

Regulation of Infrastructure

No one can argue that a monopolist is impelled by “an invisible hand” to serve the public interest.

—R. H. Tawney, 1921

Infrastructure sectors, because of scale economies and demand externalities, have traditionally been thought of as the exception to the rule that competition improves the provision of goods and services. In many countries government provision of infrastructure services was considered the only way to avoid both the monopolistic abuses of infrastructure operations and the vagaries of the market, given its importance for the general population. This led, first, to the regulation of private infrastructure providers and then, in many countries, to the nationalization of infrastructure enterprises.

In practice, publicly provided infrastructure services have often delivered poor quality and inadequate coverage. Governments in many countries have begun to allow private provision of infrastructure services, both to enhance efficiency and to ease the strain on public finances. Changes in technology have created the conditions for competition in some areas once considered “natural monopolies,” particularly the energy and telecommunications sectors. This has spurred increasing private provision. Private provision has been less prominent in the water sector, where technological progress has been less pronounced and political barriers to reform can be strong.

Overall, private sector provision of infrastructure rose tremendously during the 1990s in all sectors in all regions (table 8.1). Countries in Latin America and the Caribbean, which were in the vanguard of infrastructure reform, attracted almost half of the investment commitments in infrastructure projects with private

participation during the 1990s. Regional differences were also the result of disparities in market size and investor perceptions of risk.

But the increase in private provision during the 1990s, although large by historical standards, has been smaller than might be possible. By 1999 total private investment in infrastructure provision in the developing world had fallen significantly from its peak in 1997, although there were signs of some recovery in 2000. To encourage private investment, two factors need attention: political and regulatory reform, particularly in pricing, and efforts to enhance the credibility in the government’s new regulatory framework.¹ Policies that allow for full cost recovery and that ensure the investor a reasonable rate of return without government contributions are the preferred alternative for expanding private investment. Often, governments have failed to adopt such policies or to implement them through credible regulatory arrangements, deterring private investment.

Sometimes, even such pricing policies have not been sufficient to ensure that coverage goals are met. When this happens, governments may complement user fees with subsidies. Experience indicates that subsidies, when needed, should be transparent and carefully designed to serve poor people. When budget constraints limit the scope for financing subsidies, governments may need to reconsider their coverage goals.²

On average, private provision has relaxed capital constraints, enhanced efficiency, and increased investments.³ A recent survey of studies on privatization in the past 30 years showed that out of 24 studies on the relative performance of public and private enterprises in infrastructure, half found significantly superior performance by private or privatized enterprises, seven

Table 8.1**Investment in infrastructure projects with private participation in developing countries by sector and region, 1990–99***(billions of U.S. dollars)*

	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

Note: 0.0 means zero or less than half the unit shown. Data may not sum to totals because of rounding.
Source: World Bank, PPI Project database.

found the differences small or ambiguous, and only five concluded that public enterprises had performed at a level superior to private enterprises.⁴

Among the reasons for private sector successes have been more careful preparation and preliminary analysis of sectors and the establishment of appropriate and transparent regulatory structures. Emerging evidence on the design of concession arrangements for private participation in infrastructure (box 8.1) provides some lessons for policymakers. For example, governments have enhanced competition in infrastructure services by making structural changes before privatization. In developing countries where the capacity for enforcing regulations is particularly weak, there is a strong argument for introducing competition as much as possible in those infrastructure sectors where it can substitute for regulation. Competition, by changing incentives of agents, has added benefits in weak institutional environments; it reduces dependence on regulation (such as price reviews) to achieve desired outcomes. Governments have also ensured greater coverage of poor people by, for example, incorporating coverage targets in the initial contract design or by allowing flexibility in prices and quality.

The regulation of private providers is complicated when there is the possibility of competition in some branches of infrastructure provision while natural monopoly conditions persist in other branches. Under

such circumstances policymakers must decide whether the operators of the monopoly enterprise will be permitted to participate in the related competitive sector as well. Inexperienced regulatory agencies, particularly in poor countries, will face challenges in dealing with possible discrimination in access. Institutional design needs to account for this. There are typically two alternatives: *vertical separation* could be imposed, or the sector could *remain integrated*. In the second case, reliance on intersectoral or source competition could reduce the need for regulations.

Building effective regulatory structures in developing countries requires accounting for the quality and existence of supporting institutions and capacity. Sometimes this translates into fewer, simpler, or more cost effective regulations, or into economizing on structure. Because of differences in the capacity of complementary institutions, standards of regulation imposed in industrial countries may not be appropriate for poorer ones, and particularly for poorer regions, which are often served by smaller or informal providers. Distributional concerns can be met with flexibility in price-quality standards, the establishment of investment and access targets, encouragement of the informal sector, or direct subsidies.

Costs of infrastructure provision can be reduced by innovative approaches that involve community participation. Greater information flows between the users

Box 8.1**Private provision: recent evidence from concession arrangements**

Concessions (or franchises) are one way to introduce private provision in infrastructure—and to stimulate competition for the market. Concessions grant a private company the right to use assets, to operate a defined infrastructure service, and to receive revenues from it, usually following a competitive bidding process. The competitive bidding mechanism for concession contracts should eliminate monopoly rents and hence reduce the regulatory burden. In Côte d'Ivoire, for example, the World Bank supported concessions in the water sector. The winning bidder, SODECI, now provides water throughout the country at rates comparable to state companies in neighboring countries, but at excellent quality and with very high repayment rates from private consumers.

But a recent study on concession contracts in Latin America indicates that they can produce mixed results, for reasons that are applicable to privatization in general. (Concessions are the dominant mode of private entry in the region.) Many of the problems are attributable to initial contract design and regulations. The study finds that of more than 1,000 concessions awarded since the late 1980s, over 60 percent appear to have been renegotiated within three years—over 80 percent of these in the water and transport sectors (Guasch 2000). The concession holder has initiated the overwhelming majority of renegotiations. The degree of renegotiation is higher than is warranted by changes in economic conditions. One reason may be that investors submit low bids to secure the contract because they expect that after the contract is awarded, they can renegotiate for better terms on a bilateral basis, without competition. This means that the most efficient provider may not win the contract.

Contract renegotiation initiated by governments can reflect lack of commitment to the protection of investors. There are some ways to guard against this. First, in developing countries with well-established and effective judicial court systems, such as Jamaica, the government may sign a concession or franchise contract with the provider that may be enforced by the courts (Spiller and Sampson 1996). Second, governments can gradually establish a reputation for nonexpropriation by structuring a concession or franchise agreement so that it calls for a gradual sinking of investments over time. The investor sinks more resources after observing government behavior. This is how Hungary structured its national telecommunications concession (Armstrong and Vickers 1996). Or the government may seek to attract domestic private investors so that future expropriation would be at the expense of locals as well as foreigners, making expropriation more politically costly and thus less likely. A variation on this strategy is to use the existence of an international lending program as a commitment device, or “hostage”: the investor knows that bad behavior by the government in this sector may be punished by international lenders in a variety of other sectors (Armstrong and Vickers 1996; Levy 1998; Ordovery, Pittman, and Clyde 1994).

Before concession negotiations and privatization, a careful study should focus on the objectives of the liberalization and privatization program, taking into account the experience of other countries. This was done for the Peruvian toll road sector, for example. It is also important to undertake price reform while the enterprise is still in public hands. Prices have to be increased to cover costs (or be headed in that direction), or investors will lack confidence that they will be allowed to earn a profit on their in-

vestments. This problem affected privatization of the electricity sector throughout Central and Eastern Europe and elsewhere (Stern and Davis 1998). A system of transparent cross-subsidies or lifeline services designed to benefit all citizens, including the poorest, should be agreed upon at the start.

Any vertical unbundling—for example, separating electricity generation from transmission and distribution—should be done before privatization to avoid creating strong opposition to restructuring later on. Even if a sector is not to be unbundled at the point of privatization, the necessary separation in cost accounting should be done in preparation for any future restructuring or access issues. Several Latin American toll road projects have caused severe regulatory problems because the policymakers did not establish a mechanism for the transmission of information to regulators at the time the concessions were granted (Estache, Romero, and Strong 2000).

A critical component of a privatization strategy is an independent regulatory body. This is supported by the finding from Latin America that if a regulatory body existed at the award of the concession, the probability of renegotiation was 28 percent; if it did not, the probability was 62 percent (Estache, Romero, and Strong 2000). Although the effectiveness and independence of any regulatory authority vary between countries, the preexistence of a regulatory agency has helped, on average. Hungary tried—and failed—to open up its gas sector to private investment without having a regulatory structure in place.

Regulators need information to regulate. To obtain information, they need their rights to information to be in the contract. An important complement to such contract design is to ensure that firms use good regulatory accounting and that regulators have the capacity to analyze such data.

The presence of an independent regulatory agency mitigates the risks of political interference in the privatization process and hence provides more comfort to investors. Moreover, an independent regulatory body provides a focal point for negotiation of the concession contract and technical expertise to deter unwarranted contract negotiations. And, a regulatory agency generally has specific knowledge that reduces uncertainty and better predicts the path of technology and demand. The study on Latin America found that the presence of a regulatory agency facilitates a careful review of the contract itself and of the qualifications of the bidders before the contract is awarded.

The study also found that a rate-of-return type of regulation (which ensures the investor a guaranteed rate of return by adjusting prices according to costs) was less likely to lead to renegotiation of contracts than a price-cap type of regulation (which limits the price a firm is able to charge). A firm that is regulated by a price cap bears all the risks associated with cost change and is subject to significant regulatory discretion. In Latin America the probability of renegotiation is 9 percent with a rate-of-return price regime and 56 percent with a price-cap regime (Estache, Romero, and Strong 2000).

Finally, using a single one-time payment as the principal award criterion, rather than the lowest tariff to be charged or the lowest annual subsidy to be provided, seems to reduce the likelihood of renegotiation, since the latter criteria are operationally more conducive to future dispute and subsequent adjustment. The one-time payment locks the investor in and strengthens his commitment (Guasch 2000).

and providers of services can also produce institutional designs that serve communities better.

Competition between firms and benchmarking across jurisdictions can improve service provision and help reduce the burden on regulators. For example, competition in a sector may reduce the need for frequent price reviews.

Establishing credible regulatory systems is one of the most important factors affecting private investment in infrastructure. However, countries' success in building such systems depends as much on political issues (chapter 5) as on technical factors and human capacity. Relevant political issues range from lack of independence of the regulator to weak systems of checks and balances for the regulatory agency. Transparency for both the regulator and the regulated is also key. For example, accounting standards increase transparency for the regulated. Open disclosure of the rules of the game enhances transparency for the regulator.

This chapter reviews how competition may reduce the regulatory burden on the state; the form that regulatory institutions should take; and how institutional design may affect access by poor people. It does not discuss all the important issues in the design of regulation, but it does cover areas where recent evidence has shed some light or those that were not covered extensively in *World Development Report 1994*. Governance issues within *public* infrastructure firms are not discussed here except in certain cases, such as the design of subsidies for poor people.

Competition in infrastructure sectors

There are different ways to introduce competition *in* the market (as opposed to *for* the market) in infrastructure sectors. This section addresses this issue.

Competition and regulation

As noted in *World Development Report 1994*, services such as electricity generation and long-distance telecommunications can be provided competitively. Some services still subject to economies of scale may face competition from other services using separate technologies.

Under either scenario, competition may substitute for regulation in protecting the economy from monopoly abuses. This is all the more important in developing countries, where the capacity for enforcing regulations is generally weak. First of all, regulation is not a simple task and can lend itself to arbitrary government action. This is more likely to happen in countries where

governance is weak and where there are insufficient checks and balances to curb abuse of power by a particular branch of government. Regulation imposes costs on both the enterprises being regulated and the government doing the regulating.⁵ Sometimes government inefficiency and corruption within state firms may be replaced by corruption in the regulatory agency. Moreover, government authorities in developing countries are frequently unable to gain adequate access to the information needed for effective regulation.⁶ They may also be unfamiliar with the concept of an independent regulator and have difficulties enforcing regulatory orders. In other words, competition can avoid many of the incentive, information, and enforcement problems created by regulatory regimes and, where it is effective, can substitute for regulation.

Another form of competition that could help reduce the burden on regulators is yardstick competition. Regulators can assess the performance of an infrastructure service provider—for example, in terms of prices and coverage—by comparing it with one in another locality (such as in a neighboring country) and can adjust regulation accordingly. Although this is not competition in the market, it can have similar effects on incentives for infrastructure providers.

Competition among “monopolists” can reduce the need for sectoral regulation in sectors such as petroleum and electricity distribution.

- The long-distance transmission of petroleum by pipeline between two points may well be a natural monopoly. Producers at a particular location, however, may not require regulatory protection if they have alternative customers to a particular pipeline—for example, local buyers, or shipment by water, or a pipeline from the same producing location that serves different destinations. Similarly, customers at a particular point on a pipeline that is an origin-destination monopoly may not require regulatory protection if they have alternative sources of petroleum—for example, local producers, or shipment by water, or a pipeline to the same destination that comes from a different origin.⁷ Similar conditions hold for some natural gas pipelines. For example, pipelines from two different gas-producing areas in Argentina, Gas Atacama (a joint venture of Chile's Endesa and the U.S. firm CMS Energy) and Norandino (Belgium's Tractebel), are just beginning to compete to bring natural gas across the Andes Mountains to northern Chile.⁸

- Similarly, even if the long-distance transmission of electricity between the generation facility and the consuming enterprise or municipality is a natural monopoly, generators at a particular location may not require regulatory protection if they are served by different long-distance transmission lines serving different sets of customers. Customers at a particular location may not require regulatory protection if they are served by different long-distance transmission lines carrying power from different generators. Municipal and large industrial users are currently enjoying such competition from different generation facilities in Argentina, Brazil, Chile, and Peru.⁹

Other examples include competition provided to the railroad sector by truck and barge operators and competition among different energy sectors such as oil and gas. A more recent development is competition between telecommunications networks and cable television providers in communications services. Moreover, both these natural monopolies face competition from wireless communications technologies.

Sometimes competition may create new regulatory problems or may simply displace old ones. In many of the cases where competition is recognized as an effective way of organizing the provision of service, that service is part of a larger infrastructure sector where some natural monopoly elements may remain. If electricity generation is considered a potentially competitive sector, electricity long-distance transmission and local distribution are less clearly so. If long-distance telecommunications is considered a potentially competitive sector, local wireline telecommunications are less clearly so.

Many of the most important issues involving risks, contracts, incentives, and knowledge have involved sectors where “unbundling” is possible—that is, where *some of the* services formerly provided by vertically integrated monopolies are being opened up to competition but other services remain monopoly provided. In these broader sectors, therefore, competition and regulation are *complements* rather than *substitutes*.

The next section focuses on an issue that is currently very important in developing countries. Vertical separation can provide more opportunities for competition in developing countries.

Vertical integration or separation

In virtually every infrastructure sector there is some service that can now be provided competitively, while there

remains some service that is likely to remain a monopoly “bottleneck” in the production chain.¹⁰ This raises the question whether the traditional vertically integrated model of the infrastructure enterprise should be maintained when it might be possible to introduce competition. One problem of undertaking cost-benefit analysis in this area is that it is not possible to measure the dynamic benefits of competition, while the costs of restructuring and evidence of scale economies may be known.

It seems likely that in particular infrastructure sectors there are economies of scope to the coordinated provision of all services, for example, generation of electricity with long-distance electricity transmission and local electricity distribution. But where there remains a monopoly bottleneck to which all competitive suppliers require access, there is an incentive for the monopoly provider to discriminate in favor of its own integrated subsidiaries over their competitors (for example, in access prices or access quality). There are three main institutional options to consider:

- Option A, in which the owner of the monopoly bottleneck enterprise continues to operate in the “competitive” sector in competition with other providers in that sector (that is, an integrated firm subject to competition in the nonbottleneck market)
- Option B, in which the owner of the monopoly bottleneck enterprise operates as a monopolist in the (otherwise) competitive sector as well (that is, an integrated monopolist)
- Option C, in which the owner of the monopoly bottleneck enterprise is not permitted to operate in the competitive sector but, rather, provides connecting service to the competitive firms operating there (that is, vertical separation with competition).

In practice, intermediate forms of vertical separation may be used (this is a subset of option A) because they facilitate detecting discrimination. For example, accounting separation between different units, or restructuring the units into separate corporate entities with common ownership, could help detect discrimination.

The option most appropriate for a particular sector in a particular country depends on four main issues (table 8.2). First is the *extent of economies of scope between the provision of different services within the sector*. It appears that the extent of economies of scope may not be that large, based on the fact that, in the infrastructure sectors in most industrial countries, at least

Table 8.2
Strategy for vertical separation or integration

		Vertical integration with competition in non-bottleneck market (Option A)	Integrated monopolist (no competition) (Option B)	Vertical separation (with competition) (Option C)
Economies of scope	Large	✓	✓	
	Small			✓
Detection of discrimination	Easy ^a	✓		
	Difficult		✓	✓
Consequences of discrimination	Little effect on competition	✓		
	Bad for competition		✓	✓
Likelihood of competition in nonbottleneck market	Significant competition	✓		✓
	Little competition		✓	

a. Requires separation of the accounts of the different units of the vertically integrated producer.

some vertical transactions take place between enterprises rather than within enterprises. For example, under certain circumstances integrated electricity providers buy some power from independent generators, and integrated railroads allow some other train operators to operate on their tracks.

Second is the *ease of detecting discrimination by the integrated owner of the bottleneck in favor of its subsidiary*. Difficulty in enforcing interconnection quality even in the United States was one reason for the break-up of the integrated telecom supplier AT&T in the early 1980s.¹¹ Independent electricity generators have argued that there are so many dimensions of quality of access to long-distance transmission lines that it is virtually impossible for a regulator to prevent favoritism.¹² In contrast, the use of neutral railroad schedulers (dispatchers) in both the United States and the Czech Republic seems in some cases to have been successful in preventing discrimination against nonintegrated train operators.¹³ In the absence of separate accounts between units of the integrated producer, discrimination can be difficult to detect.

Third is the *consequences of undetected discrimination for competition*. Financial data for the United States suggest that the long-distance transmission costs of electricity are less than 5 percent of the total delivered cost to end users, while track and structure costs make up nearly 20 percent of the total delivered cost of railroad service.¹⁴ This suggests that a competing train opera-

tor, facing discriminatory access to the track, may be at a greater potential disadvantage than a competing electricity generator facing discriminatory access to the long-distance transmission grid. The possibility of discriminatory access is even more acute in the case of water and sewerage, where the fixed network costs in a developing country may be as much as 75 percent of the total cost of the delivered product.¹⁵

Fourth is the *likelihood that there would be sufficient competition in the nonbottleneck market which would significantly improve efficiency or access for users*.¹⁶ Where there are strong economies of scale in the competitive sector, as in water and rail, for example, this sector may attract at best only a very small number of entrants, making large gains from competition unlikely. This is likely to be more of a problem the smaller or poorer the country—since demand levels will support fewer suppliers with given scale economies. This limitation can be addressed where international trade of the service is feasible.

Both information availability and contract enforcement are important for combining competition and regulation in an infrastructure sector. The owner of an integrated bottleneck asset may be required by the terms of its privatization or concession contract to supply nondiscriminatory access to the bottleneck asset to all who want to use it. But someone must enforce this contract, and whoever enforces it may require a great deal of complex information. In both these areas, de-

veloping countries are at a disadvantage. This suggests that it will often be more beneficial in a developing country to impose vertical separation on an infrastructure sector as competition is being created (option C) or continue to keep it an integrated monopolist (option B), rather than have it remain as an integrated firm subject to competition in the upstream market (option A). These questions have attracted policymaker attention in the developing Internet services sector (box 8.2).

In countries where regulators tend to be experienced and skilled, the relevant question may be simply, given that competitive access is desired, is vertical integration or vertical separation likely to provide the better outcome? In the context of the information and contract enforcement problems in the developing world, however, the more relevant questions may be: Are the benefits of competition likely to be achieved, and do they exceed the costs of implementation? Are the price and quality delivered to the final consumer really likely to be significantly improved by the first or third option compared with the much simpler to implement second option? Five infrastructure sectors are considered in turn.

Telecommunications. As wireless technology continues to progress, it is less clear than in the past that even the local service is a natural monopoly.¹⁷ Nondiscriminatory access appears increasingly to be a possibility, especially in those conditions where competing providers of long-distance and other auxiliary services have a presence in the local market as well. This was a feature of Morocco's successful telecommunications reform in 1999, which was supported by the World Bank. In Chile competition in local service provision has come mainly from long-distance carriers entering into the provision of local service.¹⁸ In Guatemala the (integrated) incumbent monopolist has also been required to provide interconnection to new market entrants.¹⁹ Throughout the transition world individuals and businesses have avoided the traditional endless waiting periods for installation of fixed line service by signing up for wireless service.²⁰ Thus this appears to be a sector where *competition can often coexist with vertical integration*, that is, option A.

Water. The fixed costs of the network are so high in the water sector that competition in supplying water may not offer much benefit in the way of increased efficiencies, so the regulated, integrated monopoly model (option B) may work best in this sector. It appears that no country has actually instituted competition in the supply of water to the system, although Chile has stud-

Box 8.2

Vertical integration and discrimination in the provision of Internet services

Internet "content" (information, music, and graphics) is carried over long distances by Internet "backbone" providers and then delivered to users by Internet service providers (ISPs), such as America Online (AOL) and Mindspring, which in turn must (at least under current technological circumstances) use the wires of local telecommunications or cable television providers to reach final users. An important consideration for regulators and competition enforcers has been the degree to which vertical integration among enterprises operating at these various levels may be harmful.

For example, when AOL recently agreed to merge with Time Warner, a major content and cable television provider, U.S. antitrust enforcers were concerned that AOL might discriminate in favor of its own content and against the content of suppliers competing with Time Warner. The antitrust enforcers and the merging companies eventually agreed that AOL would provide access to its network on the same terms as were applied to all content providers. At the same time, the Federal Communications Commission, the U.S. telecommunications regulator, was concerned that the cable operations of the integrated company would discriminate against rival, nonintegrated ISPs, and it insisted on a similar settlement agreement designed to prevent discrimination. Both settlement agreements will arguably require ongoing regulatory vigilance to ensure compliance, although both are designed to be incentive-compatible and hence, to a degree, self-enforcing.

In another example, the Lithuanian Competition Council has been concerned about possible discriminatory behavior vis-à-vis independent ISPs by the local telecommunications provider, Telecom, since it has its own integrated ISP. The council has already fined Telecom for installing "filters" on its lines that reduce the speed of data transmission by the independents, although this case has been appealed to the courts.

Source: United States Department of Justice, available at www.usdoj.gov; United States Federal Communications Commission, available at www.fcc.gov.

ied the option.²¹ It may be argued that this is a sector in which it is easiest to detect and prevent discrimination against nonintegrated suppliers, so, especially if the quality of different suppliers can be adequately monitored and as regulatory capabilities develop, *vertical integration can coexist with competition in supply* (option A).

Oil and natural gas. Like the water sector, oil pipelines and natural gas pipelines have expensive networks, so the relative cost savings from competitive product supplies may be smaller than in other sectors, but with

relative ease of detection and prevention of discrimination. Where discrimination can be detected and prevented—and this will not be the case in every country—vertical integration may be consistent with a competitive supply market (option A). Where discrimination cannot be prevented, the benefits of competition are not great enough compared with the costs of regulation and the harm from discrimination to justify option A, nor are they great enough compared with the costs of vertical separation to justify option C; in this case an integrated monopoly operating in both markets—that is, option B—is probably the best outcome available. *Source competition among integrated monopolists may be a possibility* in these sectors in larger countries. As noted above, pipelines from two different gas-producing areas in Argentina are beginning to compete to supply natural gas to customers in Chile.

Railroads. One model of rail reform, favored by the European Union, entails separation of ownership and control of infrastructure (“tracks”) from operations (“trains”), with the ultimate goal of having multiple private train operators compete with each other for the business of shippers over a common track system. The experience of the United Kingdom—one of the few countries that have tried to implement this model of reform fully—has not been encouraging. It raises the question whether *vertical integration without competition at the train level* (option B) *may be the best of imperfect choices* in this sector.

In medium-size and large countries, option B may allow for competition between vertically integrated firms through services offered to different destinations, or from different origins, to particular customers (that is, “parallel” or “source” competition).²² This is the model that was eventually chosen by reforming governments in both Brazil and Mexico and that has been the arrangement for some time in Canada and the United States. Competition from other types of carriers such as trucks is also a probability.

Smaller countries with sophisticated regulators may find that discrimination is easy enough to detect that some entry may be allowed—for example, entry of large shippers that may already own their own railcars, or entry of foreign train operators from neighboring countries. The European Union (EU), for example, has enacted regulations requiring its member countries to allow train operators from other EU member countries to use the tracks of national integrated firms. In the Czech Republic, for example, the vertically integrated

rail company must permit other train operators on its tracks.

Power. In the power sector, it is difficult to detect and prevent discrimination against nonintegrated electricity generators even in industrial countries with experienced regulators, and the problems facing new regulators charged with monitoring the behavior of entrenched, powerful incumbent monopolists are that much more formidable.²³ Nevertheless, except in the smallest of economies (where economies of scale even with the most modern generation technology may rule out the presence of more than one or two generation enterprises), the benefits of competition in generation are potentially so massive that *vertical disintegration may be the best outcome* (option C).²⁴

A recent study shows that vertical disintegration in the power sector is the most widely followed approach for countries (Malaysia and many EU countries being the exceptions).²⁵ It concludes that vertical disintegration—breaking up integrated power companies into separate generating, transmission, and distribution entities—can introduce competition into power generation. Results indicate that introducing competition can be positive.

In Argentina, for example, the switch to a private competitive system quickly resolved urgent problems of power shortages. In contrast, some recent experiences have illustrated how political considerations and incomplete reform can dilute the benefits of competition in the power sector. While vertical disintegration of power companies obviates the need to regulate generation operations (as these are subject to competition), power distribution and transmission operations remain monopolies and need to be regulated. As a caveat, there is some evidence that even vertical disintegration may not significantly improve efficiency unless some type of end-user competition is also introduced.

Structure of the regulatory system

By now it is well accepted that a country should have *independent* regulatory bodies following *transparent* procedures (chapters 5 and 10), subject to oversight by a *strong and independent judiciary* (chapter 6). In practice, each of these requirements is difficult to establish. Further, without checks and balances, bureaucratic inefficiencies may be replaced by private corruption. Moreover, human capital is scarce in many developing countries (chapter 1). All these factors call for modification of institutional design. This section addresses

some other attributes that are necessary for a regulatory body to function effectively in developing countries, taking into account in particular the informational and capacity constraints in these countries.

Courts versus regulatory tribunals

Regulatory agencies may play more than one role. They may design rules, monitor compliance with rules, and enforce compliance with rules. While many regulatory agencies may do the first two well, they may still need courts for enforcement. Even in cases where the regulator has strong enforcement powers, courts are important for hearing appeals after a regulatory decision. In most developing countries the courts are overburdened, and judges may lack strong technical skills. For these reasons it would be advisable to build regulatory systems that lower their burdens. The regulator needs to be given strong enforcement authority in the first instance. Since courts are weaker in developing countries, many international investors rely on international arbitration.

One question is whether courts relying on competition laws provide sufficient oversight for service providers. The experience of New Zealand demonstrates the importance of a regulatory body that monitors compliance with the laws. As part of its broad program of deregulation in the 1990s, New Zealand eliminated sector-specific regulation and sought to rely on the competition authority, enforcing the competition law through the court system, to prevent monopoly abuses in the telecommunications and electricity sectors. Policymakers found, however, that in the absence of sector-specific regulation, proceedings were lengthy and the outcomes unsatisfying. Courts at three levels took five years to try to determine the appropriate price for a new entrant to pay to have access to the incumbent's local network. At the end there was still no general principle or direction for the companies to follow.²⁶ Recent reports by the Ministerial Inquiry into Telecommunications and the Ministerial Inquiry into the Electricity Industry have concluded that, at least at the current stage of technological development of these sectors, specialized regulatory tribunals will be an important part of an effective regulatory regime.

Scope of regulators

A second set of questions concerns the scope of action for particular local regulatory agencies. Should such bodies operate at the national level, or should local regulatory bodies control local infrastructure enterprises?

Should there be a different regulatory body for each principal infrastructure sector or for a particular function?

Local versus national regulation. There are some arguments made in favor of localized regulation of infrastructure enterprises: (a) the better knowledge of local conditions of a local regulator; (b) the more direct political accountability under which a local regulator is likely to work, with the resulting greater involvement of the affected population in regulatory decision-making (as urged in *World Development Report 1994*); (c) the more effective monitoring of the regulated enterprise that proximity is likely to provide; and (d) the frequent difficulties faced by national- or federal-level regulators in coordinating with local governments, especially in matters as politically sensitive as access to infrastructure.

These factors, however, are opposed by others in favor of centralization of regulation at the national level: (a) the technical sophistication required of regulators, at least in some sectors, leading to economies of scale in regulation; (b) the shortage of local experts; (c) the presence of external effects (such as the network demand effects mentioned above, but not limited to those) among users at different locations in a single country, which may require both a single set of rules and a single agency; and (d) the increased likelihood of industry "capture" of an agency, the more limited is the agency's jurisdictional scope. (Some would argue in favor of centralization on the basis of a perceived lesser likelihood of corruption, but the evidence here is mixed; see chapter 5.)

The arguments in favor of local regulatory agencies are probably weaker, and the first three in favor of national regulation are stronger, the smaller a country is. For small developing countries, national regulatory agencies may be preferable. Technologically less complex sectors such as water provision and highway repair are an exception. In both of these sectors the local population has been especially important in directing the provision of services (again, see *World Development Report 1994*). Even in these sectors there are often centralized bodies and rules that take care of broad interconnection and pricing issues and externality-generating activities (such as watershed management), activities that may benefit from specialized expertise (such as overseeing the bidding process for highway construction). More decentralized actors such as municipal governments and NGOs may be responsible for monitoring performance, setting local standards, dealing with

customer complaints, and in general ensuring accountability to the local citizenry.²⁷

With larger countries, it may be preferable to decentralize regulatory functions. In some cases, even though regulatory rules may be set at the national level, monitoring compliance with rules may be done at the local level, for example, by NGOs or communities. Arguments in favor of decentralization are affected by political factors. Central governments in larger countries have sometimes lacked the power to impose regulation (including demands for the basic information required for regulation) on local or regional enterprises without the agreement of the local or regional governments. However, there are still areas where it does not make sense to decentralize responsibility—such as in long-distance telecommunications regulation and interstate power and gas transmission—since much of the service is *between* areas.

There are two striking examples from the toll road sector in Brazil. First, on the toll road between Rio de Janeiro and Teresopolis, the mayor of a small town along the route has refused to cooperate in preventing illegal access by nonpaying drivers. Second, in the state of Parana the governor forced the concessionaire to charge only half the toll level agreed upon in the contract between the concessionaire and the central government.²⁸ Large developing countries such as Argentina, Brazil, India, and Russia have devolved regulatory power (sometimes completely, but often only partially) to local or regional governments in the face of these difficulties of national-level regulation and policy enforcement.

Yet a third form of regulatory structure that has emerged is supranational regulatory organizations such as those established among the smallest and poorest countries in Africa. Such supranational structures have been established for apparently the same reasons that in other countries have led to centralization: the complexity of regulation, economies of scale in regulation, and the shortage of qualified personnel to staff regulatory agencies. Another factor in this case may be the increased bargaining power of a multinational regulator, compared with a regulatory body in a small country, vis-à-vis large multinational investors.²⁹ The Organisation for Eastern Caribbean States has recently created a regional regulator for telecommunications and is considering the possible extension of this arrangement to other infrastructure sectors. Similarly, in 1995 the countries of the Southern African Development Community

formed the Southern African Power Pool to coordinate national-level power production and regulation.

While these are compelling arguments for and against centralization of regulatory structure, in practice the design of effective regulatory structures depends on political realities. For example, France, which has a very centralized political system, has mostly adopted a centralized structure (except for water and local transportation, which are largely controlled by municipalities). By contrast, in the United States, the states, being large and autonomous, have large regulatory powers. Since it is generally politically costly to remove those in power, regulatory structures have shown a strong inertia over time.

This provides an important lesson for transition and developing countries: their political structures will also determine the types of regulatory institutions that can be implemented. Reforms or regulatory designs are likely to be extremely difficult to implement without recognition of these obstacles and without efforts to overcome them. Sometimes the establishment of a new institution rather than modification of the old authority can deliver benefits. Such seems to have been the case in the privatization of the Moroccan telecommunications industry.

Sectoral specialization. Factors that are important for the choice between local and national regulators are also important for the consideration of sectoral specialization of regulatory bodies and have led to similar answers. Arguments in favor of having a specialized agency for each broad sector (transportation, energy, telecommunications, and so on) are that different sectors have different characteristics, so there are economies of specialization and no particular economies of aggregation; that more agencies diversify the risk of institutional failure; and that more agencies allow for more policy experimentation.

Conversely, there are without question some issues that cut across sectoral lines and that would benefit from a coherent policy framework. Sectoral lines are not always very clear and are probably becoming less so (as in the case, noted above, of telephony and cable television). Further, as in the localization/centralization debate, many developing countries face a shortage of qualified personnel to staff multiple regulatory agencies, and an agency with broader jurisdiction probably has a lower likelihood of “capture” by industry (or by sectoral ministries).

Again, many of these arguments are principally related to country size and capacity. Smaller developing countries such as Costa Rica, Jamaica, and Panama have responded to the scarcity of regulatory experts by creating multisectoral regulatory bodies (although regulatory rules are obviously specialized to the sector)—a practice followed at the state level in Australia, Brazil, Canada, and the United States. Hungary has followed the example of the United Kingdom in combining its electricity and gas regulators.³⁰ At the same time, following from the economic arguments above, some larger developing countries—such as Argentina, Brazil, and Russia—have created different regulators for different sectors.

Functional specialization. In some countries different agencies have responsibility for different functions; for example, an agency may do economic regulation of, say, the water sector but may not have responsibility for the sector's technical and environmental regulation. In the United Kingdom, for example, the Office of Water Regulation has responsibility for controlling end-user prices and ensuring the viability of suppliers, while the Drinking Water Inspectorate oversees the quality of tap water and the Environment Agency is responsible for maintaining the quality of rivers, canals, and groundwater. Along these lines, it is possible to have similar divisions of responsibility regarding, say, the economic and the technical, environmental, and safety aspects of electricity generation and transmission. But there are costs to the creation of multiple agencies, and likely economies of coordination.³¹ Where there is a clear need to rely on detailed knowledge of local conditions and to have the endorsement of local political forces, there may be an argument for different levels of regulation for economic versus technical regulation. For a developing country with scarce human capital, functional specialization is more difficult.

One strategy that has been attempted to “stretch” the limited supply of qualified personnel for regulatory agencies is to contract out some aspects of regulation, such as the design of pricing schemes or the monitoring of compliance, to private firms. Chile contracts out the technical monitoring of water standards, and Angola and the Philippines have considered doing the same.³² The telecommunications regulator in Argentina has hired private consultants to assist in rate rebalancing between both commercial and business customers and long-distance and local rates.³³ There seems to be wide scope for expansion in this area.

Competition authority versus infrastructure regulator.

One question frequently raised is whether a competition law enforcement agency can be relied upon to act as a day-to-day economic regulator. Every country in Central and Eastern Europe and the former Soviet Union that has set up competition authorities has done so before creating sectoral regulators, relying—at least initially—on the competition authorities to use the abuse-of-dominance provisions of the competition statutes to prevent monopolistic abuses.³⁴ Subsequently, they have complemented the economywide competition authorities with infrastructure regulators. With the increasing introduction of competition into utilities, however, the interface between competition authorities and regulators is gaining increasing attention.

Competition authorities in developing countries as diverse as Venezuela and Poland have shown that they can, like their North American and Western European counterparts, act as effective “competition advocates” in the regulatory arena without assuming the regulatory portfolio themselves. In other countries, as diverse as Australia, Bolivia, and Russia, the competition authority has at least overall coordination and management authority over the regulatory bodies—though in all three of these cases some of the details remain to be worked out.

Designing infrastructure regulation to deliver services to poor people

The quality and coverage of infrastructure services such as electricity, water, telecommunications, and transport have a major impact on living standards. Many of the world's poor today continue to lack access to many basic infrastructure services.

The findings of a recent study on the impact of infrastructure reforms on poor people in Latin America may provide lessons for policymakers elsewhere on how to design such reforms to take into account distributional and welfare effects.³⁵ The two main findings of the study are as follows.

First, private sector provision has had mixed effects on tariffs and hence mixed effects on the poor. Tariffs have fallen in cases where competition and effective regulation have cut costs. For instance, in Chile liberalization of the long-distance telecommunications market in 1994 reduced call prices by more than 50 percent. Prices fell by a similar magnitude in the mobile telephony industry when the number of mobile phone

Table 8.3

Access to electricity, water, sanitation, and telephone services in 22 Latin American countries, 1986–96
(percentage of households)

	Weighted				Unweighted			
	Water	Sanitation	Telephone	Electricity	Water	Sanitation	Telephone	Electricity
1986	75.99	66.99	5.46	82.19	68.34	73.63	4.58	72.16
1989	80.85	79.85	6.13	85.37	69.88	77.21	5.23	76.26
1992	81.33	79.84	7.44	87.72	70.16	77.50	6.54	80.19
1995		79.65	9.41	89.37	73.19	79.67	8.54	81.76
1996			10.30	90.10			9.42	80.91

Note: Weighted—equal weights assigned to all countries; unweighted—represents population-based access rates.
Source: Estache and others 2000a, p.16.

companies rose from two to four in 1998. In Argentina wholesale prices of electricity fell by 50 percent in the five-year period after privatization due to intense competition in the generation sector with the entry of 21 new generators. Residential customers enjoyed a 40 percent drop in tariffs in the five years after privatization (1992–97). In contrast, there are also examples where tariffs have risen because of the need to ensure the financial viability of service providers.

Second, the reforms have brought about increased provision of infrastructure services by the private sector. This improves access in general and can perhaps also increase access for poor people, since they have been particularly lacking access in the past. Table 8.3 shows the increase in access to electricity, water, and telephone services in 22 Latin American countries over the 1986–96 period.

The policy challenge for governments seeking to improve access to infrastructure services on the part of the poorest citizens is to square the circle of providing incentives for service to the poor while keeping the rates charged to the poor affordable, taking into account their willingness and ability to pay. This is illustrated in the case of the water concession in the Tucumán Province, Argentina (box 8.3).³⁶ Although the causes of the failure of this water concession are many and complex, earlier attention to social and distributive issues could have increased its chances of success, or an explicit subsidy program could have helped ease the situation.

There are five main ways in which regulatory policy can promote distributional objectives: (a) setting investment targets; (b) being flexible with respect to price-quality combinations in regulatory decisions;

(c) allowing liberal entry of informal infrastructure providers; (d) involving communities in the regulatory process; and (e) subsidies.

Setting investment targets

Some governments have tried to promote access to infrastructure services by including investment targets at the time of privatization or award of concession contracts. Bolivia adopted such an approach in La Paz and El Alto, where enterprises bidding for the water supply concession in 1997 had to say how many connections they would make in return for a specified tariff. The winner, Aguas del Illimani, committed to achieving 100 percent water coverage by December 2001.³⁷ Similarly, in Monteria, Colombia, specific water and sewerage expansion targets were set.³⁸

The way a contract or company is tendered in the privatization process and the variable chosen to award the contract will determine the distribution of benefits among all stakeholders. If poor households are connected to the service, then they tend to benefit more if tariffs are chosen as the competitive variable. If they are not connected, then choosing investment commitments as the tendering variable has a higher potential for benefiting the poor.

Flexibility in price/quality combination

In awarding concession contracts, if quality standards are set too high (using industrial country standards, for example), the service may be too expensive for poorer households and poorer countries. This means that there should be some flexibility in the contract to allow for the company, the regulator, and future users to agree to

Box 8.3**Water concession in Tucumán, Argentina**

In 1995 the concession for water and sanitation services for Tucumán Province, Argentina, was awarded to *Compania de Aguas del Aconquija (CAA)* for a period of 30 years. To fund the required investment program, the concessionaire bid a tariff increase of 68 percent. The tariff increase was to be immediate and to affect all consumer groups equally in a population with a significant share of urban and rural poor.

The tariff increase proved very unpopular and was considered unjust by low-consumption users. The situation deteriorated with a series of episodes of turbid water. The result was a nonpayment campaign by consumers, which provoked a financial crisis for the concessionaire. Provincial elections brought to power a new administration that was much more hostile to the concession program. At first the authorities and the concessionaire began renegotiating the contract. One initiative was to introduce a special tariff for low-income users and a system of rising block tariffs for regular customers. The negotiations did not prosper, however, and the case ended in international arbitration.

Source: Estache, Gómez-Lobo, and Leipziger 2000.

a different price-quality combination when it is necessary (as in specific geographic areas).³⁹ Insisting on high quality and safety standards for all providers will only prevent small, local enterprises from providing “imperfect” but essential services to the poor. Regulators could tighten quality and safety standards for such providers over time as incomes improve.

The principles of such a multitiered regulatory structure, in which different regulatory treatment is provided for different technologies or dimensions, have already been employed by regulators under other circumstances. For instance, in the telecommunications sector just about every country imposes different regulatory requirements on cell phones and fixed-wire operators, with the latter presumed to have greater market power and hence greater need for more intensive regulatory scrutiny. Also, many countries (Bolivia, for example) establish different regulatory requirements for the “interconnected system” (that is, those parts of the national grid) and “isolated systems,” with the former requiring closer regulation for many reasons, including the need to ensure system reliability.

Providers could also be allowed to offer a menu of services and to charge a corresponding menu of tariffs. Users could make their own choice; this type of flexi-

bility would benefit low-income users. This also reduces the informational requirements for the regulator in determining best quality or service standards. *Agua del Illimani* in Bolivia, for example, offers a choice between the regular connection fee for the water service or a lower fee if households supply their own labor for connection activities. In Brazil jointly owned sewers have been introduced in shantytowns as a form of lower-quality, affordable sewerage system.⁴⁰

Regulating outputs or outcomes rather than inputs or processes can provide incentives to providers (formal or informal) to search for and apply lower-cost ways of achieving the required result. For example, the private water concessionaire in La Paz and El Alto, Bolivia, was able to keep access costs down because regulations specified outputs (type of service and service quality) rather than inputs (material standards and construction techniques).⁴¹

Liberalizing entry

New and innovative approaches may be needed to enhance services to poor users. Such approaches include, for example, community participation in the construction and operation of networks, which may reduce their costs. An example is the water sector in Argentina, where the population in some neighborhoods provides the labor needed to work on the connections or on maintenance. Similar programs were implemented in the early 1990s in Mexico for road maintenance. Regulators need to be open to experimentation in institutional design.

In many parts of the developing world, small-scale private vendors or networks have sprung up in response to the needs of poor users who do not have access to formal providers. For example, in Paraguay about 300 to 400 private firms and individuals—called *aguateros*—supply piped water to households not served by municipal water companies. The *aguateros* range from very small operations supplying a local neighborhood to larger companies with as many as 800 connections.⁴² Similar service is provided by men driving 15-ton tanker trucks carrying water around the narrow streets of the shantytowns surrounding the *maquiladoras* on the Mexican side of the Mexico-U.S. border.⁴³ In Yemen small enterprises provide power services to rural towns and villages that are beyond the reach of the formal utility. Suppliers range from individual households that generate for their own use and sell power to a small number of neighbors to larger operators with diesel gen-

erators supplying up to 200 households.⁴⁴ In Senegal small private enterprises rent telephone lines from the national operator (privatized in 1998) and run telecenters for local households.⁴⁵

Liberalizing entry for informal providers is a policy priority particularly in the lowest-income areas of low-income countries, where infrastructure networks are underdeveloped or nonexistent and potential formal providers are nowhere in evidence. Regulators could limit such liberal entry to areas or customers not served by the incumbent provider. It seems very unlikely that entry in the service of such customers would pose a threat to the viability of the overall network. Enterprises providing services through the national network should enjoy significant cost advantages over small-scale rivals (who are often providing an imperfect substitute in any case) and should be able to win over the customers if and as the network expands.

Consultations with the community

To address the needs of the poorest citizens in countries, regulators need to engage a larger and more diverse group of stakeholders. Public education thus becomes an important part of this special regulatory agenda. In particular, regulators need to:

- Understand the needs and priorities of the poorest, including those who are not customers of traditional utilities
- Understand the needs and perspective (including costs) of a larger and more diverse group of actual and prospective service providers, ranging from small-scale or informal entrepreneurs to more traditional utilities
- Engage municipalities, NGOs, and other groups with an interest in representing and advancing the needs of the poorest.

In this context, exclusive reliance on formal regulatory hearings will not be enough. Greater efforts to engage stakeholders will ensure that decisions are well informed and help bolster the legitimacy of the regulatory system. Some promising experiments along these lines are being undertaken in many developing countries. These include:

- Visiting communities and engaging them in a dialogue on needs and priorities or establishing specialist consultative or advisory bodies to provide the regula-

tor with reliable access to a range of views. Regulators in Jamaica reach out to communities through local churches, and regulators in Bolivia hold town hall meetings across the country. In Brazil concessions in the power sector each include a special committee that comprises representatives of local government as well as different categories of users, including slum dwellers, farmers, and businesses.

- Developing information strategies aimed at educating citizens about the regulatory system. Regulators in Peru make extensive use of radio commercials, while regulators in Jamaica use “talk-back” radio shows.
- Delegating to municipal governments or NGOs particular roles in monitoring service provision and managing more intensive consultations with their constituencies. In Brazil there is a national system of consumer protection that delegates to subnational governments certain responsibilities for dealing with consumer issues within their jurisdictions.⁴⁶

Subsidies

This section discusses how infrastructure services can be made affordable for the poor. The method used to subsidize poor people needs to be settled along with other decisions on industry structure, the standards applied to the service provided, and pricing and quality regulation. Clear definition of objectives and careful targeting of intended beneficiaries can help reduce the costs of subsidy. Competition can also do so. For example, rights (and obligations) to provide subsidized services may be allocated through competitive auctions to the bidder demanding the lowest subsidy, as is done for rural electrification and rural telephony in Chile and for passenger railways in Argentina. This section addresses five issues with respect to the provision of subsidies: (a) targeting the recipients; (b) the good or service being subsidized; (c) the source of funding; (d) the delivery mechanism; and (e) subsidy costs.

Targeting the subsidy. There are two broad approaches to targeting subsidies in infrastructure: according to the consumption level of the household (lifeline) or according to socioeconomic or other characteristics (means-testing).

There are two ways the *lifeline* approach can operate. The first is the rising block tariff structure, whereby a low rate is charged for an initial lifeline block of consumption and progressively higher rates for successive blocks thereafter. The second is a subsidy whose amount depends negatively on consumption, under the as-

sumption that the poor tend to consume less than the rich. In Honduras the unit charge is reduced for customers with total consumption below 300 kilowatt-hours (kWh) per month, and the amount of the reduction has a block structure.

Both approaches are easy to implement and have low administrative costs, but the results have been mixed. In Latin America they have been found to do poorly in terms of targeting because consumption is only weakly correlated with income and, therefore, poverty.⁴⁷ In contrast, transition countries that use the lifeline approach manage to reach two-thirds of the poor for electricity and water.⁴⁸ Since there can be problems with targeting lifeline tariffs for the poor (even the nonpoor receive subsidies), policymakers need to decide whether they wish to err on the side of exclusion or inclusion.

Under the *means-testing* approach, the eligibility of households is based on observable characteristics of the household or its dwelling, under the assumption that these characteristics are correlated with income and, therefore, with poverty. The individual targeted subsidy

scheme implemented in the Chilean water sector—where households are selected on the basis of a socioeconomic interview before they are declared eligible for subsidized water tariffs—appears to be one of the most effective schemes developed so far (box 8.4). In Colombia all utility tariffs are differentiated according to the characteristics of the property and its surrounding neighborhood. On the downside, means-tested subsidies can have the undesirable consequence of affecting incentives, especially with respect to labor market participation. This is sometimes labeled the “poverty trap” problem in the welfare system.

Variations on the means-tested approach described above that have been used by countries include ones that determine eligibility according to some other categorical variables or geographic zones. For instance, in Argentina subsidies are provided to specific groups (such as pensioners and students), while in Colombia consumers are taxed or subsidized in their utility bills according to a national socioeconomic classification system based on neighborhood characteristics. Operators of toll roads in some developing countries have been required by the original contract to provide free or reduced-charge access to vehicles that are likely to be driven or occupied by poorer citizens, such as farm equipment, small trucks carrying farm products, and commuter buses.⁴⁹ In both cases, however, there are large exclusion and inclusion errors, and both these approaches are found to be inferior to the standard means-tested one.

Aside from the above approaches, the government could also reach the poorest by providing the basic minimum of service to customers, such as a single public phone or water tap in a village not yet served. Yet another approach to providing lifeline services that is typical of the telephony sector is to have a telephone to receive incoming calls, with a capability to make a fixed number of outgoing calls (or a total fixed number of minutes of such calls), as well as the capability to make calls to emergency services, collect (reverse charge) calls, and calls to toll-free numbers.⁵⁰

Consumption or connection subsidies? Subsidies can be in the form of a consumption or a connection subsidy. In principle, the subsidy should be directed to those goods or services with the highest difference between the willingness to pay and costs. In countries where capital market failures have a stronger impact on connections (as in many developing countries), subsidies for connections or network expansion should be favored over consumption subsidies because in these

Box 8.4

Targeting subsidies: Chile’s approach

Chile replaced its cross-subsidy system with a comprehensive subsidy scheme for low-income households, assisting them with the purchase of a variety of public services. The program is financed by the central government but administered through the municipalities. Subsidies are paid to the public service operator, rather than to the household, on the basis of each subsidized user served.

In the case of water, the subsidy covers 40 to 85 percent of the charges for the first 20 cubic meters of consumption. The goal of the scheme is to ensure that water and sanitation services do not take up more than 5 percent of household income. There are multiple criteria for eligibility, including region, average cost of water, household income and wealth, and family size. Eligibility is reassessed every three years. Households failing to pay their share of the bill have their subsidy suspended. Initially, the burden of proving entitlement to the subsidies was placed on the households. Low participation rates prompted the government to ask the water companies to collaborate in identifying needy customers by examining tariff payment records. It is now believed that all eligible households in urban areas (about 20 percent of the population) are covered by the scheme.

Source: Brook and others 2001, *World Development Report 2002* background paper.

countries it is almost impossible for consumers to borrow to pay for the connection, even if they were willing to do so.

Delivery mechanism. Direct subsidies may be transferred to the targeted beneficiary, either in cash form or as a tax deduction, or as a voucher tied to expenditure on the specified service. Cash payments and tax deductions may be efficient means of meeting distributional objectives but may raise concerns over the subsidy being expended on matters other than intended. Voucher schemes address this concern but can involve large administrative costs. Another means is for the subsidy to be channeled through the service provider, which will require the consumer to demonstrate her eligibility and may be conditional on paying the unsubsidized portion of the bill. This is the approach adopted in Chile.

Source of funding. The use of subsidies raises the question of the source of funding for such subsidies, which can come from general tax revenues for governments, cross-subsidies, or a common fund to which all companies contribute. Which type of funding is more convenient depends in part on the efficiency, equity, and administrative costs associated with the distortions created by the general tax system. When the tax-financed subsidies are too costly to enforce and tax reform is not a realistic option, it may be more efficient to raise funds from the utility industry, especially if done through the fixed-charge part of utility tariffs—that is, the second and third options.

General tax revenues are typically the source of subsidy funding in the case of urban transport and “negative concessions,” such as those awarded for toll roads. The issue with this source of funding is that in most developing countries the tax system is usually quite inefficient and is unable to raise resources at a low enough cost to enable sufficient funding of a welfare system.

Cross-subsidies raise funding by charging certain customers a higher price than the cost of service. This has been quite standard for public utilities in Latin America and is likely to continue to be common for private utilities when governments cannot make credible commitments to finance subsidies. The drawback of this scheme is that it could inefficiently discourage use or encourage inefficient regulatory evasion or bypass.

Traditional cross-subsidies require monopolistic market structures, without which those paying the higher prices would defect to other suppliers and so undermine the basis for the cross-subsidy. Some countries

have introduced cross-subsidy schemes that are more compatible with competitive markets. For instance, in the telecommunications sector in Australia and the United States cross-subsidies are funded from levies on the naturally monopolistic components of the system—the interconnection—rather than on consumption.⁵¹

In a variation of the cross-subsidies scheme, all companies are required to make a contribution to a *common fund* according to a rule (for example, proportional to the number of customers that each company serves or proportional to each company’s revenues). Companies still charge customers a price-cost markup to pay for this contribution. But they are free to decide which prices to charge which customer. The drawback here is that this allows for less transparent subsidies.

Conclusions

Infrastructure services are critical to the operation and efficiency of a modern economy. Improvements in infrastructure services can help promote competition in other markets, and there is evidence that infrastructure has a positive impact on growth and poverty reduction. As highlighted in *World Development Report 2000/2001*, access to infrastructure is a key concern for poor people.

Inefficiencies with public sector provision of infrastructure services and fiscal constraints led governments around the world to shift to private sector provision of infrastructure services beginning in the late 1980s. The consequent increase in private provision has expanded the provision of infrastructure services through improvements in efficiency and increases in investments. But recent experiences also shed light on institutional factors that, if improved, could increase the benefits from private provision. This chapter addresses the challenges faced by governments in regulating private infrastructure providers in order to meet both efficiency and distributional goals.

An important factor affecting service provision is the nature and extent of competition in infrastructure markets. To the extent possible, policymakers need to encourage competition in the provision of infrastructure services. Competition can help reduce the regulators’ burden of monitoring prices and quality. Key factors affecting the quality of infrastructure provision are initial contract design at the time of privatization and the presence of a strong regulatory agency. Governments that have paid the most attention to detail at the time of privatization have been better able to expand service provi-

sion, particularly to poor people. Failure to set up strong regulatory agencies can result in bureaucratic inefficiencies and public corruption being replaced by corruption in the private sector or an excessive transfer of rents to private parties. Small poor countries could benefit from coordinating the regulation of infrastructure providers at a regional level. Attention to preprivatization restructuring of the sector and postprivatization monitoring, for example, through better accounting systems (chapter 3), is important. Information flows among those who are regulated, the regulators, and the customers are essential to effective service provision.

Policymakers can also expand coverage goals by encouraging new, low-technology, informal providers, and by modifying regulations to enable their operation. Regulators can benefit from flexibility in institutional design—that is, in price-quality combinations. Innovative approaches by communities—and information sharing between communities and regulators—can help improve coverage. Distributional objectives can also be met with investment targets. In cases where subsidies are needed, they need to be transparent. Targeting is a concern, and while no system is perfect, country experience suggests that some workable solutions exist.