms they were somewhat better than random selection. For the three-block lifeline tariff and income-tested (earmarked or non-earmarked) cash transfers they were at least twice that produced by random selection.

Across-the-board price subsidies, two-block lifeline tariff and price discounts for privileged consumers provided highly predictable support to the poor. Burden limit, most earmarked and non-earmarked cash transfers, and three-block lifeline tariff (with a “penalized” third block) had medium predictability. No-disconnection and certain non-earmarked cash transfers were highly unpredictable.

No-disconnection and the burden limit based on actual utility expenditures created large price distortions (by making the effective price of the household’s last unit of consumption zero). Across-the-board price subsidy, and the three-block lifeline tariff created significant price distortions for all (or almost all) households. Two-block and “floating”-block lifeline tariffs and privileged discounts created significant price distortions for the minority of households connected. Non-earmarked cash transfers and the “normative” burden limit created no utility price distortions.

No-disconnection, across-the-board price subsidy, and lifeline tariffs (with the exception of lifelines with “floating” blocks) were very simple to administer. Price discounts for privileged consumers and the “floating” lifeline tariff posed significant administrative challenges since the utilities needed to match meter readings with certain household characteristics. Burden limits and other income-tested cash transfers would have overloaded the administrative capacity of utilities, and required specialized networks of local offices.

How to use the scoring

To find the subsidy mechanism that suits their circumstances best, decisionmakers need to

- Obtain information on the proportion of the poor connected to each type of utility (this will help to narrow the coverage scores of across-the-board subsidies and lifeline tariffs).
- See whether reliable estimation and billing of actual household consumption is possible (this will show whether lifeline tariffs can be meaningfully considered).

- Determine the weights that they assign to each of the five criteria (if neither metering nor estimation of actual consumption is feasible, zero weight should be assigned to the price distortion criterion).
- Calculate the aggregate scores for each subsidy mechanism and for each type of utility service.
- Identify the mechanisms with the highest aggregate scores for each type of utility service.

To illustrate how this can be done, table 1 includes aggregate scores calculated with double weights assigned to the first two (typically most important) evaluation criteria. For utilities with high connection ratios among the poor (for example, electricity and water), the three-block and “floating”-block lifeline tariffs occupy the first and the second place. For utilities with lower connection ratios among the poor (for example, district heat, gas and sewerage), the first place is shared between non-earmarked cash transfers and the three-block lifeline tariff. When no reliable estimate exists for actual consumption (or the billing system suffers from major deficiencies), lifeline tariffs drop out, the criterion of pricing distortions become meaningless, and the top score goes to cash transfers and privileged consumer discounts or the across-the-board price subsidy, depending on the connection rate of the poor.

Funding

In principle, the cost of the subsidies can be covered by the utilities themselves (through decapitalization), non-household consumers (by setting the prices they pay above cost), or the budget (from general taxation). The first option, however, should be used as a short-term buffer only, because it rapidly depletes the working capital of the utilities, undermines their services, and ultimately reverses the poverty alleviation impact of the subsidy.

The second option may also become unsustainable if demand from industrial consumers is highly elastic with respect to price (for example, in the district heating sector). In this case, the surcharge simply drives down demand and fails to raise the revenue needed for the subsidy. Even when the short-term price elasticity of industrial demand for a specific utility service is relatively low (as in the case of electricity), the cost of distorting the price of an essential input is likely to be higher than raising revenue through the general tax regime.

Thus financing of the subsidy from the budget seems to be the best option in most utility sectors and countries. The higher the targeting efficiency of the subsidy mechanism, the lower this burden is going to be. For a given amount of purchasing power to be transferred to the poor, the three-block lifeline tariff and the income-tested cash transfer schemes require the least money. In fact, three-block lifeline tariffs can be designed so that the “penalty” at high consumption level (in the third block) covers the subsidy at low consumption level (in the first block).

Across-the-board subsidies cost so much that most governments have phased them out. While at first sight no-disconnection appears to have no impact on the budget, in reality it tends to be so costly for utilities that the budget not only receives lower revenues from corporate taxes, but over time has to finance maintenance and rehabilitation costs and assume responsibility for the accumulated debt in order to prevent the utility collapsing. There is a further penalty for the exchequer—when utilities have been sold in such circumstances (for example, in Armenia, Georgia, Kazakhstan, and Moldova), the proceeds have been much lower than in countries where non-payers are routinely disconnected, such as Hungary.



This Note is based on a longer paper: “M. . . . , Utility Services for the Poor—Policies and Practices in Central and Eastern Europe and the Former Soviet Union,” by the same authors, published by the World Bank in September 2000, for the Annual Meetings of the World Bank and International Monetary Fund in Prague.







Multiservice Infrastructure

Privatizing Port Services

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Lourdes Trujillo and Gustavo Nombela

Ports have become increasingly capital intensive. Economies of scale have led to larger, more specialized ships. And competition between ports has started to grow. As a result, governments are reorganizing the way ports are run and permitting more private ownership and service delivery. Because ports provide multiple services, if governments are to design an efficient legal and regulatory framework for private participation it is important to study all these activities to evaluate the best approach. Moreover, because these activities must take place in a small space, it is important to study how they are coordinated.

More competition

In recent decades there have been profound changes in maritime transport. Ports, once labor-intensive, have become more capital-intensive, making much port labor redundant. The development of containerized transport has dramatically reduced the cost of cargo handling, but it has also required much investment in equipment (gantry cranes, specialized terminals, improved pavement, and so on). The economies of scale obtained by the transport of large quantities of containers and bulk cargoes have led to the building of larger and more specialized ships that require substantial port investments in new infrastructure and equipment. Moreover, the development of integrated and intermodal transport chains has reduced transport costs so much that it is often preferable for a shipper to use a distant port instead of a closer one, if the distant port has

better facilities and connections. Therefore, modern ports must be extremely competitive to be able to offer optimal combinations of time and price for those firms demanding their services.

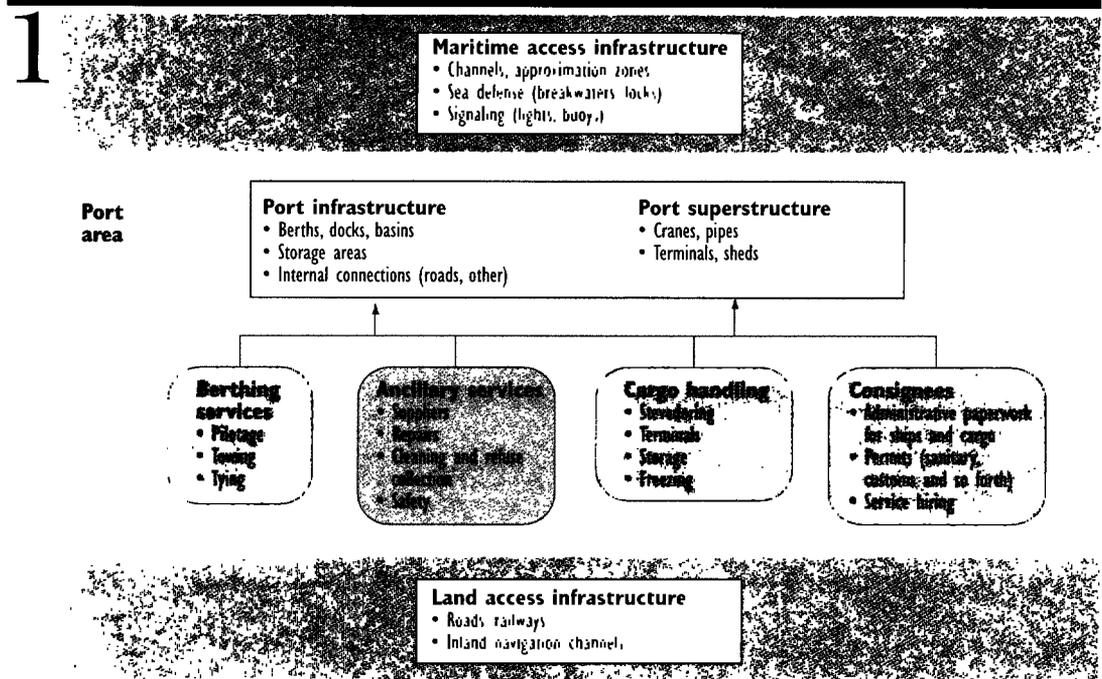
Somewhat less widely understood is the potential for intraport competition. Seaports offer many services to ships. The potential for competition in providing these services depends largely on the assets required to provide them, the space available in the port, and the volume of traffic. A defining physical characteristic of ports is that space is limited. Partly this is because many of the activities must take place around the ship. But it is also because port infrastructure is expensive to build, and much of it can only be expanded in discrete units.

Multiservice operations

For the purposes of analysis, it is useful to divide port activities into infrastructure, services pro-

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Figure Port activities



Source: Estache and de Rus 2000.

vided using the infrastructure, and coordination between the activities at the port.

Many kinds of infrastructure

A port obviously needs good access by sea (channels, locks, aids to navigation, and so on) and by land (roads, railways, and canals). The port also has internal infrastructure, such as docks and storage yards, and internal superstructure. The superstructure can be classified into fixed assets built on the infrastructure, such as sheds, fuel tanks, and office buildings, and fixed and mobile equipment such as cranes and van carriers.

In general, the port authority is responsible for the port, and the state or municipal government is responsible for the land access infrastructure. They divide responsibility for the maritime access infrastructure, with the port authority responsible for breakwaters, lights, and buoys and the government responsible for the rest.

Many kinds of services

Many services are provided by different operators. First, there is a group of services related to berthing, which include pilotage, towing and tying. They can be provided by the port authority or private firms. Pilotage covers the operations required

for a ship to enter and exit a port safely. In some ports pilots are public employees, and in others they are private agents licensed by the port authority. Towing is the operation of maneuvering a ship using tugs. Like pilotage, it can be provided by private firms or operators hired by the port authority.

Cargo handling includes all activities related to the movement of cargo to and from ships and across port facilities. The historic distinction between stevedoring—moving goods within a ship—and loading—moving goods onto a ship from the quay—has been eroded by modern cargo handling techniques like containerization. Because the technique used depends on the type of cargo, it is efficient to use specialized equipment. This has led to the formation of terminals that specialize in particular cargoes. Because cargo handling charges account for between 70 percent and 90 percent of the cost of moving goods through a port, regulators concerned with cost-efficiency of the port must pay cargo handling particular attention.

A further range of services is provided by agents who handle the documentation for port users—the health clearances, import and export requirements, and customs duties. These agents are known as consignees, and are hired by shipping companies to arrange in advance the administra-

tion and all matters related to the use of port facilities by a ship. A modern port must minimize red tape for port users. Delays cost money.

Finally, there are ancillary services, including supplies to ships such as fuel and water, cleaning, and refuse collection.

Coordination

With many activities being performed in a limited space, there is a need for a coordinator responsible for the proper use of common facilities, for safety, and for the design of the port. In most ports, this is the role of the port authority. It is generally a public institution, with representation of local interests, but in some ports the authority is purely private.

The common forms of organization are known as landlord, tool, and services ports.

- *Landlord port.* The port authority owns and manages the port infrastructure. Private firms provide all other services and own the port superstructure.
- *Tool port.* The port authority owns both infrastructure and superstructure. Private firms provide services by renting port assets, through concessions or licenses.
- *Services port.* The port authority is responsible for the port as a whole, owning the infrastructure and superstructure and hiring employees to provide services.

In landlord and tool ports, the port authority is usually public and the port operators are private firms. Services ports are more likely to be privately owned, with one private firm operating the port as a single unit. The role of port authorities should be confined to the provision of infrastructure and the coordination of port services. However, in many countries where there is no regulatory institution for seaports, port authorities perform many other tasks, such as investment planning and financing, or regulation of the tariffs that private operators charge to port users.

Privatization options

The options for privatizing port services depend on the size of the port and the services involved, and include:

- Full privatization. All assets and liabilities are transferred to the private sector.
- Build, Operate, and Own. Parts of the port are sold to private operators to be developed.

- Build (or Rehabilitate), Operate, and Transfer. Private operators build or rehabilitate facilities, which are eventually transferred to public ownership. Also known as a concession.
- Joint ventures. Operators create a new independent company. This type of agreement arises when two or more parties with common interests join forces (for example, one firm supplies technology and know-how, while another supplies market knowledge).
- Leasing. The port authority leases port assets to private operators for a given period. In contrast with a concession, the private operators do not usually make investments, and therefore they only assume commercial risks.
- Licensing. Private operators provide services requiring basic equipment, which they own. The port authority owns the port infrastructure and superstructure and charges the private operators for their use. Stevedoring companies, pilots, tug operators or consignees can work under this type of agreement.
- Management contract. The port authority remains the owner of the port, but the port is run by a private firm which can provide a more commercial approach to operations. Both investment and commercial risks are faced by the public sector, since managers do not invest their own capital in the port.

Shared or exclusive use

A basic consideration in choosing the best form of privatization is whether the service to be privatized requires the exclusive use of the port's fixed assets.

Activities in which the fixed assets can be shared include services such as pilotage, towing, consignee services and ancillary services to ships and crew. Under a system of licenses, several operators can be authorized to provide these services. The prices they charge and the quality of their services can be regulated. In cases where competition is possible, for example between consignees or pilots, strict regulation of prices would not be necessary unless collusive practices were detected. In ports where space limits the number of operators, prices and conditions of service need to be regulated to prevent market domination by a few firms who may try to exploit their position to extract rents from port users.

Because space is so scarce in ports, exclusivity in the use of some fixed assets may be necessary. Such

Box 1 Types of competition at different volumes of container traffic

Type of competition	Level of traffic (TEUs)
intra-terminal	above 30,000 per year
inter-terminal	above 100,000 per year
inter-port	above 300,000 per year

Note: TEU is a Twenty Foot Equivalent Unit. This is a unit of measurement equivalent to one 20-foot shipping container.
Source: Kent and Hochstein (1998).

assets and associated services include terminals for cargo handling, storage areas, repairing docks and fuel suppliers. It is more complicated to introduce private participation in these services, since operators need to use assets that are considered to be optimally owned by the port authority. Therefore, concession contracts need to be written carefully in order to reconcile private operators' interests with port authorities' objectives. At the same time, contracts must include incentives for private operators to maintain or enhance assets as required.

The number of operators for these services is by definition extremely limited, although it depends on port size. Similarly, the need for regulation of charges and quality depends on the type of port and how many alternative ports are nearby. In a port in a highly competitive environment, the regulator need not be too concerned about overcharging, because operators that overcharge risk losing customers.

Rule of thumb for competition

The privatization strategy should maximize the potential for competition. There is no universal rule for the degree of competition and regulation desirable in a port with a particular volume of traffic, but for container ports there is acceptance of some thresholds (box 1). A port handling fewer than 30,000 TEUs a year is too small to have several terminals and operators. The best solution is to have a single operator and to regulate its charges.

In a port handling between 30,000 and 100,000 TEUs a year, it is feasible to have several operators, possibly sharing a single terminal. There would be intraterminal competition, with stevedoring companies competing to provide cargo handling services.

A port handling more than 100,000 TEUs a year is big enough to have a number of terminals operated by several companies that can use separate berths and can manage them better. The terminals

compete with each other. When a company serves all ships using a given berth, the port authority can make it responsible for collecting port tariffs—charges for the use of the port—as well as the operator's own charges. At this volume of traffic, it is also possible to provide incentives for private operators to finance projects for infrastructure enhancement or construction.

Finally, in a region where container traffic is above 300,000 TEUs a year, the market size allows for the existence of several ports that can compete for traffic. Such inter-port competition again reduces the need for control over private operators' prices. However, even in this optimal case, attention is still needed for the proper drafting of concession contracts, since private operators must be compelled to fulfill their obligations not only on service conditions and charges, but also on equipment maintenance, safety, quality of services, and all other matters which are costly for the concessionaire, and could be underprovided.



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Port Concessions in Chile

Contract Design to Promote Competition and Investment

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Juan Foxley and José Luis Mardones

The objective of Chile's port reform is to encourage investment in better port equipment, in the hope that this will lead to more efficient service, in part by attracting larger, more modern ships. The first four major concessions, under which integrated terminals are run exclusively by private companies, started operations in January 2000. The integrated approach to port services replaces a system of free entry of multiple stevedoring companies. This Note reviews how the concessions were designed: the criteria for the winning bids, the rules to prevent concessionaires' abusing their monopoly power, the rules to encourage investment, and the provisions for redundant workers.

The old multioperator system and its limits

The new concessions replace a system established in 1981, when the government tried to introduce more efficient labor practices and competition in stevedoring. Private stevedore firms were gradually allowed to perform all transfer services in state-owned ports, a system known as the multioperator model. Until then, Emporchi, the state port company, had been the sole cargo handler on land, while stevedores performed cargo operations aboard ships and the number of workers was restricted by licensing. The changes increased throughput considerably, even with limited investments in infrastructure.

However, the division of cargo among several stevedore companies limited their incentive to invest in modern transfer equipment, and did

not permit an efficient use of limited backup space in Chilean ports. This problem was exacerbated by the considerable growth of trade in the 1980s and 1990s.

Emporchi tried to correct the shortage of investment by tendering a non-exclusive concession to install cranes in one of the main ports. The tender was won by a joint venture of the three largest stevedore companies, but this company was never profitable. The joint venture partners claimed that the multioperator system made it easy for small and informal stevedoring companies to undercut prices by breaking labor and safety regulations.

Dissatisfied with the performance of the non-exclusive concession, the government introduced the present reforms. An exclusive concession for

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each of the main container terminals makes a single company or consortium responsible for operating and maintaining it, and for all investments in equipment and infrastructure—the mono-operator system. By the time this reform was introduced, the majority of the nearly 40 ports in Chile were owned by the private sector, but Emporchi still handled most of the container and general cargo traffic. The private ports handled almost all the dry and liquid bulk cargoes.

The intention of the new concession system is to promote investment in modern transfer equipment and in new berths when needed, and to bring the management of the terminals up to date. It is also intended to reduce port costs to clients and enhance service quality, particularly by reducing waiting and service times. More efficient ports should attract larger and more modern ships, transferring a reduction of freight charges to final clients in the medium term.

The process

The government faced a number of challenges. It had to obtain approval by the legislature, one of the conditions being that agreement must be reached with labor unions and interested stevedore companies. It had to form ten new state port companies as successors to Emporchi, rapidly but with no service disruptions. Finally, it sought to attract international interest to the bidding process.

The new state port companies, one for each main state-owned port, own the port infrastructure, run maritime and land access, and enforce the concession contracts. By law they are not allowed to handle cargo or berthing. They share revenues with the concessionaire—a minimum annual rental and some revenue sharing on the upside. It is not expected that the supervisory and revenue-sharing roles will be in serious conflict since the minimum rent from the concessionaire was such that a fair market return was assured to the port company.

The design of the reform was influenced by recent port reform experience in Latin America. Investors were particularly sensitive about terminals in Buenos Aires that found themselves competing with Exolgan, a port in a neighboring municipality governed by much more favorable rules. The Chilean government took several steps to reduce investors' fears: it

fixed minimum tariffs for five years at non-concessioned state-owned terminals; it stipulated that the bids for the main terminals must be simultaneous; and the bidding documents were made similar in all the concessions, rather than using a trial-and-error approach of starting with one concession and evaluating its results.

For the initial round of concessioning the government selected four terminals in the three main ports. They were a container terminal in Valparaíso that accounts for 75 percent of the movement in the port, a container terminal in San Antonio (60 percent), a break bulk terminal also in San Antonio (8 percent) and the whole of San Vicente port. These terminals accounted for half the cargo managed by Emporchi, and the concessions were awarded in August 1999. (Some smaller ports have also been tendered with mixed results and others will eventually benefit from some form of private involvement).

Bidding mechanism

Policymakers faced a number of trade-offs in the design of the bidding process. One was between lower tariffs and higher quality service. Another especially tricky one was the distribution of expected productivity gains. Should exporters, importers, shipping agents, and shipping companies be the main beneficiaries when tariffs fall and service standards improve? Should the government instead try to maximize its revenues from concessions? The outcome was a compromise. Bidders would be asked to offer the lowest maximum tariffs. If they bid at a certain pre-set floor value, they should include an offer for a tie-breaking payment to determine the winner. The main features of bidding were the following:

- Bidders should first offer tariffs as low as they judged profitable, but the authority set a floor in order to discourage overoptimistic bids from aggressive but probably inefficient participants gambling that the government would renegotiate charges after the concession was awarded. Those tariffs were defined as a single bidding number (adjustable by the U.S. producer price index), but it represented a weighted average of four key charges, thus giving concessionaires room to accommodate their own particular pricing practices. Rules stipulated that all tariffs be posted openly and

discrimination among port clients is forbidden, although premium services and discounts by volume are permitted. There was still some risk in this tariff regime that operators might cross-subsidize regulated tariffs with non-regulated charges, in which case the bidders might focus more on the rental payment in the bidding process. Regulators expected that competition in non-regulated markets would impede that outcome.

- A bidder offering the floor tariff should also offer an upfront tie-breaking payment. This would act as a compensation mechanism if annual rental payments were underestimated by the authorities.
- Annual rental payments were fixed in advance, to prevent implicit subsidies to concessionaires affecting the competitive position of private ports. The rent must equal or exceed a minimum rate equivalent to those of Central Bank bonds of equivalent maturity, applied to the accounting value of assets in the concession, but concession contracts established an increasing rent to the state port company as tonnage rises. This means the state port company is to some extent a partner of the concessionaire, sharing part of its commercial risk and being rewarded for that. Contracts established annual rents proportional to actual tons transferred in the previous year, with a floor in the downside and with revenue sharing by the authority in the upside.

As it turned out, most tariff bids stuck to the pre-determined floor value, so the tie-breaking mechanism was triggered. The upfront payments (in six annual installments) to the first three state port companies in this process were nearly US\$300 million, three times higher than expected by the government. The tie-breaking device also boosted average returns to the state port companies on concessioned assets. For example, for the San Antonio container terminal, returns on concessioned assets for the state port company were 49.6 percent, well above the 11.5 percent obtained when no tie-breaking was expected. This is a high return given risk-free rates of about 6 percent and the fact that downside risk for gross income for the state port company was limited by the pre-established floor of

fixed annual rental payment. It indicates that tariffs could have been lower or that port assets were undervalued.

Competition

The outcome of the bidding would approximate a duopoly for the two main concessionaires. The Antitrust Commission therefore restricted horizontal integration between concessionaires or between private port owners and concessionaires in the same region. In particular, a firm or its related companies cannot hold more than 15 percent of a concessionaire if they hold more than 15 percent in another terminal or in a private port in the same region.

There are also limits on vertical integration. No more than 40 percent of a concessionaire may be owned by a "relevant" port player, defined as a shipping company, exporter, or importer operating more than 25 percent of transfers at the concessioned terminal or more than 15 percent of transfers at the ports in the region in the previous year. This is to prevent discrimination in favor of the related company, which would displace competitors and monopolize the related markets. This vertical integration restriction is reinforced with several anti-discrimination rules, and with tariff ceilings and service quality standards described below. The restrictions are temporary and can be lifted by the Antitrust Commission if the competitive situation changes.

The local shipping and stevedore companies argued in court that the bidding process discriminated against them in favor of foreign shipping companies which, because they had no history in the country, were not affected by the rules against integration. They also argued that the market had no potential for monopolistic behavior. The state port companies and the Antitrust Commission replied that there are high entry barriers in the port industry in Chile because of the scarcity of naturally protected bays and sheltered waters, and therefore potential exists for collusion between operators of ports in the same region and of monopolization of activities downstream. The Supreme Court ruled that the Antitrust Commission and the state port companies had used their powers properly, but the court case delayed the concessioning process by six months.

Incentives to invest

Instead of stipulating how much the concessionaire must invest, the concessions encourage investment simply by imposing penalties for slow service. Transfer velocities and ships' waiting times are specified in the contract. The intention is that the concessionaire will invest in the facilities it judges necessary to avoid penalties. There are also rules for progressive improvement in these service standards during the life of the contract.

The concessions are also designed to avoid any disincentives on the part of the concessionaire to invest as the end of the contract approaches, since a departing concessionaire would be able to take only its more liquid and mobile assets. The concessionaire will be compensated for the part of fixed assets not depreciated. To increase investors' confidence that they will get fair market values, any disputes are to be referred to an independent arbiter. Also, the initial concession period of 15 or 20 years (depending on the port) may be extended to the maximum permitted by the law of 30 years, if some investments in infrastructure (specified in the concession contract) are operative some years before the initial period ends.

Although basic maximum charges on vessels and cargo transfer are fixed in the concession contract, the concessionaire is also allowed to charge special tariffs provided they are for additional value added (for example, extra charges for prompt dispatch). Allowing premium services encourages the concessionaire to invest according to the evolution of both the technical progress in port operations and the demands of customers of different levels of sophistication. The contract stresses that premium services must never preclude the supply of some basic services by the concessionaire; otherwise tariff ceilings would be effectively eluded.

Labor unrest

There were several stoppages arising from labor unrest but with no additional delays to the concessions. The 5,000 employees of the stevedoring companies, some permanent, others temporary, demanded a return to the pre-1981 labor licensing system, and compensation for any workers laid off by the concessionaires. The government rejected both demands, arguing

that private companies, not state companies, employed these workers. After several labor stoppages the government agreed to set up a safety net for workers who might be laid off after the concessions. Voluntary early retirement was provided for older workers, and 700 have already availed of it. The safety net, if fully used, will cost US\$30 million, about 10 percent of the upfront payments by winning bidders.

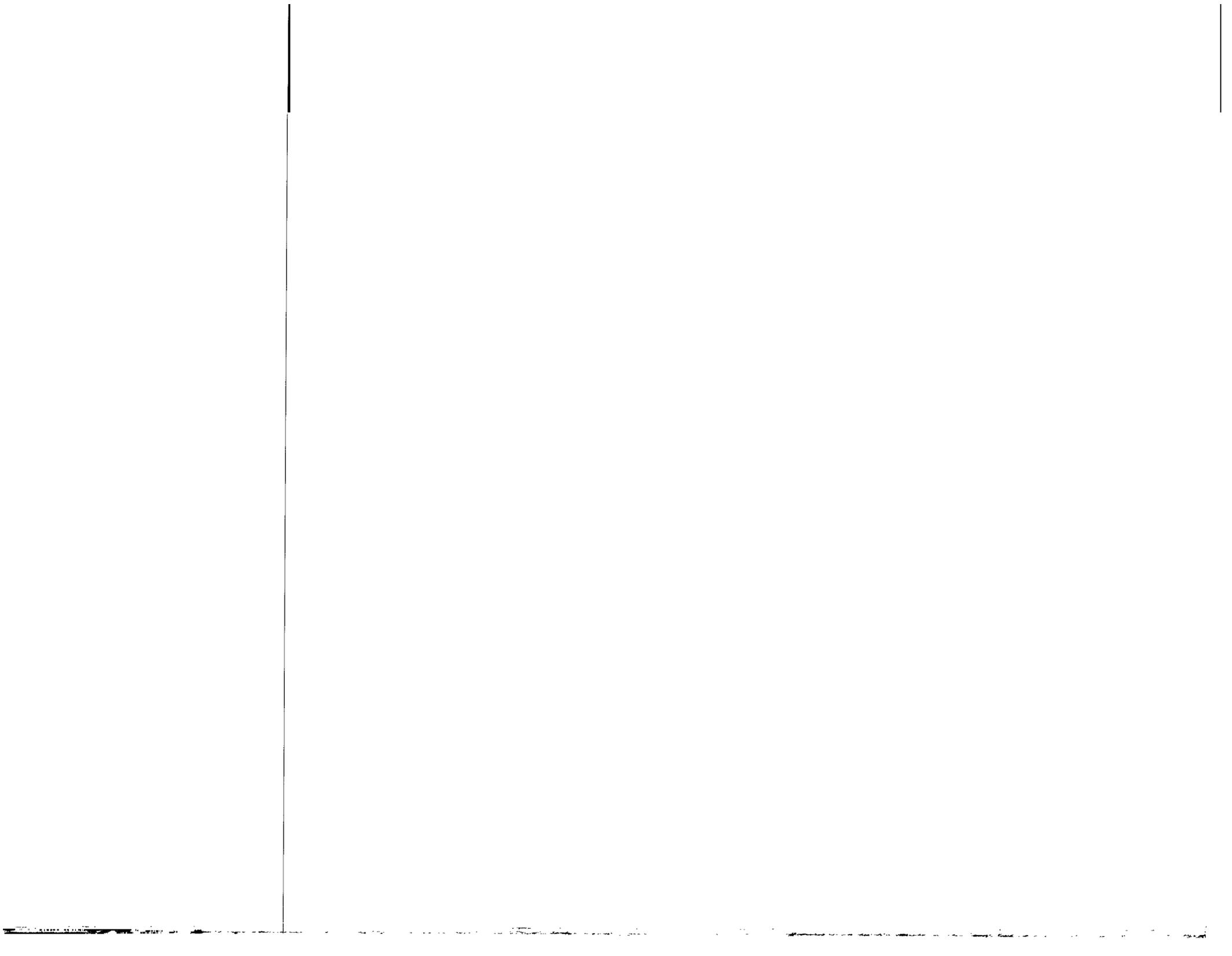
The lesson is that there is no such thing as a private conflict when a national interest—in this case, the country's foreign trade—is involved. The dynamics of conflict resolution and decision-making make it difficult to avoid political costs, which could be mitigated by making provision for safety-nets in the early stages of conflict.

Conclusion

While it is too soon to assess Chile's port reforms, there are some positive signs in terms of lower tariffs and more efficient service. A crucial factor in getting both lower tariffs and a reasonable return to the treasury was the deliberate effort to keep a high level of competitive tension among prospective bidders. Five of the major world operators participated in the bidding consortia (Hutchison, P&O, Stevedoring Services of America, HHLA and ICTSI, among others). Competition was enhanced through simultaneous bidding, hiring an internationally respected investment bank whose fee was partly tied to the number of qualified bidders, and using sealed bids to avoid collusion among bidders.

Other reforms are needed to complete the modernization of the ports. The issuing of maritime permits to build a new port should be transferred from the administrative sphere to another format that can guarantee stability to investors in new private ports. Tariffs for navigation aid systems are too high and over-finance this service. Pilotage is monopolistic (reserved to former navy officers) and charges are also too high.

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