Market forces and competition can improve the production and delivery of infrastructure services. That is the consensus emerging from a reevaluation of the sector based on experience, technological change, and new insights into regulatory design.

This new consensus is displacing the long-held view that infrastructure services are best produced and delivered by monopolies. Because the unit costs of delivering an infrastructure service—a gallon of water, a kilowatt-hour of electricity, a local telephone call—typically decline as service output increases, provision by a single entity seemed to make economic sense. To limit the undesirable exercise of market power, government was expected to be the sole supplier or to closely regulate the private monopoly.

Technological change and, even more important, regulatory innovation are making competition possible in many forms. The economies from large-scale production and delivery, although still important in some infrastructure activities, have diminished, especially in telecommunications and power generation. Regulatory innovation has made possible the unbundling of activities—the separating of activities in which economies of scale are not important from those in which they are. Unbundling promotes competition by detaching activities that were earlier performed in monolithic organizations and opening them to various forms of competitive provision. Even when infrastructure service is provided most economically by a single supplier—making competition in the market inadvisable or even infeasible—competition from alternative suppliers for the right to supply the market can spur efficiency.

Market forces do not eliminate the need to regulate prices and profits to protect consumers. However, where extreme underprovision of services is common, as in many developing countries, concerns about a private monopolist restricting output to boost prices and profits may have less force than where networks are better developed. Thus, the regulatory apparatus needs to foster efficiency and investment both by eliminating outdated restrictions on the right to provide service and by assuring fair terms of network access to new entrants.

In the move from a government monopoly to a more competitive system, enforceable contracts are required to balance the interests of various parties in specific projects and to provide the stability needed for long-term investment. Also required are comprehensive, transparent, and nondiscriminatory rules of the game. Although these are desirable in the long run, the evidence shows that the move to private supply and competition does not have to wait for the rules to be embedded in a fully developed statutory regulatory system.

Regulation itself is imperfect because the “right” regulatory mechanisms are not always evident. It is also imperfect because effective implementation of economic regulation requires an information base and sophistication that are rarely (if ever) attainable. Regulators are therefore vulnerable to manipulation. Regulation can also have perverse, unintended consequences when competition from substitute goods and services is possible. A greater appreciation of regulatory failure has led to progress in the design of simple rules to which regulators can precommit and that produce predictable and consistent outcomes. Moreover, involvement of other interested parties, especially consumers, can make the regulatory process more effective.
Unbundling services for competition

Should one company provide all telephone services—local, long distance, cellular, data transmission—or should the elements of the telecommunications business be unbundled into separate enterprises? Is electric power provided most efficiently when generation, transmission, and distribution are coordinated within a single entity, or should the stages involved in delivering power be separated? Should a railway be a monolithic organization owning all facilities and offering a variety of passenger and business services, or should services be operated as separate lines of business, possibly under independent ownership?

Central to this discussion is the concept of a natural monopoly, which is said to exist when one provider can serve the market at a lower cost than two or more providers could. Such is the case when the costs of producing and delivering a service decline with increasing output (a condition often referred to as economies of scale). In infrastructure sectors, it is also common for providers to supply a number of services, some of which are natural monopolies and others of which are not. However, a natural monopoly in one service may allow the provider to gain an advantage in another service that can be competitively provided. This occurs when it is cheaper for a single provider to produce and deliver two or more services jointly than for separate entities to provide the services individually (and, when that happens, economies of scope are said to exist).

By isolating the natural monopoly segments of an industry, unbundling promotes new entry and competition in segments that are potentially competitive. Failure to unbundle can constrain an entire sector to monopoly provision even when numerous activities can be undertaken competitively. In the past, maintaining sectors in a bundled form has been justified on two counts. First, where economies of scope are significant, unbundling raises the costs of provision. However, the gains from economies of scope, where they do exist, need to be weighed against the benefits of cost-minimizing behavior under competitive pressures. Second, subsidy of one service by another has been extensively undertaken within enterprises offering multiple services and has been the main mechanism for subsidizing services to poor customers or those in remote areas. Unbundling, however, is desirable because it makes cross-subsidies between different lines of business more transparent, identifies more precisely the subsidies needed to deliver services to the poor, and improves management accountability. The trend is unmistakable: unbundling of infrastructure services is proceeding at a brisk pace.

Vertical unbundling

The electric power industry illustrates how regulatory and technological innovation interact. In 1978, the Public Utilities Regulatory Policy Act (PURPA) required electric utilities in the United States to purchase power from independent power producers. This requirement opened up the industry to more efficient generators, including those that produce power from waste heat in manufacturing operations (cogeneration). Combined-cycle gas turbines, using clean natural gas and requiring small investments, also became popular, although many independent power projects continue to use conventional technologies.

Such vertical unbundling—separating electricity generation from transmission and distribution—has since been effectively adopted in many developing countries, allowing new, substantial entry in generation. Countries that have operationally independent power producers include Argentina, Chile, Colombia, Guatemala, and the Philippines. Independent power projects are being constructed or considered in Côte d’Ivoire, India, the Lao People’s Democratic Republic, Pakistan, Sri Lanka, and Tanzania. (See Chapter 5 on the financing of independent power producers.) In addition, to facilitate competition in the distribution of electric power, transmission and distribution have been separated in several countries. The transmission agency handles the transport function, and generators and distributors contract directly for power supply. Transmission is likely to remain a natural monopoly. While the physical distribution network will also retain monopoly characteristics—it would not be economical to run more than one distribution line to a home or a business—alternative suppliers can and do compete for the right to supply over the single distribution line.

Similarly, in the natural gas industry, the wellhead and the pipeline and local distribution systems can be owned and operated by different entities. In Argentina, Gas del Estado was until recently an integrated monopoly in both the transportation and distribution of natural gas, acting as the sole gas trader. Today, ten distinct entities—two transport businesses and eight distribution corporations—provide these services, as well as gas treatment and storage. To demonopolize the natural gas industry in Hungary, the OKGT—a trust that operated the entire oil and gas sector—was split into six systems.
regional gas distributors and an enterprise owning the refineries, storage facilities, and transport pipelines. The liquid-propane gas operations that had been part of OKGT's operations were privatized separately.

A key part of many rail transport reforms is to separate track management from railway operations. For example, in 1988 two rail organizations were created in Sweden: Baverket is in charge of track investment and maintenance, while Statens Järnvägar operates the freight concession and passenger transport on trunklines. For its track services, Baverket receives a fixed charge per unit of rolling stock plus a variable charge reflecting the social marginal costs of operation (including those for pollution and accidents). Separation between track and operation is implicit in many reforms of the rail sector in developing countries, where specific services, such as passenger and freight, are being separated (see the following discussion on horizontal unbundling). To be successful, such reform requires that operators be allowed access on a fair basis to track outside their jurisdiction.

Horizontal unbundling

The second type of unbundling separates activities by markets—either geographically or by service categories. In Japan, the national railway was reorganized and split into six regional passenger operators and one freight operator that rents track time from the regional railways. Gains from restructuring have been enormous—freight volumes, which had been falling before the restructuring, have risen, while unit costs, which had been rising, have declined; the need for government subsidies has consequently fallen. Other countries are now emulating the Japanese model. Argentina split the monopoly Argentina Railways into five freight concessions and seven suburban concessions, with the efficiency gains reflected in a substantial reduction of the government operating subsidy. The Polish national railway is to be divided according to region served and type of service (Box 3.1).

Telecommunications lends itself to this kind of unbundling as well. The operation of rapidly growing radio-based cellular services is typically separated from the provision of traditional telephone services. In some cases, horizontal unbundling, or divestiture, into a number of producers allows direct competition; in other cases, as when divestiture leads to regional monopolies, it allows for better performance comparisons and therefore more efficient regulatory monitoring.

But in other segments of telecommunications the distinction between vertical and horizontal unbundling is not always sharp. Specialized providers sell information services using communication links owned by traditional network operators. In such cases vertical unbundling between the provision of networks and the supply of information services is needed to allow fair competition between horizontally separated service operators.

Practical approaches to unbundling

Constraints on unbundling are both technical and economic. Attempting to force activities that are closely interdependent into distinct boxes can impose high transaction costs as the coordination once achieved smoothly within a single firm becomes more difficult and less effective when handled between firms. And having separate, vertically linked monopolies, each charging a markup over costs, may result in higher charges than with a single, vertically integrated firm.

However, that does not mean that the incumbent monopolists—who will always argue that unbundling will increase costs—should go unchallenged. There may well be options for allowing a vertically unintegrated firm (for example, a power generator) to compete with a firm whose operations span the entire range of activities, although that would require a regulatory framework for ensuring interconnection. As long as competition occurs on a fair basis, the market outcome will indicate whether or not genuinely important economies of scope exist.

But even where the technology permits unbundling, the legacy of history and institutions often limits the possibilities. In Hungary a telecommunications law enacted in 1992 separated long-distance (including international) services from local telephone services, which are under the jurisdiction of municipal authorities. Under the law, private concessions for local services were to be granted on a competitive basis. But practical problems intervened. As in other countries, local calling rates are very low, attracting few investors to that part of the network. And investors in the long distance service faced the prospect of bargaining with group after group of local government officials on terms of interconnection to local networks. A compromise awarded a single franchise for long distance services and 60 percent of the local network. Competition for the rest of the local network was open to companies with demonstrable financial strength and sound business plans.
Box 3.1  Divided they stand: unbundling railway services

As infrastructure markets, technology, and operating practices have evolved, the need for single ownership has diminished—even in such traditionally monolithic operations as railways.

Argentina. In 1989, following years of bad service, heavy losses, and government subsidies as high as 1 percent of GDP (9 percent of the public sector budget), the Argentine railway began to transfer operational responsibility for many services to the private sector.

All services were transferred on a concession basis, most loss-making lines and services were dropped, and the railway's surplus assets were sold. There were five freight concessions, seven suburban concessions (including the Buenos Aires subway), and a remnant of intercity passenger service that was transferred to provincial governments. In Buenos Aires the new company established to take over Argentina Railways' suburban operations transferred the relevant lines to the new concessionaires and then regulated and coordinated all transport issues in the area. A metropolitan authority was also established.

In their first two years of operation, the new railways carried about the same traffic as before (a downward traffic trend has been reversed), with only 30 percent of the labor force. Freight rates are falling, service is improving, and the level of annual government subsidies has fallen from $800 million to $150 million. Some of the franchises will have to be reconstituted as demand for services evolves, and not all the commitments made in the franchise agreements will be honored because some requirements imposed as part of the franchise award are likely to be unsustainable.

Poland. Polish Railways (PKP) is restructuring its monolithic railroad system along its principal lines of business: commercial freight (primarily coal), intercity passenger, international passenger, and local and suburban passenger services. Eventually, PKP is expected to have an infrastructure department servicing institutionally separated lines of business, with suitable nondiscriminatory compensation for track use paid by each line of business (in line with European Union directives). Suburban passenger activities will be spun off to local agencies or covered under "contracts" with national or local governments to provide unremunerative public services in return for adequate compensation. PKP will transfer its liabilities (mainly surplus labor) and nonrail assets (mainly urban real estate) to a new authority. It will also seek to transfer its nonrailway activities to the private sector.

This reorganization will separate commercial services (unregulated and unsupported) and public services, such as urban and suburban passenger services, rural lines, and certain lines of strategic importance. The public services are to be planned and paid for by public authorities at appropriate levels.

The range of market alternatives

Once sectors have been unbundled, competition can be used to increase efficiency and new investment. In infrastructure services, the choice is not simply between unfettered supply in the marketplace and monopoly government supply. Four intermediate arrangements for market-based provision are possible, and often advisable. Three of them promote competition. The fourth, private monopoly, creates the basis for greater accountability through a harder budget constraint and more explicit regulation than government monopoly.

- **Competition from substitutes.** The threat of losing customers to suppliers of substitute products provides motivation and discipline.
- **Competition in infrastructure markets.** Multiple providers compete directly with each other, while government regulatory control ensures fair competition.
- **Competition for the market.** Governments create competitive conditions through leases or concessions, and firms compete not for individual consumers in the market but for the right to supply the entire market.
- **Privatization of monopolies.** Where monopolies persist, transfer to private ownership generally yields efficiency gains. Regulatory innovations that reward performance (such as price caps and other incentive mechanisms, discussed below) create the basis for continued productivity growth.

Moving an existing enterprise to more market-based provision can lead to one or more of these arrangements (Figure 3.1). Competition for the market is Option B, public ownership and private operation (see Chapter 1); the remaining three arrangements are variations on Option C, private ownership and operation.

**Competition from substitutes**

Competition from substitutes is frequently disregarded in discussions of natural monopolies in infrastructure. Failure to take it into account can result in perverse consequences. Energy and surface transport are the two most important areas where competition from substitutes brings pressure to bear on the monopoly supplier.

A natural gas provider may be a monopolist, but natural gas is only one possible fuel for the genera-
Figure 3.1 Unbundling activities increases the options for competition and private sector involvement.

Unbundling activities increases the options for competition and private sector involvement.

Competition

- Competitive activities
  - Competition in the market with entry of new firms
  - Competition from substitutes

Monopoly activities

- Monopoly facility
- Competition for the market via concession or lease

Integrated state-owned monopoly

- Integrated monopoly
- Right of access to monopoly facility and access price
- Prices, quality, and service obligation, via contract
- Prices, quality, and service obligation, via statute

Business practices, environment, safety, and antitrust

Initial status | Industry structure | Options for competition | Object of regulation
--- | --- | --- | ---

Unbundling
No unbundling

**tion of electricity. Oil and coal can be used as well, and competitive pressures from oil and coal producers can discipline natural gas suppliers. Germany views these competitive pressures as strong enough to justify deregulating the natural gas industry, even though some aspects of gas supply have strong economies of scale.**

Where railways are operated as a monopoly, shippers often have a choice between rail, road, and water transport. In the United States the 1887 Interstate Commerce Act regulated railroads, but to sustain such regulation without undermining the profitability of railroads soon required regulation of the otherwise competitive trucking services, limiting growth in that industry. In the 1970s and 1980s railroads and trucking were both deregulated, leading to rapid growth in productivity.

Hong Kong’s experience with urban transport further illustrates what can happen when services are regulated and substitutes are available. When a
government-owned subway system began operation, large buses became less profitable, and the rate of return that had formerly been guaranteed to bus companies by regulation became unviable. Efforts to maintain the rate of return by raising fares on large buses caused passengers to abandon bus transport, leading to taxi shortages, overuse of cars, and continuing congestion.

Thus, when substitutes are available, regulation can have especially perverse effects. To shore up returns in the regulated sector, regulators often extend their reach to sectors in which natural monopoly elements are weak. It is far better in these circumstances to allow the competition from substitutes to discipline the conduct of the alleged monopolist.

*Competition in Infrastructure markets*

Although infrastructure markets with numerous suppliers are rare, competition among a few rival providers can lower costs and prices. The theory of contestable markets says that even where economies of scale and scope favor a single provider, the existence of potential rival suppliers that can contest the market limits the risks of monopoly abuse. The implication is that, absent compelling arguments to the contrary, all new entrants should be allowed to provide services, with the market deciding how many providers can operate profitably. Potential competition is most effective where new entrants have limited sunk costs of market entry—that is, when entrants can recover their investments by selling their assets if they decide to pull out of the business. Technological change and easing of regulatory constraints are permitting greater contestability.

Much of the experience with direct competition in infrastructure is relatively new, but the results validate the benefits of competition. Systematic evidence of efficiency gains from greater competition comes mainly from the United States, which, after years of regulation, has introduced a number of major deregulatory initiatives over the past two decades. In virtually all sectors, greater competition has led to lower prices or better services for consumers—while efficiency gains and new technologies or business practices have led to sustained profitability (Box 3.2).

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**Box 3.2 Regulatory cycles in the United States**

With its long history of private infrastructure provision, the United States exemplifies the changes in regulatory goals and implementation and the ensuing cycles in regulatory policy. In the late nineteenth century and well into the early part of the twentieth century, much competition prevailed, especially in electric power and telecommunications.

An early instance of economic regulation—the Interstate Commerce Act of 1887—was concerned with monopoly power in railway operations. The bounds of economic regulation were extended gradually, but especially during the 1930s and the Great Depression, to virtually all infrastructure sectors and to other areas of public interest (for example, creating service obligations and information disclosure requirements).

Delivery of infrastructure thus came to be based on a particular social compact. The service provider was typically provided with exclusive rights to specific markets, and, in return, the government took on the public responsibility of ensuring that service obligations were fulfilled at "reasonable and just" prices. Inflationary pressures of the early 1970s caused regulators to intervene even more heavily in the operations of service providers. Health, safety, and environmental regulation also gained momentum around this time.

Public dissatisfaction with regulatory outcomes resulted in a move to reduce economic regulation in many sectors in the late 1970s and 1980s. According to one estimate, 17 percent of the U.S. gross national product (GNP) in 1977 was produced by fully regulated industries; by 1988, this proportion had declined to 6.6 percent as large parts of the transportation, communications, energy, and financial sectors were freed of economic regulation. Greater operational freedom and competitive threats stimulated service providers to adopt new marketing, technological, and organizational practices. The evidence from the United States points to substantial economic gains from deregulation, as shown in Box 3.2.

**Box table 3.2 Estimated gains from competition through deregulation of infrastructure sectors in the United States**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Extent of deregulation</th>
<th>Estimated annual gains from deregulation (billion of 1990 U.S. dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airlines</td>
<td>Complete</td>
<td>13.7–19.7</td>
</tr>
<tr>
<td>Trucking</td>
<td>Substantial</td>
<td>10.6</td>
</tr>
<tr>
<td>Railroads</td>
<td>Partial</td>
<td>10.4–12.9</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>Substantial</td>
<td>0.7–1.6</td>
</tr>
<tr>
<td>Natural gas</td>
<td>Partial</td>
<td>Substantial gains to consumers</td>
</tr>
</tbody>
</table>

Note: Gains from competition cover net gains to producers (in terms of profits), consumers (prices and service quality), and industry employees (wages and employment).

Helped in part by sectoral unbundling, competition in infrastructure sectors has increased in the past decade. The possibilities and conditions for effective competition are illustrated below for urban transport, telecommunications, and power.

**Urban Bus Transport.** Competition has stimulated both innovation and cost reduction in urban public transport. In Sri Lanka, for example, deregulation permitted the profitable operation of smaller vehicles by small-scale entrepreneurs, substantially improving service availability. Competitively tendered franchises or the granting of overlapping franchises to competing associations of operators is being practiced successfully in several major cities in Latin America and Africa.

The challenge is to combine competition, for its cost-reducing impulse, with residual controls to ensure the quality of service and maintain operating discipline. Fragmentation of ownership has in some instances led to difficulties with route coordination and, at times, to excessive congestion and unsafe practices. In some countries, at least part of the organizing or regulatory function has been taken over by an operators' association. Experience with such associations shows that, while some aspects of regulation can be successfully delegated to the private sector, provisions are needed to ensure that regulatory powers are not used to prevent new entry. Moreover, public scrutiny and regulation on such matters as passenger safety, service obligations, and pollution are essential in this competitive industry.

**Telecommunications.** A major competitive element of special relevance to developing countries is the advent of radio-based cellular telephone networks. These networks have relatively low capital costs, making their market readily contestable. Radio-based telephones compete with existing local networks—and in many countries, with one another. By 1993 Sri Lanka had licensed four cellular operators, leading to prices that are among the lowest in the world: connection costs of $100 and operating costs of 16 cents a minute. Compare those costs with the more typical costs in El Salvador—$1,000 and 35 cents a minute—which has a single operator. However, regulation is important to sustain competition. For example, in Mexico regulatory action was necessary to ensure fair interconnection by cellular operators into fixed networks.

Long distance services will be the next arena of competition in developing countries. Korea already allows competition in international services. Other countries are committed to permitting new entry in domestic long distance services (Chile and Mexico by 1996 and Hong Kong by 1997).

Although transitional issues arise when competition is being introduced, pragmatic solutions can be found. In the past, long distance telephone calls were priced high enough to allow monopoly suppliers of telecommunications services to earn reasonable profits while keeping down the price of access to the network and of local calls. With unbundling and increased competition, this structure of prices becomes unviable, and rate rebalancing is required.

But during the transition the incumbent operator is saddled with the old rate structure and service obligations. If new entrants are unencumbered by these obligations, they will flock to sectors with artificially high profitability, a "cream skimming" that can be economically inefficient.

Mexico and the Philippines have taken two different approaches to resolving such conflicts. In Mexico, Teléfonos de México (Telémex) was awarded a six-year monopoly under a concession agreement in 1990. To begin to bring prices in line with costs, rates for local services were raised three or four times over original levels. Telémex was required to further rebalance rates during the period of the concession; long distance rates have fallen, while rates for local services have risen steadily. The Philippines chose instead to encourage new entry immediately. New operators are prevented from serving only the lucrative international services market and are required to provide 300 local exchange lines for each line on their international gateway.

The opposite problem arises when the incumbent operator acts to limit competition, placing the aspiring entrant at a disadvantage. This is especially the case when the entrant's use of the incumbent's established network is restricted, reducing the entrant's reach until it has invested in possibly duplicative network facilities. Such a bottleneck effect in facilities owned by the incumbent is also an issue in other sectors when they are vertically unbundled—access to the railtrack is required by all service operators, and competitive suppliers need the right to transmit and distribute electricity over monopoly facilities. Two distinct issues need to be resolved for efficient interconnection of entrants: the physical right of access and, at least as important, the price of access. No established norms exist for interconnection pricing, although a variety of approaches are being tried. Most favorable to the incumbent is an arrangement whereby the price of interconnection between a point on the network and a customer is the retail price charged by the incumbent less direct costs of operating that link. This
maintains the full profits of the incumbent and is also socially optimal if the network is efficiently priced and operated. In New Zealand such a rule has led to new entry, although the rule has been challenged by the new entrant as anticompetitive. Other approaches seek to encourage entry by limiting interconnection charges to full costs incurred by the incumbent (excluding profits accruing on the link). Such charges (e.g., those in Australia) include an element for fixed costs of the network as well as costs incurred due to universal service obligations.

The interconnection issue is acquiring increasing importance in developing countries, and especially in Eastern Europe where multiple operators have been licensed. In Poland, for example, a 1990 telecommunications law allowed independent operators the right to develop networks in regions not served by the government-owned telecommunications provider Telekomunikacja (TP SA). Three large independent operators have been licensed to provide local services, in addition to almost sixty other small providers. Interconnection between TP SA and the independent operators involves providing access to each company’s network and sharing revenues from this access. To date there is no one standard interconnection agreement between TP SA and the independents. The telecommunication law states that each independent company must negotiate its own separate agreement with TP SA. This lack of standard agreement has prevented the majority of the independents from further pursuing the development of their local network. Without interconnection, outside investors are hesitant to commit any resources until a strong and fair contract is established. Alternative models are being examined to provide interconnection on fair terms. Developing countries seeking to expand networks and new services may wish to consider a pricing system favorable to entry, effective antimonopoly legislation, and procedures for implementing both.

POWER. Electricity generation is another area in which unbundling can introduce competition. Using similar approaches in electric power generation, Argentina, Chile, Norway, and the United Kingdom have created electricity pools that simulate competitive market conditions. Generators bid for the right to supply bulk electricity in time slots (as short as half an hour in the United Kingdom) by specifying a supply schedule of price and quantity. The power pool manager aggregates these offers and arrives at a systemwide price based on estimates of demand for the particular slot. All offers below this “pool price” are then accepted. Not all electricity is supplied in this form. Because pool prices tend to be volatile and unpredictable, both suppliers and buyers (mainly regional distributors) tend to enter into long-term contracts as well, relying on the spot market for a relatively small share of transactions. Having a choice of suppliers when contracts are renegotiated maintains competitive discipline.

If generating capacity is concentrated in one or two firms, they can try to influence the price at which electricity is purchased from them. Antitrust laws can be used to prevent monopolistic or collusive behavior. Effective competition, however, may require splitting large generators into new companies.

Competition in electric power is being extended to retail distribution in the United Kingdom, starting with large consumers. Users whose peak demand is 100 kilowatts of power or more are not restricted to their local distributor, but may contract with other distributors or directly with generators. About 45,000 businesses are eligible to shop for electricity in this way. All customers will be able to do so by 1998.

In many developing countries, one legacy of poor public sector performance is the large underused generation capacity of many large manufacturing firms. The market for electricity can be made more contestable by allowing large manufacturers with their own generating capacity to sell electricity to the public grid, creating competitive discipline and fostering cost reduction. A systematic study shows that, if firms in Nigeria were allowed to sell power from their underused generating capacity, the unit costs of electricity produced by these firms would fall considerably. Informal evidence suggests that the same is likely to be the case in many developing countries.

*Competition for the market*

Where direct competition is not possible, efficiency can be increased by means of competition managed through contractual arrangements, ranging from simple contracts for specific services to long-term concessions that require operation, maintenance, and facility expansion. Although there is only a single supplier of the service at any point in time, competition occurs before the contract is signed and, in principle, when the contract (or concession) expires and is due for renewal. Thus, there is competition for the market even though there is no direct competition in the market during the term of the concession. The commitments entered into through the contract can then, within limits, provide an alterna-
Leases and concessions are increasingly common in infrastructure. Such arrangements are in full operation or under implementation in thirty-seven countries, including eighteen low-income countries (Figure 3.2). In transport, concessions are primarily for large, fixed facilities such as ports and toll roads. Concessions are common in the water sector. Because economies of scale remain important in water supply, most countries have used mechanisms that create competition for the market (Table 3.1). Even among these agreements, there is a wide variety of arrangements.

The effectiveness of a franchise arrangement depends upon a number of factors. The incentives for franchise holders to operate efficiently depend on the criteria for awarding the franchise, which in turn vary with sectoral characteristics and government objectives (Box 3.3). The contractual provision of services is most likely to succeed when the contract increases transparency and accountability by specifying in detail the terms of operation. How the contract is awarded is also important to its success, as is demonstrated by the successful award of a concession in Buenos Aires for water and sewerage, in contrast to a proposed concession in Caracas that failed to attract responsive bids. Buenos Aires benefited from a number of advantages that Caracas did not share, including stronger support from government authorities, better technical and financial preparation, more attractive initial tariffs, and lower economic risks to investors.

In practice, the original franchisee is rarely dislodged. In Hong Kong, which uses franchising methods extensively for infrastructure provision, only one bus company has lost its franchise in recent decades. In France, franchises tend to extend into perpetuity. The incumbent enjoys significant advantages in rebidding, which must be factored into efforts to make the market contestable.

Leases. Under a lease, the government supplies the major investments for production facilities, and a private contractor then pays for the right to use the public facilities in providing service. A lease generally awards the contractor exclusive rights to the stream of revenues for a period of six to ten years. The contractor bears most or all of the commercial risks, but not the financial risks associated with large investments. Such arrangements are most practicable in activities where investments come in infrequent bursts, so that responsibility for operations can be separated from responsibility for investment. In France leasing has been used for decades in urban water supply and sewerage, and the model was recently adopted in Guinea (Box 3.4).

Leases allow a mix of ownership. In “landlord ports,” the public authority owns the land and infrastructure facilities, while a private firm owns and operates the superstructure. In 1986 Malaysia transferred operation of the Port Kelang container terminals and berths to two consortia under leases. The private operators, freed of many of the constraints facing the public operator, improved productivity substantially. Similar successes in Hong Kong, Japan, and Malaysia began a wave of such operations in Asia—leasing is now under way in China, the Philippines, and Thailand and is under consideration in Korea, Pakistan, and Viet Nam. At times, only parts of the port—such as individual berths or container terminals—are leased, leaving arrangements for other parts of the port unaffected.

Concessions. Concessions incorporate all the features of a lease but give the contractor the added responsibility of investments—such as for specified extensions and expansions of capacity or for the replacement of fixed assets. Concession arrangements exist for railways, telecommunications, urban trans-
**Table 3.1 Contractual arrangements for private water supply**

<table>
<thead>
<tr>
<th>Contract</th>
<th>Applications</th>
<th>Incentives</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>Meter reading, billing and collection, and maintenance of private connections</td>
<td>Permits competition among multiple providers, each with short and specific contracts</td>
<td>A public water company, EMOS, in Santiago, Chile, encouraged employees to leave the company in 1977 and compete for service contracts for tasks previously performed internally—resulting in large productivity gains</td>
</tr>
<tr>
<td>Management</td>
<td>Operation and maintenance of the water supply system or major subsystem</td>
<td>Contract renewed every one to three years, and remuneration based on physical parameters, such as volume of water produced and improvement in collection rates</td>
<td>Electricity and Water Company of Guinea-Bissau (EAGB); contract awarded to Electricité de France, with about 75 percent of the remuneration guaranteed and a possible additional 25 percent based on performance</td>
</tr>
<tr>
<td>Lease</td>
<td>Extended operational contract</td>
<td>Contract bidding, with contract duration of about ten years; provider assumes operational risk</td>
<td>Water supply in Guinea owned by state enterprise (SONEG) and leased to operating company (SEEG) from 1989 for ten years; achieved large increases in bill collection</td>
</tr>
<tr>
<td>Concession</td>
<td>All features of the lease contract, plus financing of some fixed assets</td>
<td>Contract bidding, with contract period up to thirty years; provider assumes operational and investment risk</td>
<td>Côte d'Ivoire's urban water supply concession went to SODECI, a consortium of Ivorian and French companies; SODECI receives no operating subsidies and all investments are self-financed</td>
</tr>
</tbody>
</table>

*Source: Triche 1993.*

Port systems, and water supply and treatment. SODECI, the private water company in Côte d'Ivoire, has a well-established and successful concession contract (Box 3.5).

Argentina has recently had a flurry of concession arrangements, some of which were made possible by prior sectoral unbundling. In addition to the rail and water concessions described above, the operation of the Buenos Aires subway system was offered under a concession and awarded on the basis of the lowest subsidy demanded to operate and invest in the system. Highway maintenance has also been opened to concessions, and it is funded by revenues from tolls initiated on many highways in 1992.

A possible problem with leasing and concession arrangements is that they may not provide suffi-
icient incentives to maintain and expand the facilities in their charge. A private supplier that does not own the production facilities or is uncertain of contract renewal may depreciate assets rapidly for short-run gain and skimp on routine maintenance. Most of these problems can be avoided. Explicit maintenance requirements can be written into contracts, and compliance can be monitored. Private

Box 3.3 Tailoring concessions to sectors and government objectives

The method of awarding concessions or the right to operate is extremely important in determining the incentives to private sponsors. When the returns to the sponsor are unrelated, or only weakly related, to the performance of the operation, the benefits of private sponsorship are forgone.

The goal is to ensure an attractive financial return for investors while safeguarding public interests. One key element of negotiation is the price the investor pays for the right to operate the service—or the extent of capital or operating subsidy that the government may provide. Other negotiating points are the price that will be charged for services, the concession period, and the rights and obligations at the end of the contract period.

This is a complex brew, with each element depending on another. There is always a danger that the terms of a concession will allow investors to secure too high a rate of return, or will fail to provide sufficient incentives for proper maintenance of the assets and provision of services.

To simplify matters, certain norms and conventions have been adopted. The length of concession periods is typically related to the life of the underlying asset. For example, thirty-year concessions are common for toll roads, and fifteen years is common for power generation projects (although for hydroelectric projects, thirty years is more likely). Contracts for solid-waste disposal are in the range of four years, a period in which garbage trucks depreciate considerably. But because trucks can be sold more easily than assets underlying roads and power plants, the contract period may be as short as several months.

An interesting variation is used in telecommunications, although it could be applicable also for independent power projects. The focus is not on the length of the concession period, which can be indefinite, but on the period of the exclusive concession. In Mexico and Argentina, the newly privatized companies have been granted exclusive licenses for six to ten years, during which they have certain investment obligations. After the exclusive period, the government is free to allow new entrants.

The method of charging for the right to provide service can take different forms. In theory, it is most efficient to award a concession to the bidder who offers the largest lump sum up front. Having paid a large initial fee, the operator will be motivated to operate the facility in the most efficient manner. For large projects, however, where project costs and revenues are uncertain, revenue-sharing or profit-sharing arrangements can spread the risk (as in the Guangzhou-Shenzen highway in China). Where the government sees itself mainly as a guardian of consumer interest, it may choose to receive no fee but to award the contract on the basis of the lowest price charged to the consumer (which can later create problems with quality of service and requires specification of minimum service standards).

Box 3.4 Success of a lease contract—Guinea's water supply

When the Republic of Guinea's water supply sector was restructured in 1989, it was one of the least developed in West Africa. At that time a new autonomous water authority, SONEG, took over ownership of the urban water supply infrastructure and assumed responsibility for sector planning and investment. SEEG, 49 percent government-owned and 51 percent owned by a foreign consortium, was created to operate and maintain the system's facilities.

Under the ten-year lease contract signed with SONEG, SEEG operates and maintains the system at its own commercial risk. Its remuneration is based on user charges actually collected and fees for new connections. SEEG also benefits from improvements it achieves in the collection ratio, from reduced operating costs, and from reductions in unaccounted-for water. Since SONEG has ultimate responsibility for capital financing, it has strong incentives to seek adequate tariffs and to make prudent investments based on realistic demand forecasts.

To make sure the necessary tariff increases would be affordable, the Guinean lease contract included an innovative cost-sharing arrangement. Under the agreement negotiated by the government, the two sector entities, and the external financier (the World Bank), the consumer tariff was to be adjusted gradually from the first to the tenth year of the contract. During this period the World Bank agreed to assume a declining share of the debt service. By the tenth year tariffs were expected to cover the full cost of water. Tariff increases have to date exceeded the planned schedule, rising from $0.12 per cubic meter in 1989 to about $0.75 in 1993. Despite higher tariffs, the collection ratio for private customers has increased dramatically—from less than 20 percent to more than 75 percent in 1993—and technical efficiency and service coverage have improved.
suppliers can be held responsible for documented deterioration of the capital stock (although this can be problematic because some deterioration may be due to poor construction). Eligibility for renewal can be made contingent on the observed state of the capital stock.

*Privatization of monopolies*

Another way to introduce market principles into infrastructure is through privatization, which transfers assets out of the public sector. Privatizations are spreading rapidly in developing countries—the value of transactions reached more than $6 billion in both 1991 and 1992 (Table 3.2). Privatization has gone the furthest in telecommunications. Argentina, Chile, Hungary, Jamaica, Malaysia, Mexico, and Venezuela have all undertaken substantial privatizations of telecommunications services. The power sector, too, has recently seen several large privatizations.

Although privatization of industrial enterprises has a relatively long history—providing evidence of its positive effect on performance—privatizations in infrastructure are comparatively new. Privatized public utilities typically undergo major corporate restructuring, and the immediate gains from privatization have been impressive. A study of total welfare gains (net monetary gains to producers, consumers, and employees) found that in three cases involving telecommunications, the gains (as a proportion of sales) ranged from 12 percent in the United Kingdom to 155 percent in Chile (Figure 3.3). Two years after the privatization in Venezuela, the total network had expanded by 50 percent and virtually all targets for service improvements had been met (Box 3.6). Disentangling the effects of privatization and of increased competition is not yet possible in many sectors, however, nor have sustained long-term gains in productivity growth yet been demonstrated.

Utility privatizations are often accompanied by a requirement to undertake certain minimum investments. These so-called roll-out obligations are exemplified by the service conditions imposed on Telmex, the privatized Mexican telecommunications provider. Network development targets built into the concession require Telmex to achieve a line growth rate of at least 12 percent a year—twice the growth rate achieved during the late 1980s. Tax incentives reinforce Telmex’s contractual investment

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**Box 3.5 Côte d’Ivoire’s experience with a concession for water supply**

An excellent example of a private company providing public services in West Africa is Côte d’Ivoire’s SODECI. SODECI is an Ivorian company whose capital (about $15 million) is owned 52 percent by local interests; 46 percent by Saur, the French water distributor; and 2 percent by a government investment fund. It started operations with the Abidjan water supply system thirty years ago and now manages more than 300 piped water supply systems across the national territory. Until recently, SODECI operated under concession contract for water production in Abidjan, the capital city. It was under lease contract for water production and distribution in all other urban centers; for water distribution in Abidjan; and for management of the Abidjan sewerage system.

To deal with financial troubles caused by government policies in the 1980s regarding sectoral investment and tariffs, the urban water sector was reorganized. SODECI’s contract for urban water supply services was transformed into a concession contract for the entire country, with SODECI taking responsibility for both operations and investments. Today the company has 300,000 individual connections that serve some 70 percent of Côte d’Ivoire’s 4.5 million urban residents—2 million in Abidjan and the rest in settlements of 5,000 to 400,000 people. Under a policy to provide low-income households with direct access to water, 75 percent of SODECI’s domestic connections have been provided with no direct connection charge. The number of connections is growing between 5 and 6 percent a year.

Since the early 1970s, full cost recovery has been the rule, and revenues from water sales have fully covered capital and operation and maintenance costs. During the past ten years, unaccounted-for water has never exceeded 15 percent, and collection from private consumers has never fallen below 98 percent (collection from government agencies is more problematic). Moreover, despite the dispersion of operations, there are only four staff per thousand connections, reflecting best-practice standards. The company has also succeeded in reducing expatriate staff while expanding operations.

SODECI retains part of the rates collected to cover its operating costs, depreciate its assets, extend and rehabilitate distribution networks, and pay dividends to shareholders. It also pays the government a rental fee to service the debt attached to earlier projects financed by the government.

SODECI provides service close to the standards of industrial countries. Yet the cost to consumers is no higher than in neighboring countries in similar economic conditions or in members of the CFA franc zone, where tariffs rarely cover capital and operation and maintenance costs, and service lags behind. Private Ivorian interests now own a majority of SODECI’s shares. Its bonds are one of the main items traded on Abidjan’s financial market, and it has distributed dividends to its shareholders. The company has also paid taxes since its inception.
Table 3.2 Value of infrastructure privatizations in developing countries, 1988–92
(millions of U.S. dollars)

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<tr>
<td>Telecommunications</td>
<td>325</td>
<td>212</td>
<td>4,036</td>
<td>5,743</td>
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<td>Power generation</td>
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<td>2,100</td>
<td>20</td>
<td>248</td>
<td>1,689</td>
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<td>Power distribution</td>
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<td>0</td>
<td>98</td>
<td>1,037</td>
<td>1,135</td>
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<td>Gas distribution</td>
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<td>0</td>
<td>0</td>
<td>1,906</td>
<td>1,906</td>
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<tr>
<td>Railroads</td>
<td>0</td>
<td>0</td>
<td>110</td>
<td>217</td>
<td>327</td>
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<tr>
<td>Road infrastructure</td>
<td>0</td>
<td>0</td>
<td>250</td>
<td>0</td>
<td>250</td>
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<td>0</td>
<td>0</td>
<td>175</td>
<td>175</td>
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<td>Total</td>
<td>431</td>
<td>2,312</td>
<td>4,307</td>
<td>6,200</td>
<td>6,535</td>
<td>19,785</td>
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Closely related privatizations:

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<tr>
<td>Airlines</td>
<td>367</td>
<td>42</td>
<td>775</td>
<td>168</td>
<td>1,461</td>
<td>2,813</td>
<td>14</td>
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<tr>
<td>Shipping</td>
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<td>0</td>
<td>135</td>
<td>1</td>
<td>136</td>
<td>2</td>
<td></td>
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<td>Road transport</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>12</td>
<td>13</td>
<td>3</td>
<td></td>
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<tr>
<td>Total developing</td>
<td>2,587</td>
<td>5,188</td>
<td>8,618</td>
<td>22,049</td>
<td>23,187</td>
<td>61,629</td>
<td>25</td>
</tr>
</tbody>
</table>

Note: Countries undertaking infrastructure privatizations:
- 1988: power—Mexico; telecom—Belize; Jamaica, Turkey; airlines—Argentina, Mexico.
- 1989: power—Korea; telecom—Chile; Jamaica; airlines—Chile.
- 1990: power—Malaysia, Turkey; telecom—Argentina, Belize, Chile, Jamaica, Malaysia, Mexico, Poland; roads—Argentina; airlines—Argentina, Brazil, Mexico, Pakistan.
- 1991: power generation—Chile, Hungary; power distribution—Philippines; railroads—Argentina; telecom—Argentina, Barbados, Belize, Hungary, Jamaica, Mexico, Peru, Philippines, Venezuela; airlines—Honduras, Hungary, Panama, Turkey, Venezuela; shipping—Malaysia; road transport—Togo.
- 1992: power generation—Argentina, Belize, Malaysia, Poland; power distribution—Argentina, Philippines; gas distribution—Argentina, Turkey; telecom—Argentina, Estonia, Malaysia, Turkey; railroads—Argentina; ports—Colombia, Pakistan; water—Argentina, Malaysia; airlines—Czechoslovakia, Hungary, Malaysia, Mexico, Panama, Philippines, Thailand; shipping—Sri Lanka; road transport—China, Peru.

Source: Sader 1993.

Obligations. In addition to line growth requirements, the concession improves requirements in service quality. Telmex has more than met the targets and has announced plans to invest $13 billion over five years to upgrade equipment, add access lines, and improve service.

Underpinning these requirements is the concern that a monopoly service provider—such as Telmex—may restrict output below socially desirable levels. While this may be a legitimate concern in the longer term, it sits uneasily with the current situation in many, if not most, developing countries. Levels of service provision are now so low that even an unfettered monopolist would face strong incentives to expand—and to do so at lower cost than the public sector providers of the past. Roll-out requirements may consequently be unnecessary and, when used to secure the provision of services on uneconomic terms to particular areas or consumers, can perpetuate pricing distortions.

Paths to market provision

The move from government monopoly to competitive market provision has taken many routes, but, whatever the path, success requires a sustained commitment to private entry. The transitional phase can be effectively managed through enforceable contracts that create incentives for the entrepreneur to be efficient while also embodying the public interest.

A statutory regulatory system that provides for clear and open enforcement of the terms of the contracts is also required, although its absence has not held up private entry. The design of such regulation may well benefit from contractual experience with early entrants. Effective statutory regulation requires predictable and nondiscriminatory rules and the creation of consumer constituencies.

Transitions in market structures

Should the move to a market-based system occur in a single step, or can it be achieved more gradually? There are no simple answers. What is important is that the shift to market provision be credible. Without that, private entrepreneurs are not likely to take on new investments. Commitments from governments are most credible when all the enabling measures needed for private entry and
market provision are adopted within a short span of time as part of a consistently designed program. Where institutional legacies—concerns about labor redundancy, for example—prevent immediate privatization, opening the sector up to substantial new entry may be a strong sign of government commitment to sector reform.

One recommended sequencing strategy is to start with the design of statutory regulation that sets the rules of the game. This is to be followed by the determination of the appropriate industry structure (the degree of unbundling, extent of new entry, and split of existing providers to prevent economic dominance) and privatization. Chile comes closest to having implemented this sequence over the period of a decade, although industry structure has continued to evolve after privatization. Other countries have followed pragmatic strategies dictated by their circumstances, with impressive results. Three examples illustrate transitional options and issues.

ARGENTINA. Argentina has adopted the most far-reaching privatization program, designed to create competitive conditions in the economy. All major infrastructure providers were privatized between 1989 and 1993, and activities were unbundled to foster competition. In the electric power sector, generation, transmission, and distribution were separated; two telecommunications franchises were awarded to serve the north and the south; and railways were separated along different lines of business.

Although privatization has occurred rapidly, the capacity for regulatory oversight has lagged (as it has in most developing countries other than Chile, where sophisticated regulatory capabilities were put in place prior to privatization). The absence of regulatory oversight has not been an impediment so far; however, where market forces do not provide adequate discipline, efficient functioning will require regulation. Antitrust regulations will need particular attention in view of the heavy concentration of ownership. The Chilean experience, with one private firm owning 65 percent of generating capacity, shows that a dominant provider can influence market outcomes. Also in Chile, concerns have been expressed that the large installed base of the local telephone company may prevent fair competition when the company begins to provide long-distance services. And everywhere, market provision will require greater information disclosure and public feedback.

PHILIPPINES. In the Philippine power sector, private provision was based entirely on the entry of new generators. Opening generation to new providers required the elimination of the monopoly enjoyed by the National Power Corporation, a government-owned utility that has not been privatized.

These reforms came in response to an almost crippling power shortage. The urgency was so great that new entry had to be based on contractual agreements between the government and private generators, since reform of the Electricity Regulation Board would have taken too long. By August 1993, seven new projects with a combined capacity of 800 megawatts had been completed, and five additional generators were placed under private contracts for rehabilitation and operation. Fifteen more projects (2,000 megawatts of capacity) are under negotiation.
Box 3.6  Telecom privatization: the case of Venezuela

When Venezuela privatized its state-owned telephone company (CANTV) in December 1991, it had 1.6 million lines in service (8.2 lines per 100 people as compared with 35 lines per 100 people in Korea. An eight-year wait for a new telephone was common, and completion rates for international calls were less than 20 percent. The government sought to expand and improve basic service rapidly by turning the company over to a private operator with first-class international experience. Although it recognized the need to increase local rates substantially, the government was concerned with the potential political fallout from “rate shock.” Consequently, it decided to phase the rate rebalancing over nine years. During this period the new operator was granted an exclusive franchise for local, long distance, and international service. The profits from international service would be used to cross-subsidize local service and finance the desired network expansion. The concession contract included annual obligations to expand and improve basic service (including the installation of 3.6 million additional lines over nine years) and a cap on the increase in prices for basic telephone services. All other services were open to competition—including cellular service, private lines, information services, and equipment. This model resembled telecom privatizations in Mexico and Argentina, where the privatized operators were granted a limited monopoly on basic service (six years in Mexico; seven years extendable to ten in Argentina).

In Venezuela the process culminated with the successful public tender sale of a 40 percent share (but with majority voting control) to an international operating consortium for $1.9 billion. Pending passage of a new telecom law, the government enacted a series of decrees that established the regulatory agency, CONATEL, and defined the regulations for the various types of service. Until the new law is passed, rate increases must be ratified by the government.

In the two years following privatization, CANTV invested more than $1.1 billion and installed 850,000 new and replacement lines, far exceeding its obligations under the concession contract. Virtually all service improvement targets were met.

Several lessons have emerged from the Venezuelan experience. Even without a fully defined legislative framework, telecom privatization can provide immediate benefits from increased investment. Although some rebalancing of tariffs has occurred, sustained tariff increases will be needed. With rapidly changing technology, monopoly rights granted to maintain cross-subsidies and to promote service expansion will prove increasingly difficult to define and enforce.

During this process, new laws and administrative procedures have also been put in place (Box 3.7).

Although regulation through individual contracts has attracted new investment to the power sector, further development will require sectoral rules to ensure fair competition. As in most developing countries, new generating capacity has been developed without well-agreed principles on interconnection and dispatch among providers. This absence has not been a problem so far, partly because private supply was filling large demand gaps. As the gaps close, however, the various suppliers will come closer to being competing sources of power, and the regulatory authority will have to define clear rules for determining whose power is bought and on what terms.

Malaysia. Malaysia’s approach puts it somewhere between that of Argentina and the Philippines. Utilities have been gradually privatized, and new entry has been allowed in electric power and water. Statutory regulatory efforts have lagged, and discipline on operations is imposed through contractual agreements. The government also has maintained direct regulatory supervision of large utilities through continued shareholding or through “golden shares” that give the government veto rights, especially on matters relating to the social obligation of the utilities (Box 3.8).

Dealing with regulatory imperfections

Regulation must negotiate many potential pitfalls: as it controls the exercise of monopoly power, it must also ensure service quality, safety, environmental protection, service obligations, and the rights to network access (Figure 3.1). The weight of each of these objectives varies with industry structure, which evolves over time. Flexibility must therefore be balanced with commitment to fixed rules. Too much flexibility lets well-organized interest groups gain control of the regulatory process, to their own benefit. Too rigid a regulatory structure limits the ability to correct mistakes and adapt to change. It can also stifle initiative. Regulation sometimes leads to outcomes worse than those that imperfect markets could achieve.

Experience argues for keeping regulation to a minimum. Three considerations influence the regulatory task that accompanies the introduction of private sector involvement:

66
Providing sufficient resources, autonomy, and credibility for the regulator

Where price regulation is necessary, choosing instruments that encourage cost efficiency in the regulated entity

Creating constituencies in the regulatory process.

REGULATORY RESOURCES, AUTONOMY, AND CREDIBILITY. Regulation requires detailed knowledge and continual monitoring of the activity concerned. The regulatory menu includes problem identification, fact finding, rulemaking, and enforcement. Regulators need to be able to shift course in order to anticipate or respond to changing conditions in the industry. They also need operational autonomy within a broad policy mandate to ensure their effectiveness. Because doing all of this well requires a detailed working knowledge of the industry, there is a strong case for regulatory bodies to be specialized and autonomous public agencies, rather than general bureaucracies. But because sectorally specialized agencies are more susceptible to capture by the industry—and so are more likely to perpetuate regulation that favors incumbents—the regulatory agency must be monitored as well.

Much of the experience with statutory regulation derives from North America, where the private (although often monopoly) provision of infrastructure services has been the norm. The United States, relying on federal and state commissions, has developed a significant capacity for autonomous regulation. Although the process is remarkably open, it is also characterized by adversarial relationships and litigation. Europe and Japan have had less experience with explicit regulation, since they rely on public monopolies, combined with regulatory and operational responsibilities. Even when regulatory instruments such as price controls, technical standards, and entry licensing have been used, they have been implemented by related ministries or interministerial committees rather than by specific regulatory agencies. The United Kingdom has recently moved toward privatization and independent regulation, and similar reforms are taking place elsewhere in Europe. Developing countries have virtually no experience with regulation of private providers because their infrastructure enterprises have, in the main, been publicly owned and operated. An exception is Hong Kong, which is well known for its encouragement of private initiative but which has a regulatory system that protects consumer interests.

A problem for developing countries is assembling experienced professionals to staff a regulatory agency. Regulators have limited resources and are

Box 3.7 The evolution of private power in the Philippines

The Philippines' evolutionary approach to attracting private entrepreneurs in power generation is instructive. In July 1987 private power generation became a deliberate element of government policy and effectively signaled the end of the generating monopoly of the state-owned National Power Corporation. Although the first project, Hopewell Navotas 1, was successfully negotiated and commenced operation in 1991, early dealings with other private proposals were generally not fruitful. A proposal for a 220-megawatt cogeneration plant did not proceed beyond the negotiation stage in 1989, in part because of inadequacies and inconsistencies in administering regulations. The lessons from the failed effort helped ongoing efforts to improve regulatory and clearance procedures.

After 1989, Philippine agencies associated with private power began to work in a more coordinated manner. There was greater participation from the National Economic Development Authority (which had played a key role in initiating the private power program) and more ranking of priorities through the Investment Coordinating Committee. A major improvement in the framework for reviewing and clearing proposals was the 1990 build-operate-transfer law and its accompanying implementing rules and regulations—the law created a clearer legal basis for allowing entry by private capital, though still requiring transfer of ownership back to the government at the end of the concession period.

The Philippines is also seeking to streamline the private power solicitation process. Under present arrangements, the effectiveness of project contracts depends on several conditions that must be met after the contracts are signed. Delays or failures to meet certain conditions can jeopardize a project. The National Power Corporation is seeking to establish model contracts, preapproved by concerned government agencies, to facilitate private participation. This arrangement is expected to enable investors to proceed immediately from signing the contract to finalizing the financing plan.

The urgency in creating new capacity in the Philippines led to expensive power generation. Early projects used "peak-load" plants that can be installed rapidly but operate at very high cost and are designed to serve only for the few hours in the day when demand is very high. Subsequent projects, prepared under less time pressure, have addressed this concern. At the same time, experience has allowed project size to grow.
often unable to attract qualified people. Even in Argentina, which has a pool of well-qualified people, civil service salary restrictions and tight budgets have led to weak regulatory agencies (Box 3.9).

Allowing a regulatory agency autonomy while maintaining its accountability requires a delicate balance. If regulators are easily replaced, directly elected at frequent intervals, or easily influenced by special interest groups, they may be unwilling to implement policies that are socially desirable but politically inexpedient. Conversely, a regulator with too much discretion can, for example, arbitrarily restrict new investment. Experience in Jamaica reflects some of these problems (Box 3.10).

A few principles seem to have general acceptance. It is important for a regulatory agency to report directly to the legislature rather than solely to (or through) a minister. Legislative scrutiny of regulators is typically more open, although informal pressures can creep in. The head of the regulatory agency should be appointed for a fixed term, preferably out of cycle with political elections. Scrutiny should be regular and should systematically assess an agency's performance in achieving its goals and whether regulation is well focused. Transparency is critical to regulatory accountability because only if the process and policies are known and published can assessment of regulation be effective.

The Philippines, responding to the generally ineffective regulation of the past, has recently acted to make the process more autonomous and account-able. A draft bill in the lower house of Congress defines the role of the National Telecommunications Commission more clearly, increases the number of commissioners, assigns a fixed tenure, and increases the commission's access to operational funds.

As regulators become stronger, "regulating the regulators" may be desirable, if experience in industrial countries is a guide. In the United Kingdom, for example, the National Audit Office audits regulators as part of a mandate to determine "value for money" in public service, and the Monopolies and Mergers Commission hears appeals of decisions by sectoral regulators.

**INSTRUMENTS OF REGULATION.** While regulators seek to maintain "reasonable" and "just" prices in order to protect consumers, profits must be adequate and not subject to political risk or uncertainty. The ubiquitous instrument of regulation used to balance these goals—for sectors ranging from urban transport to electricity systems—has been "cost-
plus,” or rate-of-return regulation, which ensures that the financial return received by the provider covers all costs (operations and maintenance, depreciation, and taxes) and, in addition, guarantees a negotiated return on investment.

In recent years this instrument has come in for much criticism. Rate-of-return regulation is difficult to implement—obtaining accurate information on costs of production and the allocation of such costs between alternative services is a formidable task. Determining an appropriate rate of return is also a source of much contention between the regulators and the regulated. These problems encourage misrepresentation of information and the adoption of inefficient technologies that inflate the base on which rates of return are calculated; they also foster unproductive lobbying. Most important, because all costs are covered and a rate of return is guaranteed,

**Box 3.9 Development of regulatory capacity in Argentina**

Although a well-defined regulatory framework was legally in place after the privatization of telecommunications, regulatory practice did not conform to the framework. Charged with regulatory responsibilities in November 1990, the Comisión Nacional de Telecomunicaciones (CNT) did little until the end of 1991. No clear regulatory processes were developed, and a backlog of decisions began to pile up. Experienced staff were lacking, as were resources to hire additional staff or even pay existing staff on a regular basis.

The outcome of these regulatory and staffing gaps was that the development of new telecommunications services proceeded slowly. This was due in part to CNT’s failure to formulate standards and processes for issuing licenses, making most of these services uneconomic. Meanwhile, a number of radio operators and telephone cooperatives, faced with little or no regulation, started operations without licenses. Consumers also suffered from CNT’s inability to effectively address service complaints.

Since mid-1993—almost three years after the beginning of the reform process—CNT has improved its performance, in particular with respect to the concerns of consumers. A team of outside consultants working with CNT made progress in developing strategies and procedures. Moreover, after some early difficulties in the selection process, CNT’s top staff (6 directors) are now in place. The selection was made by an independent private recruitment company after a rigorous screening of 125 professionals, and its five nominees were retained as directors, including the president. The last director was proposed by the provinces.

Progress in Argentina’s telecommunications sector has been significant, and privatization has been able to move ahead in spite of the delays in implementing regulatory changes.

**Box 3.10 Jamaica’s regulatory roller coaster for telecommunications**

Jamaican telecommunications were initially privately run, then nationalized in 1975, and then reprivatized in 1987. Investment under private ownership was strong until the 1960s and has been strong again since 1987. But between 1962 and 1975 utility-government relations were turbulent, and investment levels were low.

Repeated shifts of power between two opposing political parties with divergent views have made it difficult to establish a credible regulatory regime that investors could rely on with confidence beyond another election. Until 1962 the regulatory regime—including precise, enforceable provisions on the rate of return the utility could earn—was built into the utility’s operating license. Because of Jamaica’s strong, independent judiciary, private participants were willing to invest, confident that parliament would not unilaterally change the terms of a license.

The newly independent Jamaican government decided in 1962 that a precisely specified operating license unacceptably constrained the democratic process. Using the United States as a model, the government established the Jamaica Public Utility Commission in 1966. Not only was the commission open to representations from all interested parties; the new system did not set a floor on the returns that the utility could earn. In the United States constitutional protections plus well-developed rules of administrative process afford private utilities substantial protection, even though the private-utility commission system nominally gives regulators substantial discretion. But Jamaica lacked these foundations. It also lacked a cadre of well-trained regulators and experience in delegating authority to a quasi-independent commission. Clashes between the utility and the commission ensued, culminating in the 1975 nationalization of telecommunications.

After the 1987 privatization, Jamaica returned to its pre-1962 regulatory system. It wrote into the operating license of the newly privatized utility a guarantee of a 17.5 to 20 percent annual rate of return on equity, shielded from change except with the consent of the utility, and enforceable by the judiciary. The result was a surge in investment and substantial welfare gains for Jamaica.
private management can become complacent about making the right investments and keeping costs down.

The response has been to design new "incentive" regulations in which the prices a provider is allowed to charge do not hinge on costs incurred. Thus, if costs increase, profits are lowered; if costs decline, the provider and investors enjoy greater profits. Incentive regulation therefore seeks to motivate providers to use their superior knowledge of operating conditions to lower costs and introduce new services.

*Price caps.* An example of incentive regulation is the increasingly popular price-cap, or "RPI–X," method for determining permitted increases in service price. RPI is the percentage increase in the retail price index (other indexes of costs that the provider does not control can also be used), and X is the (pre-determined) expected percentage increase in the provider's productivity. The infrastructure provider has an incentive to lower costs, since gains in productivity greater than the expected X percent contribute to increased profits. To maintain incentives for efficient production, the X-factor should remain unchanged for a period of several years.

Price caps are diffusing widely to different countries and, gradually, to sectors other than telecommunications, where they originated. The United Kingdom has led the way, using price caps in airports, telecommunications, electricity distribution, gas, and water supply. Elsewhere, however, their main application has been in telecommunications, with electricity distribution a distant second. In Mexico, for example, the government introduced price-cap regulation for Telmex in January 1992 which applies a price cap to the overall weighted average price of Telmex's services, rather than a specific price cap for each service. In the United States many state regulatory commissions have shifted from rate-of-return to price-cap regulation. Where comparison is possible, as between different states in the United States, the evidence is that price caps lead to lower prices than does rate-of-return regulation.

There are also some early indications that the difference between price-cap and rate-of-return regulation may not be as great as originally thought. Price caps are rarely observed in their pure form. Most regulators see a continued need to assess the rate of return and so set the caps on estimates of profitability, once again increasing the information requirements for effective regulation. An exception arises when profits are under the control of competitive forces. For example, in the U.S. market for long distance phone services, price caps on the dominant provider, AT&T, are thought to be the only instrument needed because profits are limited by competing suppliers. But where local monopolies exist (as in local telephone services), rate-of-return considerations can reassert themselves so that, over time, price-cap regimes may converge toward their rate-of-return predecessors. Nonetheless, price caps do have the advantage of shifting a greater part of the financial risk onto providers of infrastructure services, who cannot be sure that the regulator will allow them to recoup excess costs. This threat encourages tighter self-monitoring of performance.

*Yardstick competition.* When direct competition or competition from producers of substitute products will not work, competitive forces can be replicated through comparisons with performance elsewhere. A utility in one region can be motivated to perform better by promises of greater rewards if its performance exceeds that of a similar utility in another region. However, only if the utilities' input prices, market demand, and government regulations equate can better performance be attributed to the efforts of the utility.

A number of countries use yardstick competition, formally or informally. In France the contracts of the local water company often depend on the quality of services and their production costs relative to those of other French water companies. The water sector regulator in the United Kingdom relies explicitly on cost comparisons. The Chilean telecommunications industry uses an important variant of yardstick competition. A hypothetical "efficient" firm, rather than other Chilean firms, is used in setting the prices that telecommunications suppliers can charge. International cost and price trends are used to estimate the performance an efficient firm should achieve, and prices are established based on this estimate. Within this framework, the more efficient the Chilean firm, the larger its financial rewards. In electric power, reasonable distribution costs are estimated for three "reference systems," which vary according to such key determinants as distribution costs, population density, and peak demand. Individual electricity distributors are placed in one of these three systems, and delivery prices are regulated accordingly. A distributor benefits if it delivers electricity more cheaply than the average provider in its reference system. However, manipulation of "reference system" costs by the few suppliers in the market has driven the government to explore improvements in its use of benchmarks.

Although yardstick competition is limited by the need for sufficiently refined and comparable infor-
mation, that constraint is being partly relieved by the increasing possibilities of international comparison. Specialized industry organizations and international development banks can serve a useful function by disseminating data on production costs. Periodic audits can also provide information feeding into the regulatory process.

New instruments. The limitations of existing regulatory instruments (such as rate-of-return, price-cap, and yardstick regulation) have spurred the search for new instruments. New instruments have been designed to minimize the information required by the regulator and to increase the responsiveness to the customer, making them, at least in principle, especially suited to the needs of developing countries—although many of them have not been fully tested in practice. In the United States, an intermediate form of regulation balances the risk of windfall profits (or losses) from the selection of an inappropriate X in the price-cap formula. If the rate of return exceeds a prespecified limit, the firm has to refund the difference to customers. If returns fall below the lower limit, price increases greater than those implied by the cap are permitted in some cases.

Another regulatory approach offers a provider a choice of regulatory options (a stiff price cap but no monitoring of profits, or larger price increases with closer monitoring of profits). The expectation is that the regulated entity will, through its choice, reveal its ability to undertake significant cost (and, hence, price) reductions, as well as its attitude toward risk.

A form of regulation that is even less restrictive but that can provide meaningful discipline is known as "potential regulation." Regulators monitor the performance of suppliers and stand ready to intervene should problems arise. As long as customers are reasonably satisfied with the suppliers' performance, the regulator places no formal restrictions on the suppliers' activities.

Creating a consumer constituency. Consumers, both individuals and businesses, are not typically involved much in the regulatory process, even though their input can be critical to efficient service where the regulator has only limited means of acquiring information. Final consumers are often the best monitors of service quality. Consumer feedback can be employed directly to motivate suppliers to provide high-quality service. For example, returns for suppliers can be linked to consumer ratings of performance. Initial steps have been taken in Bangalore, India, toward creating an information base relevant for consumer awareness and decisionmaking (Box 3.11).

Some pointers on consumer involvement in regulation are available from industrial countries. The United Kingdom has ten consumer commissions, one for each of the ten water service jurisdictions. Each is headed by a commissioner who reports to the Office of Water Services on the needs and the concerns of consumers, including the results of formal surveys and public meetings. In France, where water services are controlled through local municipal councils with consumer representatives, private providers consider good consumer relations essential for maintaining their standing with the municipal authorities.

Conclusion

The past decade marks a watershed. Boldly innovative measures have been taken to pry open monolithic infrastructure sectors. Competition and unbundling of diverse activities are spreading. Technological change (as in telecommunications and

Box 3.11 Participation as regulation: an initial step in Bangalore

A serious handicap facing the individual consumer dealing with a public utility is the lack of knowledge of the “rules of the game” and the right to service. Expectations are often low and incentives for collective action are often limited.

A random sample of 800 households in the industrial city of Bangalore, India, highlighted dissatisfaction with the quality of service supplied by the telephone, electricity, and water utilities. Only 9 percent of those sampled were satisfied with their telephone service. Even fewer people were satisfied with electricity and water services. Problems cited included supply shortages, excess billing, inability to get errors corrected, and a general lack of communication with the service agency.

The conclusions of a broader study of quality of service were clear: more competition and better information are needed. The two groups of agencies that performed relatively well in consumer assessment—banks and hospitals—operate in a relatively competitive environment.

Another conclusion was that consumer “voice,” mobilized through groups such as residents’ associations, can be an important force in sectoral reform and reorganization. These associations can provide critical monitoring and feedback to minimize abuses and hold public officials accountable. Well-publicized intercity comparisons of service quality would create an information base on which consumer associations could act.
electric power generation) has much to do with these innovations. But more fundamental forces are at work, making the new initiatives relevant to sectors as diverse as surface transportation, waste treatment and management, and drinking water supply. The weight of evidence is that competition in or for a market for services is generally more effective in responding to consumer demands than are mechanisms for making public enterprises more accountable. We stand on the cusp of change. Familiar practices are disappearing, but in their place are unprecedented opportunities for productivity growth and emergence of new products and services.

The diffusion of novel ideas such as sector unbundling, competitive entry, and incentive regulations from industrial to developing countries has occurred at a remarkable speed. Some developing countries have in fact led the move toward more market-based provision of infrastructure, as in privatization of utilities. Continuation along this path will bring further dividends. In particular, developing countries need to place greater reliance on new entry and on competition to encourage investment and efficiency and to mobilize the skills necessary to achieve social goals. As the evidence presented in this chapter shows, where regulatory barriers have been lowered, even limited new entry or the credible threat of competition has led to lower prices and substantial cost reductions.

Tailoring contracts to attract specific investments has been the most common means used to balance the public interest and private initiative. Contracts have been not only a regulatory instrument, but also an essential mechanism for risksharing and hence for financing private projects (Chapter 5). But expecting individual contracts to bear the continuing burden of policy formulation and regulation, although attractive in the short term, raises the possibility of misuse because consistency and transparency in contract terms are not always easy to ensure.

In the long run, what is needed is a statutory regulatory system that clearly defines the rules of the game in each sector and openly enforces them. Although the possibility of abuse cannot be eliminated, it can be minimized through a system of checks and balances that reinforces the incentives for all parties to act in a manner consistent with the social good. Using consumer feedback in innovative ways in the regulatory process should be an important priority for regulators.