

Crafting Regulation for Privatized Infrastructure

MANY INFRASTRUCTURE ACTIVITIES IN DEVELOPING and transition economies already involve substantial competition. But others have little or none—though that may soon change (Klein 1996a; Gray and Klein 1997). For two main reasons, industries lacking competition require regulation. First, to ensure fair treatment of customers who lack the protection that comes with competition. Second, to ensure that competitors have fair access to bottleneck network facilities controlled by incumbent service providers. If incumbents do not face regulatory constraints, they can use these facilities to control—or destroy—their rivals.

Thus regulation plays a central role in subjecting network utilities to competition. Governments also have a permanent role in enforcing antimonopoly and antitrust policies, which ensure that competition is not suppressed by private monopoly power or by collusion among or combinations of competitors (Kahn 1996). So, one of the biggest challenges for policymakers in developing and transition economies is managing the shift from state ownership and control of infrastructure operations to more independent regulatory oversight.

The Emergence of Post-Privatization Regulation

WHEN PRIVATIZATION REFORMS WERE INTRODUCED, developing and transition economies had few precedents to guide the design of regulatory mechanisms. Until the 1980s the state owned and operated core infrastructure industries in

most countries, usually as part of sector ministries. In the few countries that had private infrastructure, regulation was based on the principle that these industries were mostly natural monopolies. Accordingly, regulation sought to capture the efficiency benefits of size while protecting consumers from possible monopoly abuses.

The 1980s and 1990s saw a dramatic global reassessment of the state's role in infrastructure and of the view that such industries were mainly natural monopolies. As developing and transition economies began restructuring and privatizing their infrastructure, they looked to the countries that had first taken this approach: Canada, New Zealand, the United Kingdom, and the United States. But these advanced industrial countries have long traditions of market capitalism supported by strong legal institutions. They also have well-developed education programs that teach how to regulate private monopolies, facilitate entry by new service providers, and promote competition. Lacking these features, developing and transition economies have faced a huge challenge in developing effective regulation for infrastructure (Gray 1998; Noll 2000d).¹

Under pressure from international agencies, investment banks, and financial advisers, many of these countries have hastily adopted regulatory templates from industrial countries, especially the United Kingdom and the United States. But these models have rarely been adapted to the political and institutional features common to poorer countries, including lack of checks and balances, low credibility, widespread corruption and regulatory capture, limited technical expertise, and weak auditing, accounting, and tax systems (Laffont 1996). As a result such efforts have had limited success—or been outright failures.²

Moreover, many government entities (especially sector ministries) have resisted giving up their regulatory functions. They have also been reluctant to limit their roles to policy oversight: assessing industry developments and adjusting policies accordingly (Crales and Smith 1997). Indeed, in Brazil the ministries of communications and of mines and energy have tried to recapture some activities assigned to regulatory agencies (Landau 2002). Morocco's telecommunications regulator, one of the world's best, continues to struggle with the sector ministry (Samarajiva, Mahan, and Barendse 2002). Most new regulatory agencies are not independent of government and insulated from political control—crucial conditions if privatization is to achieve its public interest goals.

Complicating matters further, state enterprises in developing and transition economies were often organized to achieve political objec-

tives, not to solve market failures (Guasch and Hahn 1999). Many have been tools of special interest groups and corrupt officials. There is a danger that such rent-seeking coalitions, aiming to avoid financial losses from privatization and competition, will subvert the regulatory process (Noll 1999). Regulatory institutions and processes are exploited even in industrial countries. But social welfare is at much greater risk in developing and transition economies because the rule of law is often weak and cronyism and corruption are often endemic. Yet international donors and privatization advisers have largely ignored the substantial risks that political and regulatory capture pose to the public interest (Laffont 2003).

To contribute to social welfare, regulation must reflect local capacity. Almost all regulatory mechanisms have been developed by industrial countries and have substantial information requirements. Implementing them will be difficult in most developing and transition economies due to insufficient economic data and technical skills. For example, weak accounting systems hamper the use of long-run incremental costs—a key concept for public utility pricing in industrial countries (Laffont 1996). Until they develop economic and technical expertise, developing and transition economies will have to rely on simple, perhaps second-best regulatory mechanisms consistent with local capacity. There is also an urgent need for increased analytical and technical assistance from international agencies.

In addition, regulatory models from industrial countries should be carefully evaluated before being applied in developing and transition economies. For example, policymakers need to understand regulatory mistakes in the United States and elsewhere to avoid repeating them (box 2.1; Joskow and Noll 1994).

The Evolution and Elements of Effective Regulation

CREDIBLE, STABLE REGULATION IS REQUIRED TO ACHIEVE the benefits of privatizing and liberalizing infrastructure. The past two decades show the importance of planning such regulation before privatization, including its economic content and institutional architecture (Willig 1999). An inadequate focus on sector economics has been a serious weakness of privatization in many developing

Box 2.1 Regulation in Argentina—Repeating U.S. Mistakes

A 1995 REVIEW OF ELECTRICITY REGULATION IN ARGENTINA FOUND that the pricing of transmission services was based not on market demands or incremental transmission costs, but on economically meaningless accounting allocations. For example, charges for a new transmission line were based on a determination of the “energy benefits” for the line’s beneficiaries. Such assessments were based on the fully distributed cost methodology of allocating common and fixed costs—a method that U.S. regulators abandoned in the 1980s because it was considered a major cause of the deteriorating performance and bankruptcy of the railway industry.

Source: Willig (1995).

and transition economies. It has also been a weakness of technical assistance provided by their international advisers, including the World Bank.

Moreover, many developing and transition economies lack the institutional prerequisites for effective regulation, including:

- Separation of powers, especially between the executive and the judiciary.
- Well-functioning, credible political and economic institutions—and an independent judiciary (Bergara, Henisz, and Spiller 1998).
- A legal system that safeguards private property from state or regulatory seizure without fair compensation and relies on judicial review to protect against regulatory abuse of basic principles of fairness.
- Norms and laws—supported by institutions—that delegate authority to a bureaucracy and enable it to act relatively independently.
- Strong contract laws and mechanisms for resolving contract disputes.
- Sound administrative procedures that provide broad access to the regulatory process and make it transparent.
- Sufficient professional staff trained in relevant economic, accounting, and legal principles.

Developing and transition economies cannot develop these crucial features overnight—achieving them will take time.³

Institutional Requirements

The structure and process of infrastructure regulation determine how effectively it supports reforms and promotes efficiency and other social objectives (Smith 1997c). In most developing and transition economies such regulation is at an early stage of implementation. Thus these countries can draw on recent findings for effective regulation of privatized utilities, including the importance of coherence, independence, accountability, transparency, predictability, and capacity (box 2.2; Noll 2000d).

Coherence. Regulations for each infrastructure sector should be complementary and mutually supportive. The laws guiding regulation must be in agreement, and regulations must be consistent over time. New rules should take into account previous ones, with amendments made to eliminate significant inconsistencies.

Regulatory coherence requires that national regulators, ministries, and provincial and municipal regulators have clearly defined responsibilities—ensuring that the same agency always makes decisions involving specific aspects of regulation. Such arrangements imply continuity in the people and methods used to make decisions and make adherence to the rule of law more likely.

Similarly, the same agency should handle regulatory activities that require harmonization. For example, in Argentina's privatized telecommunications sector, service providers' access prices and cost reporting are the responsibility of the sector's regulatory agency, while end user (retail) prices are under the purview of the Secretariat of Energy and Communications (Kessides 1997). Regulation for access and user prices should be closely harmonized, however, and both institutions should base their decisions on cost data.

Regulators should be required to publish statements explaining their goals and reasons for decisions on entry, pricing, and other industry behavior subject to oversight. Doing so forces the government to think through its long-term policy objectives and regulatory principles. It also

Box 2.2 Recent Shortcomings and Achievements in Infrastructure Regulation

Romania—lacking coherence

IN ROMANIA RESPONSIBILITIES FOR OVERSEEING telecommunications prices are splintered among the National Agency for Communications and Informatics, the Office of Competition, the Cabinet, and the Competition Council. Moreover, unclear guidelines for determining which prices should be regulated produce strange anomalies, such as a lack of regulation for interconnections not involving Rom Telecom, the dominant carrier. In addition, regulators are not required to justify their policies, and they cannot request cost information from service providers. As a result pricing decisions are uncoordinated, and inconsistencies—such as different prices for local services, interconnections between Rom Telecom and mobile carriers, and interconnections between mobile carriers—are not explained.

Latvia—undermining independence

In 1999 Latvia's Telecommunications Rate Council approved large increases in telephone rates. But the sector ministry called the increases unfair and annulled the council's decision, a move not clearly allowed by the law. The Ministry of Justice evaluated the legality of the annulment and declared it legal—and was backed by Latvia's parliament, which argued that the council had failed to safeguard the interests of consumers. The government then announced that a new council would be formed and removed the original members.

Brazil—promoting accountability

Brazil's National Telecommunications Regulatory Agency has introduced a number of innovations. In 2000 it became the world's first telecommunications regulator to receive ISO-9001 certification, an international standard for meeting customers' technical needs. The agency's extensive Website enables Brazilians to comment on its activities and provides information such as telecommunications laws, service

prices for different providers, and annual updates on operator compliance. The Advisory Council, an entity with representatives from civil society, assesses the agency's annual reports and publishes its findings in the official gazette and on the agency's Website. In addition, the agency employs an ombudsperson who evaluates its performance every two years.

Peru—ensuring transparency

In Peru the Supervisory Authority for Private Investment in Telecommunications sets telecommunications prices, ensures a competitive market, and monitors compliance with concession contracts and quality standards. The agency uses transparent mechanisms to formulate norms—for instance, requiring that regulatory proposals be supported by assessments of welfare benefits and best practices. After being reviewed by the agency, each proposal is published in the official gazette and undergoes a 30-day consultation period. In addition, some proposals are subjected to public hearings. The agency has also created independent committees, supported by experts, to resolve disputes between service providers. If parties cannot reach an agreement, the committee can dictate a solution. Finally, the agency has created an internal tribunal to handle consumer complaints not satisfactorily managed by phone companies.

Argentina—undermining transparency and predictability

A 1996 review of Argentina's gas sector revealed investor concerns about the transparency and predictability of the National Gas Regulatory Authority. In one case the agency did not permit wholesale prices charged to distribution companies to be passed on to consumers. In addition, it used its authority over transportation and distribution activities to regulate field prices—changing the rules of the game since field prices were deregulated as part

Box 2.2 *(continued)*

of privatization. Moreover, the agency did not provide coherent or predictable principles for determining acceptable gas prices. There were also complaints about capricious penalties for violations of gas quality standards.

Ukraine—coming up short on capacity

Ukraine's National Electricity Regulatory Commission, established in 1994, was one of the first independent regulators in a transition economy. In

1997 the commission's specialists were about 70 percent engineers, 20 percent economists, and 10 percent lawyers. All but one of the economists had graduated from Soviet universities in 1965–81. The commission has no specialists in regulatory economics, and Ukraine offers no training in energy regulation. Moreover, key employees have left the electricity commission to join private companies regulated by it—increasing pro-industry bias and the potential for capture.

Source: Noll (2000d); East European Constitutional Review (1999); World Bank (2000); ITU (2001b,d); Kahn (1996); Tsaplin (2001).

enables firms and consumers to predict how they will be treated in the future, enhancing accountability (for more details see below, in the section on regulatory commitment).

Independence. Effective regulation requires that regulators be largely free from political influence, especially on a day-to-day or decision-by-decision basis. Agencies must be objective, apolitical enforcers of policies set forth in controlling statutes.

Still, complete independence for regulators is not possible or even desirable (Kahn 1996). The executive branch should be able to ensure that the regulators it appoints are sympathetic to its reforms and to administration policies. But if regulators are not insulated from political intervention, the regulatory process may become politicized, decisions may be discredited, and policies may lack continuity.

Compromise is needed to ensure that regulators are both independent and responsive to an elected administration's policy goals. Safeguards that can help achieve such compromise include (Smith 1997c):

- Giving the regulator statutory authority, free of ministerial control.
- Setting clear professional criteria for appointing regulators.
- Requiring that both the executive and legislative branches participate in appointments.

- Appointing regulators for fixed periods and prohibiting their removal without clearly defined cause (subject to formal review).
- Staggering the terms of an agency's board members so that they can be replaced only gradually by successive administrations.
- Funding agency operations with user fees or levies on service providers, to insulate agencies from political interference through the budget process.
- Exempting agencies from civil service salary caps, to enable them to attract and retain well-qualified staff.
- Prohibiting the executive branch from overturning an agency's decisions except through new legislation or judicial appeals of existing laws.

Accountability. A regulator's independence should be reconciled with its accountability. Allowing a regulator to set prices and quality standards gives it enormous power to redistribute rents. Without an accompanying obligation to respect previous decisions and the legal rights of all parties, a regulator has considerable leeway for opportunism. Thus checks and balances are required to ensure that regulators do not become capricious, corrupt, or grossly inefficient. Citizens and firms should be able to find out who makes regulatory decisions and what guides them, and to voice their concerns. In addition, affected parties should be able to easily and quickly obtain redress if a regulator acts arbitrarily or incompetently.

It is difficult to strike a proper balance between independence and accountability, but certain measures can help:

- Writing statutes that specify the rights and responsibilities of each regulatory agency and distinguish between primary and secondary objectives when there are multiple goals.
- Subjecting agency decisions to review by courts or another non-political entity.
- Requiring regulators to produce annual reports on their activities and subjecting their performance to formal reviews by independent auditors or legislative committees.
- Removing regulators that act inappropriately or incompetently.
- Allowing stakeholders to submit their views on matters under review and requiring regulators to publish their decisions and the reasons behind them.

Transparency. Infrastructure regulation is an important policy issue, and in a democracy all citizens need transparent information about it to evaluate government performance. Thus all regulatory rules and agreements—and the principles guiding them (and future regulation)—should be a matter of public record. This record must be accessible to all market participants, not just service providers, to inform long-term business plans. Transparency helps induce investment by incumbents and new entrants—and avoid costly, time-consuming regulatory disputes.

Transparency also protects against corrupt regulation. In addition, it makes citizens (especially those adversely affected by regulatory decisions) less likely to believe that decisions are corrupt. When regulatory decisions and principles are clearly written, the reasons for them are apparent. Moreover, corrupt decisions are easier to detect and harder to defend.

Predictability. Regulatory agencies are predictable if they follow the rule of law, particularly respect for precedent and the principle of *stare decisis*. Respect for precedent means that regulators reverse past decisions only if they have created significant problems. *Stare decisis* requires that cases with the same underlying facts be decided the same way every time.

Thus regulatory decisions must be based on durable rules and procedures that will apply in future cases unless new information is obtained. Even then, regulators must prove that past decisions should be changed. Otherwise, market participants will lack confidence in regulation, undermining the size, scope, and quality of infrastructure and related investments.

Capacity. A regulatory agency's responsibilities should match its financial and human resources. Available financing reflects government willingness to support independent regulatory institutions. But with the possible exception of very small and poor countries, lack of financial capacity is unlikely to be a genuine constraint—though failure to provide adequate financing for regulation is a more common problem.

Inadequate expertise is a much bigger challenge in many developing and transition economies. Well-developed economic, accounting, engi-

neering, and legal skills are required for regulatory functions such as monitoring industry performance, analyzing cost data, dealing with information asymmetries, and analyzing the behavior of regulated firms. But until recently infrastructure in these countries involved little private activity or assets. As a result there are few regulatory experts. To overcome these deficiencies, regulatory agencies need to be given complete freedom to hire specialized staff (Estache and Martimort 1999). This may require exempting such agencies from civil service salary and recruitment rules (Noll 2000c).

Moreover, most regulatory efforts have focused on institution building: writing enabling legislation, defining organizational architecture, determining administrative procedures, identifying sources of funding, and so on. Not enough attention has been paid to identifying issues that require regulatory resolution—ensuring access to bottleneck facilities, eliminating anticompetitive cross-subsidies, setting prices and rebalancing tariffs, developing mechanisms to fund universal service mandates—and to developing related expertise. The scarcity of such skills has been one of the main impediments to effective regulation in developing and transition economies (Petrazzini 1997; Stern 2000a).

Building regulatory capacity is one of the toughest tasks of infrastructure reform

In many of these countries staff and budget resources have not been allocated based on careful, rational planning. Because engineers dominate many infrastructure activities, high priority is often given to purely technical functions. Accounting and financial and economic analysis receive much less attention. Moreover, low budgets severely constrain hiring decisions, resulting in slow changes to the skill mix of regulatory staff.

A recent review of state and central electricity regulators in India shows the problems created by inadequate capacity (Prayas Energy Group 2003). One of the main issues identified was grossly inadequate staff resources. Requests for professional and technical staff are routinely delayed for months or years. Although state regulators were supposed to have 8–10 professional and technical staff, all but two had 3 or fewer. And 8 of the 12 state regulators studied had no permanent professional and technical staff, instead often relying on temporary staff from incumbent utilities.

Preliminary Appraisal of Regulatory Systems

THE MOVE FROM MONOLITHIC STATE-OWNED MONOPOLIES TO regulated private entities is still under way in most developing and tran-

sition economies. Thus few regulatory agencies have been around long enough to allow for a definitive assessment of their effectiveness and impact on industry performance. Still, several empirical findings provide insights on appropriate regulation for these countries.

One point is clear: effective regulation requires more than formal requirements for independence, accountability, and transparency. Many governments are unlikely to observe the spirit of the law and implement proper, consistent regulation—especially if their initial ownership of reforms was weak and their acceptance of reforms was influenced by external pressures and loan conditions. Regulatory frameworks and attendant institutions may not operate as expected if they fail to take into account a country’s constitutional, legal, and public interest mechanisms (Stern 1997).

A sample of progress—and problems—by region. On paper, developing and transition economies have made considerable progress in establishing the institutional requirements for effective, independent regulation. But in practice the record is mixed, with discouraging developments in many countries and sectors. Moreover, it is unclear how well these agencies will work in the future.

Around the world, lack of regulatory independence has been one of the clearest institutional shortcomings. Even some early Latin American reformers with regulation based on the U.S. model have failed to achieve independence. Power regulators have a fair degree of autonomy in El Salvador and Nicaragua and to a lesser extent in Ecuador and Honduras (IADB 1999). But in Chile and Colombia the independence of power regulators is uncertain because their boards include government ministers and they rely on budget allocations made by ministry officials (Fischer and Galetovic 2000). Lack of independence allegedly led the executive secretary of Chile’s regulatory commission to resign in 1999. Political interference has also undermined the independence of electricity regulators in Guatemala and Peru (IADB 1999).

Argentina’s two power regulators, the National Electricity Regulatory Authority and the National Gas Regulatory Authority, are reasonably independent. But there have been concerns about the lack of transparency and predictability in some of their decisions (see box 2.2) and the absence of external scrutiny of their administrative practices (Estache 1997). Transparency problems also initially plagued the country’s water regulator. And during its first few years the telecommunications regula-

tor lacked both independence and transparency. Mexico's telecommunications regulator suffers from similar shortcomings (Noll 2001).

In Jamaica the multisector Office of Utilities Regulation, which became operational in 1997, has been handicapped by defective legislation. It can only offer advice, because line ministries retain control over decisionmaking (Stirton and Lodge 2001). Similarly, in Costa Rica government interference, especially in tariff adjustments, has weakened the independence and effectiveness of the multisector Regulatory Authority of Public Services (IADB 1999).

In Hungary the energy regulator's independence is limited by a lack of autonomous revenue, fixed-term appointments for the board of directors, and well-defined criteria for appointing and dismissing directors. In addition, civil service salary caps make it difficult to attract qualified staff (Stern 1999; Newbery 2000e). In telecommunications the head of the sector's regulatory authority reports to the minister of transport and communications (Rosston 2000).

The Czech Republic also lacks independent regulators for energy and telecommunications—not surprising given the government's ambivalence toward specialized regulatory agencies in the early years of transition (Stern 1999). As a result the Ministry of Finance has the final say in regulating gas and electricity prices, while the energy regulator is part of the Ministry of Industry and Trade (Newbery 2000d). Similarly, the primary regulator for telecommunications is part of the Ministry of Transport and Communications (Kessides and Ordovery 2000).

Poland's energy regulator, by contrast, meets most of the formal requirements for independence. And Latvia's multisector regulator enjoys financial independence from the state budget and has shown strong commitment to transparency and accountability (Vanags 2001). But its independence is compromised by the close affiliation between its board members and the political parties that nominate them.

In Romania telecommunications regulation lacks coherence (see box 2.2), while gas regulation lacks any semblance of independence (Newbery 2000b; Noll 2000d). The minister of industry and trade appoints the chair, vice chair, and three members of the gas regulator's board of directors, ensuring ministerial control over the agency. In electricity, however, Romania and Bulgaria have taken bold steps to create independent regulators. Romania's National Electricity and Heat Regulatory Authority is a U.K.-style independent entity, while Bulgaria's State Commission for Energy Regulation incorporates, at least on paper, elements of U.S.-style independent commissions (Stern 1999).

Table 2.1 Ranking of Infrastructure Regulation in Asia, by Sector and Institutional Criteria, 1998

Country/sector	Institutional criteria				
	Coherence	Independence	Accountability	Transparency	Predictability
Bangladesh					
Electricity	D	D	D	E	E
India					
Electricity, federal	D	C	D	C	E
Electricity, Orissa	B	A	B	A	D
Gas	E	E	E	C	E
Telecommunications	C	B	B	A	C
Indonesia					
Gas	E	E	E	E	E
Transport	E	E	E	E	E
Malaysia					
Telecommunications	C	C	D	E	E
Transport	C	C	D	E	D
Water	C	D	D	E	D
Pakistan					
Electricity	C	B	C	C	D
Philippines					
Electricity	C	C	D	D	C
Water	C	C	C	C	D

Note: Rankings are on a scale of A (best practice) to E (highly unfavorable for private investment).

Source: Stern and Holder (1999).

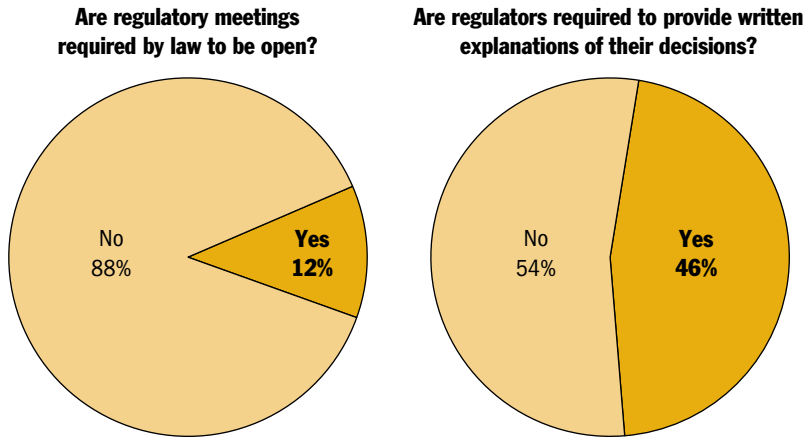
A 1998 study of infrastructure regulation in six Asian developing countries (Bangladesh, India, Indonesia, Malaysia, Pakistan, the Philippines) found significant weaknesses in coherence, independence, accountability, transparency, and predictability. On a scale from A (best practice) to E (highly unfavorable for private investment), only electricity regulation in the state of Orissa (India) ranked better than C in four of these areas (table 2.1). It was followed by telecommunications regulation in all of India, which did better than C in three areas. Elsewhere the results were dismal: only one other sector ranked better than C in any area (the independence of Pakistan's electricity regulator). The rankings were similar across sectors in each country, suggesting the importance of country characteristics in regulatory design.

Other Asian governments have also been reluctant to cede control to new independent regulators. For example, during the first phase of Sri Lanka's telecommunications reforms (1991–96) the government insisted on keeping the regulatory agency a government department—despite clear evidence that it was unable to attract needed expertise (Samarajiva 2001).

Many African countries have established regulatory agencies for their utilities. These agencies face serious challenges, including obtaining adequate expertise, financial resources, and statutory authority. Many are simply extensions of sector ministries, which maintain a tight grip on regulated sectors and still perform key oversight functions. A recent analysis of telecommunications regulation in 29 countries in the region indicates problems with independence and transparency (Pyramid Research 1999). On a scale of 1 (worst) to 4 (best), 23 of the countries received scores of 1 for autonomy, and only 2 received scores higher than 2. Rankings for transparency were better, though 10 countries still received scores of 1, and only 2 scored higher than 2. Scores for credibility and efficiency were similarly lackluster.

Insufficient statutory authority among telecommunications regulators has led to enforcement failures in several African countries. In Ghana the incumbent fixed line monopolist (Ghana Telecom) entered the cellular business despite being legally prohibited from doing so. It also inhibited entry by charging—with impunity from the regulator—very high interconnection fees (Ahortor 2003; Laffont 2003). In Tanzania the dominant mobile operator (Mobitel) entered a region in direct violation of the regulator's order. And in Côte d'Ivoire the regulator has been unable to force the incumbent fixed line operator, CItelecom, to comply with the service quality and network expansion terms of its concession contract (Laffont 2003).

There are, however, notable examples of effective regulation in Africa. The Uganda Communications Commission is independent, competent, and has strong statutory powers to demand information from and fine operators that do not comply with its regulations (Shirley and others 2002). The Botswana Telecommunications Authority was one of the first independent regulatory agencies in Africa (Bruce and Macmillan 2002). It establishes and finances its operational budget and exercises its licensing authority without government interference (ITU 2001a). Similarly, Morocco's National Telecommunications Regulatory Agency has gained credibility for its impartiality, transparent decisionmaking, re-

Figure 2.1 Results from a Survey of Telecommunications Regulators, 2001

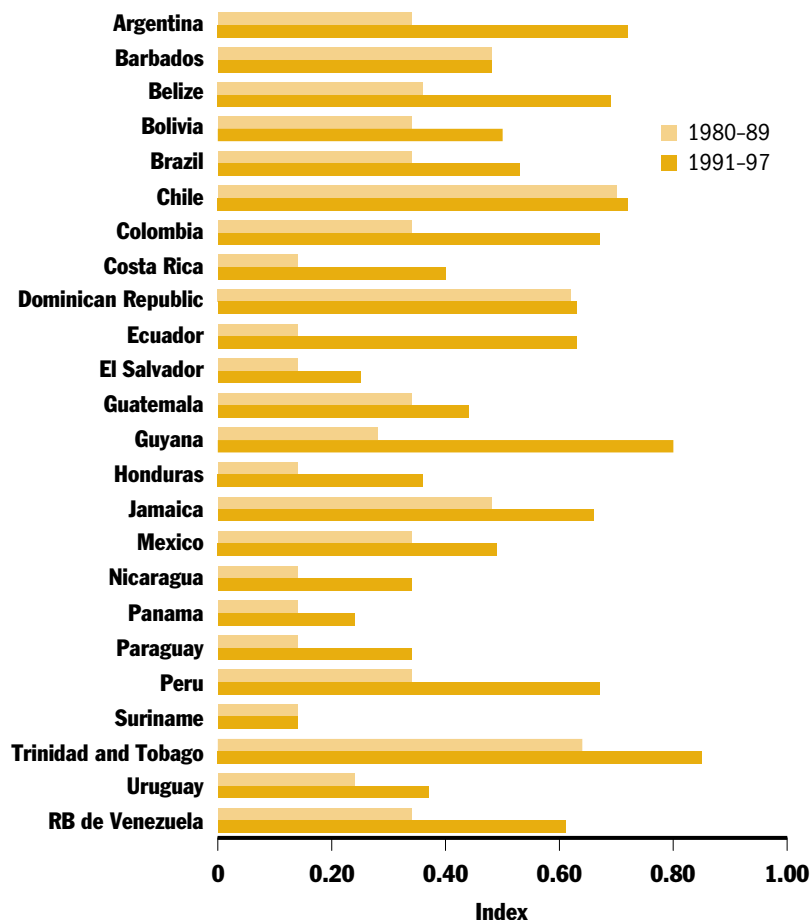
Source: World Bank (2001e).

spect for deadlines, and willingness to let all interested parties be heard on important policy issues (Wellenius 1999; ITU 2001c).

A recent survey of telecommunications regulators in 41 developing and transition economies found that only 5 are legally required to hold meetings open to the public—an important element of transparency (figure 2.1).⁴ This finding suggests limited formal transparency among regulatory institutions and perhaps lack of appreciation of its enormous importance (World Bank 2001e). Still, two-thirds of the agencies surveyed hold at least some open meetings.

Less than half of these agencies, however, are required to publish explanations for their decisions—another important element of regulatory accountability and transparency (see figure 2.1). A similar survey of energy regulators in developing and transition economies uncovered even weaker commitment to transparency, with less than half opening their meetings to the public (World Bank 2002a).

Unrealistic expectations? Or just the first stage in an evolutionary process? The label “independent” is somewhat exaggerated when applied to new regulators in developing and transition economies. Many of these agencies report to sector ministries and are mainly staffed by government representatives. Moreover, transparent regulatory practice remains limited in most of these countries.

Figure 2.2 Regulatory Indexes for Telecommunications in Latin America, 1980–97

Note: Each index is the average of seven scores. Six scores for the country's regulatory agency, each with a value of 1 or 0, measure autonomy in funding and in potential for being removed from office, authority for regulating prices and assessing fines, accountability for decisions, and separation from the operator. In addition, the country's legal framework is given a score of 1 for a law, 0.5 for any other legislation, and 0 otherwise.

Source: Gutierrez (2002).

Still, assessments of regulation in the developing world are strongly influenced by attitudes toward regulation. Optimistic observers point out that regulatory regimes in developing and transition economies have been created from scratch, are still in early stages of development, and (at least in terms of formal arrangements) are moving in the right direction—toward greater independence, accountability, and transparency than under state ownership (figure 2.2). It is also worth re-

membering that it took many years for today's industrial countries to develop effective regulation, and that developing and transition economies face enormous economic, political, and social challenges.

Pessimistic observers, however, insist that the widespread reluctance of governments to give up regulatory control is more than a symptom of the early stages of an evolutionary process. Instead, they argue, it is a deliberate attempt to use the regulatory process to protect interest groups whose benefits under state ownership would be threatened by market liberalization and privatization (Noll 1999).

Pessimists could also argue that expectations of regulatory independence and transparency were unrealistic. Under pressure from international financial institutions, many countries—especially in Africa and Eastern Europe—adopted regulatory structures that were inconsistent with their political, institutional, and human capacities (Laffont 2003). One cannot reasonably expect strong regulatory independence to rapidly emerge in countries where the separation of powers and concomitant checks and balances are not prominent elements of political and legal structures. Thus it is uncertain whether these countries will honor commitments they have made (especially under pressure) to regulatory arrangements. For example, as a condition of a stabilization loan from the International Monetary Fund, in 1999 Bulgaria established a State Commission on Energy Regulation that was to start functioning as an independent regulator in mid-2000. But that goal was undermined when the government removed—without explanation—five of the commission's six members just as it began exercising its statutory authority.⁵

The truth probably lies between these two extremes. Moreover, some of the asserted deficiencies of regulation in developing and transition economies are similar to those observed in industrial countries (Kahn 1996).

The Structure of Regulatory Institutions

SEVERAL DECISIONS MUST BE MADE ABOUT THE ORGANIZATION of regulatory governance. How should regulatory responsibilities be assigned among national and subnational tiers of government? Should regulatory agencies focus on specific industries, or should they oversee multiple sectors? How should functional responsibilities—for prices, licensing, quality, and environmental considerations—be al-

located? And what type of relationships should regulators have with sector ministries and with competition or antitrust authorities?

The economic and technological characteristics of a regulated industry, as well as a country's resources (including human resources), will affect the institutional architecture of regulatory governance. Moreover, effective regulation requires both an administrative body (to execute it) and a political institution (to ensure its legitimacy; Aubert and Laffont 2000). Formal regulatory structures that seem optimal in theory may be impossible to implement when political constraints are taken into account.

Centralized or Decentralized?

Designing regulation involves tradeoffs (Smith 2000b). For example, decentralization—making lower levels of government responsible for regulating utilities—offers several advantages. It:

- Allows local conditions and preferences to shape regulation.
- Moves regulators closer to services, allowing them to gather better information on users.
- Promotes competition among subnational regulators to attract private investment (Tiebout 1956; Oates 1999).
- May improve enforcement of regulatory decisions (Laffont and Zantman 1999).

But centralization also has advantages. A national regulatory structure makes the best use of scarce expertise and minimizes the fixed costs of regulation (such as those of maintaining regional offices). Centralization can also reduce the risks of a regulatory race to the bottom—as when jurisdictions competing for investment take on excessive financial risk or lower their environmental standards.⁶ And centralization may be necessary if jurisdictions are too small to support an efficient scale or scope of operations for certain industries.

Regulatory decisions in some jurisdictions may have implications for others, as when effluents discharged into rivers affect downstream users. Moreover, subnational regulation can impede trade between jurisdictions (say, because of different technical standards), protect local monopolies, or create subsidies for local producers. These situations call for a higher-level regulatory authority to protect social welfare and

ensure harmonization. Decentralized regulators also face a greater risk of being captured by industry interests or local politicians.

Thus the issues raised by centralizing or decentralizing regulatory oversight cut across a wide range of institutions and reflect a country's characteristics and constraints. Accordingly, analysis of the costs and benefits of either approach must reflect the country's institutional structure and the industry's technological features. Still, several general conclusions can be drawn.

First, small or poor countries may have only one effective tier of government. Large or rich countries have far greater potential for decentralization and more options in assigning different regulatory tasks to different tiers of government. But while multitiered approaches are the norm in large industrial countries, they increase the complexity of establishing new systems in developing and transition economies.

Second, spillovers across jurisdiction and industry boundaries depend on the industry:

- *Electricity.* Some distribution utilities operate solely within subnational boundaries. Most transmission grids are designed to operate nationally. And features of generation vary—serving one or multiple jurisdictions, sometimes with technological spillovers that affect much larger areas, and sometimes involving cross-border trade. Thus in most countries transmission and at least some aspects of generation may be best regulated at the national level, while in large countries it may be feasible to regulate distribution at the subnational level (Smith 2000b).
- *Water.* Most countries have decentralized responsibilities for water services. Many water utilities operate solely through local networks, with limited interconnection. But other utilities serve neighboring municipalities or draw on water resources that cross political boundaries. As a result municipal, state, and even national governments may dispute water regulation.
- *Telecommunications.* Of the three main utility industries, telecommunications involves the most competition. Networks have national (and international) reach, and major firms tend to operate nationally. Because firms in different jurisdictions should face consistent regulation, nearly all countries regulate telecommunications at the national level.

Box 2.3 Decentralized Water Services in Mexico and Morocco

ALTHOUGH MEXICO'S GOVERNMENT STRUCTURE is highly centralized, several water supply functions have been decentralized. First, public irrigation systems were transferred to user groups. By 1996 some 2.9 million hectares—87 percent of the area under medium- and high-level irrigation and 46 percent of the area under all irrigation—had been transferred to 386 water user associations. Water resource management remains the central government's responsibility, but local authorities manage many supply tasks.

Similarly, Morocco has a strongly centralized government but a highly decentralized regulatory

structure for water, with considerable functional specialization. The Directorate General of Hydraulics (part of the Ministry of Equipment) plans and develops water resources. The National Office of Potable Water (under the same ministry) acquires and distributes water to households, firms, and local governments. The nine regional authorities for agricultural development (under the Ministry of Agriculture) develop and maintain water distribution networks and collect water charges. In smaller systems local governments and farmers play a larger role in distribution and maintenance.

Source: Saleth and Dinar (1999).

Finally, limited regulatory capacity bolsters arguments for centralized regulatory responsibility, at least initially. The potential benefits of decentralization can then be achieved using other strategies. For example, national regulators can tailor their efforts to local conditions and establish regional offices to be closer to firms and other stakeholders (box 2.3).

Multiple Agencies, or Just One?

If regulatory responsibilities are assigned to a single tier of government, should the government create industry-specific regulators? Or a single agency with a broader mandate? Establishing separate agencies has advantages. It recognizes the unique economic and technological characteristics of each infrastructure industry and enables regulators to develop deep, industry-specific expertise. It also mitigates the risk of institutional failure and encourages innovative responses to regulatory challenges.

But there are also benefits to using one regulator for several industries. Doing so makes it possible to share fixed costs, scarce talent, and other resources. Consolidation also builds expertise in cross-cutting regulatory issues: administering tariff adjustment rules, introducing competition in monopolistic industries, and managing relationships

with stakeholders. In addition, the broader responsibilities of a multi-industry agency reduce its dependence on any one industry and so help protect against capture. And a multi-industry agency may be better able to resist political interference because its broader constituency gives it greater independence from sector ministers.

Moreover, the notion of distinct utility industries is under threat. Deregulation and changing business strategies have seen electricity, gas, rail, and water companies entering telecommunications, gas companies entering electricity, and water and electricity companies merging. A multi-industry regulator can address the issues emerging with these multi-utilities. In addition, a multi-industry regulator is in a better position to guard against distortions created by inconsistent regulation of utilities competing directly (such as electricity and gas) or for investment capital (Helm 1994).

So, deciding on the breadth of regulatory coverage involves numerous considerations—and no single approach will suit all circumstances. First, in economies with a small base of consumers (not necessarily population) and limited human and financial resources, there is a strong argument for merging regulatory responsibilities (box 2.4). For example, multi-industry regulators have been successful in Costa Rica, Jamaica, and Panama and in the states of Brazil. But in large economies the benefits of a multi-industry agency may be outweighed by concerns about insufficient industry focus and diseconomies of scale.

Box 2.4 Latvia's Public Utilities Regulation Commission

UNTIL 2001 PUBLIC UTILITIES IN LATVIA WERE REGULATED BY THE Ministry of Economy's Energy Regulation Council and the Ministry of Transportation's Telecommunications Tariffs Council, Railway Administration Department, and Communications Department (postal services). The government combined regulatory oversight of the four sectors in a single agency—the Public Utilities Regulation Commission—to ensure regulatory consistency and technological convergence and make better use of human and financial resources.

Source: <http://www.sprk.gov.lv>.

Second, regulators in developing and transition economies typically have less discretion than their counterparts in industrial countries. Multi-industry agencies with narrower responsibilities raise fewer concerns about inadequate industry focus or potential diseconomies of scale.

Third, if market substitution can occur between the output of regulated industries—especially between electricity and gas, but also between modes of transportation and telecommunications—economic distortions may arise from inconsistent regulation of common issues. Thus the case for consolidating regulatory responsibility may be stronger for some industries.

Fourth, the scarcity of expertise and vulnerability to political and industry capture in developing and transition economies also strengthen arguments for multi-industry regulation. The benefits of industry-specific agencies can then be gained through other strategies, including the creation of industry-specific departments.

Finally, different reform strategies place different demands on new regulatory agencies, affecting their ability to develop expertise and maintain focus. One common strategy is staggered reform, where the government reforms utility industries sequentially over time. This strategy allows a new regulatory agency to focus initially on one industry and build up experience. If things go as planned, the agency is better prepared to oversee additional industries as they undergo reform.

Under the other strategy, concurrent reform—also known as the big-bang approach—the government privatizes and reforms all or most utility industries more or less simultaneously. This strategy can place enormous demands on a new multi-industry agency. Governments intent on this strategy might consider the advantages of first creating industry-specific agencies and then merging them. Another approach, adopted in Bolivia, is to establish a hybrid structure that captures some of the benefits of both industry-specific and broader approaches (Crales and Smith 1997).

The Importance of Regulatory Commitment

REGULATION THAT ENCOURAGES SUSTAINED PRIVATE INVESTMENT in infrastructure does more than serve the interests of investors—it also promotes competition and increases ac-

cess to basic services. Such regulation must be clear and credible, ensuring investors that regulators are committed to fair, consistent, and sustainable policies and procedures. For two reasons, commitment and credibility are especially important in the restructured and privatized infrastructure industries of developing and transition economies. First, because of the economic characteristics of these industries. Second, because of the history of arbitrary administrative intervention and discretionary executive power in many of these countries.

Infrastructure industries are essential for the public and for the economy. When infrastructure service prices are based on costs, they can eat up a large portion of household budgets. Thus price changes can have a considerable impact on the level and distribution of real incomes. Cultural attitudes toward paying the full cost of these services change slowly, and price increases often encounter strong resistance. For example, in 2002 in Kerala, India, protestors ransacked utility offices and the political opposition called for a general strike in response to the state government's decision to raise electricity tariffs by 60–100 percent. The decision was quickly reversed (*Platts Power in Asia*, 19 September 2002).

Because infrastructure services are also essential for other economic activities, service levels and prices can significantly influence industrial costs and international competitiveness. Moreover, having only a few utility operators in each locality raises concerns about concentrated market power and excessive prices and profits.

Infrastructure characteristics also create opportunities for government manipulation (Spiller and Savedoff 1999). Because many infrastructure investments are fixed and sunk, private utilities will continue operating as long as prices cover short-run marginal costs. Thus once sunk investments have been made, bargaining power shifts from investors to regulators (Hart 1995). At that point governments may impose special taxes, require special investments, control procurement and employment practices, restrict the composition and movement of capital, or lower the regulated prices that utilities can charge for services (box 2.5). Recognizing these risks, private utilities will likely invest less than is optimal—especially in activities with large sunk costs—or demand high risk premiums unless governments can credibly commit to regulatory stability.

The extent of the commitment problem depends on the country's political institutions and the industry's production technology. In sectors like telecommunications, where technology is changing rapidly, assets depreciate quickly. Thus sunk costs and expropriation risks are low.

Development requires facilitating investment and growth and empowering poor people to participate in that growth

Box 2.5 Examples of Allegedly Opportunistic Government Behavior

Argentina's electricity regulator cuts the penalty for late payments

In 1999 Argentina's National Electricity Regulatory Authority ordered the country's three distribution companies—Edenor, Edesur, and Edelap—to reduce from 10.0 percent to 1.2 percent the penalty for paying electricity bills late. The distribution companies said that this order changed agreed rules, and they feared that the agency would try to change its other agreements with the industry.

Ghana imposes a new telecommunications tax

In January 2002 the Accra Metropolitan Assembly introduced a new tax of 50,000 cedis per mobile telephone subscriber and 20,000 cedis per fixed line subscriber. The dominant mobile operator, Scancom, estimated that the tax would cost it \$1 million a year. In December 2002 the assembly closed the offices of Scancom and the other mobile operator, Millicom Ghana, for failing to pay the tax—leading both companies to file a writ challenging its legality.

Kazakhstan's government reverses a promised increase in energy prices

In 1996 Tractebel—a subsidiary of Suez Lyonaise—acquired Almaty Power Consolidated, the producer and distributor of electricity and heat in

Almaty, the former capital of Kazakhstan. The government promised to raise tariffs in exchange for a \$300 million investment in distribution by Tractebel. But in 1997 a nationalist administration took office and refused to allow the tariff increases. When Tractebel claimed breach of contract, it became the target of demonstrations. The conflict contributed to Tractebel's withdrawal from the market and the return of assets to state ownership in 2000.

Ecuador's government is sued by the leading private utility

In 1992 Empresa Eléctrica del Ecuador (Emelec) was awarded \$51.9 million in international arbitration because for a decade the government had refused to set rates that would allow Emelec to achieve the contractually guaranteed 9.5 percent rate of return on its investment. The government refused to pay the award, and in 1995 Emelec sued it to abide by the arbitration decision—prompting the government to agree to a settlement. But in a 1999 lawsuit Emelec sought substantial additional damages because it alleged that the government had failed to honor the 1995 settlement. Even though Emelec has had its position vindicated by several tribunals and Ecuadorian courts (including the supreme court), the government has refused to honor its obligations.

Source: NERA 1999; Haggarty, Shirley, and Wallsten 2002; *Balancing Act News Update*, 6 January 2003; Bayliss 2001; PR NEWSWIRE Reuters Textline, "Ecuador's Leading Private Utility Sues Government of Ecuador in the US Courts for Dollars 900,000,000," 14 July 1999.

But commitment can be a severe problem in the water sector, where assets depreciate slowly. The risk of expropriation is also high in countries where regulatory procedures are inadequate, the judiciary has little authority or capacity to review administrative decisions, and elections are frequent, highly contested, and dominated by well-organized constituencies (Spiller 1992). However, in small, poor countries the more likely scenario is that the regulator will be small and too weak to avoid capture by powerful interest groups, rather than that it will behave opportunistically and expropriate private assets (Noll 2000c).

Opportunistic behavior is not the exclusive domain of governments. Some regulated firms behave opportunistically, with outcomes dependent on their bargaining power relative to regulators. A major imbalance can occur when low-income countries deal with large foreign investors and multinational corporations. Private investors may demand post-privatization contract adjustments, and countries might agree because they need foreign investment and because legal action (regardless of its merit and outcome) might result in caution among all foreign investors.

Commitment through Administrative Procedures

In some countries utility regulation is based on well-defined administrative procedures. These procedures determine how regulatory agencies make substantive decisions and define mechanisms for appealing them (Spiller 1996). For example, U.S. regulators must:

- Announce that they will consider an issue and their intention to hold hearings on it.
- Solicit comments on major policy issues from interested parties.
- Facilitate participation in decisionmaking by allowing interested parties to offer testimony and evidence, and even to cross-examine other stakeholders.
- Set deadlines for reaching decisions.
- Justify their decisions.
- Provide arrangements for appealing decisions.

By specifying the institutional environment for decisionmaking, procedural requirements limit regulators' range of policy decisions and so their discretion (McCubbins, Noll, and Weingast 1987).

Ideally, such procedural requirements strike a balance between ensuring that all stakeholders receive both due process—meaning quasi-judicial procedures, hearings, written opinions, and avenues for appeal—and administrative efficiency—which aims to avoid an overly judicial regulatory process. Not all policies should be formulated and not all decisions made using a quasi-judicial approach. Wherever possible, procedures should rely on informal negotiations between regulatory staff and interested parties (though open to public scrutiny, review, and possible appeal) or other informal dispute resolution procedures (such as negotiations between interested parties, with the regulator intervening only to arbitrate unresolved issues).

A mandate to rely as much as possible on market-like solutions—such as auctions and negotiated settlements—is one aspect of the quest to achieve administrative efficiency and minimize the need for direct regulatory determinations of results. Another example is a preference for price caps over cost-plus, rate base, or rate of return regulation. Price caps offer regulated companies market-like incentives for efficiency and innovation, and should enable efficient providers to recover costs, including a return on investments commensurate with risk.

At the same time, in many developing and transition economies there is a need to subject regulatory procedures and decisions to prescribed deadlines. In addition, decisionmaking processes and decisions themselves should be transparent, justified, apolitical, and accountable to an impartial nonpolitical arbiter—and should not be subject to alteration by officials from the executive branch.

There have been many claims that regulators in these countries abuse their powers, fail to meet deadlines, rigidly enforce rules even when the results are irrational, and fail to respond to requests to relax rules in such circumstances. Such controversies are inevitable even under the most enlightened regulation. Moreover, it is difficult to determine the merits of such complaints and of the often conflicting problems asserted by opposing parties.

One way to resolve such issues is to have external consultants conduct management audits of regulatory agencies to examine claims of excessive rigidity. Another way to resolve such disputes as they arise, rather than after the fact, is to create an ombudsperson for each regulatory agency or for all regulatory agencies. Although legislative committees could conduct such oversight, that approach could undermine regulatory independence—particularly if such committees tried to resolve specific disputes. Ombudspersons in the executive branch could combine the objectivity needed for prompt, apolitical resolution of controversies and the accountability of informal, impartial, external scrutiny.

Commitment through Concession Contracts

In some infrastructure sectors (telecommunications, electricity generation, gas production) ownership has been transferred to the private sector through outright divestiture. In others (water and sewerage, transportation, electricity transmission and distribution, gas transportation

and distribution) legal, political, and constitutional restraints have hindered the transfer of ownership to the private sector. As a result many countries have used innovative strategies to facilitate private participation in those sectors. Concession, lease or affermage, and (to a much lesser extent) management contracts have emerged as attractive alternatives to outright privatization (Guasch, Kartacheva, and Quesada 2000).

A concession contract grants a private company, typically through competitive bidding, the exclusive right to provide a service for a specified period by using existing facilities and developing new ones. Thus a concession agreement entails only a temporary transfer of assets to the private sector. At the end of the concession period the assets are transferred back to the public authority. From a political perspective, concessions offer advantages over privatization. Continuing government ownership of infrastructure assets is perceived as providing some assurance that social obligations will be met and that, if service is inadequate, the government will intervene (Uribe 2000).

In an ideal environment—with well-developed technology, well-defined demand, homogeneous service, and low asset specificity—franchise bidding also has properties that make it superior to regulation. A concession contract typically defines the concessionaire's obligations (in terms of service coverage and performance standards), rights, incentives, and risks, including pricing arrangements (Klein 1998a). By establishing an explicit contractual relationship, concessions limit the government's discretionary powers and can reduce the risk of political expropriation. Contracts that contain certain guidelines—say, for revising tariffs and settling disputes—can help minimize regulatory discretion and opportunism (Crampes and Estache 1998; Stern and Holder 1999). Moreover, concessions granted through competitive bidding contribute to allocative and productive efficiency by resulting in average cost pricing and the selection of the most efficient firm.⁷ In addition, periodic rebidding of concessions creates competition for the market, potentially solving the problem of natural monopoly (Demsetz 1968; Klein 1998b). Thus franchise bidding can achieve allocative and productive efficiency at lower costs than regulation because it requires less information. In essence there is no need for a regulator, because rivalry in the open market imposes the needed discipline.

But in a more real-world setting—with substantial technological and demand uncertainty, incumbents who acquire particularized knowledge, and specialized long-lived assets—franchise bidding differs mainly

in degree than in kind from the regulation it is supposed to supplant. The convergence of franchise bidding and regulation becomes evident when one considers the challenges of contract execution and renewal under these less than ideal conditions. Fixed price bids become problematic in the face of uncertainty and rapid technological change. Cost-plus contracts are more appropriate, but they require auditing—the standard requirement of regulation (Williamson 1976). Thus regulation and concession contracts are complements, not supplements, in the context of network industries (Stern 2003).

The main challenge of infrastructure concessions is writing enforceable contracts that cover all the contingencies that might arise over time. Contractual incompleteness is inevitable given the technical complexity and economic uncertainty involved in such activities. Allowing for renegotiation and adjustment is appropriate and even desirable in the face of new information and experiences. But incomplete contracts can also lead to opportunistic renegotiation by both regulators and concessionaires. If concessions are governed by credible regulation that defines the criteria for contract revisions, dynamic and socially desirable adjustments are feasible and less likely to place significant strain on contracts involving uncertain economic conditions. In industrial countries renegotiation is not a big concern because high-quality institutions enforce adherence to contracts and can guide the renegotiation process (Laffont and Tirole 1993).⁸ But in developing and transition economies the limited supply of credible institutions makes opportunistic renegotiation an important public policy issue—and one of serious concern to private investors. Without an independent and credible mediating regulator, adjustments have to be renegotiated with the government, increasing the risk of political interference.

Early or frequent renegotiation hurts sector performance if there is uncertainty about the institutional environment.⁹ It can also undermine the credibility of the concession process and the reputation of the country. A bidder who knows that early renegotiation is possible may submit an unrealistically low bid with a view to renegotiating better terms (without competition) shortly after securing the concession (Dnes 1995).¹⁰ And that bid might be accepted, regardless of its implications for efficiency and value. Thus the way that private enterprise is introduced has important implications for performance.

For political and economic reasons, renegotiation often favors operators. After a concession has been awarded, the government typically

Table 2.2 Example of Infrastructure Concessions in Developing and Transition Economies

Telecommunications (wireline voice)	Electricity generation	Natural gas transportation and distribution	Railways (mainly franchises)	Water distribution
China, Cook Islands, Guinea-Bissau, Hungary, Indonesia, Madagascar, Mexico	China, Côte d'Ivoire, Guinea, Hungary, Mexico	Argentina	Argentina, Brazil, Burkina Faso, Chile, Côte d'Ivoire, Mexico	Argentina, Brazil, Chile, China, Colombia, Côte d'Ivoire, Guinea, Hungary, Macao, Malaysia, Mexico, Senegal

claims that it is a great success and points to the large amounts of promised investment. Rejecting a request from an operator to renegotiate soon after a concession has been awarded may result in its abandonment or suspension, which could be seen as a failure and might require issuing a new concession at a potentially high transaction cost. Faced with this dilemma, governments usually agree to renegotiate, demonstrating the leverage of the operator. But in cases where the original contract shifts too much of the risk of uncertain initial conditions to the concessionaire (as has been the tendency in some water concessions), renegotiation that favors the operator may simply be an effort to make the contract more realistic.

Since the late 1980s thousands of concession contracts have been awarded to private infrastructure operators around the world (table 2.2); in Latin America and the Caribbean alone more than a thousand concessions have been signed. Yet despite their early promise, concessions have had mixed results.¹¹ There have been serious doubts about their efficacy, acrimonious disputes over contract compliance, numerous bankruptcy claims by concessionaires, and frequent complaints about excessive tariffs, poor services, and opportunistic renegotiation. Excluding telecommunications, more than 40 percent of concessions have been renegotiated—and 60 percent of those were renegotiated within their first 3 years, despite contract periods of 15–20 years (Guasch 2001). As noted, some renegotiation can be for the good. But the excessive share of renegotiated contracts (including more than 80 percent in the water and transportation sectors) and extent of early renegotiation strongly suggest opportunistic behavior and flawed contract design.

Many concessions have had problems because they lacked mechanisms for resolving disputes

Recent empirical work suggests that the high incidence of concession renegotiation can be attributed to political interference, weak regulation, and flawed contract design (Guasch, Laffont, and Straub 2003).¹² Setting up a separate regulatory body to govern concessions appears to significantly reduce the incidence of renegotiation. Contingencies that occur during the concession can then be dealt with through the revision process stipulated by the regulator, reducing the need for disruptive renegotiation and the consequent transaction costs—though whether the regulator’s decisions contribute more or less to social welfare than do renegotiations is an empirical question. Having a separate regulator can also signal a commitment to enforcement and may signify experience in dealing with complex contract issues.

Commitment through Substantive Economic Restraints

Government discretion can be limited by having regulators publicly articulate the basic economic principles that guide their policy decisions (Willig 1999). Before utilities are privatized and private investments made, regulators should commit to the transparent application of these principles to reach decisions and resolve disputes.

To enhance government credibility, these principles should be embedded in privatization and concession contracts. Alternatively, they could be contained in an overarching statute and so have the force of law. They would not, however, rigidly micromanage the terms of privatization. Instead these principles would allow space for regulation to adapt to changing market conditions and require regulators to:

- Refrain from unilaterally imposing policy or rule changes that undercut promised investment value.
- Refrain from intervening in activities of regulated firms that relate to competitive markets, or at least markets not identified as protected natural monopolies.
- Avoid expanding regulatory interventions without demonstrating that the benefits outweigh the costs.
- Ensure competitive service quality and prices by avoiding privatization deals that result in higher prices than necessary, allowing consumers to challenge deals that result in higher prices in return for higher government revenue, using price cap mechanisms to

control regulated monopoly prices (see below), and allowing consumers to seek rate adjustments if service quality falls far short of that promised in a privatization agreement.

- Provide consumers, suppliers of complementary and substitute services, suppliers of inputs, and investors with signals and incentives for efficient actions by ensuring that prices reflect the value and marginal costs of services and by giving service providers pricing flexibility.
- Require infrastructure monopolists to give rivals open access to their bottleneck facilities at prices with the same markups as the competing services sold by these monopolists.
- Pay competitively neutral attention to social goals pertinent to each infrastructure sector by targeting subsidies as much as possible and requiring that any surcharges or taxes imposed have equal effects on the prices charged by competing suppliers (Willig 1999).

Balancing Commitment and Flexibility

To encourage efficient performance, a regulatory system must be able to adapt its mandate and rules in response to new challenges, circumstances, information, and experiences. Such flexibility is especially imperative in sectors experiencing rapid technological and market changes.

The goal of dynamic regulation argues in favor of granting discretion to skilled, well-intentioned regulators. But discretion can be abused, whether by governments (to advance short-term political goals) or regulators (to benefit themselves). Thus the owners of sunk assets subject to regulation may see discretion as a mortal threat—because the value of investments in such assets can be destroyed if aggressive regulation disallows revenue beyond that needed to recover short-run variable costs. Accordingly, the fear of regulatory discretion can override incentives to invest.

If there is significant concern about the abuse of regulatory flexibility, discretion can be reduced by introducing rigid, specific rules. For example, in the early 1980s Chile introduced a law that significantly reduced the scope for regulatory opportunism in the electricity sector (Spiller and Martorell 1996). But the resulting rigidity undermined the regulator's ability to adapt to market changes (box 2.6). Thus this approach creates substantial risks for the public interest. Actual or per-

Box 2.6 Regulatory Rigidity in Chile

IN 1981–82 CHILE INTRODUCED A NEW ELECTRICITY law to assure potential investors that the regulator would not expropriate their investments. The power to make decisions was taken away from the regulator and embedded in the law, which made it comprehensive and complex. Still, at the time this seemed like a good approach: in the early 1980s Chile needed to convince investors that the rules of the game would not change based on regulatory whim. But although this mechanism attracted investment when electricity was eventually privatized, it made the regulatory regime excessively rigid.

Source: Fischer and Serra (2000).

The system's inflexibility became quite costly during the 1998–99 drought. During the crisis the entire regulatory system collapsed, and the country suffered prolonged blackouts without any compensation to users—causing \$300 million in damage to the economy. The failure of regulation during the crisis was partly due to the lack of flexibility embedded in the law, which limited the regulator's ability to respond quickly to the drought.

ceived regulatory risk can also be curtailed by including detailed regulations in privatization and concession agreements. Indeed, tight privatization contracts have become common in many developing and transition economies. Again, though, a careful balance is needed between limiting regulatory discretion and avoiding micromanaged privatization and concessions.

Getting the Economics Right

MUCH OF THE DISCUSSION OF INFRASTRUCTURE REFORM has focused on the institutional foundations of effective regulation and nondiscretionary governance. Institutional mechanisms that restrain arbitrary intervention signal to potential investors that the value they add to infrastructure will not be expropriated. This type of commitment reduces investment risk and so the discount rate applied to net present value and cash-flow calculations.

But effective regulation requires more than just building institutions and ensuring regulatory independence. To create an attractive investment environment, policymakers must also focus on regulation's substantive content. That includes sector economics, which must be attractive for any investment plan to be feasible.

For example, in 2000 household electricity prices covered less than 50 percent of long-run marginal costs and industrial prices less than 70 percent in almost all the countries that form the Commonwealth of Independent States (von Hirschhausen and Opitz 2001). Even with independent, transparent regulation, such a pricing policy would make it impossible to attract private investment. Similarly, regulation that forbids flexible prices or imposes social service obligations on only some competitors will not promote efficient investment—even if institutional mechanisms provide a credible commitment to stable policies.

Thus pricing reform is perhaps the most important element of investment-oriented regulation. For prices to encourage efficient actions by consumers, suppliers, and investors, their structure and level will require substantial adjustment in most developing and transition economies. Cost-reflective tariffs enable infrastructure operators to maintain, replace, modernize, and expand their facilities and services, benefiting consumers and the economy.

Financial viability is crucial to any program of price regulation. But how should financial viability be gauged? And what information is required to determine when a utility's revenues are adequate to cover its pertinent costs? Though the answer seems obvious, the history of regulation shows that this issue is widely misunderstood. Among the costs that must always be included in these calculations is the cost of the firm's capital, including internally generated capital.

The logic of this criterion is straightforward. Revenues are adequate if they enable a firm to maintain, replace, modernize, and (if needed) expand facilities and services. If revenues are lower, services will deteriorate (and possibly disappear) and utilities will have a harder time obtaining new capital. The market for funds simply offers no room to those who cannot face competition from others seeking capital.

The following principles determine whether a firm's revenues are adequate (Kessides and Willig 1995):

- Its rate of return must equal the returns being earned by a typical firm with similar risks elsewhere in the economy. Otherwise it will be denied required funds.
- The adequacy of a firm's revenues can be judged only by comparing them with the earnings of other firms, not with the market value of the firm's equity. That market value will automatically fall to match any regulatory action that lowers the firm's earnings below

a compensatory rate of return, so such a comparison would appear to justify any earnings restriction—no matter how inappropriate.

- In determining the revenue required for financial viability, the rate of return obtained by comparison with other firms must be applied to a rate base that covers the replacement cost of all facilities.
- With the rate base determined in this way and the rate of return on that base equal to the cost of capital—as indicated by earnings elsewhere in the economy—one has determined the net earnings by the utility considered adequate for it to compete in the capital market.
- This earnings figure must not be applied as a rigid ceiling. Otherwise utilities will not be able to earn this figure over the long run, because they will be precluded from making up for revenue shortfalls that may result from temporary ebbs in the demand for their services.

For prices to make sense economically, they must always be compatible with this earnings level. Of course, no prices can guarantee that regulated utilities will earn adequate returns overall. If demand for their services is insufficient, their operations are conducted wastefully, or their services are poor, even appropriate prices cannot be expected to lead to profitable operations. But once utilities are permitted to charge appropriate prices in a competitive environment, regulatory impediments to financial viability will have been eliminated. It is then up to the utilities to take advantage of this opportunity through efficient operations, high-quality services, and effective marketing.

Mechanisms to Regulate Prices

FIVE BASIC GOALS SHOULD GUIDE THE DESIGN OF PRICE regulation:

- Rent extraction—setting rates that strike a socially acceptable compromise between the interests of investors and consumers.
- Supply-side efficiency—providing signals and incentives for suppliers and investors to increase efficiency.
- Demand-side efficiency—providing signals and incentives for efficient consumption of regulated utility services.
- Revenue adequacy—allowing regulated firms to earn sufficient revenue to attract needed capital.

- Fairness—ensuring that prices are just and reasonable, and contribute to universal service goals without creating significant distortions (Joskow 1998b).

These goals cannot all be achieved simultaneously. Indeed, practical regulation entails tradeoffs among them. For example, a regulatory mechanism that passes on to consumers (through lower prices) all the cost reductions achieved by a firm will meet the rent extraction goal. But it will likely do a poor job of promoting supply-side efficiency and attracting investment.

On the other hand, a regime under which the firm is the residual claimant on all cost savings will provide strong incentives for cost-reducing innovations (supply-side efficiency). But it will do poorly in achieving the rent extraction goal (Laffont and Tirole 1993; Joskow 1999). Two alternative mechanisms for regulating prices are cost-plus and price caps. This section analyzes these approaches and their likely implications for pricing policies.

Cost-Plus Regulation

Until recently cost-plus regulation dominated utility industries in the United States and several other countries (box 2.7). Policymakers have been attracted to this mode of controlling utility behavior because it

Box 2.7 Cost-Plus Mechanisms

- *Pure cost-plus.* The regulated firm simply submits a bill for its operating expenses and capital costs (depreciation plus an after-tax return on its investment that equals or exceeds its cost of capital), and the regulator passes on these costs in the prices charged to consumers. Prices are continuously tied to these accounting costs.
- *Rate of return.* The regulated firm's capital and operating costs are evaluated using a specific accounting system. Prices are then set to cover these audited costs plus a reasonable return on investment. Once these base prices are set, they are not adjusted automatically for changes in costs over time—they remain fixed until the subsequent regulatory review.

seems fair to both the regulated firm and its customers. It permits the firm to earn sufficient revenues, including a fair return on its investment, by passing its costs on to consumers through the prices charged. It is also designed to protect consumers from monopolistic pricing distortions.

One of the attractions of cost-plus systems is that they are likely to attract investment to a regulated sector because investors know they will recover their operating and investment costs, perhaps with a return that exceeds their cost of capital. These systems shift a variety of firm- and market-specific risks to consumers, satisfying the goal of revenue adequacy. Moreover, by holding revenues close to costs, cost-plus systems keep utility services reasonably affordable. These are important considerations given the socioeconomic characteristics of many developing and transition economies and their substantial requirements for infrastructure investment.

Still, cost-plus systems have shortcomings. The firm has an incentive to engage in accounting contrivances and to pad its costs to convince the regulator to approve higher prices. These systems allow considerable scope for such behavior: a range of estimates is possible due to conventions for calculating depreciation, procedures for allocating joint costs between regulated and unregulated outputs, and procedures for calculating capital costs. Unless the regulator has a well-developed cost accounting system to audit the firm's costs, the firm can misrepresent them. If that happens, the regulator will set prices too high, frustrating its rent extraction goal.

Moreover, in the presence of asymmetric information about the firm's capabilities and the level of managerial effort and other costs it must incur to realize a specified level of operating efficiency, a pure cost-plus regime distorts the firm's incentives to minimize its costs—even if the regulator has sophisticated auditing technology. Because the firm is not rewarded for reducing costs, it has no incentive to do so (Armstrong and Sappington 2003). In addition, the firm has incentives to expand its rate base by adopting excessively capital-intensive technology (the Averch-Johnson effect). So, although consumers pay prices that just cover the firm's costs, such costs may be too high. As a result rents may accrue to the firm's managers, employees, and input suppliers, undermining supply-side efficiency.

Few pure cost-plus systems (in which prices are continuously tied to accounting costs) are in place today, and no one would choose such a system to promote the public interest. Indeed, constant review of costs to keep prices equal to the cost-plus target has never been conducted

anywhere. In practice, under rate of return regulation (a form of cost-plus), prices are set in public hearings that evaluate cost data using specific accounting criteria. Once set, prices remain fixed until the regulator reviews them again.

The tendency of prices to adjust slowly to changing costs, commonly referred to as regulatory lag, restores some of the incentives for efficiency lost under a pure cost-plus system. By partly decoupling prices from costs, the regulatory lag imposes penalties for inefficiency and incorrect guesses, and rewards efficiency by permitting the firm to keep the profits it earns from cutting costs and improving performance. Moreover, regulators normally have the authority to disallow operating and capital costs that they find imprudent or unnecessary. The threat of disallowing such costs encourages the firm to make efficient production decisions. Similar benefits are obtained if the regulator limits profits to a certain range (banded rate of return), allowing price adjustments only when returns fall outside that range (Joskow 1974; Joskow and Schmalensee 1986). Thus cost-plus has gotten a worse reputation than it deserves.

Price Cap (Incentive) Regulation

Given the weak incentives for productive efficiency under cost-plus regulation, many types of incentive-based regulation have been developed (Vogelsang 2002). These mechanisms encourage the regulated firm to achieve desired goals by granting it some—but not complete—discretion. In essence the regulator delegates certain performance-related decisions to the firm, and the firm's profits depend on its performance as measured by the regulator.

Price caps are the main incentive mechanism (Baron 1989; Laffont and Tirole 2000). Their key purpose is to control the prices, not the earnings, of the regulated firm (box 2.8). Thus this form of regulation does not make explicit use of accounting data. Under price caps the regulator:

- Defines a set of prices (or a weighted average of prices for different services) that the firm will be allowed to charge. The firm is free to price at or below these ceilings. (Price floors may also be set to prevent predatory behavior.)
- Estimates the ability of firms in the regulated industry to limit cost increases and compares that with firms in other industries.

Box 2.8 Price Constraints Imposed by Price Cap Plans

FOR A BASKET OF REGULATED GOODS OR SERVICES, THE TYPICAL price cap plan limits the weighted average (percentage) price increases to not exceed the difference between some measure of the general inflation rate and the specified productivity offset:

$$\sum_{i=1}^n w_i^t \left[\frac{p_i^t - p_i^{t-1}}{p_i^{t-1}} \right] \leq RPI^{t-1} - X,$$

$$\text{where } w_i^t = \frac{p_i^{t-1} q_i^{t-1}}{\sum_{i=1}^n p_i^{t-1} q_i^{t-1}}$$

- n = the number of regulated goods or services,
- t = year ($t=0$ at the start of the price cap plan),
- p_i^t = the unit price of good or service i in year t ,
- q_i^t = the number of units of good or service i sold in year t ,
- RPI^{t-1} = the inflation rate in year $t-1$ (most recent 12-month period),
- X = the specified productivity offset, and
- w_i^t = is the proportion of the firm's total regulated revenue in period $t-1$ derived from product i .

Source: Sappington and Weisman (1996).

The estimated differential in productivity between the regulated industry and the rest of the economy is called the X factor.

- Specifies a formula for adjusting prices (or the weighted average price) over time to reflect input inflation (easily observable changes in costs beyond the firm's control) and the expected rate of productivity improvement (X factor). Thus price cap regulation severs the link between the firm's authorized prices and its realized costs.

In a typical price cap plan, related services and products are grouped into categories often referred to as baskets. Alternatively, all services may be bundled in a single basket. An overall price cap is set for each basket. This index ceiling is usually a weighted average price for all regulated services in the basket (box 2.8). The average price of each basket is allowed to rise at the economywide inflation rate less the productivity off-

s e t
 (X factor), which may vary across baskets. Moreover, the firm can set the price of any service in a basket as long as it does not exceed the index ceiling (although restrictions are often imposed on the prices of individual services to protect specific groups of consumers or promote socially important services). Thus the firm can rebalance its prices over time.

In a pure price cap regime the firm's realized costs and profits do not enter into the regulatory contract: once the index ceiling and its path are set, they are not changed (infinite regulatory lag). Pure price cap regulation operates much like a fixed-price contract under which the firm is the residual claimant for all its cost savings (Laffont and Tirole 1993). The firm has strong incentives to pursue cost-reducing innovation, use the lowest-cost technology, operate with no waste, and report its costs truthfully (Weisman 2001). At the same time, consumers are protected because prices do not vary with the firm's reported costs.

Actual price cap regulation, however, is not as straightforward as the theoretical case. Price caps do not last indefinitely. It is standard for a price cap mechanism to be reviewed after a stipulated period, often three to five years. Such a review could lead to a revision of the basic parameters of the price cap formula (such as the X factor). If a firm realizes strong earnings under the initial regime, the review could also lead to more demanding standards being placed on the firm by raising the X factor (table 2.3).

Moreover, unless prohibited by law, the regulator could conduct a full earnings audit to recalibrate prices so that expected future earnings move toward a target rate of return. So, while the firm's earnings do

Table 2.3 X factor Decisions in U.K. and U.S. Telecommunications Regulation, 1984–Present

(percent)

United Kingdom		United States	
Year	X factor	Year	X factor
1984–89	3.0	1991–94	3.3
1990–91	4.5	1995–97	3.3–5.3
1992–93	6.25	1998–2000	6.5
1994–97	7.5		
1998–present	4.5		

Source: Ros (2001).

not directly affect prices under a pure price cap regime, most price cap plans include provisions for adjusting prices if the rate of return falls outside a given range (Braeutigam and Panzar 1993).

When strong efficiency gains cause an increase in future productivity offsets, it dulls the firm's incentives to cut costs and improve performance. This reduction in incentives becomes more pronounced if the price cap regime is reviewed more frequently. Still, the regulator is not supposed to intervene in the firm's pricing decisions during the review period—implying that the firm has an incentive to cut its costs faster than was envisaged when the X factor was set, because by doing so it can keep the resulting high profits.

It also implies that in setting the period between price reviews there is a tradeoff between providing incentives for efficiency (supply-side efficiency goal) and reducing excess profits (rent extraction goal). The longer is the period, the greater are the benefits for the firm. The shorter is the period, the greater are the benefits for consumers (because they do not benefit from cost reductions until the price cap is reset). Very short periods would make the price cap system look like rate of return regulation. There are grounds for expecting a ratcheting-up effect in the price cap system: as the end of the review period approaches, the firm will ease off its cost-reducing activities so that the reset caps will reflect its higher costs. Empirical evidence supports this conjecture. In Chile's electricity system, for example, the cost reductions of distribution companies (which operate under a price cap regime) are U-shaped. Strong initial cost reductions reverse every four years, coinciding with the timing of regulatory reviews (Di Tella and Dyck 2002).

Price caps offer regulators a variety of choices. Which services will be subject to a price cap? Which services will be used to construct the price index? Will certain cost increases be automatically passed on to consumers, and if so, to what extent? Different utilities will require different designs, so introducing price cap regulation can be costly in terms of information requirements and human capital. Still, this approach has sufficiently desirable properties—in terms of lowering prices and reducing regulatory costs—to be worth the setup costs.

Hybrid Regimes

Box 2.9 Hybrid Regulatory Mechanisms

MOST PRACTICAL REGULATORY SYSTEMS INVOLVE aspects of cost-plus and price cap mechanisms. Examples of these hybrids include:

- *Banded rate of return.* A range (band) of earnings is specified, and prices are set to generate earnings that fall within the range. Prices are not revised as long as earnings fall within the band.
- *Sliding scale profit- or cost-sharing.* Prices are automatically adjusted if the firm's rate of return differs from a preset target. But to encourage efficiency, the adjustment is only partial. Thus

the firm and its customers share both risks and rewards. Alternatively, the rate of return can vary within a preset range without causing price adjustments. If the return falls outside the range, it can trigger profit (or cost) sharing.

- *Institutionalized regulatory lag.* Price reviews do not occur for a specified period, usually two to five years. During that time all investigations into the firm's earnings are suspended. Whereas the time between price reviews can vary significantly under traditional rate of return regulation, it is known and fixed under institutionalized regulatory lag.

Pure cost-plus and pure price cap mechanisms represent opposite regulatory extremes. Practical considerations and multiple regulatory objectives imply that neither is likely to be the most feasible or desirable regulatory scheme. Each trades incentives for rent extraction (with weight placed on consumer surplus) against those for supply-side efficiency (with weight placed on producer surplus), with cost-plus regulation focused on rent extraction and price caps focused on supply efficiency. The optimal balance between these two goals depends, among other factors, on the cost of public funds. It is best to place the entire weight on supply efficiency only when the marginal social cost of taxation is zero—a condition that will never be met (Ergas and Small 2001).

Most practical regulatory regimes are hybrid schemes that involve tradeoffs between supply-side efficiency, capital attraction, rent extraction, and demand-side efficiency (box 2.9). These mechanisms aim to share cost benefits and burdens between the regulated firm and its customers. For example, under some profit sharing mechanisms the firm is allowed to keep all profits as long as the rate of return (revenue) falls within a specified range. That approach retains incentives for firms to achieve cost efficiency. But if the rate of return falls outside this range, consumers receive a portion of the gain or loss—weakening the firm's incentives. Overall, incentives for cost efficiency are stronger under such profit-sharing schemes than under rate of return regulation, but

Table 2.4 Features of Rate of Return and Price Cap Regulation

Feature	Rate of Return	Price Cap
Sensitivity of prices to costs	High	Low
Firm's flexibility to adjust prices	Low	High
Regulatory discretion	No	Yes
Regulatory lag	Short	Long

Source: Armstrong and Sappington 2003.

weaker than under price caps. Similarly, institutionalized regulatory lag restores some of the incentives for cost efficiency lost under rate of return regulation. But an institutionalized lag does not provide firms with ideal incentives for investment.

Choosing between Rate of Return and Price Cap Regulation

From a public policy perspective, the choice between rate of return and price cap regulation is an empirical question. Textbook models of pure cost-plus and pure price cap regulation differ substantially in terms of regulatory discretion, the links between prices and costs, the pricing flexibility granted to the regulated firm, and the frequency of regulatory review (table 2.4). But in practice there has been significant convergence between the two schemes. Thus the choice between them is not nearly as clear-cut as once thought.

Comparative linking of prices to costs. One area where the difference between the two mechanisms has been exaggerated is the extent to which they link prices to costs—and hence their different implications for the tradeoff between incentives for supply-side efficiency and rent extraction. Under price cap regulation, prices are not linked to costs, and incentives for lowering costs are strongest if the cap is never reset. But that approach is politically untenable if the regulated firm earns extremely high profits at any point.

Moreover, nearly every price cap regime is periodically updated at preset intervals. Regulators typically use these updates to eliminate excessive returns and to pass on to consumers (through lower prices) a

portion of the efficiency gains the firm made in the previous period (Cowan 2002). Even if political considerations are discounted, when setting a price cap the regulator has to forecast future costs and revenues to ensure that the firm will be financially viable. Otherwise, having no link between prices and costs could bankrupt the firm and disrupt service (Ergas and Small 2001). Price cap regulation with periodic updates is similar to rate of return regulation with regulatory lag.

Under a price cap the rate at which prices vary over time is fixed for several years. Thus the regulatory lag is supposed to be exogenous and long. But price cap reviews are often initiated ahead of schedule.

Cost-plus (rate of return) regulation, on the other hand, never involves ongoing hearings. The process typically involves periodic reporting of profits and other service measures. Hearings are initiated by firms, regulators, or interested third parties, with firms being the most common source of requests. Inflation is an important determinant of the frequency of reviews: when inflation is low, reviews are infrequent (Joskow 1974). Regulators can schedule automatic reviews every three to five years—for example, the rate of return regime established in 2000 for Bolivia’s water sector uses a five-year regulatory lag (McKenzie and Mookherjee 2003).

Comparative pricing flexibility. In theory price cap regulation controls only the firm’s average prices, leaving it free to change individual prices in each basket of services. By contrast, prices are rigid under rate of return regulation. But in practice the difference between the two schemes is not as pronounced. In addition to its overall price controls, price cap regulation often limits price changes for individual services. With separate baskets and basket-specific restrictions, price increases in one basket might not be allowed even if they are offset by reductions in another basket. These types of restrictions can severely limit a firm’s pricing flexibility under price caps. Moreover, under cost-plus regulation firms have some flexibility in pricing noncore services (those not involved in universal service programs). They often also have the authority to cut prices and to raise them through automatic adjustment formulas.

Still, despite the convergence between the two regimes, important differences remain in terms of pricing flexibility. If all conditions are satisfied, proposed price changes are put into effect faster under price

caps—an issue of crucial importance to regulated firms facing new competitors.

Cost-plus regulation is better for sectors with large investment requirements and countries with weak commitment capacity

Price caps might be preferable in countries with poor accounting and auditing, scarce expertise, and high inflation

Comparative regulatory discretion. Price cap reviews give regulators significant discretion over future policies. In infrastructure industries—where asset lives are much longer than the typical regulatory lag—concerns about regulatory credibility and uncertainty about future prices can inhibit investment. These problems can be especially serious if governments have limited capacity to commit to long-term regulatory rules.

By contrast, under a rate of return regime the regulator has a statutory obligation to ensure that the regulated firm earns a fair return (Armstrong and Sappington 2003). This commitment implies that rate of return regimes are less prone to renegotiation than price caps. Evidence supports this view: in Latin America 38 percent of price cap contracts were renegotiated before their scheduled reviews (which usually occur five years after a contract is awarded), compared with 13 percent for rate of return contracts and 24 percent for hybrid mechanisms (Estache, Guasch, and Trujillo 2003). Thus rate of return regulation can be preferable if significant new infrastructure investment is needed—as is usually the case in developing and transition economies. Moreover, in uncertain environments guaranteed returns are more attractive for potential investors.

Comparative information and human capital requirements. Most developing and transition economies do not have well-established cost accounting and auditing systems. And as noted, they often lack regulatory expertise. Thus the information and human capital requirements of different regulatory mechanisms are important. Given typical inflation rates in these countries, hearings could be common under rate of return regulation. At the end of each review period, price caps require similar information as rate of return systems. They also require forecasts of relevant variables through the next review. So, setting up and revising price caps requires the same type of professional skills as a rate of return system. But far less professional input is required between reviews: the regulator only has to verify compliance with the price cap by monitoring changes in a well-defined price index. Thus price caps will likely require much less information overall.

The choice in practice. The optimal choice among regulatory mechanisms depends on a variety of factors: the quality of accounting and auditing systems, the availability of economic and technical expertise, the efficacy of the tax system, the sector's investment requirements, the government's commitment powers, institutional checks and balances, and overall macroeconomic stability. Some of these will change over time. For example, auditing systems and expertise will likely improve if sufficient resources and independence are provided—making it possible to adopt more sophisticated regulation (Joskow 1998b).

Thus different stages of national development have implications for the choice of regulatory regimes. During the first stage of regulation, with scarce expertise and poor auditing and monitoring, price caps with provisions for adjustment are likely the best choice.¹³ Initial prices might need to be high to attract capital and ensure firm viability, but increased investment and supply-side efficiency should compensate for them. This stage should be used to improve regulatory capacity and accounting and auditing systems.

Once these conditions have been met, the second stage can promote cost-plus mechanisms that facilitate large-scale, sustainable investment—especially if government credibility improves at a slower pace—and achieve the rent extraction goal in the face of continuing high costs of public funds. As development continues, with infrastructure system expansion nearly complete and enhanced commitment powers, the optimal solution is to move to hybrid regulation (Laffont 1996). Once infrastructure systems have been developed, firms can do better by being less efficient (padding their costs). Hence the need for more powerful incentive schemes.

Most evidence on performance under different regulatory mechanisms comes from industrial countries. In telecommunications, competition and incentive regulation together spur lower costs and prices, but incentive regulation alone often has limited effects (Sappington 2002). An international comparison found that price cap regulation exposes firms to much higher risk than rate of return regimes, increasing their cost of capital (Alexander, Mayer, and Weeds 1996). And in Latin America price caps have led to higher capital costs (and so tariffs) and reduced investment (Estache, Guasch, and Trujillo 2003).

Price cap regulation is better for industries with excess capacity supported by institutions with strong commitment powers

Moving toward More Practical Regulation

DESIGNING EFFECTIVE REGULATION IN DEVELOPING AND transition economies is a daunting task for several reasons. Some are endemic to infrastructure regulation everywhere, while some are driven by the complexities of underdevelopment.

In the face of scarce technical expertise, severe information problems, weak accounting and auditing, limited separation of powers, lack of checks and balances, ineffective legal systems, widespread corruption, and poor commitment, adopting many aspects of U.K. and U.S. regulatory models will prove challenging for developing and transition economies. Most of these countries are poorly suited to the complex procedures required by quasi-judicial, command-and-control regulatory techniques.

Moreover, regulatory methods have very different implementation costs. Given the limited expertise in most developing and transition economies, it is crucial that these resources be allocated efficiently by:

- Exploiting all opportunities for competitive restructuring that might reduce the need for regulatory intervention.
- Isolating activities that require regulatory oversight from those that should be left to market forces.
- Identifying second- or even third-best regulatory instruments that demand less information but are better suited for countries with limited capacity.

International Benchmarking

Regulators in many developing and transition economies face severe problems measuring pertinent economic variables. The true economic costs of various infrastructure services are especially difficult to estimate, for several reasons. First, the costs reported by incumbents (former state-owned and often bloated monopolies) are unlikely to be efficient, and there are good reasons to believe that their technologies are not proper measures of forward-looking costs (that is, the costs of expanding services using currently available technologies).

Second, especially in economies undergoing a transition to a market economy, accounting costs are often largely fictitious because they reflect nonmarket valuations of inputs. Many firms do not know their

efficient costs. And even when they do, regulators rarely have access to such information.

Although these measurement difficulties make it extremely difficult for regulators to assess the performance of utilities, they need not result in haphazard regulatory decisions. One way for regulators to ease information problems and determine efficient costs is by using international benchmarks, adjusted to country conditions. (Because the underlying technologies are available in international markets, certain costs should not vary much by country.)

For example, one of the most contentious issues in price cap regulation involves determining the productivity offset (X factor). A variety of benchmarking methods have been used to estimate the X factors (Jamash and Pollitt 2000). Another vexing challenge for regulators is setting access and interconnection charges. In telecommunications several interconnection disputes have been resolved by benchmarking access fees against comparable international markets. For instance, in 2000 Morocco's telecommunications regulator resolved an interconnection dispute between Maroc Telecom (the fixed line incumbent) and Mediatecom (a mobile service provider) through international benchmarking and an analysis of the cost models used by the operators (ANRT 2000). International benchmarking was also used to settle an interconnection dispute in Botswana (Bruce and Macmillan 2002).

International benchmarking can be invaluable in assessing the scope for efficiency gains and the pace at which service providers in developing and transition economies could achieve those gains. In some countries it might be the only practical tool. Still, benchmarking raises methodological issues that must be considered before it is applied for regulatory purposes. First, utilities from different countries vary greatly in terms of size and operate under different regulations and ownership structures that affect incentives and distort production decisions. Thus the selection of countries included in a benchmark sample is of critical importance. Second, benchmarking makes companies "guilty until proven innocent" because it implicitly assumes that high costs are due to inefficiency (Shuttleworth 1999). Thus no matter how sophisticated its techniques, benchmarking can be subjective, lack transparency, foment disputes, and put utilities at financial risk (Ivistorza 2003).

Multinational Regulatory Authorities

The market areas of infrastructure industries often transcend national borders. For example, electricity, telecommunications, and transportation operate more efficiently if their networks are organized according to the patterns of their transactions. Thus regulation in these sectors rarely has purely domestic effects. International agreements about regulation and the creation of multinational regulatory authorities would help achieve regulatory harmonization and minimize distortions from national regulation (Noll 2000b).

Some regions contain many countries that are small or poor and lack formal institutions and technical expertise. A pragmatic response to this limited national capacity would be to increase policy and regulatory coordination and cooperation—and ultimately to create regional (multinational) regulatory authorities (Noll 2000c; Stern 2000). Furthermore, multilateral regulatory agreements could advance domestic reform, enhance credibility, and help countries overcome commitment problems.

In individual countries regulatory reform, especially when debated one issue at a time, is often blocked by well-organized interest groups. But if reform becomes part of a broader international policy that covers a range of issues, all stakeholders will likely participate—making it harder for a single group to block it. Moreover, regulatory credibility is often undermined by political interference and opportunistic behavior. It is much more difficult and costly for governments to behave opportunistically when regulatory policy is part of an international agreement, or to interfere in the decisionmaking of a supranational regulator. In addition, regional cooperation may generate large enough gains to discourage deviations from negotiated agreements.

Regional regulatory cooperation and the eventual creation of a regional regulator will be more feasible in countries that have had a fair amount of success in regional economic integration. For example, the Pacific Islands Forum Secretariat has helped harmonize economic policy among countries in the region (Fiji, Kiribati, Samoa, the Solomon Islands, Vanuatu), including consensus on the role of the private sector. A regional approach to infrastructure regulation might be a natural next step. Regional regulatory policy might also be a logical move in:

- Sub-Saharan Africa, where cooperation was achieved in the sensitive area of monetary policy through the creation of the West African Monetary Union.

Box 2.10 African Cooperation on Telecommunications Regulation

IN 2001, 21 NATIONAL TELECOMMUNICATIONS agencies formed the African Telecommunications Regulators Network to:

- Promote telecommunications modernization and regulatory reform as prerequisites for the development of Africa's information society.
- Increase cooperation on telecommunication regulation.
- Harmonize national regulation to foster economic integration.
- Coordinate national approaches to achieve greater efficiency in international forums.
- Exchange information and experiences among regulators and between regulators and other pub-

Source: ITU (2001e).

lic and private entities engaged in information and communications technology activities in Africa

The network's activities include:

- Exchanging officials, technical staff, and experts between members.
- Organizing seminars and workshops on issues such as accounting, e-commerce, the Internet, and pricing.
- Conducting studies on telecommunications harmonization and economic integration.
- Maintaining a Website and promoting online discussions.
- Collecting, disseminating, and benchmarking data.

- The Caribbean, building on the framework of the Caribbean Community.
- South America, based on the Southern Common Market (Mercosur).

Regional regulatory initiatives are under way in several parts of the developing world; examples include the South Asia Forum for Infrastructure Regulation, Regional Electricity Regulators Association and Southern African Power Pool in Southern Africa, and African Telecommunications Regulators Network (box 2.10). The objectives of these initiatives range from designing training, building capacity, and sharing information to more ambitious goals of coordinating and harmonizing national regulatory policies and practices.

Obtaining consensus from all governments in a region for a regional regulator is problematic due to different attitudes and commitments toward reform, as well as concerns about national sovereignty. It requires considerable cooperation and trust between countries—more than now exists in most parts of the world. Thus regional regulatory cooperation might be a more realistic option for alleviating scarce regulatory expertise and resources, especially in small and low-income countries (Stern 2000).

As a first step, regional regulatory advisers could be established to facilitate information exchange and offer nonbinding advice on procedural issues (such as dispute resolution) and matters such as standardization, interconnection, and pricing and costing methodologies. But consensus for multinational regulatory agencies could increase as more countries reform, gains from regional policy coordination and trade become more apparent, and countries (especially small ones) confront the costs and staffing challenges of creating and maintaining national regulators.

Decentralizing Decisions to Firms

In many developing and transition economies the pursuit of pricing and other regulations to elicit optimal industrial performance is hindered by a dearth of proper accounting systems and of information on marginal costs, demand elasticities, and other attributes of demand and cost relationships. Under the traditional command-and-control regulatory model, prices calculated without such information are apt to be inconsistent with economic efficiency and damaging to economic welfare. The information available to firms is also highly imperfect in many developing and transition economies. Still, firms will likely have better, more timely estimates of cost and demand conditions than will regulators (Baumol and Sidak 1994).

How can regulation in these countries have a realistic chance of becoming effective in the face of severe information problems? One approach would be to decentralize decisions on pricing and other key variables to firms that have the necessary information. Regulators' role would be limited to imposing floors and ceilings on prices, based on a rough analysis of costs or international benchmarks. Firms would be free to set prices within these ranges, with self-interest leading to prices that serve the public interest. Such a framework could enable infrastructure providers to earn adequate revenue while protecting consumers from monopolistic pricing.

Infrastructure entities can earn high profits if they are given considerable pricing flexibility and are not tightly regulated. They will have strong incentives to provide services to those who can afford to pay their prices—and so will resolve the problem of unavailable services for large portions of the population in developing countries. Moreover, to the extent that these firms enjoy large profits from increased usage, they

will also have powerful incentives to eliminate the quality of service problems that plagued state-owned infrastructure monopolies (Noll 2000c).

Notes

1. The distinction between developing and transition economies is important here. Many developing countries have experience with legal institutions to support a market economy, though they may not have experience with regulating private utilities.

2. Notable examples of not getting the fit right include the Philippines, where in the face of a weak judiciary the adoption of the quasi-judicial U.S. model in the telecommunications and energy sectors led to significant regulatory failure (Smith and Wellenius 1999); and Jamaica, where the creation of a U.S.-style Public Utility Commission without the constitutional protections and well-developed rules of administrative due process prevalent in the United States led to regulatory instability that culminated in the nationalization of telecommunications in 1975 (Levy and Spiller 1996).

3. The most important features of U.S. regulatory institutions have been judicial review, constitutional protections against taking private property, and sound, transparent administrative procedures. Countries without these basic protections will have a hard time creating credible, durable regulatory institutions.

4. Open hearings are a U.S. regulatory tradition that is not widely practiced. Perhaps a more important issue is whether stakeholders have an opportunity to submit comments and the regulator responds to them.

5. Although the commission members refused to comment on their removal, one said that it was not his place to criticize the decisions of his superiors (East European Energy Report, June 2000).

6. In India in 1997, for example, lack of investor interest in the Haryana Power Project was exacerbated by the fact that other Indian states were competing for a small pool of international investors. As a result Haryana decided to provide an attractive regulatory environment, taking into account the privatization plans of other states. Part of Haryana's strategy was to reduce the financial exposure of the private sector by redesigning the privatization contract. Such an approach could have adverse long-term consequences if it transfers financial risk to the state government (World Bank 1997; Bayliss 2001).

7. Regulation could also achieve average cost pricing, but with much higher information requirements. To achieve average cost pricing, the regulator would need to have access to and analyze cost and demand data. Under

franchise bidding no such information and analysis are required—competition, rather than a regulatory determination, leads to average cost pricing and the selection of the most efficient firm.

8. But if the contract is incomplete, there is uncertainty about how the adjudicator (even a high-quality one) will decide the case—and it is precisely this leeway that permits opportunistic renegotiation. Still, this might be less of a problem in industrial countries because contracts are more fully specified, for some long-term supply contracts market prices act as a reservation value and so reduce the bargaining range, there may be less uncertainty about initial conditions, and the parties may be repeat players.

9. In a credible institutional environment, frequent renegotiation should not undermine performance any more than does frequent regulatory review.

10. There is some empirical evidence, however, that such underbidding is held in check by the desire of franchisees to maintain reputation (Zupan 1989).

11. A careful reading of history renders this finding unsurprising. After all, in many countries it was the failure of concessions that led to state ownership or regulated monopolies. In Europe, Japan, Latin America, and the United States many infrastructure services started as private concessions operating under contracts that ultimately failed. Moreover, the precise definition of renegotiation is important. If it includes any change to a contract that requires a contract amendment, frequent renegotiation in the early years is to be expected.

12. Poor regulation arguably has the same causes as frequent contract renegotiation. Thus there is a need for caution in drawing causal inferences from the observed correlation between the high incidence of concession renegotiation and weak regulatory governance.

13. Cost-plus mechanisms generally perform better than price caps in the presence of cost uncertainty and uncertainty about the capabilities of the regulated firms (Schmalensee 1989). However, during the first stage of regulation in many developing and transition economies, auditing and monitoring are likely to be so poor that a simple adjustment mechanism under price caps would still be the preferred option.