

Reforming Infrastructure

Privatization, Regulation,
and Competition

**A World Bank
Policy Research Report**

Reforming Infrastructure

Privatization, Regulation,
and Competition

Ioannis N. Kessides

A copublication of the World Bank
and Oxford University Press

© 2004 The International Bank for Reconstruction and Development / The World Bank
1818 H Street, NW
Washington, DC 20433
Telephone 202-473-1000
Internet www.worldbank.org
E-mail feedback@worldbank.org

All rights reserved.

1 2 3 4 07 06 05 04

A copublication of the World Bank and Oxford University Press.

This volume is a product of the staff of the World Bank. The findings, interpretations, and conclusions expressed herein do not necessarily reflect the views of the Board of Executive Directors of the World Bank or the governments they represent.

The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Rights and Permissions

The material in this work is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The World Bank encourages dissemination of its work and will normally grant permission promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA, telephone 978-750-8400, fax 978-750-4470, www.copyright.com.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, World Bank, 1818 H Street NW, Washington, DC 20433, fax 202-522-2422, e-mail pubrights@worldbank.org.

Library of Congress Cataloging-in-Publication Data

Reforming infrastructure : privatization, regulation, and competition.

p. cm. — (A World Bank policy research report)

Includes bibliographical references.

ISBN 0-8213-5070-6

1. Public utilities. 2. Privatization. 3. Public utilities—Government policy.
4. Infrastructure (Economics) I. World Bank. II. Series.

HD2763.R427 2004

363.6—dc 22

2004043841

Cover photos (clockwise from top left): © Adrian Lyon/Getty; World Bank Photo Library; © Corbis; World Bank Photo Library
Cover designed by Richard Fletcher of Fletcher Design

Contents

Foreword **xi**

The Report Team **xv**

Executive Summary **1**

State-owned Monopolies Often Exhibited Poor Performance . . .	2
. . .Leading to a New Model for Financing and Providing Infrastructure	3
The New Model Poses Risks—But Also Holds Considerable Promise	4
What Effects Have Reforms Had?	9
Developing Good Regulation Remains a Major Challenge	17
Many Prices and Subsidies Still Require Reform	19
An Agenda for Action—From Institution Building to Policymaking	21

1. The New Paradigm for Network Utilities **29**

Why Are Network Utilities So Important?	29
From State to Market—Changing Views on Utilities	30
The Dawn of a New Utility Model	35
Framework for Assessing Reforms and Regulations	42
Recent Experiences with Privatization and Reform— Promises and Perils	51
Second Generation Reforms—Choices and Challenges	63

2. Crafting Regulation for Privatized Infrastructure **79**

The Emergence of Post-Privatization Regulation	79
The Evolution and Elements of Effective Regulation	81
The Structure of Regulatory Institutions	95
The Importance of Regulatory Commitment	100
Getting the Economics Right	110
Mechanisms to Regulate Prices	112
Moving toward More Practical Regulation	123

3. Restructuring Electricity Supply	131
Background to Electricity Reform	132
Addressing the Problems of State Ownership	141
Regulatory Challenges	158
Reform Experiences and Lessons	167
4. Managing Private Participation in Transportation	183
Railroads: Restructuring Regulation for the Public Interest	184
Ports: Alternatives for Organizing a Multiproduct Activity	205
5. Reforming the Water Sector	219
Economics of Water Supply	220
Options for Competition and Market Structure	227
Choosing Regulation	235
Reform Experiences and Lessons	252
6. An Agenda for Action	259
Assessing Reform's Effects on Performance and Distribution	260
Pricing Reform—Balancing Efficiency and Equity	269
Facilitating Access to Bottleneck Facilities	275
References	279
Boxes	
1.1	Milestones in Infrastructure Reform in the United States, the United Kingdom, and the European Union 32
1.2	The Technological Revolution in Telecommunications 40
1.3	Power Generation in Brazil Shows That Privatization Is Not Always the Best Approach 43
1.4	Disadvantages of Vertical Separation 48
1.5	Prerequisites for Effective Privatization 58
1.6	Using Competition Policy to Avoid Regulatory Capture 69
1.7	Telmex's Market Power in the Internet Market 70
1.8	Consumer Participation in Colombia's Rulemaking 76
2.1	Regulation in Argentina—Repeating U.S. Mistakes 82
2.2	Recent Shortcomings and Achievements in Infrastructure Regulation 84
2.3	Decentralized Water Services in Mexico and Morocco 98
2.4	Latvia's Public Utilities Regulation Commission 99
2.5	Examples of Allegedly Opportunistic Government Behavior 102
2.6	Regulatory Rigidity in Chile 110
2.7	Cost-Plus Mechanisms 113
2.8	Price Constraints Imposed by Price Cap Plans 116
2.9	Hybrid Regulatory Mechanisms 119
2.10	African Cooperation on Telecommunications Regulation 127
3.1	Rationale for Structural Integration of the Electricity Industry 133
3.2	Power Shortages in the Philippines 137

3.3	Opening the Electricity Market—Photovoltaic Systems in Kenya	141
3.4	Underpricing Undermines Electricity Expansion in Zimbabwe	143
3.5	Stranded Power Purchase Agreements in Poland	156
3.6	Lessons from California’s Experience	164
4.1	Limited Rail Options Result in Captive Shippers	191
4.2	Examples of Port Services	208
4.3	Organizational Structures of Ports	209
5.1	Water Systems in Small African Towns and Rural Areas	229
5.2	Problems with Service Contracts in Mexico City	230
5.3	Private Sector Transactions in Water and Sanitation	235
5.4	Objectives of Water Tariff Design	237
5.5	An Aborted Attempt at Water Concessioning in Atlanta, Georgia	241
5.6	Creative Management of South Africa’s Commitment to Free Water	247
5.7	Making New Connections Affordable in Buenos Aires	248
5.8	Adapting Quality Standards to Permit Extensions of Low-cost Service in El Alto	249
5.9	Providing Incentives to Extend Service in Côte d’Ivoire	250
6.1	The World Bank Wonders about Utility Privatizations	260
6.2	The Need for Data on Infrastructure Reform	261
6.3	Criteria for Designing Subsidies	267
6.4	Picking Apart Cross-Subsidies	271

Figures

1	In 1990–2001, Latin America and East Asia Received the Most Private Investment in Infrastructure	10
2	Private Investment in Infrastructure in Developing and Transition Countries Peaked in 1997	11
3	Privatized Services Have Increased Access to Safe Water in a Variety of Cities and Countries	12
4	In 1989–94, Privatization Contributed to Faster Growth in Phone Lines in Latin America	13
5	Railway Concessions Sharply Increased Labor Productivity in the 1990s	14
6	In 2000, Electricity Prices Covered a Small Fraction of Long-Run Marginal Costs in Many Transition Economies	15
1.1	Latin America and the Caribbean Has Led Developing Regions in Private Investment in Infrastructure, 1990–2001	34
1.2	The Optimal Size of Power Generating Plants Has Shrunk	39
1.3	There Are Now More Mobile Phone Users Than Fixed Phone Lines	41
1.4	Latin Americans Increasingly Disapprove of Privatization	52
1.5	Privatization Has Led to Rapid Growth in Telecommunications Networks	54
1.6	Private Competition Generated the Fastest Growth in Telecommunications Lines in Latin America	56

1.7	Electricity Prices Often Fail to Cover Costs in Europe and Central Asia, 2000	66
1.8	Despite Liberalization, Entrants into the Local Exchange Account for a Small Share of Latin American Telecom Markets, 2001 Second Quarter	72
2.1	Results from a Survey of Telecommunications Regulators, 2001	93
2.2	Regulatory Indexes for Telecommunications in Latin America, 1980–97	94
3.1	Vertical Integration in Electricity	132
3.2	Customers per Electricity Employee in Selected African Countries, 1998	138
3.3	Projected Costs of Small-Scale Electricity Generation Technologies, 2000–15	139
3.4	The Single-Buyer Model for Electricity	148
3.5	The Wholesale Competition Model for Electricity	150
3.6	Average Ratios of Household to Industrial Electricity Prices, 1990–99	161
3.7	Types of Private Investment in Electricity, by Region, 1990–2001	170
3.8	Top 20 Recipients of Private Investment in Electricity, 1990–99	171
3.9	Post-Privatization Labor Productivity in Electricity Distribution in Argentina, Chile, and the United Kingdom	174
3.10	Energy Losses among Argentina’s Distribution Companies, at Privatization and in 1999	175
3.11	Electricity Coverage in Peru, 1986–97	176
4.1	Railroad Freight in Transition Countries, 1988–2001	185
4.2	Cumulative Investment in Rail Projects with Private Participation in Developing and Transition Countries, 1990–2001	199
4.3	Performance of Class I U.S. Railroads, 1964–2000	200
4.4	Rail Labor Productivity in Argentina, 1974–2000	202
4.5	Cumulative Investment in Port Projects with Private Participation in Developing and Transition Countries, 1990–2001	211
5.1	Winners and Losers before and after Adjustments to a Water Concession in Parana, Argentina	246
6.1	Telephone and Water Access in Urban and Rural Areas of Developing Regions, 1990s	266

Tables

1.1	Private Investment in Infrastructure in Developing and Transition Economies, by Sector, 1990–2001	33
1.2	Noncompetitive and Competitive Components of Network Industries	37
1.3	Exclusivity Periods for Incumbent Telecommunications Operators in Latin America	59

1.4	Access to Infrastructure Services in Urban and Rural Areas of Developing Regions, late 1990s	65
1.5	Average Household Incomes and Energy Tariffs in Ukraine, 1992–98	67
2.1	Ranking of Infrastructure Regulation in Asia, by Sector and Institutional Criteria, 1998	91
2.2	Example of Infrastructure Concessions in Developing and Transition Economies	107
2.3	X factor Decisions in U.K. and U.S. Telecommunications Regulation, 1984–Present	117
2.4	Features of Rate of Return and Price Cap Regulation	120
3.1	Net Electricity Consumption in Industrial and Developing Countries, 1990–2020	136
3.2	Options for the Structure of Electricity Markets	144
3.3	Cash Collection and Commercial Losses for Electricity Companies in Southeastern Europe, 2000	147
3.4	Market Shares of the Three Largest Generation, Transmission, and Distribution Companies in Various Countries, 2000	163
3.5	Electricity Reforms by Region, 1998	168
3.6	Private Investment in Electricity by Region, 1990–99	169
4.1	Market Structure and Ownership Options in Railroads, Various Countries, 2001	196
4.2	Rail Freight Tariffs in the Initial Years of Concessions and in 1999, Various Countries	203
4.3	Operating Performance of Ports in Colombia before and after Reforms, 1993 and 1996	212
5.1	Ratios of Prices Charged by Water Vendors and Public Utilities	222
5.2	Institutional Options for Water Supply	228
5.3	Initial Conditions and Reforms in Six Water Systems	253
5.4	Effects of Reforms on Access and Waste in Six Water Systems	255

Foreword

INFRASTRUCTURE INDUSTRIES AND SERVICES ARE CRUCIAL FOR generating economic growth, alleviating poverty, and increasing international competitiveness. Safe water is essential for life and health. Reliable electricity saves businesses and consumers from having to invest in expensive backup systems or more costly alternatives, and keeps rural women and children from having to spend long hours fetching firewood. Widely available and affordable telecommunications and transportation services can foster grassroots entrepreneurship and so are critical to generating employment and advancing economic development.

Recognizing infrastructure's importance, many countries have implemented far-reaching reforms over the past two decades—restructuring, encouraging private participation, and establishing new approaches to regulation. This report identifies the challenges involved in this massive policy redirection within the historical, economic, and institutional context of developing and transition economies. It also assesses the outcomes of policy changes and suggests directions for policy reform and research to improve infrastructure performance.

In most developing and transition economies, private participation in infrastructure and restructuring have been driven by the high costs and poor performance of state-owned network utilities. Under state ownership, services were usually underpriced, and countries often could not afford the substantial investments required to expand services to large parts of their populations. Deficiencies in infrastructure quantity and quality imposed a heavy penalty in terms of growth and welfare.

Although privatization, competitive restructuring, and regulatory reforms improve infrastructure performance, several issues must be considered and conditions met for these measures to achieve their public

interest goals. There is no universal reform model; every restructuring and private participation program must take into account the sector's features and the country's economic, institutional, social, and political characteristics. Telecommunications offers perhaps the most compelling case for privatization, and in many transportation segments—railways, ports, trucking, airlines, interurban busing—competition within and between modes is often sufficient to justify aggressive liberalization. However, the case for privatizing transport network facilities is much less compelling. Electricity is more dependent on administrative ability and therefore quite challenging, but not more so than telecommunications. And the scope for introducing competition in water supply is more limited than in other network utilities (although there are opportunities to introduce competition in sewage treatment).

While the links between infrastructure reforms and subsequent performance are complex, several conclusions can be drawn. First, reforms have significantly improved performance, leading to higher investment, productivity, and service coverage and quality. Prices have become better aligned with underlying costs. And services have become more responsive to consumer and business needs and to opportunities for innovation.

Second, effective regulation—including the setting of adequate tariff levels—is the most critical enabling condition for infrastructure reform. Protecting the interests of both investors and consumers is crucial to attracting the long-term private capital needed to secure adequate, reliable infrastructure services and to getting social support for reforms. Regulation should clarify property rights, allocate them sensibly, and assure private investors that their investments will not be subject to regulatory opportunism. Crafting proper regulation is the greatest challenge facing policymakers in developing and transition economies.

Third, for privatization to generate widely shared social benefits, infrastructure industries must be thoroughly restructured and able to sustain competition. The benefits from privatizing infrastructure monopolies are much smaller than those from introducing competition. It is often hard or costly to change structural choices—such as the degree of vertical and horizontal integration—after privatization. Thus restructuring to introduce competition should be done before privatization, and regulation should be in place to assure potential buyers of both competitive and monopoly elements.

There is a clear discrepancy between scholarly assessments and public perceptions of privatization. In recent years the alleged failures of pri-

vatization have led to street riots, skeptical press coverage, and mounting criticism of international financial institutions. Concerns are increasingly being expressed about the distributional consequences of privatization and market liberalization—especially their effects on basic services for poor households and other disadvantaged groups.

The critics are right in pointing out the cases where privatization was undertaken without institutional safeguards and conducted in ways widely considered illegitimate. Thus there is an urgent need for more comprehensive welfare assessments of infrastructure reforms and for both retrospective and forward-looking analyses to clarify the successes and failures associated with reforms and to identify better instruments and policies to guide ongoing and future efforts. In addition, extensive information is required to analyze the links between specific policy reforms and infrastructure outcomes, including their distributional dimensions. Because comprehensive data on distributional dimensions of costs and benefits are currently unavailable, it is imperative that a systematic cross-country data collection effort be undertaken.

In sum, infrastructure restructuring, privatization, and regulatory reform offer substantial potential benefits for governments, operators, and consumers. And there is sufficient experience to guide these institutional reforms. Still, they should not be pursued blindly in a specific country or industry without carefully assessing the institutional and structural prerequisites and without explicit attention to the concerns they raise.

François J. Bourguignon
Senior Vice President and Chief Economist
The World Bank

Michael U. Klein
World Bank–IFC Vice President,
Private Sector Development
and Chief Economist,
International Finance Corporation

Nemat Talaat Shafik
Vice President and Head of Infrastructure Network
The World Bank

March 2004

The Report Team

THIS POLICY RESEARCH REPORT WAS WRITTEN BY IOANNIS Kessides (Lead Economist, Development Research Group) under the supervision of François Bourguignon (Senior Vice President and Chief Economist) and David Dollar (Senior Adviser), with guidance from an advisory board comprising Paul Joskow (Massachusetts Institute of Technology), Michael Klein (World Bank–IFC Vice President and Chief Economist, IFC), David Newbery (University of Cambridge), and Roger Noll (Stanford University).

Extremely helpful comments on earlier drafts were provided by peer reviewers Antonio Estache, Luis Guasch, and Bernard Tenenbaum, as well as by many others including Ian Alexander, Mark Armstrong, Varadarajan Atur, Nancy Benjamin, John Besant-Jones, Harry Broadman, George Clarke, Shantayanan Devarajan, Janet Entwistle, Indermit Gill, Philip Gray, Kenneth Gwilliam, Luke Haggarty, Jonathan Halpern, Aira Htenas, Gregory Ingram, Philip Keefer, Christine Kessides, Frannie Leautier, Ira Lieberman, Laszlo Lovei, Abel Mejia, Richard Messick, Pradeep Mitra, Gobind Nankani, Paul Nounba Um, Takis Papapanagiotou, Luiz Pereira Da Silva, S. Ramachandran, Hossein Razavi, Jamal Saghir, Luis Serven, Zmarak Shalizi, Mary Shirley, Peter Smith, Warrick Smith, Jon Stern, Helen Sutch, Louis Thompson, Lee Travers, Cecilia Valdivieso, Jos Verbeek, Scott Wallsten, Bjorn Wellenius, and Colin Xu. The author is also grateful for the excellent work of Paul Holtz, who edited the report; Polly Means, who managed the art files; Dimitrios Mantoulidis and Periklis Saragiotis, who provided research assistance; Paulina Sintim-Aboagye, who processed the report; and those involved from the Office of the Publisher of the World Bank—Susan Graham, Stuart Tucker, and Monika Lynde—for their management of the book production process.

The findings, judgments, and conclusions expressed in this report do not necessarily reflect the views of the World Bank, its Board of Executive Directors, or the countries they represent.

Executive Summary

FOR MUCH OF THE 20TH CENTURY AND IN MOST COUNTRIES, network utilities—electricity, telecommunications, railroads, water supply, natural gas—were vertically and horizontally integrated state monopolies under ministerial control.¹ Infrastructure’s enormous economic importance, a desire to protect the public interest in industries supplying essential services, and concerns about private monopoly power led governments to conclude that control over these services could not be entrusted to the motivations and penalties of free markets. Governments also believed that, given the large investments involved, public resources were required to increase infrastructure coverage. Accordingly, a single public entity usually controlled every aspect of a utility—facilities, operations, and administration—and determined which services to provide to essentially captive customers.

The past decade has seen dramatic change in views about how network utilities should be owned, organized, and regulated. The new model calls for increased reliance on private infrastructure to improve efficiency, promote innovation, and enhance services. But after a series of financial crises, corporate scandals, and stock market collapses, the California electricity crisis, and blackouts around the world, clear guidance is needed on what should be done for infrastructure—as well as reassurance about (or qualifications of) earlier, more confident messages. What are the promises and perils of the new model? And what principles should guide future efforts to restructure, regulate, and expand infrastructure?

State-owned Monopolies Often Exhibited Poor Performance...

THE PERFORMANCE OF STATE-OWNED INFRASTRUCTURE monopolies varied considerably across countries. In many developing and transition economies these entities suffered from low labor productivity, deteriorating fixed facilities and equipment, poor service quality, chronic revenue shortages and inadequate investment, and serious problems of theft and nonpayment. In addition, large portions of the population lacked services in developing countries—though not in transition economies, many of which achieved fairly high service coverage. Moreover, prices varied considerably across sectors. In telecommunications they were typically high, while underpricing was common in electricity and certain segments of transportation, and especially serious in water.

Infrastructure performance was generally much better in advanced industrial countries. Still, high construction costs (caused by delays and changing environmental and safety requirements) and expensive, politically driven programs led to problems in the electricity sector. State-owned telecommunications entities were forced to adopt inefficient pricing structures and were used to generate revenue for governments and support excessive employment—delaying investment and modernization and undermining efficient operations and universal service. In almost all countries railroads failed to earn adequate revenue, had difficulties adjusting to changes in markets, experienced declining market shares for passenger and freight traffic, and exhibited poor productivity relative to technological opportunities.

In developing and transition economies a main cause of deteriorating infrastructure performance was underinvestment, which was largely due to the failure of governments to prescribe cost-reflective tariffs, especially during periods of high inflation. Under state ownership, prices fell to levels that could not cover the investment needed to meet growing demand. This problem was deferred as long as governments were able to provide subsidies and international financial institutions were willing to bail them out. But years of underfunding and failure to address systemic problems led to a significant infrastructure deficit in the developing world, generating substantial welfare losses. Infrastructure inefficiencies constrained domestic economic growth, impaired international competitiveness, and discouraged foreign investment.

Underinvestment—largely caused by underpricing—was the key problem of the state-owned utility model

In the early 1990s, for example, developing countries incurred annual losses of about \$180 billion due to mispricing and technical inefficiency in water, railroads, roads, and electricity—nearly as much as annual investments in these sectors (World Bank 1994b). With growing budget deficits and the resulting inability of governments to maintain and expand infrastructure services, most developing and transition economies simply could not sustain state-owned utilities. Debt and fiscal crises, combined with extraordinarily weak performance, stimulated strong pressures for infrastructure reform.

...Leading to a New Model for Financing and Providing Infrastructure

RECOGNIZING THE PERFORMANCE PROBLEMS OF STATE-owned, monolithic network utilities—and driven by technological progress, advances in economic thinking, and mounting evidence on the high costs of government intervention—nearly all industrial and many developing and transition economies have implemented far-reaching infrastructure reforms. These institutional reforms have entailed a combination of competitive restructuring, privatization, and establishment of regulatory mechanisms.

Because of their financial, technical, and managerial resources, private entities are seen as having a comparative advantage in the rapidly changing markets and technologies of network utilities. Thus rebalancing of the roles of the private and public sectors has been an integral part of every infrastructure reform program. A key attraction of privatization is that it places the realignment of prices with underlying costs at the center of the reform agenda. Investors demand cost-reflective tariffs before they will commit their capital and expand networks.

Moreover, network utilities are no longer seen as monolithic natural monopolies, but rather as encompassing distinct activities with entirely different economic characteristics. Thus most analysts now believe that network utilities should be unbundled, horizontally and vertically, with potentially competitive segments under separate ownership from natural monopoly components:

- In electricity, transmission and distribution should be unbundled from generation.

The monolithic, state-owned utility option is largely a strawman from today's perspective—no one would choose it for the public interest

Competition should be pursued where feasible, and regulation confined to core natural monopoly activities

- In telecommunications, the local loop should be split from long-distance, mobile, and value added services.
- In natural gas, high-pressure transmission and local distribution should be separated from production, supply, and storage.
- In railroads, tracks, signals, and other fixed facilities should be separated from train operations and maintenance.

Under this view, in competitive or contestable segments any interference with market mechanisms should be minimized and privatization and competitive entry should be fully exploited. Only segments where natural monopoly conditions persist and are unavoidable (generally because they involve substantial sunk capital) should be regulated and perhaps operated by the public sector.

The New Model Poses Risks—But Also Holds Considerable Promise

THE GLOBAL WAVE OF INFRASTRUCTURE PRIVATIZATION AND liberalization in the 1990s was a significant departure from previous economic consensus. This departure did more than just question the need for state ownership of network utilities. It also reconsidered—and often replaced—long-standing notions about natural monopolies and related regulatory interventions. As a result it has become widely accepted that the monopoly utility model no longer applies—and perhaps never should have been applied—to all network industries. Moreover, if these industries are properly restructured, substantial competition can emerge in many activities.

Yet today's industrial countries relied on the old, vertically integrated model to develop good infrastructure and have only recently pursued unbundling. So why should developing and transition economies take this new approach? This question is especially relevant given that the new model poses significant risks if not accompanied by appropriate structural and regulatory safeguards.

The simple answer is that the new model, implemented correctly, offers benefits too big to ignore—for governments, operators, and consumers. And there is enough experience to guide its implementation. Still, it should not be pursued in a specific country or industry without carefully assessing its institutional and structural prerequisites and without explicit attention to the concerns it raises.

Institutional reforms—restructuring, privatization, establishment of effective regulation—can significantly improve performance

Unbundling Is No Panacea...

The primary virtue of unbundling is that it promotes competition, ensuring that firms provide their services at efficient prices. Unbundling is likely to be particularly attractive when market size and density permit many operators to function, providing both active and potential competition.

But in many developing countries markets are too small for substantial competition to emerge. In electricity, for example, 60 developing countries have peak system loads below 150 megawatts, another 30 between 150 and 500 megawatts, and possibly another 20 between 501 and 1,000 megawatts. Even a 1,000-megawatt system is small for introducing competition. Thus the benefits of competition that come from unbundling will be limited in many developing and transition economies.

Moreover, provision of many innovative, market-responsive utility services requires investments in physical infrastructure. In unbundled systems it may be difficult for providers of competitive final services to coordinate with monopoly owners of infrastructure networks—especially if their incentives for investments are not in harmony. Thus another factor required for unbundling is a mature, well-developed set of network facilities, so that there is little need for new investments where incentive problems are more likely. Yet circumstances in most developing and transition economies are exactly the opposite. These countries require substantial new infrastructure investments, either because their networks are underdeveloped or because they have not been adequately maintained or modernized (or both).

... And Requires Careful Regulation

Unbundling can reduce the need for regulation by isolating monopoly segments, containing their damaging consequences, and replacing regulation with competition. But even though fewer activities require regulatory oversight in unbundled systems, performance becomes much more sensitive to regulatory efficacy. In fact, some inefficient practices (such as internal cross-subsidies) that were tolerable in a monopoly environment can cause much more damage in the new setting.

To obtain the benefits of unbundling, policies need to harmonize regulatory oversight of monopoly activities with increasing competi-

The competitive advantages of unbundling and the potential economies of vertical integration must be carefully balanced

Regulating unbundled utilities is harder than regulating vertically integrated utilities, and may require aggressive pro-competitive policies

Infrastructure networks offer more opportunities for market manipulation than do ordinary markets. Ensuring efficient entry conditions is challenging

As with all economic elixirs, privatization has been oversimplified, oversold, and ultimately disappointing—delivering less than promised

tion. Otherwise, the interface between bottleneck components (those essential to the provision of final services and too costly to duplicate) and competitive segments can create such severe distortions that the mixed system is the worst of both worlds. Thus unbundling makes the regulatory task more complex, which is likely to be a problem in environments with weak institutional capacity—as in most developing and transition economies.

Privatization Has Been Oversold and Misunderstood

Just a few years ago, privatization was heralded as an elixir that would rejuvenate lethargic, wasteful infrastructure industries and revitalize stagnating economies. But today, privatization is viewed differently—and often critically. Skepticism and outright hostility toward privatization are not limited to a few radical protesters. Opinion polls in several developing and transition economies, especially in Latin America, reveal growing public dissatisfaction with privatization. Disapproval ratings were higher in 2002 than in 2000, and higher in 2000 than in 1998. In 2002 almost 90 percent of Argentines and 80 percent of Chileans surveyed disapproved of privatization.²

Public discontent with privatization has been fueled by price increases, job reductions, and the high profits of firms that have improved operating performance—as well as by economic and political crises that had little to do with government policy toward infrastructure. But these adjustments have been necessary for privatization to achieve its public interest objectives. As noted, inadequate revenue was a key problem of the old model. The choice was either higher prices or more taxation. Higher prices generally fall on those benefiting from services—in many developing countries, the middle and upper classes—while higher taxes are likely to occur partly through inflation taxes that hurt poor people and other vulnerable groups. Thus a sensible, and arguably less regressive, response is to realign prices with costs. That privatization makes such adjustments mandatory—to attract investors—is one of its main appeals.

As for layoffs, state utilities in most developing and transition economies had high excess employment before reforms. Efficiency and competitiveness require eliminating redundant jobs. Efficiency is especially important in infrastructure because such services are critical for manu-

facturing, transportation, and commerce—and so essential to boosting economic activity.

Moreover, the market's primary incentive is the prospect of profits for firms that succeed. So, while preventing monopoly profits is a legitimate goal for public policy, it should not lead to artificial limits on post-privatization profits or restrict such returns based on mechanistic formulas or populist demands. Otherwise, incentives for investment, innovation, efficiency, and productive growth—badly needed in the network utilities of most developing and transition economies—would be undermined or eliminated.

Finally, the role of institutions cannot be overlooked. Most developing and transition economies have suffered from much worse infrastructure performance than have advanced industrial economies. But the structure of ownership has not been the key explanatory variable for the differences in performance. After all, for many years state ownership prevailed in most advanced economies. The true explanation lies in the broader institutional context.

It can be argued that the performance of state-owned network industries reflects a variety of country characteristics both observable and unobservable, including institutional capacity, business culture, nature of organized interest groups, patterns of social conflict, and codes of conduct. It would be unrealistic to expect such features to change on a timescale comparable to that of privatization transactions—or to think that less attractive attributes would disappear overnight.

Strong institutions took a long time to develop even in advanced industrial economies. It is difficult to create such institutions overnight in societies that do not have the constitutional, political, and legal traditions required to support them. Thus achieving the public interest objectives of privatization will take longer than has elapsed since such reforms were introduced in most developing and transition economies. Even in East Asia's "miracle" economies it took several decades of concerted efforts to produce notable results.

Reforms Require Proper Sequencing . . .

It is often hard or costly to change structural choices—such as the degree of vertical and horizontal integration—after privatization. Moreover, the absence of regulation that clarifies the rules of the game for

**Restructure and regulate—
and only then privatize**

potential investors may cause them to demand risk premiums that could later appear unreasonably high and generate public backlash against privatization, possibly leading to policy reversals. So, restructuring to introduce competition should occur before privatization, and regulation should be in place to assure potential buyers of both competitive and monopoly elements. But it is also important to keep options open—and to delay irreversible changes until their benefits outweigh their potential costs. State ownership may be undesirable, but at least it retains the option of well-designed future privatization.

. . . And Each Sector Must Choose Among Imperfect Options

There is no universally appropriate model for restructuring network utilities. And the fact that state ownership is flawed does not mean that privatization is appropriate for all infrastructure activities and all countries. Before state ownership is supplanted by another institutional setup, it is essential to assess the properties and requirements of the proposed alternative—taking into account the sector's features (its underlying economic attributes and the technological conditions of its production) and the country's economic, institutional, social, and political characteristics.

The telecommunications sector offers perhaps the most compelling case for privatization and liberalization in developing and transition economies. Prices are typically too high and investment and penetration too low. In many countries the economic implications of efficient telecommunications are extensive but underappreciated. Thus the benefits from relaxing restrictions on entry are potentially substantial. Issues of regulatory commitment to safeguard private investors are probably less important than issues of regulatory design to facilitate competitive entry and price reductions.

In many segments of the transportation sector—railways, ports, trucking, airlines, interurban busing—competition within and between modes is sufficient in most countries to justify substantial liberalization and privatization. But the case for privatizing transport network infrastructure is much less compelling than that for privatizing services operating on the network. Rail track, basic and access port infrastructure, and certain portions of airport facilities, where monopolies are unavoidable and substantial amounts of sunk capital are involved, must be regulated or even operated by the public sector.

In the United States railroad liberalization worked splendidly because rail is competitive with roads for freight carried over long distances. In most other countries (except perhaps Argentina, Brazil, China, India, the Russian Federation, and parts of Africa) rail is uncompetitive for freight except for bulk items, many of which are in decline. In these countries “liberalization” is often code for restructuring, downsizing, and reorienting transportation toward roads.

In electricity, wholesale competition has worked well in industrial countries because of excess capacity, moderate demand growth, and the availability of natural gas (which enabled the entry of gas-fired plants at modest scale and relatively low cost). In contrast, electricity markets in many developing countries face capacity shortages, enormous excess demand, and periodic blackouts. Thus electricity restructuring and privatization are more problematic and dependent on administrative ability. California’s experience has shown that market liberalization under conditions of tight demand can lead to serious problems: market-clearing prices would be politically unacceptable and would likely derail attempts at radical liberalization.

The scope for introducing competition in the supply of water is far more limited than in other network utilities. Local networks of pipes and sewers remain quintessential natural monopolies. Moreover, unbundling is not as attractive because increased competition in supply will likely provide far fewer benefits than in other network utilities—the costs of producing water (a potentially competitive activity) are low relative to the value added at the transportation stage (where natural monopoly prevails), though this may vary across countries. Greater opportunities exist to introduce competition in sewage treatment. Overall, concessions and leases will likely be the most effective way of increasing competition in this sector.

What Effects Have Reforms Had?

THIS REPORT EVALUATES THE EFFECTS OF INSTITUTIONAL REFORMS—vertical and horizontal restructuring, privatization, establishment of effective regulation—in the network utilities of developing and transition economies using three criteria: the resulting levels of investment (and thus service expansion), operating efficiency, and allocative efficiency (as indicated by the rebalancing of tariffs). But

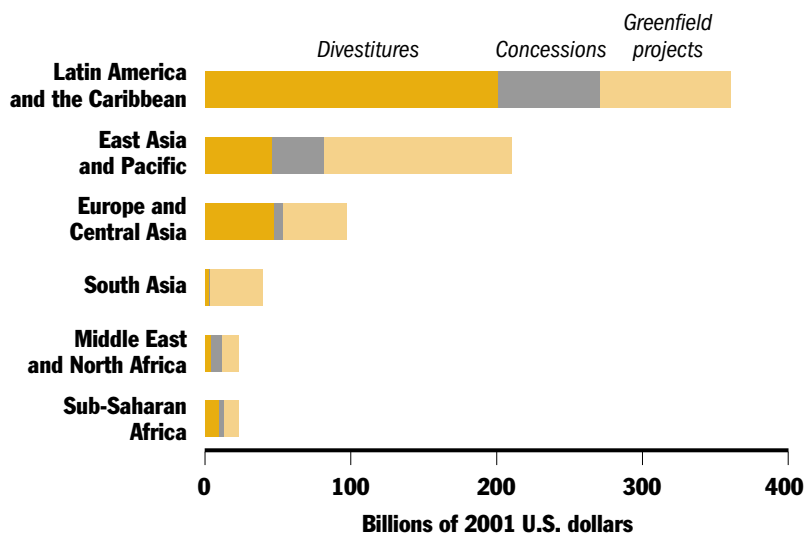
no public policy can be justified on purely economic grounds if a country's population considers its results unjust. Thus the report also assesses the distributional consequences of reforms—especially their impacts on basic services for poor households and other disadvantaged groups.

Although experiences have varied considerably across countries and sectors, for the most part these reforms have significantly improved infrastructure performance. Investment and service coverage have increased. Productivity and cost-effectiveness have risen. Service quality has improved. Prices have become more closely aligned with underlying costs. And services have become more responsive to consumer and business needs and to opportunities for innovation.

Effects on Investment and Service Expansion

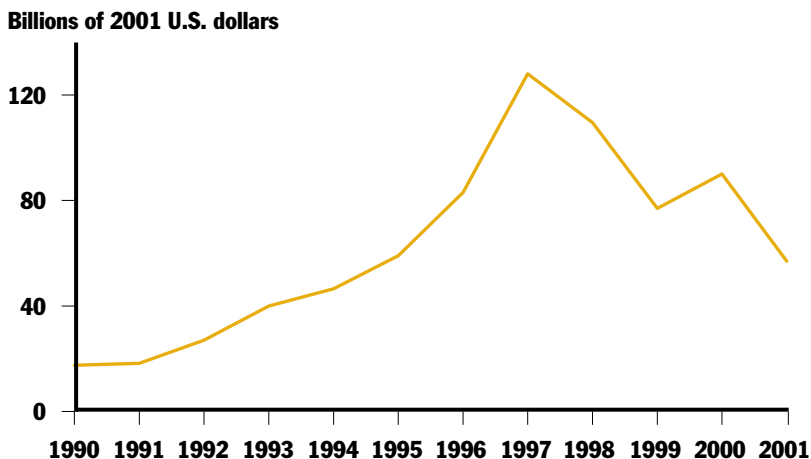
Between 1990 and 2001 more than \$750 billion was invested in 2,500 private infrastructure projects in developing and transition economies. This investment varied enormously across regions, with nearly half going to Latin America and the Caribbean (mainly through divestitures) and more than a quarter going to East Asia and the Pacific (mainly in greenfield projects; figure 1). Meanwhile, Sub-Saharan Africa and the Middle

Figure 1 In 1990–2001, Latin America and East Asia Received the Most Private Investment in Infrastructure



Source: World Bank, Private Participation in Infrastructure Project database.

Figure 2 Private Investment in Infrastructure in Developing and Transition Countries Peaked in 1997



Source: World Bank, Private Participation in Infrastructure Project database.

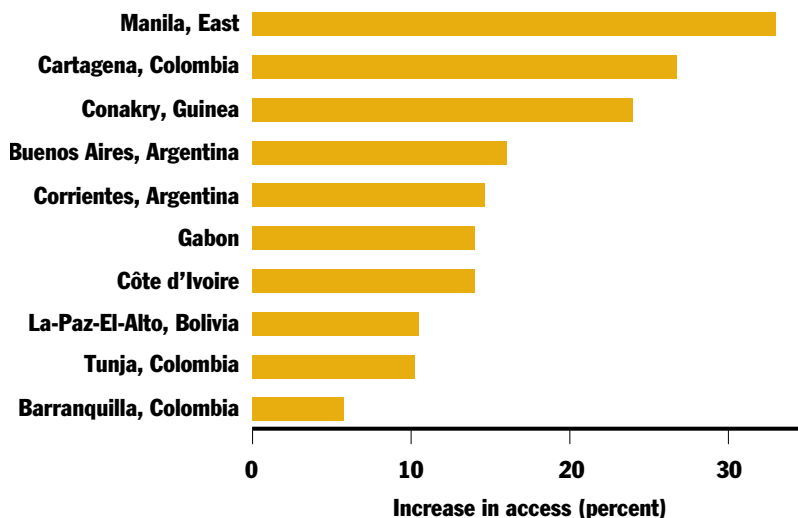
East and North Africa each received just 3 percent of private investment—reflecting much weaker reforms. Investment also varied considerably by sector, with most going to telecommunications and power.

Investment peaked at around \$130 billion in 1997, but by 2001 had fallen to about \$60 billion (figure 2). This sharp drop was mainly due to the deteriorating global market for private financing of infrastructure assets—reflecting financial crises, stock market collapses, and corporate scandals—though lack of economic reforms might also have played a role. Whatever the cause, utility operators around the world are having an extraordinarily hard time securing the financing needed to maintain and expand services. Even with effective regulation and attractive domestic conditions, foreign direct investment in the infrastructure sectors in these countries would be at risk. Thus there is a legitimate question of whether there is a new role for international financial institutions in finding ways to support investment in these sectors.

Reforms have expedited service expansion in a variety of sectors and countries. Telecommunications coverage has seen the largest jump, but significant increases have also occurred in electricity, transportation, and access to safe water (figure 3). The size of such changes depends enormously on the extent to which the market is liberalized and the effectiveness of regulation. For example, increased competition has been particularly powerful in boosting telecommunications coverage. In Latin

Reforms have significantly increased private investment in infrastructure—one of the key goals of restructuring

Figure 3 Privatized Services Have Increased Access to Safe Water in a Variety of Cities and Countries



Source: Harris (2003).

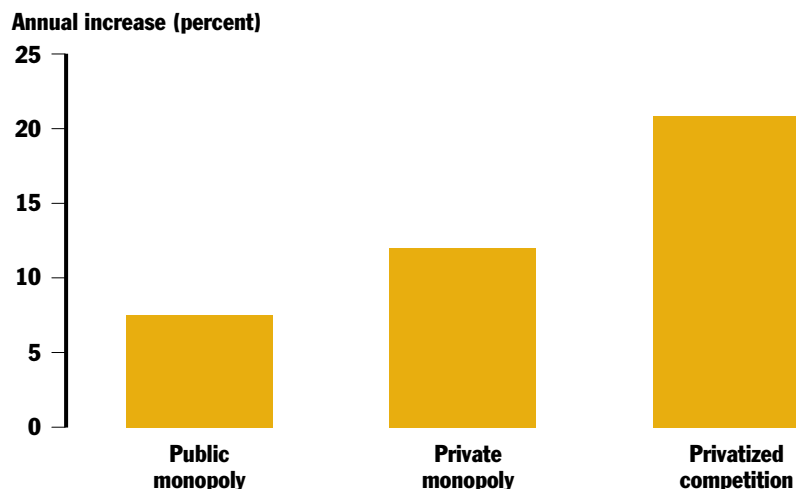
American countries that have allowed competition in telecommunications after privatization, networks have expanded almost twice as quickly as in countries that simply converted to private monopolies. But even private monopolies have expanded faster than public ones (figure 4).

Effects on Operating Efficiency

Restructuring, privatization, and deregulation have made network utilities much more efficient in developing and transition economies. Many of these gains have resulted from policy options previously denied to state enterprises. As part of their privatization contracts, new operators could generally start shedding excess employees—one of the most vexing problems facing state-owned utilities in nearly every developing and transition economy. As a result reforming countries have often seen dramatic improvements in labor productivity (figure 5).

A key argument for privatization is that, relative to state-owned utilities, private owners and operators who face competition have stronger incentives and are better able to control costs, respond to consumer

Figure 4 In 1989–94, Privatization Contributed to Faster Growth in Phone Lines in Latin America



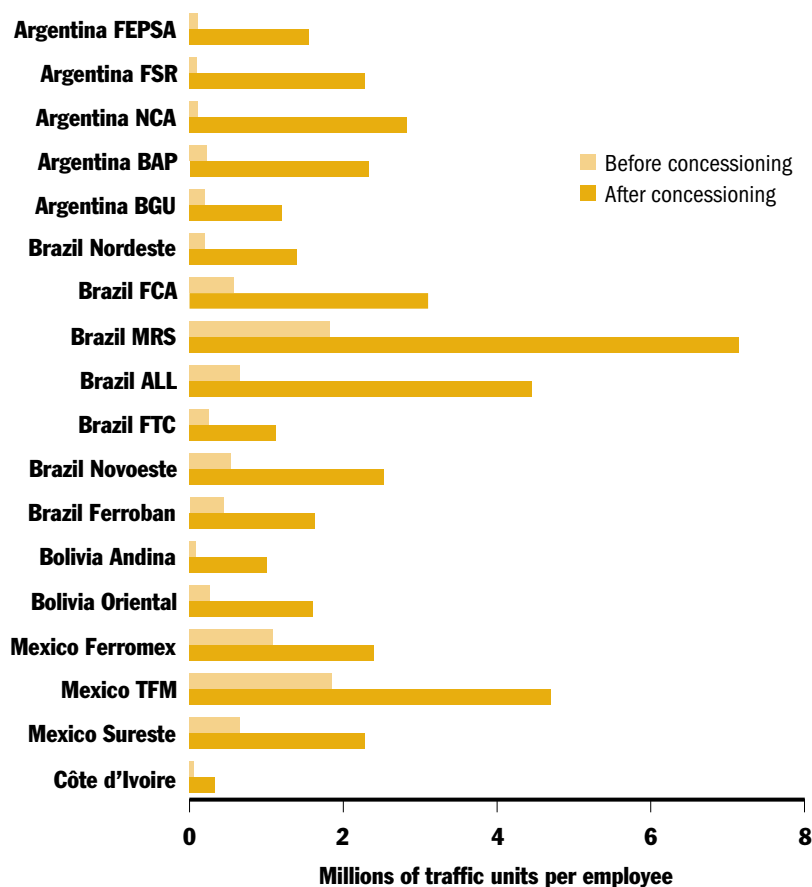
Source: Wellenius (1997b).

needs, and adopt new technologies and management practices. Privatization and deregulation have significantly improved physical performance, service quality, and other aspects of efficiency in many developing and transition economies. Although the most dramatic gains have been in telecommunications (due to revolutionary technological changes and the sector's substantial scope for competitive entry), other infrastructure sectors have also made swift advances.

In telecommunications privatization and related reforms have lowered repair requests and raised call completion rates and the probability of receiving a dial tone. In railroads they have increased locomotive availability. In ports they have shortened waiting times for vessels and increased crane handling rates. And in electricity they have lowered energy losses, outages per customer, and rates of plant unavailability.

Effects on Allocative Efficiency

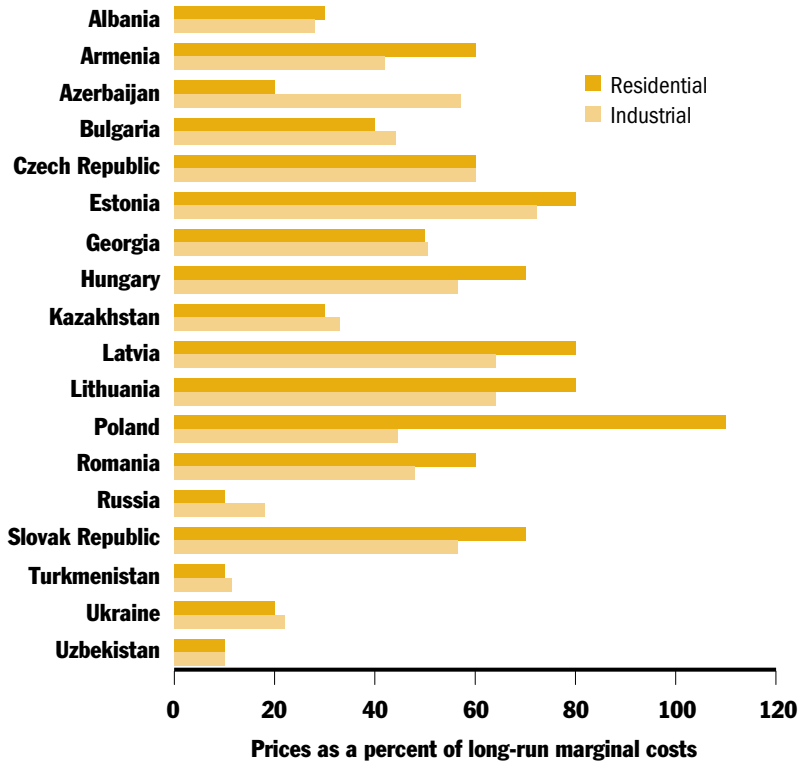
Before reforms, the failure of many governments to adequately increase service rates, especially during periods of high inflation, effectively de-

Figure 5 Railway Concessions Sharply Increased Labor Productivity in the 1990s

Source: Thompson and Budin (2001).

capitalized their infrastructure systems. Thus one of the main attractions of infrastructure privatization is the expectation that it will make price reform a policy priority. The assumption is that private investors will be unwilling to invest in infrastructure unless governments agree to implement prices that reflect costs. And indeed, many countries are dismantling long-standing policies of underpricing and cross-subsidies. But in some countries price reform has been slow, with infrastructure prices still far removed from their underlying costs. For example, in 2000 household electricity prices still covered less than 50 percent, and

Figure 6 In 2000, Electricity Prices Covered a Small Fraction of Long-Run Marginal Costs in Many Transition Economies



Source: Stern (2002).

industrial prices less than 70 percent, of long-run marginal costs in most transition economies (figure 6).

Effects on Distributional Equity

To mitigate the public discontent associated with restructuring and privatization, more comprehensive assessments are needed of their welfare effects—moving beyond standard analyses of their impacts on firm profitability and industry performance to include their effects on workers and households at different income levels. Moreover, distinctions between low- and middle-income countries need to be made more care-

fully. In low-income countries nearly all rural and many poor urban residents lack access to basic infrastructure services. Thus the policy reforms that normally accompany restructuring and privatization—such as eliminating cross-subsidies and moving toward cost-reflective prices—mainly affect higher-income groups. But in middle-income countries—such as those in Latin America and especially transition economies—such reforms can hurt poor people because many of them (mainly in urban areas) have access to basic services. The solution is not to halt the needed reforms but to put in place safety nets and tariff rebalancing schemes that do not involve radical, across-the-board price increases.

Recent empirical work offers insights on the distributional effects of infrastructure reforms. Studies in Argentina, for example, have found that all income classes benefited from the efficiency, quality, and access improvements resulting from the utility privatizations that began in 1990. More efficient infrastructure services also affect most other economic activities and promote general economic growth—enhancing economic opportunities for poor people. When these general effects are taken into account, the poorest groups seem to benefit the most from the increased productivity and access brought about by privatization and related reforms (Benitez, Chisari, and Estache 2003).

Recent research analyzing the welfare effects of utility privatizations in four Latin American countries (Argentina, Bolivia, Mexico, Nicaragua) found no clear pattern in price changes—in about half the cases, prices fell (McKenzie and Mookherjee 2003). But there were adverse distributional effects on the bottom half of the income distribution due to job cuts in the privatized utilities. (Though the utilities accounted for only a small share of employment in these countries, so privatization cannot be blamed for any significant increases in national unemployment.) Still, the negative distributional effects of layoffs and price adjustments were more than offset by improvements in service quality, increased access for poor people, and the changed structure of public finances, which benefited poor people more.

Negative popular perceptions of privatization might also reflect a process that has at times been deeply flawed. For privatization to achieve its public interest objectives, significant institutional preconditions must be met. For example, effective regulation is needed to balance the interests of consumers and operators—to protect consumers lacking competitive alternatives while allowing operators to earn a fair return on prudent investments. But creating regulatory institutions that render

Fears that restructuring and privatization would hurt poor people have proven largely unfounded . . .

. . . In fact, these reforms have increased coverage, often delivering the biggest benefits to poor households

decisions legitimate to citizens and credible to investors has proven to be the most vexing problem of every infrastructure reform program.

Given the importance of network utilities, removing pricing distortions is crucial to economic reform in developing and transition economies. Still, there are good reasons to avoid overly abrupt, across-the-board price changes, which can cause large, unnecessary adjustment costs for consumers and firms alike. Even optimal prices, if instituted extremely quickly and without sufficient notice, can lead to a difficult transition process that is far from optimal. Thus policymakers should plan from the outset for a smooth, well-planned transition to efficient pricing levels and structures.

Developing Good Regulation Remains a Major Challenge

AMONG THE MOST CRITICAL TASKS FOR POLICYMAKERS IN developing and transition economies is designing and implementing stable, effective regulation for network utilities. In many advanced industrial economies the challenge has been reforming existing regulations and reducing unwarranted governmental intrusion. By contrast, in nearly every developing and transition economy the most pressing issue is designing—from scratch—regulatory mechanisms for privatized utilities.³

Regulation that provides a credible commitment to safeguarding the interests of both investors and customers—particularly when economic shocks create political pressure to shift the balance of power among competing interest groups—is crucial to attracting the long-term private capital needed to secure an adequate, reliable supply of infrastructure services. Successful reform requires regulation that clarifies property rights, allocates them sensibly, and assures private investors that their sunk investments will not be subject to regulatory opportunism.

For regulation to promote welfare by facilitating investment, innovation, and allocatively efficient pricing, its institutional design and substantive content must be consistent with country circumstances—particularly the country's size, institutional endowments (including checks and balances), technical expertise, auditing technologies, fiscal condition and tax system efficacy, and the economic characteristics of its industries. Thus it is inappropriate and often costly for developing

Credible regulation is essential

and transition economies to try to uncritically replicate the regulatory frameworks of advanced industrial countries.

What Makes for Effective Regulation?

Regulatory procedures must be predictable, accountable, and transparent. Regulatory bodies should:

- Have competent, nonpolitical, professional staff—expert in relevant economic, accounting, engineering, and legal principles and familiar with good regulatory practices.
- Operate in a statutory framework that fosters competition and market-like regulatory policies and practices.
- Be subject to substantive and procedural requirements that ensure integrity, independence, transparency, and accountability.

Where Do Things Stand?

Political interference has undermined regulatory independence in many developing and transition economies. Governments, especially line ministries, have been reluctant to consign important regulatory functions to independent agencies. Instead, many regulatory agencies report to sector ministries and are filled with government representatives.

Recent surveys indicate that most regulatory agencies in developing and transition economies are not legally required to hold open meetings. Nor are they obligated to provide written justifications for their decisions. And in many countries the regulatory framework lacks coherence, with responsibilities splintered among regulatory agencies and line ministries.

One emerging lesson is that although formal requirements for integrity, independence, transparency, and accountability are essential for effective regulation, they are far from sufficient. The experience so far raises doubts that governments will observe the spirit of the law and implement proper, consistent regulatory procedures—especially when their choices are influenced (and constrained) by external pressures and loan conditions.

Still, it is important to remember that it took many years for advanced economies to achieve regulatory effectiveness. For example, it

Competent regulatory institutions are the linchpins of successful reform . . .

. . . Yet many developing and transition countries have paid inadequate attention to creating such institutions

The label “independent” is often applied too quickly to regulators in developing and transition economies

took decades for the United States to reach an equilibrium in which the independence of regulatory agencies was recognized and supported by administrative procedures, *ex parte* rules, and judicial review. In developing countries regulatory structures have been created from scratch and are still in early stages of development. And although progress towards regulatory effectiveness has been slow, at least the trend is in the right direction—greater independence, accountability, and transparency than under state ownership.

Many Prices and Subsidies Still Require Reform

STATE-OWNED INFRASTRUCTURE MONOPOLIES IN DEVELOPING countries often failed to achieve widespread service coverage. Thus infrastructure reform must be designed to increase access to affordable services for previously unserved customers—mainly poor and rural groups. Pricing policies and subsidy mechanisms play a crucial role in achieving this goal.

Past pricing policies and subsidy mechanisms were seriously flawed and usually failed to achieve their stated objectives. Rather than providing affordable infrastructure services to poor people, they undermined the financial viability of utilities, resulted in rationing of services, and actually exacerbated inequality. Thus there is an urgent need for tariff and subsidy mechanisms that do a better job of achieving economic efficiency and social equity.

Moving toward Efficient, Equitable Pricing

Most developing and transition economies have been slow to implement cost-reflective prices for infrastructure services. Moreover, many infrastructure prices contain significant cross-subsidies that cannot be defended on social equity grounds.

Infrastructure services are often considered essential both to the public and to the effective functioning of the economy. Because some of these services are extremely price and income inelastic, their pricing has important distributional implications. Subsidizing basic services such as electricity and water is politically attractive because it can approximate a lump-sum grant based on the number of household members.

Conversely, raising the price of basic services appears like a lump-sum tax bearing heavily on poor and elderly people and large households. Not surprisingly, moves toward cost-reflective tariffs often encounter strong political opposition. As a result most governments that have liberalized infrastructure have not accorded sufficient prominence to adjusting infrastructure prices.

Deviations from optimal pricing also reflect lack of appreciation of how alternative pricing schemes could strike a better balance between economic efficiency and social equity. In particular, price differentiation and competitive pricing flexibility, potentially valuable tools for achieving adequate revenue and expanding service to poor people, have not been sufficiently exploited in developing and transition economies.

Most developing and transition economies have used cross-subsidies ostensibly to promote desirable social goals (such as helping disadvantaged customers) and positive economic externalities (such as those associated with universal service). In telecommunications, rates for access and for local calls have been low, while those for domestic and international long-distance calls have been high (relative to underlying long-term costs). Similarly, residential electricity has often been priced below its incremental cost—while service for industrial users has been priced above its stand-alone cost.⁴ But because of poor targeting, a large portion of such subsidies flow to people other than the intended beneficiaries. Furthermore, distorted prices impose significant costs by sending the wrong economic signals to consumers, suppliers, and investors. And economic theory and regulatory experience suggest that cross-subsidies are incompatible with open entry and competition.

Even though cross-subsidies can create significant distortions leading to welfare and financial losses, they should not be eliminated in all circumstances. It is true, for example, that using general tax revenue to support social goals can be less distortive than internal cross-subsidies. But in many developing and transition economies the cost of public funds can be very high because government revenue is raised with distortive taxes. So, in developing countries with especially inefficient tax systems, reliance on cross-subsidies might be preferable. Moreover, alternative subsidy mechanisms could require elaborate administrative systems that are costly or unavailable. In such cases cross-subsidies might have to be tolerated as a second-best solution.

Targeting Subsidies Better

Government subsidies for infrastructure services are common in developing and transition economies. For example, India's federal and state governments spend more than \$1 billion a year subsidizing water services. The purported rationale for such support mechanisms is to ensure that essential services remain affordable to poor segments of society. Yet many subsidy programs involve almost no targeting: price structures do not discriminate between rich and poor people, so everyone benefits. In fact, because many poor people do not have access to infrastructure services (such as private water connections), poor households capture only a small fraction of subsidy resources.

As an alternative to traditional subsidies, direct subsidies have been proposed using various targeting mechanisms. These alternative mechanisms have several advantages: they are transparent, explicit, and minimize distortions in the behavior of the utility and its customers. Targeting based on location or housing characteristics can substantially reduce subsidy leakage and so substantially increase the share of subsidy resources captured by poor households. Moreover, targeted connection subsidies appear to perform better than targeted consumption subsidies.

An Agenda for Action—From Institution Building to Policymaking

THERE IS MUCH TO APPLAUD IN THE RESTRUCTURED AND privatized network utilities of developing and transition economies—from their new architectures to the commitment of those who crafted them, who operate in them, and who regulate them. But even in countries where restructuring has been carried out in a way that promotes the public interest, a host of significant problems have emerged.

Many of these second generation problems are endemic to infrastructure everywhere and largely reflect issues that arise after privatization, especially when combined with unbundling. Yet lack of resources (especially economic, accounting, and other technical expertise), inexperience with regulating private utilities, and preoccupation with insti-

tution building during the first stage of reform have created some unique challenges in these countries.

Designing Retrospective Analysis and Data Collection

Infrastructure restructuring and privatization are undergoing a multifaceted revisionism. Choosing the right restructuring strategy is harder than early optimists claimed, and privatization and related institutional reforms are less impressive in practice than earlier believed. Growing public discontent with these reforms may partly be the result of the failure of some governments to publicly articulate the economic and social rationales, prerequisites, and expected outcomes. Thus it may simply reflect public misunderstanding. Still this discontent points to the importance of careful analysis of what works, what can go wrong, and why.

Lack of empirical knowledge is among the main hindrances to infrastructure policy analysis and reform in developing and transition economies. Given that most reforms began in the early 1990s, until recently there were not enough data to evaluate different ownership, structural, and regulatory options and their dependence on country circumstances. But there is now a growing list of experiments in infrastructure reform—putting us in a better position to reflect on lessons and identify the most important issues to address and options to consider.

Empirically untangling the links between distinct policy decisions and ultimate industry performance will require systematic collection of cross-country infrastructure data. International financial institutions—which at times have imposed covenants to address performance in these sectors, and have collected financial and other data to monitor those efforts—are ideally suited to undertaking this effort. However, in many cases the data have not been collected consistently with a view to supporting the needed types of analysis.

Addressing Second Generation Reforms

Experience and economic logic suggest that post-privatization improvements in performance will be limited, and probably unsustain-

able, unless accompanied by appropriate second generation regulatory reforms. These include:

- Designing pricing policies that strike a balance between economic efficiency and social equity.
- Developing rules governing access to bottleneck infrastructure facilities.
- Adapting regulation to address emerging problems, changing circumstances, and new information in regulated infrastructure sectors.
- Finding new ways to increase poor people's access to services.

Many of the rules and principles for resolving second generation regulatory issues have been developed in the context of advanced industrial economies. To be effective in developing and transition economies, they must be modified.

Price reform. Price reform is among the most important and challenging tasks facing policymakers in developing and transition economies. In most of these countries price structures continue to conflict with economic efficiency. Ministries still conduct old-style centralized price setting, in part in an effort to control inflation. Some deviations from optimal policy are due to political and social constraints—noneconomic and equity considerations inevitably intrude when economically efficient prices are devised and administered. But other deviations are due to lack of appreciation of the power of alternative pricing schemes, which could strike a better balance between economic efficiency and social equity.

Policy solutions consistent with both economic efficiency and social equity are not always available or politically feasible. Thus policymakers in the transition and developing economies face no greater challenge than to design and implement price reforms that better manage the tradeoffs between these two goals. The literature provides little guidance for managing the move to cost-reflective prices. Specific challenges include what standards to apply, how fast to proceed, and how to promote universal service in a competitive environment. In particular, there is need for further applied policy research to evaluate the potential use of price differentiation and price flexibility for achieving revenue adequacy and expanding services to poor people.

Access to bottleneck infrastructure facilities. A vexing task for regulators is designing terms and conditions of access to bottleneck infrastructure facilities by competing service providers. These facilities are essential inputs in the production or delivery of final products, and cannot be economically duplicated. Examples include the local loop (“final mile”) in telecommunications, the transmission grid in electricity, the network of pipelines in natural gas, and the track in railroads. Access policy is the keystone of the contemporary response to the problem of residual monopoly in infrastructure. Indeed, it is at the fore of discussions of ways to facilitate competitive entry into activities that have traditionally been run by franchised monopolies. The access issue is especially difficult in situations where several firms compete in the sale of a final product, but one is the monopoly owner of an input that is indispensable in the supply of that product. The problem is how competition in the final product market can be preserved and not tilted to favor either the owner of the bottleneck input or its rivals.

The economic literature offers two main approaches to efficient pricing of essential input facilities: the efficient component pricing rule (also known as parity pricing) and the Ramsey pricing rule. But despite their internal consistency and powerful theoretical results, it is difficult to translate either approach (especially the Ramsey pricing rule) into workable rules and access pricing schedules. Given circumstances in developing and transition economies, there is a need for further research to identify variants of these rules that are less complex technically and less demanding informationally.

Regulatory adaptation and contract renegotiation. Regulation needs to adapt to emerging problems, changing circumstances, and new information and experiences in regulated sectors. Regulatory flexibility is especially imperative in sectors experiencing rapid technological and market changes.

Inflexibilities built into privatization agreements are often a severe impediment to solving post-privatization regulatory problems. Such inflexibilities were probably needed to create commitments to reform, protect consumers, and attract the private capital required for privatization. But they also make it difficult to solve emerging problems, because many parties find adaptations threatening to the privatization commitments that protect their interests and the entire fabric of reform.

To solve this problem, the regulator should articulate a set of fundamental principles that serve as a transparent basis for policy analysis and decisions. These principles should protect the interests of investors at the levels established by privatization agreements, protect consumer interests, ensure economically efficient competition, and so on. International financial institutions could make an important contribution in this area by helping to develop guidelines for revising regulatory mandates and rules, and for renegotiating privatization contracts—guidelines that adhere to accepted principles of the economic public interest and embody much of the best available economic learning.

Increasing poor people's access. In addition to reducing distortions and adjustment costs, pricing policies must be designed to maximize efficiency—subject to meeting certain social policy goals, such as universal access for rural and poor urban consumers. When considering and undertaking reforms, policymakers need to know existing service levels for these groups, how policy proposals will affect them, and how to enhance their access. Although low coverage among low-income and rural households suggests that public monopolies have not successfully provided these households with access to infrastructure services in most developing countries, it is not clear that privatization and liberalization will automatically benefit them either.

In the pre-reform era, universal service obligations were funded, at least in theory, by subsidies and, more commonly, cross-subsidies. But with privatization and market liberalization it is impossible to maintain significant cross-subsidies in the structure of prices. So, either new sources of subsidy must be found or rates below incremental costs must be raised to compensatory levels.

In the United States, after the deregulation of key sectors of the economy, substantial effort was put into designing competitively neutral mechanisms to promote universal service. The need to adopt support mechanisms sufficient to advance universal service, and to help consumers who would otherwise be disadvantaged, is even more pronounced in developing and transition countries reforming their infrastructure sectors.

The requisite policy approach for pursuing universal service goals in a specific industry is likely to be sensitive to the country's political and institutional endowment and fiscal condition, consumer incomes and

preferences, and the industry's economic characteristics. Additional work is needed to understand how these factors affect the optimal design of support mechanisms: whether support for universal service should be funded out of general tax revenues, or perhaps out of a broadly based tax on revenues from the industry's products and services; the extent and scope of subsidies; and more targeted methods for delivering subsidies without distorting competition.

Designing Effective and Practical Regulatory Regimes

Empirical assessment of economic regulation reveals that in a variety of circumstances its effects deviate substantially from efficiency. Regulatory failure arises from a combination of the information problems facing regulators and the complex agency relationships inherent in the control structure of every regulatory setting. Even in the United States, where regulatory oversight has been supported by expert economic analysis, the disappointing performance that followed the economic regulation of the 1960s and 1970s raised doubts about time-honored regulatory solutions to allocative problems.

In developing and transition economies regulatory failure is exacerbated by lack of technical and economic expertise in critical areas. This may require regulators to avoid sophisticated interventions that impose significant informational and analytical requirements. Indeed, in some circumstances in these countries the costs of regulation may exceed its benefits, and the public could be better off relying on unfettered competitive market forces.

There is an urgent need to:

- Deepen understanding of how to design effective and practical regulatory mechanisms in the face of scarce technical and economic expertise.
- Identify options for the structural reorganization of industries that reduce the need for regulatory oversight.
- Develop more precise criteria distinguishing between cases where regulatory intervention is required and those where it is not.
- Develop models for optimal allocation of scarce regulatory resources among firms and sectors with different sizes, technologies, information asymmetries, and political constraints.

- Identify appropriate, perhaps less sophisticated, tools of intervention better suited to regulators in the developing and transition countries.

Notes

1. This refers mainly to the period after World War II. Private ownership in electricity was initially the norm in many countries in Europe and North and South America. State ownership spread later, especially after World War II, either for ideological reasons (as in England and France) or because political constraints on prices forced private firms into bankruptcy (as in Latin America). Similar situations prevailed for railroads and water in many countries. Telephone services became captive of state-owned post offices in Europe and Japan, but not in Canada, the United States, or, initially, Latin America.

2. The results of such polls can be very sensitive to how the questions are asked. As Klein (2003) notes, according to such polls only 21 percent of Peruvians seemed to generally support electricity privatization. But when asked specifically about privatization implemented transparently and accompanied by increased investments as well as prices set by a regulatory process, more than 60 percent favored it.

3. The regulatory function was not entirely avoided under state ownership. For example, service quality still had to be monitored, and prices for infrastructure services had to be set. The main difference lies in the characteristics of the regulatory process, which was ad hoc and opaque under the old regime—while it is necessary to adhere to certain transparent requirements of due process in the new setting.

4. A service's incremental cost is the addition (per unit of the service's additional output) to a firm's total costs when output of the service expands by some preselected increment. The stand-alone cost of a service (or combination of services) is the cost that would be incurred by an efficient entrant if it were to produce only that service or combination of services—that is, the cost of producing “standing alone” (Baumol and Sidak 1994).