



CASES FROM LATIN AMERICA

Paradox and Perception: Evidence from Four Latin American Countries

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Latin America's supposed privatization failure has recently become a source of street riots, protest demonstrations, and negative news coverage. In June 2002, riots erupted in Arequipa, Peru, following announcement of the proposed privatization of power plants; two years earlier, Cochabamba, Bolivia, witnessed a so-called water war. Ecuador and Paraguay have recently experienced antiprivatization protests, and popular opposition in Lima and Rio de Janeiro have led to cancellation of water privatizations.¹ Street protests by antiglobalization activists have targeted privatization on the grounds that the profit calculus of global capitalism

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1. See "Turmoil in Latin America Threatens Decades of Reform," *Boston Globe*, August 18, 2002, A12; William Finnegan, "Letter from Bolivia: Leasing the Rain," *New Yorker*, April 8, 2002; Democracy Center, "Bechtel versus Bolivia: The Water Rate Hikes by Bechtel's Bolivian Company (Aguas del Tunari): The Real Numbers," August 20, 2002, www.democracyctr.org/bechtel/waterbills/waterbills-global.htm.

should not overtake national values. News articles highlight popular objection to private enterprises profiting from such basic services as water; failure of Bolivian water privatization; and problems with quality, price increases, and large-scale employee layoffs.² In response to popular opposition, Nicaragua's National Assembly passed a law forbidding privatization of any enterprise related to provision of water services (the country's president subsequently vetoed that law).

Negative sentiment regarding privatization extends beyond protest groups. For example, in the year 2000, Latinobarometer opinion polls showed that a majority disapproved of the privatization process; the pattern was uniform across countries, age, gender, and socioeconomic class. Moreover, the opinions became increasingly negative over time (e.g., disapproval ratings were higher in 2001 than in 2000, and higher in 2000 than in 1998) (see appendix 2A).³

Despite negative public opinion, economists tend to view privatization favorably (Megginson and Netter 2001). Evaluation criteria typically include profitability, labor productivity, firm growth, and market valuation. Most empirical studies have focused on the transition countries of Eastern Europe and the former Soviet Union, while public disaffection is more pronounced in Latin America and the Caribbean (LAC). This factor may help to explain the discrepancy between economists' views and public perception. In addition, economists use different evaluation criteria. For example, increased profitability and efficiency may come at the expense of customers, workers, and other social groups (i.e., increased prices may result in lower levels of employment, longer work hours, worsening service conditions, and negative environmental effects).⁴ Clearly, a more comprehensive welfare evaluation of privatization must incorporate consumer and worker effects, as well as firm profitability. Particular attention should be devoted to the effects on inequality and poverty, which underlie perceptions of unfairness among privatization's critics and may functionally affect long-term economic efficiency via the effects on human capital investment, entrepreneurship, crime, and governance (Aghion, Caroli, and García-Peñalosa 1999; Bardhan, Bowles, and Gintis 2000).

This chapter presents an overview of the results of a project that evaluated privatization's distributive effect in four Latin American countries. The project aimed specifically to estimate privatization's effects on customers and workers, based on existing household and employment surveys. The

2. See "As Multinational Runs the Taps, Anger Rises over Water for Profit," *New York Times*, August 26, 2002.

3. See "An Alarm Call for Latin America's Democrats," *The Economist*, July 26, 2001.

4. La Porta and López-de-Silanes (1999) estimate the fraction of increased profitability of privatized Mexican enterprises attributable to consumer losses at 5 percent and transfers from laid-off workers at 31 percent, with productivity gains accounting for the remainder.

four countries selected—Argentina, Bolivia, Mexico, and Nicaragua—vary in size and per capita income; two are large, middle-income countries (Argentina and Mexico), while two are small, poor countries (Bolivia and Nicaragua). An overview of the methodology, as well as results, is provided for each of the four country studies, which contain details on the privatization process and data sources used.⁵

Since the late 1980s, all four countries have undergone significant privatization, and have similar data sources that permit the application of a common method. The Nicaraguan case, however, differs qualitatively from the other three in that large portions of that country's economy—including agriculture—were privatized as part of its transition from a socialist economy, while state-sector utilities were exposed to greater liberalization throughout the 1990s.

The project's first and most significant component focuses on privatized utilities (primarily electricity, telecommunications, water, and gas); it estimates the effects of price and access changes on household welfare by expenditure categories.⁶ Estimated budget shares and price elasticities are used to calculate first- and second-order approximations to consumer surplus changes. Each of the four country assessments address various groups' valuation of access gains.⁷

The project's second component documents privatization's effects on workers, especially accompanying employment changes and potential effects on wage levels and earnings inequality. The four country studies assess employment changes relative to the respective economies' overall levels of employment and unemployment. Employment surveys for Argentina and Mexico are used to calculate upper-bound estimates of the extent to which earnings inequality may have increased as a result of layoffs (Ennis and Pinto 2002, López-Calva and Rosellón 2002). These surveys assume that those who lost their jobs have subsequently failed to secure employment. The rotating panel feature of the Mexican employment surveys permits López-Calva and Rosellón to explore the validity of this assumption by tracking those who lost their jobs for one subsequent year. Finally, effects on wage rates, working conditions, and wage inequality for employed workers are discussed within the context of Argentina and Nicaragua (Ennis and Pinto 2002, Freije and Rivas 2002).

The third project component gathers facts on privatization's fiscal effects. Short of attempting to simulate a structural macroeconomic model, one can

5. Argentina: Ennis and Pinto (2002); Bolivia: Barja, McKenzie, and Urquiola (2002); Mexico: López-Calva and Rosellón (2002); and Nicaragua: Freije and Rivas (2002).

6. In Nicaragua's case, this exercise was carried out only for the electricity sector, which, during the 1990s, witnessed the entry of numerous private firms while preparations were under way to privatize major state firms.

7. It should be noted that the available data on quality attributes were not rich enough to incorporate into the welfare calculations.

only speculate about potential implications for public debt, budget deficits, and social spending. Nevertheless, these facts help to put some of privatization's broader implications into perspective.

Severe data limitations make it necessary to qualify inferences that can be drawn from the results. The privatizations were far from constituting a natural experiment; rather, they were part of a broader set of market-oriented reforms including trade liberalization, fiscal reform, macroeconomic stabilization, and changes in regulatory institutions. Certain sectors, such as telecommunications, witnessed significant technological change with the introduction of new products and a reduction in cost of traditional services. Most of these countries underwent significant macroeconomic changes that affected all economic sectors. Attempting to assess privatization's effect per se would have been a futile exercise, in effect, requiring predictions of how the industries would have performed had they not been privatized, while all other changes occurred. Consequently, it was feasible to calculate the effects of observed changes before and after privatization only, while comparing the effects in privatized sectors with other sectors to control for macroeconomic changes in the economy.

Other household survey limitations included lack of information on service quality and household prices paid. Therefore, we were forced to use firm and regulator data on price and quality, assuming that all households were sold the same product at the same price. Because take-up decisions were not recorded directly, we had to estimate access indirectly from availability of the service in the same building or neighborhood, in combination with the households' reported expenditures. In terms of employment, little is known about layoff's effects on income distribution since data is lacking on laid-off workers' subsequent earnings and other forms of transfer (e.g., unemployment assistance or transfers from friends and family) that may have cushioned the income effect. Accordingly, only upper bounds to income losses can be computed by assuming that laid-off workers lost their incomes entirely thereafter.

While one can gauge only the short-term effects of most of these privatizations, experience suggests that the effects three or four years after privatization can differ markedly from the more immediate effects observed one or two years out.⁸ In addition, environmental effects are not incorporated. Moreover, the data do not permit any assessment of the distributive

8. This observation is evidenced by employment changes. In the case of Bangladesh, for example, Bhaskar, Gupta, and Khan (2002) found that, with regard to privatization of jute mills in the 1980s, the employment effects 15 years later differed markedly from those that occurred in the first few years after privatization. Using the longer time horizon, the employment difference that Bhaskar and Khan (1995) found between privatized and nonprivatized mills during the first six or seven years disappeared entirely.

changes resulting from ownership change (e.g., through changes in firms' value after privatization) or effects on nonprivatized parts of the economy (e.g., through changes in price or competition). Thus, our assessment of the distributive effect must be viewed as a rough approximation to some of privatization's first-order effects on the bottom half of the distribution, assuming that changes in price, access, or employment levels that occurred at the time of the privatization could be attributed to that process.

Privatization Process: An Overview

In the four countries studied, the privatization process began in the 1980s (Argentina and Mexico) and early or mid-1990s (Bolivia and Nicaragua) (table 2.1).

Beginning in 1989 and continuing through the early 1990s, Argentina privatized a wide range of its state-owned enterprises (SOEs). These included major utilities (telecommunications, electricity, water, gas, and air and rail transport); petrochemicals; tankers; natural gas; defense (navigation); and a broad group of services, including insurance and grain control. The method of privatization involved inviting bids from a set of prequalified, international bidders. Over the 1990–97 period, approximately \$23 billion was realized from the proceeds, of which \$10 billion was used to retire outstanding public debt. The process, whose objectives included macroeconomic stabilization and improved efficiency, was carried out as part of a wider program of fiscal contraction, debt reduction, and trade liberalization. Many privatized firms represented joint ventures between foreign-owned and domestic firms, and were thus subject to equity participation rules for foreigners. The process included a complex system of transferring SOE debt to the new private entities, as well as a voluntary retirement program negotiated with unions in the large privatizations (e.g., the railways), which the World Bank funded. In telecommunications and electricity privatizations, 10 percent of shares were allocated to workers in these enterprises. The total fraction of the economy's labor force in the state sector before privatization was approximately 2 percent.

During 1995–97, Bolivia privatized its major utilities—electricity, telecommunications, transport, and water—as well as oil and gas. The novel feature of the process was the widespread use of capitalization as an alternative to traditional privatization methods. Capitalization involved allocating shares equivalent to 50 percent of the firm's value to the investor with the winning bid, 45 percent to an old-age welfare and pension fund, and the remaining 5 percent to the firm's employees. Investors gained the right to manage the firm, but were required to invest their capital contribution (i.e., what they offered for their 50 percent share) over a six- to eight-year period, in addition to conforming to regulators' expansion and quality

Table 2.1 Main features of privatizations, by country

Country	Period	Sector privatized	Proceeds		Labor force in SOE firms before privatization (percent)	Employment cuts (percent of total labor force)
			Billions of dollars	Percent of GDP ^a		
Argentina	1989–97	Utilities, other manufacturing, services	23	25	1.95	1.46
Bolivia	1995–97	Utilities, oil, gas	2	30	<0.5	0.13
Mexico						
Phase I	1982–88	Manufacturing, services	Negligible	Negligible	2	n.a.
Phase II	1988–94	Manufacturing, services	23	10	2	1.00
Phase III	1994–2000	Utilities	10	3	n.a.	n.a.
Nicaragua						
Phase I	1991–96	All	0.24	14	7–9	n.a.
Phase II	1996–2002 ^b	Electricity, telephony, energy	0.17	5	n.a.	n.a.

n.a. = not available

SOE = state-owned enterprise

a. Proceeds are given as percentage of GDP in a midpoint year of the privatization.

b. Electricity sector was liberalized in 1997, and privatization occurred in 2000–02.

Sources: Argentina: Ennis and Pinto (2002); Bolivia: Barja, McKenzie, and Urquiola (2002); Mexico: López-Calva and Rosellón (2002); Nicaragua: Freije and Rivas (2002).

targets. Thus, under this scheme, the government gained no disposable income, with privatization proceeds earmarked mostly for investment and social spending. Of the \$2 billion realized from the privatizations—amounting to 30 percent of GDP—approximately \$1.6 billion resulted from capitalization and the remainder from traditional privatizations. A second alternative to traditional privatization, used most notably in the case of water, was concessions.

Bolivian officials separated electricity generation and transmission. In 1995, three privatized firms were created in the generation sector, realizing \$140 million; these firms were subject to a 35 percent limit on market shares. In 1999, the sector was further liberalized, and two new private firms entered. In 1997, two private firms were created in the transmission sector, realizing \$90 million; these firms were subject to tariff regulations and quality controls. That same year, three private firms, valued at \$834 million, were capitalized in the oil and gas sector. Between 1997 and 2000, discovery of new reserves multiplied existing ones nearly tenfold, and three more firms were privatized in 2000, realizing \$125 million. Because these oil and gas firms were oriented primarily toward exporting to Brazil, sector privatizations were unlikely to affect domestic consumers significantly. In 1995, Bolivia capitalized its monopoly telecommunications firm, ENTEL (Empresa Nacional de Telecomunicaciones), at a value of \$610 million, and entry was further liberalized in 2001. In 1996–97, the rail and air transport sectors were capitalized at \$90 million. Across all of these sectors, private firms were subject to regulatory controls, and most met their investment targets by mid-2000.

Attempts to privatize water encountered greater difficulties, resulting in the proliferation of concessions for administration of state assets. In 1997, only one municipal firm was transferred to the private sector, and a second attempted transfer failed. The Bolivian government was slow to develop this sector's necessary legal framework (the required legislation was not approved until 2000). In various cities, municipal water firms signed concession contracts that stipulated expansion, internal efficiency, and quality goals. Tariff regulations, designed to permit the firm to comply with its contractual obligations, were established under a rate-of-return mechanism with a five-year regulatory lag.

Mexico undertook large-scale, two-phase privatization of SOEs across a wide range of industries, including mining, manufacturing, and services. The first phase, implemented in 1982–88, was followed by a second, more significant phase in 1988–94 during the Salinas administration. Over the 12-year process (1982–94), the number of SOEs fell from 1,155 to 219. Although more SOEs were privatized during the first phase, most of the larger firms were privatized in the second phase. Of all assets privatized during the two-phase period, about 96 percent was concentrated in the second phase. By 1992, nearly Mexico's entire state-owned sector had been privatized (excluding oil, petrochemicals, gas, water, electricity, highways,

railways, and ports). The telephone sector was privatized in 1990. Phase-two proceeds, amounting to \$23 billion, were used mainly to repay public debt (table 2.1).

A third phase, started in 1994, saw the privatization of most of Mexico's utilities. During 1993–98, water and natural gas were privatized. The 1990s also witnessed ongoing privatization efforts in civil aviation and banks. In more than 90 percent of cases, the privatization method used involved the sale of control rights or majority stake through a first-price, sealed-bid auction. Third-phase proceeds amounted to \$10 billion (table 2.1).

The state-owned sector, which had accounted for 4.4 percent of the labor force in 1982, had shrunk to 2 percent by the 1990s, such that the overall scale of the privatization process amounted to approximately 2.0 to 2.5 percent of the labor force. Privatization's employment implications were largest for railways; after privatization, employment was halved (from 46,000 to 23,000). La Porta and López-de-Silanes (1999) estimate that, during phase two, a maximum of about 30 percent of privatized enterprises' improved profitability resulted from job layoffs.

Unlike privatization in Argentina, Bolivia, and Mexico, Nicaragua's process encompassed the transition from a socialist, war-ravaged economy. The first phase of Nicaraguan privatization, 1991–96, involved divestment of SOEs in many areas (e.g., farming, fisheries, industry, forestry, mining, commerce, trade, transport, construction, and tourism). In 1991, a parallel process was started to allow private participation in banking, and closure or privatization of state-owned banks followed during 1994–2000. The second phase (1996–2002) of Nicaragua's privatization included utilities and involved both entry of private firms and awarding of concessions. Private participation has been allowed in telephony since 1995 and in electricity since 1997. During 1995–98, a comprehensive reform package aimed at full privatization of utilities was implemented, and privatization was slated for electricity distribution (2000), telephony (2001), and energy (2002).⁹

By 1998, divestiture of 343 Nicaraguan enterprises had occurred. In addition to liquidation, three reorganization methods were used: mergers with existing firms (mainly other SOEs), restitution to previous owners, and sale or lease. During 1991–96, these methods accounted for 25, 28, and 36 percent of the proceeds, respectively; while shares allocated to workers and war veterans amounts to 13 and 1.5 percent, respectively. Use of proceeds was characterized by a lack of fiscal transparency. Although the proceeds amounted to 2.5 percent of GDP every year during the first phase, they did

9. Unfortunately, this study's data did not cover year 2000 or later; thus, our consumer-side analysis is restricted to estimating the effect of liberalization—rather than privatization—on the electricity sector. However, we were able to provide a detailed, economywide analysis of privatization's effect on Nicaragua's wage distribution (analysis in the other three countries is restricted to the utilities sector).

not accrue to the government budget. Portions were used to retire enterprises' outstanding commercial debt and cover the administrative expenses of CORNAP (Corporación Nicaraguense del Sector Público) (the state agency responsible for implementing privatizations). Many sales involved the transfer of credit and liabilities, creating further lack of transparency. By contrast, in 2000–02, electricity privatization proceeds were large (representing about 4.9 percent of GDP in 2000) and relatively transparent (60 percent accrued to the government budget, while the remainder was used to retire debt or settle tax arrears).

Evaluating the Consumer Welfare Effect

Privatization of infrastructure can directly affect consumers by altering network access and service price and quality. In addition, privatization may indirectly affect consumers by causing the prices of substitute goods to change.¹⁰

Data Description

Household income and expenditure surveys from each of the four countries studied were used to measure the effects of utility privatization on consumers.¹¹ These surveys enabled measurement of household-level access to electricity, water, and telephone service through questions that asked respondents directly whether their household had a service connection and by observing whether the household had a positive expenditure on the service. The surveys reported total household expenditure on each service; since no specific price information was given, prices were obtained from various other sources. Limited availability of surveys—only two were available for Argentina and Nicaragua and only a few for Mexico¹²—severely restricted the extent to which the country studies could determine whether changes that occurred over the privatization period differed from longer-term trends. In addition, survey coverage was often limited; for example,

10. This study does not attempt to measure this indirect effect.

11. The surveys are Argentina: National Household Expenditure Survey (ENGH) (Encuesta Nacional de Gastos de los Hogares) (1985–86, 1996–97); Bolivia: Integrated Household Survey (EIH) (Encuesta Integrada de Hogares) (1992, 1993, and 1994) and Ongoing Household Survey (ECH) (Encuesta Continua de Hogares) (1999); Mexico: National Household Income and Expenditure Survey (ENIGH) (Encuesta Nacional de Ingresos y Gastos de los Hogares) (1984, 1992, 1998, and 2000); and Nicaragua: National Household Living Standards Survey (EMNV) (Encuesta Nacional de Hogares sobre Medición de Niveles de Vida) (1993 and 1998).

12. Bolivia conducted surveys more frequently; however, survey format and design varied somewhat for the years immediately before and after privatization.

while the Mexico and Nicaragua surveys were nationwide, the Argentina surveys covered only the urban area of Greater Buenos Aires and the Bolivia surveys were limited to nine departmental capitals and El Alto.

Access to Services

For several reasons, privatization is expected to improve access to utility services. First, the long waiting periods under public ownership,¹³ often associated with unsatisfied demand, would be reduced. Second, many privatization agreements include government-mandated expansion of the network or universal service obligations. For example, Estache, Foster, and Wodon (2002) note that the Bolivian government awarded the La Paz and El Alto water concession based on bids for the number of new connections offered at a predetermined tariff level; in Argentina, awarding of the Greater Buenos Aires concession incorporated connection targets aimed at increasing coverage from 70 to 100 percent by the end of the contract period. Third, private firms may be more apt to innovate and develop new means to reduce the costs of network expansion (Estache, Foster, and Wodon 2002, 40–43).

In all four countries studied, privatization resulted in increased access to infrastructure (table 2.2). While the household surveys provided detail on whether a given household used a particular service, they did not indicate whether the household had the option of connecting to the network. For Bolivia, Mexico, and Nicaragua, water and electricity surveys directly considered physical use of the service; for Argentina, however, access to water and electricity was determined by whether the household had a positive telephone service expenditure. For Bolivia and Mexico, access to telephone service was similarly determined. While Argentina's 1996–97 household expenditure survey provided information on observed physical use, the average take-up rate was reported as 99.88 percent for electricity and 97.39 percent for water.¹⁴ Thus, relying on observed use to determine household access represents a reasonable approximation. A further caveat is that the surveys did not provide information on illegal connections, which may have resulted in overestimating increased access (i.e., certain users merely switched from illegal to legal connections).¹⁵

13. For example, in 1990, the average waiting time for a new phone connection in Mexico was 2.5 years.

14. Take-up rates among the poorest decile were 99.4 percent for electricity and 92.5 percent for water.

15. Nevertheless, the switch from illegal to legal connection can benefit households in other ways. For example, a formal connection can be less hazardous to household members' health; in addition, it provides evidence of an address, making the household eligible for state benefits (see Estache, Foster, and Wodon 2002, 22–23).

Table 2.2 Percentage of households with access to infrastructure services, by decile (percent)

Country and sector	Period	1	2	3	4	5	6	7	8	9	10	Total
Argentina (urban)												
Water and electricity ^a	1985–86	64.8	81.5	87.8	91.2	93.3	93.9	97.4	96.4	97.8	99.3	90.3
	1996–97	82.5	91.6	94.0	94.5	94.9	94.7	95.9	96.1	96.1	96.9	93.7
	1985–86	18.4	26.5	33.7	43.6	47.0	49.6	61.4	67.2	75.9	82.3	50.6
Telephone ^a	1996–97	22.8	39.6	53.5	57.7	68.5	78.2	82.7	86.7	89.8	92.9	67.2
Bolivia (urban)												
Electricity ^b	1994	89.2	93.3	93.2	94.6	96.6	97.7	98.1	98.0	98.8	99.7	96.0
	1999	98.9	95.0	97.9	96.9	100.0	100.0	100.0	100.0	99.9	100.0	98.8
Telephone ^a	1994	2.9	7.2	8.1	9.4	13.4	22.3	27.4	35.6	48.6	69.7	25.5
	1999	7.9	6.9	13.0	22.9	33.4	35.2	36.7	42.6	58.6	62.0	31.0
	1994	64.5	68.1	74.7	73.2	76.4	83.0	85.1	91.1	91.5	95.5	80.6
Water ^c	1999	89.1	82.5	89.1	89.0	87.8	95.7	98.7	97.7	95.7	97.8	92.1
Mexico (all)												
Telephone ^a	1992	2.0	3.3	5.1	5.7	10.1	14.1	19.9	26.4	39.1	60.8	18.6
	1998	3.9	6.0	9.1	12.6	15.9	21.8	28.4	37.9	54.8	72.8	26.3
	1992	22.0	30.5	39.1	44.3	48.8	54.1	63.0	66.0	75.0	87.1	53.0
Water ^c	1998	27.9	35.8	39.3	44.8	49.4	58.5	64.8	72.1	83.3	89.9	56.6
Nicaragua (all)												
Electricity ^d	1993	11.1	25.2	36.2	53.4	64.4	68.5	78.5	81.7	82.0	78.0	57.9
	1998	11.3	29.5	40.3	58.4	72.0	77.2	88.5	91.4	93.2	84.9	64.7

a. Household had infrastructure access if it reported positive expenditure for the infrastructure item.

b. Household had infrastructure access if it had electricity.

c. Household had infrastructure access if the water network reached the building of the household dwelling unit.

d. The 1993 figures were obtained from a 1998 survey using a question regarding whether the household had installed electricity within the past five years.
 Sources: Argentina: Ennis and Pinto (2002); Bolivia: Bajja, McKenzie, and Urquiola (2002); Mexico: López-Calva and Rosellón (2002) Nicaragua: Freije and Rivas (2002).

The distributional effect of expanded access depends heavily on initial access levels. For example, with the exception of Nicaragua, expansion of water and electricity networks tends to benefit the poor the most since coverage of the richer deciles was already high. In Nicaragua, where initial electricity access was lower than in the other three countries, expanded access benefited the top half of the per capita expenditure distribution more than the poor. In terms of telephone service, the Latin American region has historically had low access levels; thus, expanded access has been directed mainly toward the middle and top of the expenditure distribution. Rapid expansion of cellular service has accounted for some of the increased access to telephony; however, the surveys do not distinguish the two types of service. Introduction of competition in cellular service was particularly important for Bolivian access, because local fixed-line phone cooperatives charge individuals US\$1,200–1,500 for a fixed line, more than Bolivia's per capita income. ENTEL-Móvil's entry into cellular service in 1996 prompted a price war with the incumbent firm, Telecel, with cellular access charges falling below US\$10. Over the 1996–2000 period, cellular penetration increased from 0.27 to 6.96 subscribers per 100 residents, thereby overtaking fixed-line penetration (ITU 2001).

Current trends make it difficult to determine the precise amount of increased access that resulted from privatization. For Bolivia, increased access was separated from current trends by comparing changes in access to water in La Paz and El Alto, where a private concession was put in place in 1997, with the country's other main cities of Santa Cruz and Cochabamba, which remained public. As table 2.3 shows, access increased in both areas during the 1992–94 and 1994–99 periods. The difference-in-difference estimate, which compares the change in La Paz and El Alto with the change in the nonprivatized areas, is negative over the 1992–94 period, indicating that access was growing faster in the other cities, but was positive after privatization between 1994–99. The resulting triple difference (annual growth in La Paz and El Alto relative to other cities from 1994–99, less the relative annual growth over 1992–94) was positive for all but the bottom quintile, suggesting that privatization increased access to water relative to both the existing trend and nonprivatized areas.¹⁶ For Argentina, Galiani, Gertler, and Schargrodsky (2002) used 1991 and 1997 surveys to calculate the difference-in-difference for access to water between the privatized and nonprivatized areas; they found increased access in privatized municipalities.

Beyond the private benefits of access to water, electricity, and telephony, privatization carries many potential public benefits. For example, telecommunications services benefit from network externalities, whereby the value

16. Since 100 percent is the maximum for access, growth rates in access should fall over time as access approaches full coverage. The triple difference should therefore give a lower bound of the privatization effect.

Table 2.3 Increased access to water resulting from Bolivian privatization, by quintile (percent)

Quintile	La Paz and El Alto			Other main cities ^a			Difference-in-difference estimate ^b		Triple difference ^c
	1992	1994	1999	1992	1994	1999	1992–94	1994–99	
1 (lowest)	53.3	66.1	88.8	57.4	66.4	82.5	3.8	6.6	-0.6
2	70.7	73.3	93.3	69.8	74.2	86.9	-1.8	7.4	2.4
3	76.0	77.4	95.6	75.7	80.6	89.4	-3.5	9.5	3.6
4	87.1	89.8	100.0	84.1	87.5	97.3	-0.7	0.4	0.4
5 (highest)	96.2	94.6	100.0	87.8	93.1	95.4	-6.9	3.1	4.1
Overall	78.1	81.7	94.4	75.6	80.3	90.7	-1.0	2.2	1.0

a. Cochabamba and Santa Cruz.

b. The difference-in-difference estimate equals the change in La Paz and El Alto, minus the change in other main cities.

c. The triple difference equals one-fifth the difference-in-difference over 1994–99, minus one-half the difference-in-difference over 1992–94.

Source: Barja, McKenzie, and Urquiola (2002).

of having a telephone depends on how many other people are connected to the system. Expanded access to telephones therefore benefits existing, as well as new, users. Access to telephones can also foster trade networks and enhance remotely located residents' connection with society. With regard to electricity, expanded access implies environmental benefits if new users switch from fuelwood and fossil fuels. In terms of water, expanded access benefits public health by limiting the spread of disease. For example, in Argentina, Galiani, Gertler, and Schargrodsky (2002) found that in areas that privatized water, child mortality fell 5 to 9 percent because of reduced incidence of infectious and parasitic disease. While these public benefits and externalities are difficult to measure and are not included in our valuation of privatization's effect on consumers, they should be acknowledged when assessing the overall benefits of privatizing utility services.

Price Changes

The popular perception is that privatization tends to drive up consumer prices. Since public enterprises were often loss-making and cross-subsidized, subsequent private owners had to raise prices to cover costs. For electricity, Millan, Lora, and Micco (2001) found that industrial users in Latin America subsidized residential customers before privatization, while for telecommunications, high long distance rates often subsidized local calls. In such cases, tariff rebalancing serves to increase the prices paid by residential and poorer customers. However, other reasons lead one to expect that privatization will result in lower prices. In chapter 1, Birdsall and Nellis note that, if private management were more efficient, lower prices may result. The net result often depends on the amount of competition and regulation the

Table 2.4 Price changes after privatization^a

Sector	Argentina		Bolivia		Mexico		Nicaragua	
	Before	After	Before	After	Before	After	Before	After
Telephone	100	83.9	100	91.7	100	147.9	n.a.	n.a.
Electricity	100	67.5	100	126.2	n.a.	n.a.	100	124.2
Water	100	84.0			100	109.2	n.a.	n.a.
La Paz and El Alto			100	89.5				
Cochabamba			100	143.0				

n.a. = not applicable or not available (either service was not privatized or data after privatization was not yet available)

a. Real price indices relative to consumer price index (CPI); before privatization = 100.

Sources: Argentina: water data from Galiani, Gertler, and Schargrotsky (2002, table 2.3), electricity prices are residential final prices from FIEL (1999), and telephone based on communications price index from Instituto Nacional de Estadística y Censos (INDEC). Bolivia: telephone prices are the minimum fixed tariff from Instituto Nacional de Estadística (INE), electricity prices are residential tariff rates from Superintendencia de Electricidad de Bolivia, and water rates in La Paz and El Alto are the tariff for 10 cubic meters from INE, whereas water rates in Cochabamba are R2 category rates (very poor users) from the Democracy Center. Mexico: water prices are from CONAGUA (Comisión Nacional del Agua) and PROFECO (Procuraduría Federal del Consumidor) and telephone prices are residential monthly subscription charges from ITU (2001). Nicaragua: electricity prices are from Banco Central de Nicaragua (Central Bank of Nicaragua).

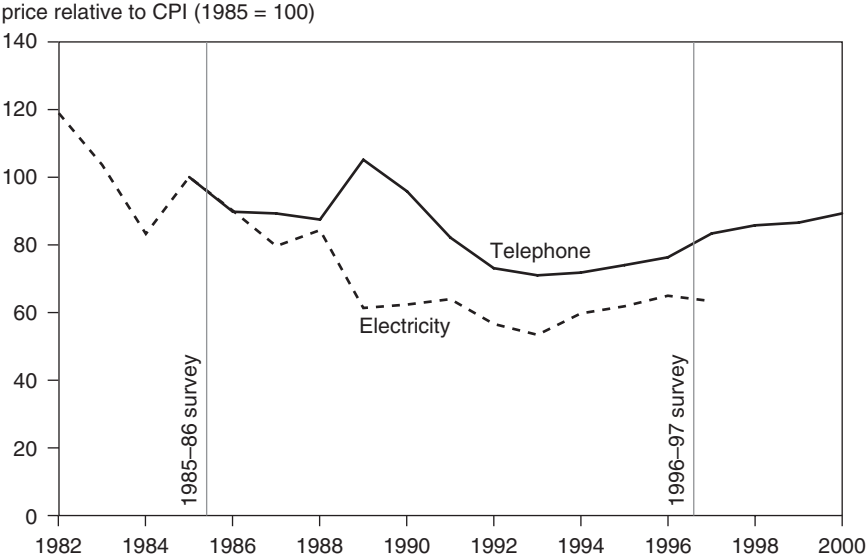
private firm faces. Price changes will also depend on whether the government awards the privatization contract based on the highest bid (thereby maximizing government revenue) or the lowest tariff bid (which results in lower consumer prices but less government revenue).

Because the household surveys used in this study collected information only on household expenditure for infrastructure services—not the prices the households paid for these services—the four countries had to use aggregate price indices at the city, state, or national level to assess price changes after privatization.¹⁷ As table 2.4 shows, the reported price changes are sensitive to the base year chosen; we used the prevailing prices in the same years as the surveys. The four cases generally avoided basing these price changes on prices from years of high macroeconomic instability, such as 1995 in Mexico (the peso crisis) or 1988–89 in Argentina (hyperinflation). Figures 2.1 to 2.4 provide further context with regard to the price evolution of selected utilities in Argentina, Bolivia, and Mexico.

Of the 10 privatizations studied in the four countries, prices fell in five cases and rose in the other five. Electricity prices increased in two out of the three countries with reforms. The price decrease in Argentina possibly reflected the fact that prior prices were high by international standards and privatization caused increased competition in electricity generation. Delfino

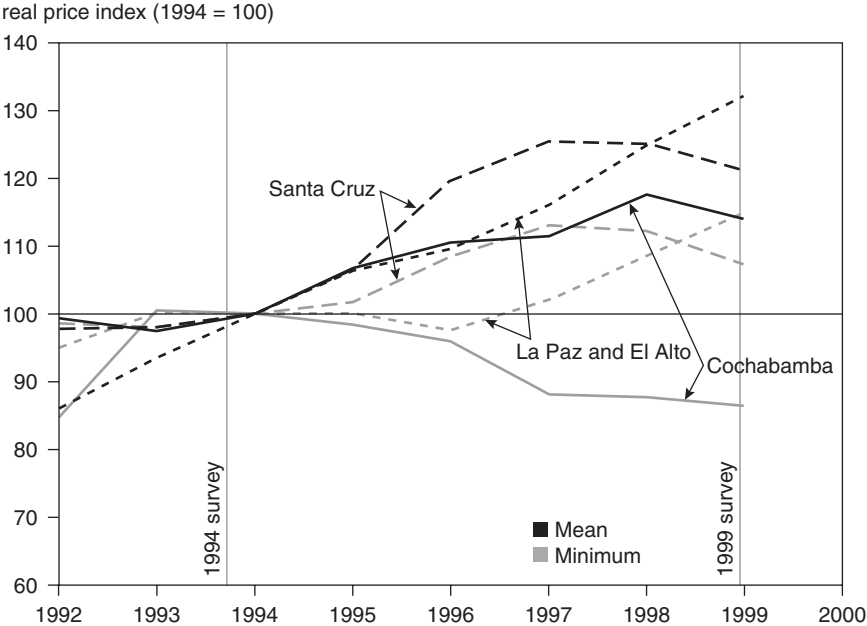
17. Unless otherwise noted, price information was provided by national statistics agencies in Argentina (INDEC) and Bolivia (INE) and by the Banco de México in Mexico.

Figure 2.1 Evolution of prices in Argentina, 1982–2000



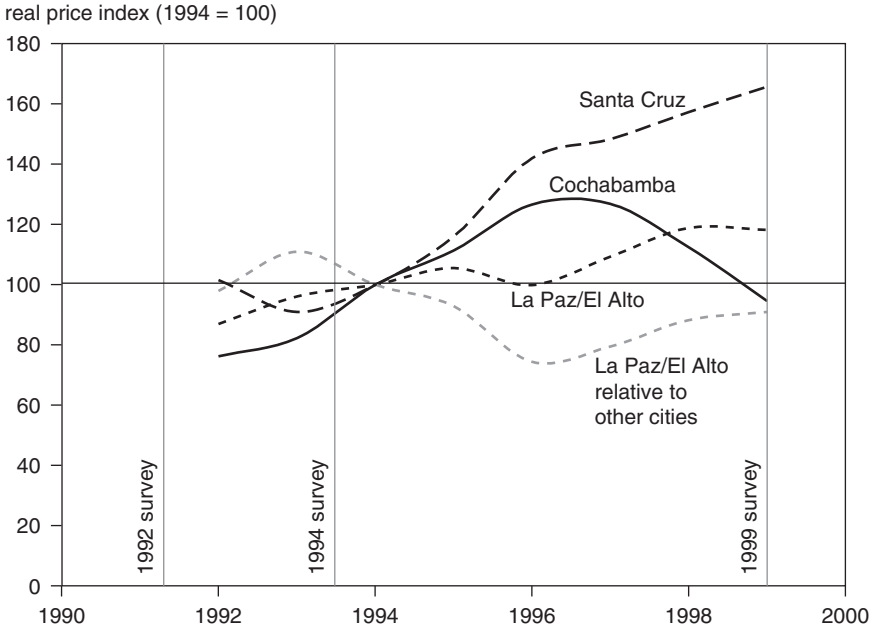
CPI = consumer price index.
 Sources: Electricity from FIEL (1999); telephone and CPI from INDEC.

Figure 2.2 Electricity prices in Bolivia, 1992–99



Sources: Bolivia's INE and Electricity Superintendencia.

Figure 2.3 Water prices in Bolivia, 1992–99



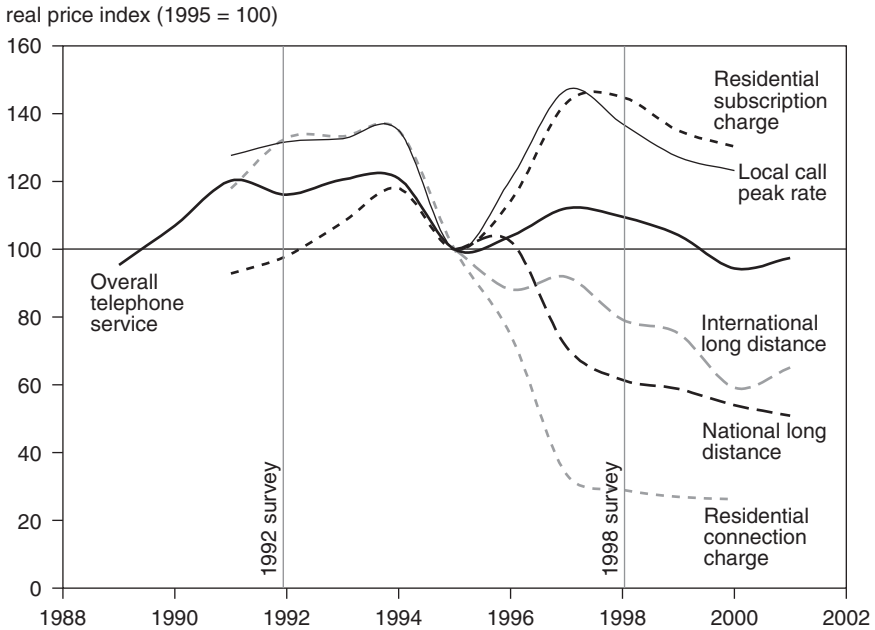
Sources: Water prices for 10 cubic meters from Bolivia's INE.

and Casarin (2001), using only postprivatization price data through 1999, found that electricity prices increased in Argentina. In chapter 5, Ennis and Pinto argue against using 1999 as a comparison point because of the deflation and macroeconomic instability that began in Argentina at that time; instead, they use 1996.¹⁸ Unlike Delfino and Casarin, Ennis and Pinto compare the 1996 price with a preprivatization year, 1986. (We discuss the sensitivity of Ennis and Pinto's results to alternate measures of the price change when we evaluate privatization's overall effects on poverty and inequality.)

Telecommunications prices fell, on average, in Argentina and Bolivia, but rose in Mexico (Galiani, Gertler, and Scharrodsky 2002). Regulatory problems and lack of competition prevented all prices from decreasing in Mexico, although connection charges fell 75 percent between 1991 and 1998 and the prices of long distance and international calls fell more than 20 percent after the introduction of competition in 1995. However, during 1992–98, residential subscription rates increased 48 percent, and local per-unit rates

18. Ennis and Pinto justify their choice of comparison years by citing research by Urbiztondo, Artana, and Navajas (1998), which supports their assertion that prices fell.

Figure 2.4 Evolution of telephone prices in Mexico, 1988–2002



Sources: ITU (2001), Banco de México national consumer price index by expenditure item.

also rose. The increased cost of local calls and decreased cost of long distance calls resulted from Telmex's requirement to eliminate cross subsidies before introducing long distance competition in 1997. In Bolivia, an overall 8 percent decline in telephone prices masked a doubling of the minimum tariff in the city of Santa Cruz, where the local operative moved quickly to raise rates before price regulation was implemented.

In Argentina, the Buenos Aires water concession lowered prices, and addition of a fixed, universal-service fee allowed the concessionaire to reduce access fees to one-tenth of their previous level (Galiani, Gertler, and Schargrodsky 2002). The successful water concession in La Paz and El Alto resulted in lower water price increases in those cities, compared to elsewhere in Bolivia. However, a second concession issued to Aguas de Tunari in 1999 for the city of Cochabamba resulted in tariff increases averaging 43 percent for poor consumers, with some consumers experiencing a more than doubling of their bills.¹⁹ Strikes and demonstrations ensued, followed by the declaration of martial law and eventual expulsion of the private

19. See Democracy Center, "Bechtel versus Bolivia: The Water Rate Hikes by Bechtel's Bolivian Company (Aguas del Tunari): The Real Numbers," August 20, 2002, www.democracyctr.org/bechtel/waterbills/waterbills-global.htm.

firm. In Mexico, heavily subsidized water prices resulted in 9 percent price increases in privatized areas, relative to nonprivatized ones. Thus, although prices increased after privatization in some instances, they decreased in many others. While technological advances (particularly in telecommunications) may be partially responsible for these decreases, Mexico's experience suggests that such gains cannot be realized without an appropriate regulatory framework.

Service Quality

Estache, Foster, and Wodon (2002) remark that consumer concern with state-owned utilities' low-quality service, especially in terms of service rationing and supply interruption, is a major justification for privatization, especially in Mexico (figure 2.5). A strong negative correlation of -0.55 is found between public support for privatization or private supply of a service and the perceived quality of that service. A 1991 poll in Buenos Aires, for example, found that 75 percent of respondents expected the quality of telephone service to improve with privatization, although over half thought the improvement would take three to five years to occur.²⁰

Improved service quality was not only expected with privatization; in some cases, the government mandated it as part of the conditions for sale of public enterprises. For example, privatization of Bolivian electricity was accompanied by regulations that established a system for measuring quality, including dates by which firms had to comply with quality indicators and financial penalties in cases of noncompliance.

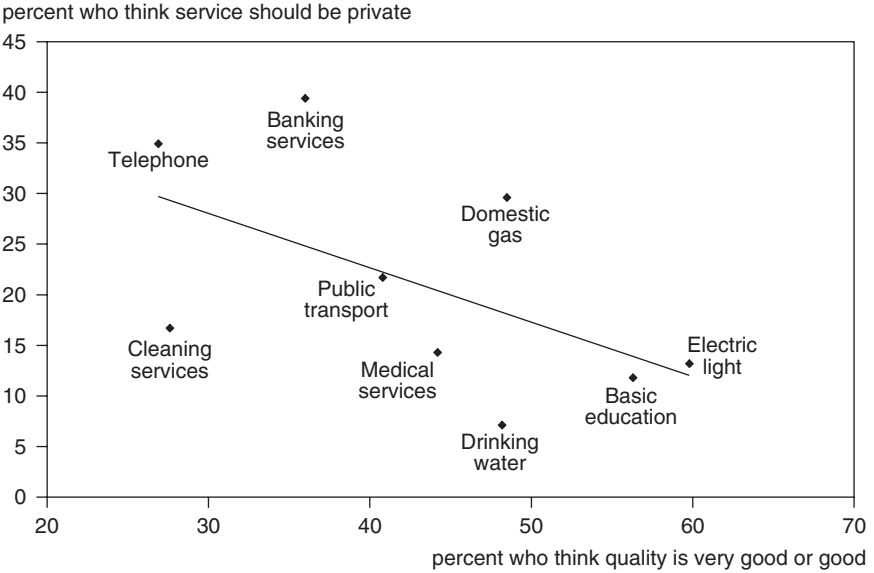
The household expenditure surveys used in this study did not collect information on the quality of infrastructure services used, and information from other sources is scarce. In particular, preprivatization quality indicators are mostly unavailable for the four countries studied. This lack of data made it impossible to formally measure the value of quality changes to consumers.

As table 2.5 shows, privatization is generally followed by improved quality of service (e.g., better quality telephone lines and shorter waiting periods for connection). In Mexico, for example, the waiting time for a telephone connection fell from 2.5 years in 1990—the year of privatization—to 72 days in 1995 and 30 days in 1997. Not all consumers, however, agreed that quality improved; a 1992 GEO (Gabinete de Estudios de Opinion) poll indicated that 36 percent of Mexicans thought telephone service had worsened with privatization,²¹ while a 1993 poll found that one in four Mexicans

20. The EQUAS Poll (LI034), February 1991, obtained from the Roper Center Latin American Databank.

21. See "Public Opinion in the Valley of Mexico about Public Services," *El Nacional*, January 16–21, 1992 (obtained from the Roper Center Latin American Databank).

Figure 2.5 Support for privatization and perceived service quality—results from a 1992 Mexican poll



Source: Author's calculations from a 1992 Gabinete de Estudios de Opinion (GEO) poll.

wanted to jail the telephone company management because of poor service.²² Nevertheless, available data indicate general improvements in quality following privatization.

Methodology

Deaton (1989) shows that the simple, nonparametric estimation of Engel curves can be used to describe the average welfare effects of price changes on consumption. Since essentially all consumers do not privately produce electricity, water, or telephone services, the budget shares of those services provide a first-order approximation of the relative welfare effect of a change in their price. If one lets x_0 equal a household's initial total expenditure per capita, w_{j0} its initial budget share on service j , p_j the price of service j , and U the household's utility, then the first-order approximation to the change in utility is (Banks, Blundell, and Lewbel 1996):

22. See "Mexico Phone Monopoly at End of the Line," *Houston Chronicle*, August 13, 1996.

Table 2.5 Selected quality indicators, by country and sector

Country and sector	Quality measure	Baseline value	Postprivatization value (year)	
Argentina				
		<u>1989–90</u>	<u>1994</u>	<u>1997–98</u>
Telephone	Digitalization (percent)	13	63	100
	Lines in service	3,139,685	4,886,957	6,852,086
	Faults per 100 lines per year	42.4 ^c	37.2	17.2
	Average repair waiting time (days)	11	3	n.a.
		<u>1992–93</u>	<u>1994–99</u>	
Water	Spilled water (millions of m ³ /day)	1.49	1.27	
	Average delay in attending claims (days)	180	32	
Bolivia				
		<u>Legal limit of goal</u>	<u>1997 or 1999^a</u>	
Electricity	Average response time to users technical complaints (hours)	3	2.26	
	Average interruption frequency per user	25	4.7	
	Index of commercial complaints	12	1.14	
	Telephone (percent)			
Long distance	Rural towns connected	25	32.66	
	National long distance calls completed	55	69	
	Faults corrected within three days	85	88	
Fixed line	COTAS digitalization	80	96	
	COTEL digitalization	5	5	
	COTAS incidence of faults	40	8	
	COTEL incidence of faults	60	27	
		<u>1993</u>	<u>1999</u>	
	Waiting list for main lines (number)	50,000	8,000	
Mexico				
		<u>1990</u>	<u>1995</u>	<u>1997</u>
Telephone	Waiting time for new connection (days)	890	72	30
	Faults per 100 lines per year	6.0 ^b	4.6	3.3
	Digitalization (percent)	38.6 ^c	88	90.1
	Pending connections (number)	259,875 ^b	70,798	91,367

n.a. = not available

a. Electricity results are based on a 1999 average reached by the firms CRE, ELECTROPAZ, ELFEC, ELFEO, and CESSA; telephone results are for 1997.

b. Based on 1993 data (1990 data was unavailable).

c. Based on 1991 data (1990 data was unavailable).

Sources: Argentina: Ennis and Pinto (2002); Bolivia: Galiani, Gertler, and Schargrodsky (2002) (water measures); Barja, McKenzie, and Urquiola (2002); Mexico: López-Calva and Rosellón (2002), ITU (2001).

$$\frac{\Delta U}{x_0} = -(\Delta \log p_j)w_{j0}. \quad (2.1)$$

A change in service price will have the greatest effect on consumers who devote a larger share of their total budget to that service. The approximation in equation 2.1 provides an upper bound on the loss to consumers of a price rise (or lower bound on the gain from a fall in price), as it assumes that consumers do not adjust their consumption quantity when the price of the service changes.²³ Banks, Blundell, and Lewbel (1996) therefore provide a second-order approximation to the change in welfare, which allows for quantity response to the price change:

$$\frac{\Delta U}{x_0} = -(\Delta \log p_j)w_{j0} \left(1 + \frac{\Delta \log p_j}{2} \frac{\partial \log w_j}{\partial \log p_j} \right). \quad (2.2)$$

Computation of equation 2.2 requires estimating the elasticity, $\partial \log w_j / \partial \log p_j$. This term is estimated by γ_{jj} / w_{j0} , where the coefficient γ_{jj} is obtained by estimating the Engel equation for household h .

$$w_{hj} = \alpha_j + \sum_{i=1}^k \gamma_{ij} \log p_i + \beta_j \log \frac{x_h}{n_h} + \phi_j \left(\log \frac{x_h}{n_h} \right)^2 + \lambda_j' Z_h. \quad (2.3)$$

Here, n_h is the number of members in household h , Z_h contains other demographic control variables, and p_i for $i \neq j$ is the price of good i . In much of this empirical work, the time periods and cross-sectional information are insufficient to allow for including the prices of substitute goods. This lack of sufficient price variation also precludes estimating a complete demand system to calculate welfare changes, as Wolak (1996) does.

These first- and second-order approximations can be used to measure the change in welfare arising from price changes associated with privatization for consumers who had access to the privatized service both before and after privatization.²⁴ For consumers who lacked access either before or after privatization, change in the price of the privatized good had no direct welfare change; however, if privatization caused a change in the price of substitute goods, this could be valued using first- and second-order approximations.

To value the welfare change for the remaining consumer group—those who gained access to the service after privatization—we used the concept of a virtual price that Neary and Roberts (1980) pioneered to examine

23. Waddams, Price, and Hancock (1998), who analyze utility privatizations in the United Kingdom, assume that quantity is fixed.

24. The approach could easily be modified to incorporate welfare gains from quality improvements by using quality-adjusted prices if sufficient data on quality were available.

household behavior under rationing.²⁵ Within this context, the virtual price of the privatized service is the lowest price at which a household would have chosen to consume zero units of the service before privatization if it had had access to the service in question. Given this virtual price, the welfare change from privatization is then calculated using equations 2.1 and 2.2, with the change in price moving from the virtual price to the post-privatization price and using the postprivatization expenditure share, w_{j1} , and total expenditure, x_1 , in place of their preprivatization counterparts as reference points.²⁶

The virtual price, p_v , is obtained from the estimated Engel equation 2.3 as the price at which the estimated expenditure share is zero. This virtual price differs across households according to their total expenditure and demographic characteristics—certain households are more able or willing to pay for access to the utility service. One potential concern is that equation 2.3 is only estimated for households that have access to the service; thus, it will result in inconsistent parameter estimates if omitted variables correlated with access also influence demand patterns. Therefore, we carry out Heckman’s two-step selection correction, first using a probit to estimate the probability of access and then adding the inverse Mills ratio obtained from this step to equation 2.3 (Heckman 1979).

The method outlined above could be applied directly in the case of Nicaragua to assess welfare changes from privatizing electricity since that country’s 1998 EMNV enables one to determine whether a given household had access in both 1993 and 1998.²⁷ The other three countries studied face the complication that household surveys are repeated cross-sections, rather than a panel. This means that a given household is interviewed only once, either before or after privatization of services; thus, it is only possible to identify whether the household has access in the survey year. Appendix 2.B outlines how the method described thus far is adapted to calculate welfare changes when the surveys contain a different sample of individuals each year.

The budget share allocated to each infrastructure category provides a first-order approximation of the households most affected by price changes. The mean budget shares capture the joint effect of differences in access across groups (those with no access have zero budget share) and income elasticities across those with access (table 2.6). The result is that not all budget shares

25. We make the empirically plausible assumption that no consumers lost access to the service as a result of privatization. Prices may have risen sufficiently to enable some users to choose to consume zero quantity; however, the option of paying for the privatized service remained.

26. A change in access has no value if one uses the preprivatization reference point since, in this case, the expenditure share w_{j0} is zero.

27. The 1998 EMNV asked respondents whether electricity service had been installed since 1993.

Table 2.6 Budget shares allotted to infrastructure sector, by decile
(per capita expenditure)

Country and sector	Period	1	2	3	4	5	6	7	8	9	10
Argentina (urban)											
Telecommunications	1985–86	0.3	0.3	0.5	0.8	0.7	0.6	1.0	0.9	1.0	1.1
	1996–97	1.8	2.2	2.3	2.6	2.4	2.7	2.5	2.6	2.3	2.2
Water and electricity	1985–86	2.3	2.6	2.6	2.9	2.3	2.6	2.4	2.3	2.0	1.8
	1996–97	4.7	4.2	3.7	3.6	3.1	2.9	2.7	2.5	2.1	1.5
Bolivia (urban)											
Telecommunications	1994	0.1	0.3	0.4	0.3	0.5	0.9	1.0	1.5	2.0	2.8
	1999	0.3	0.2	0.6	0.9	1.3	1.3	2.2	2.2	4.6	4.4
Water	1994	2.2	1.9	1.6	1.6	1.6	1.9	1.9	1.9	1.8	1.4
	1999	2.1	1.5	1.9	1.8	1.8	2.1	2.0	1.8	1.7	1.7
Electricity	1994	4.8	4.1	3.9	4.0	3.9	4.2	3.9	3.7	3.6	2.9
	1999	4.4	3.6	4.0	3.9	3.4	3.4	3.7	3.6	3.5	2.9
Mexico											
Telecommunications	1992	0.1	0.1	0.4	0.4	0.6	1.0	1.2	1.5	2.0	2.4
	1998	0.1	0.2	0.6	1.0	1.4	1.8	2.4	2.6	2.9	3.1
Water	1992	0.9	1.1	1.1	1.1	1.1	1.0	1.0	1.0	0.8	0.6
	1998	1.2	1.0	1.3	1.2	1.2	1.2	1.2	1.0	0.9	0.6
Nicaragua											
Electricity	1993	2.5	1.9	1.6	2.1	2.3	2.3	3.4	3.5	3.6	3.4
	1998	0.4	0.8	1.1	1.3	1.5	1.9	1.7	2.1	2.1	1.8

Note: Includes all households, including those without access.

Sources: Argentina: Ennis and Pinto (2002); Bolivia: Barja, McKenzie, and Urquiola (2002); Mexico: López-Calva and Rosellón (2002); Nicaragua: Freije and Rivas (2002).

decrease with total expenditure. Taking mean budget shares only across households with access, one finds that water and electricity are necessities—that is, budget shares decline as income increases—in Argentina, Bolivia, and Mexico; while telephone service is a luxury in Bolivia but a necessity in Argentina and Mexico. Price changes in water and electricity therefore tend to have the greatest effect on the poor, except in Nicaragua, where low access to electricity means that fewer poor residents are subject to price changes. By contrast, as telephone service constitutes a higher proportion of richer households' total budget, telephone price changes affect the upper deciles more than the lower ones. In most cases, however, each infrastructure service constitutes only 1 to 3 percent of total household budget; thus, even large price changes should not have dramatic effects.

Tables 2.7, 2.8, and 2.9 present the joint welfare effect of access and price changes obtained by the Nicaragua, Bolivia, and Argentina studies, respectively, using the above-outlined method in equations 2.1 through 2.3. For Nicaraguan electricity reform, Freije and Rivas (chapter 3) distinguish between households that had access before and after privatization and those that gained access after privatization (table 2.7). Clearly, increased

Table 2.7 Nicaragua electricity reforms: Joint effect of price and access change on consumers
(percent of per capita total household expenditure)

Decile ^a	Households with access before and after privatization		Households that gained access after privatization		Overall effect	
	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation
	1 (lowest)	-0.78	-0.76	12.99	12.66	-0.09
2	-0.55	-0.54	15.98	16.55	-0.16	0.58
3	-0.59	-0.58	15.61	16.25	-0.24	0.47
4	-0.48	-0.46	5.38	6.29	-0.27	0.07
5	-0.43	-0.40	5.38	6.27	-0.32	0.22
6	-0.53	-0.49	3.57	4.30	-0.41	0.04
7	-0.43	-0.39	1.69	2.41	-0.37	-0.07
8	-0.50	-0.43	2.02	2.59	-0.45	-0.10
9	-0.49	-0.39	1.38	1.84	-0.45	-0.11
10 (highest)	-0.49	-0.36	0.74	1.25	-0.40	-0.19

a. Preprivatization.

Source: Freije and Rivas (2002).

Table 2.8 Bolivia privatization reforms: Joint effect of price and access change on consumers
(percent of per capita total household expenditure)

Decile ^a	Water ^b															
	Electricity (overall effect)				Telephone (overall effect)				Scenario 1 ^c				Scenario 2 ^d			
	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation		
1 (lowest)	11.97	17.36	0.23	0.34	4.12	6.93	0.94	1.48	-0.99	-0.95	0.94	1.48	-0.99	-0.95		
2	0.76	1.56	0.13	0.13	0.83	1.58	0.31	0.50	-1.08	-1.04	0.31	0.50	-1.08	-1.04		
3	3.48	5.64	0.50	0.70	2.01	2.96	0.46	0.63	-0.55	-0.52	0.46	0.63	-0.55	-0.52		
4	1.60	2.65	1.80	2.69	1.30	2.63	0.43	0.77	-0.69	-0.66	0.43	0.77	-0.69	-0.66		
5	2.11	3.57	4.06	5.80	1.29	1.94	0.87	1.29	-0.95	-0.92	0.87	1.29	-0.95	-0.92		
6	0.97	1.98	4.05	5.65	1.15	1.86	0.47	0.70	-0.76	-0.72	0.47	0.70	-0.76	-0.72		
7	0.86	1.62	3.55	4.65	0.85	1.29	0.17	0.17	-0.75	-0.71	0.17	0.17	-0.75	-0.71		
8	0.78	1.60	2.62	3.71	0.60	0.83	0.18	0.19	-0.38	-0.34	0.18	0.19	-0.38	-0.34		
9	0.02	0.42	8.38	10.51	0.42	0.62	0.26	0.33	-0.50	-0.46	0.26	0.33	-0.50	-0.46		
10 (highest)	-0.50	-0.41	-7.44	-9.27	0.42	0.54	0.15	0.16	-0.57	-0.53	0.15	0.16	-0.57	-0.53		

a. Preprivatization.

b. Both scenarios 1 and 2 measure the overall effect of water privatization in La Paz and El Alto.

c. Scenario 1 assumes that privatization is the cause for all increased access.

d. Scenario 2 assumes that only increased access above increases in Santa Cruz and Cochabamba is due to privatization.

Source: Barja, McKenzie, and Urquiola (2002).

Table 2.9 Argentina electricity and telecommunications reforms: Joint effect of price and access change on consumers
(percent of per capita total household expenditure)

Decile ^a	Electricity		Telecommunications	
	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation
1	3.05	3.32	0.10	0.14
2	2.22	2.48	0.29	0.37
3	1.79	2.03	0.47	0.61
4	1.71	1.94	0.47	0.59
5	1.19	1.41	0.51	0.67
6	1.29	1.51	0.66	0.86
7	1.11	1.32	0.55	0.72
8	1.08	1.29	0.45	0.63
9	0.88	1.09	0.39	0.57
10	0.81	1.02	0.36	0.52

a. Preprivatization.

Note: Overall effect in urban areas only.

Source: Ennis and Pinto (2002).

price negatively affected households that already had access; because budget shares allocated to electricity are low, however, the welfare loss to these households is less than 1 percent of their per capita expenditure. By contrast, the value of gaining access can be much larger, reaching 16 percent of per capita expenditure for the lowest deciles. Therefore, the overall effect on a decile depends on the number of households who gained access relative to those with existing access. Deciles 2 through 6 experienced small gains in welfare, while the other deciles saw small welfare losses. For Bolivia, Barja, McKenzie, and Urquiola (chapter 4) estimate that the welfare increase from gaining access to electricity exceeded 100 percent for the lowest deciles. Thus, although prices rose, the overall effect was positive for all but the top decile.

Since prices fell in Argentina, Ennis and Pinto (chapter 5) find that the welfare effects were positive for all deciles for both electricity and telephone service (table 2.9). Electricity privatization benefited the poorer deciles relatively more, with an average effect of 2 to 3 percent of per capita expenditure for the lowest three deciles, while telephone privatization benefited the middle class more. As mentioned above, Delfino and Casarin (2001) suggest that privatization caused electricity prices to rise, rather than fall. Using the results of Ennis and Pinto, we estimate that prices would have needed to rise 32 percent to generate a negative welfare effect for decile 1, and more than 60 percent to have an overall negative welfare effect on deciles 2 and 3. Delfino and Casarin report a 38 percent price increase for the poor and a 10 percent decrease for consumers above 150 kWh (which must

be viewed as the maximum possible price increase stemming from privatization because of the 1998–99 deflation). Such a price increase would still imply overall positive welfare effects for deciles 2 through 10 and a welfare loss of 0.01 percent of per capita expenditure for decile 1. Thus, the welfare effect is most likely positive, on average.

In Bolivia, the benefits of telephone privatization were highest among the middle class; increased access was greatest for this group, with deciles 5 to 7 receiving overall gains of 5 to 6 percent of per capita expenditure (table 2.8). For the water concession in La Paz and El Alto, we present results under two scenarios: (1) taking privatization as the cause for all increased access and (2) valuing increased access in La Paz and El Alto relative to other major cities. In both cases, the effect was positive, but lower under the second scenario. The benefits of water privatization were relatively larger for Bolivia's poorer deciles since increased access was greatest for them. Decile 1 benefited 7 percent of per capita expenditure, although a gain of only 1.5 percent was attributable to privatization.

The failed concession in Cochabamba, Bolivia resulted in large increases in average water tariffs. Prices for the poorest consumers—for whom water usage consisted of only an indoor toilet and outside water tap—rose 43 percent on average. The middle class and commercial users experienced average price increases of 57 and 59 percent, respectively.²⁸ The short-lived nature of the privatization meant that agreed-on expansion of the water network under the concession contract was not realized, and consumers had immediate welfare losses from these price increases. Nevertheless, our estimates of the average welfare losses were not nearly as large as press reports suggested. For example, Finnegan reported that "ordinary workers now had water bills that amounted to a quarter of their monthly income."²⁹ By contrast, our estimated average cost of a 43 percent price rise at a maximum of 1 percent of per capita household expenditure. In the 1999 household survey, the maximum expenditure share on water observed in Cochabamba was 10.5 percent, with an average expenditure share of 1.6 percent and with the 95th percentile at 5.4 percent. For most households, then, expenditure shares were simply too low for even a doubling of price to result in the water bill reaching a quarter of income. The numbers reported in the press represented the maximum possible effect on very few consumers, while the average consumer had smaller welfare losses.

28. See Democracy Center, "Bechtel versus Bolivia: The Water Rate Hikes by Bechtel's Bolivian Company (Aguas del Tunari): The Real Numbers," August 20, 2002, www.democracyctr.org/bechtel/waterbills/waterbills-global.htm.

29. William Finnegan, "Letter from Bolivia: Leasing the Rain," *New Yorker*, April 8, 2002.

Poverty and Inequality

Consumer-welfare changes are a household-level money metric of the change in welfare if one assumes no income effects (Banks, Blundell, and Lewbel 1996). To evaluate privatization's effect on inequality, the country studies first calculate the Gini coefficient and Atkinson inequality indices before privatization. They then take each household's per capita expenditures before privatization; add the estimated per capita change in consumer welfare; and recalculate the inequality measures, taking the consumer effect of privatization into account. Use of repeated cross-sectional surveys entails complications associated with not being able to identify the specific households that gained access to the privatized service (appendix 2.C details the adjustments needed with this data).

One popular approach to poverty measurement is unified basic needs measures, based directly on availability of and access to certain essential services (e.g., World Bank 1996). Access to piped water and electricity is often included, in which case the increased access shown in table 2.2 would directly improve poverty measures.

Other poverty measures are based on household income or expenditure; however, the same approach for inequality can be used to evaluate privatization's consumer effect on poverty. The Foster, Greer, and Thorbecke (1984) poverty measures are calculated before privatization and again after adjusting for welfare changes, according to the following formula:

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^N \left(1 - \frac{x_i}{z}\right)^{\alpha} 1(x_i \leq z), \quad (2.4)$$

where z is the poverty line, x_i is household expenditure per capita for household i , N is the total number of households, and the parameter α is 0 for a headcount measure of poverty, 1 for the poverty gap ratio, and 2 for a poverty measure sensitive to distribution among the poor.

Privatization's overall effects on inequality and poverty among consumers in Argentina, Bolivia, and Nicaragua are given in table 2.10. In Argentina, privatization of electricity and telephone service reduced inequality by a small amount and reduced head-count measures of poverty 1.0 to 1.5 percent. That country's poor benefited from both increased access to utilities and reduced prices. In Bolivia, privatization of electricity and water had similar effects, reducing inequality slightly and poverty by 1.0 to 1.5 percent. Cochabamba's failed water privatization is estimated to have increased poverty by 2 percent and to have had little effect on inequality. Privatization of Bolivian telephone services had a larger effect because increased access was largest for the middle deciles. However, privatization is estimated to have resulted in 5 to 6 percent fewer households falling below the poverty line. (Bolivia has a high poverty level; even households in deciles 5 and

Table 2.10 Privatization effects on consumer inequality and poverty

Inequality and poverty measure	Estimated measure after privatization												
	Measure before privatization	Electricity			Telephone			La Paz and El Alto			Water ^a		
		First-order approximation	Second-order approximation	Third-order approximation	First-order approximation	Second-order approximation	Third-order approximation	First-order approximation	Second-order approximation	Third-order approximation	First-order approximation	Second-order approximation	Third-order approximation
Argentina (urban)													
Inequality measures	0.400	0.396	0.396	0.396	0.396	0.396	0.396	0.396	0.396	0.396	0.396	0.396	
Gini coefficient													
Atkinson indices													
A (0.5)	0.130	0.128	0.127	0.129	0.128	0.128	0.129	0.128	0.128	0.128	0.128	0.128	
A (1.0)	0.241	0.238	0.237	0.237	0.237	0.237	0.237	0.237	0.237	0.237	0.237	0.237	
A (2.0)	0.424	0.519	0.482	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	
Poverty measures													
Head count ($\alpha = 0$)	0.113	0.095	0.095	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	0.102	
Poverty gap ($\alpha = 1$)	0.032	0.027	0.027	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	
Distribution sensitive ($\alpha = 2$)	0.013	0.011	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	
Bolivia (urban)													
Inequality measures	0.442	0.440	0.442	0.455	0.464	0.464	0.435	0.430	0.442	0.442	0.442	0.442	
Gini coefficient													
Atkinson indices													
A (0.5)	0.164	0.162	0.163	0.171	0.176	0.176	0.159	0.156	0.164	0.164	0.164	0.164	
A (1.0)	0.278	0.275	0.278	0.293	0.303	0.303	0.270	0.265	0.278	0.278	0.278	0.278	
A (2.0)	0.660	0.652	0.649	0.641	0.641	0.641	0.652	0.647	0.660	0.660	0.660	0.660	

(table continues next page)

Table 2.10 Privatization effects on consumer inequality and poverty (*continued*)

Inequality and poverty measure	Estimated measure after privatization														
	Measure before privatization	Electricity				Telephone				Water ^a					
		First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	First-order approximation	Second-order approximation	La Paz and El Alto	First-order approximation	Second-order approximation	Cochabamba	First-order approximation	Second-order approximation
Poverty measures															
Head count ($\alpha = 0$)	0.625	0.610	0.610	0.566	0.572	0.566	0.618	0.612	0.612	0.646	0.625	0.625	0.646	0.625	
Poverty gap ($\alpha = 1$)	0.259	0.251	0.251	0.240	0.240	0.240	0.250	0.245	0.245	0.262	0.259	0.259	0.262	0.259	
Distribution sensitive ($\alpha = 2$)	0.136	0.132	0.132	0.128	0.129	0.128	0.130	0.125	0.125	0.138	0.136	0.136	0.138	0.136	
Nicaragua															
Inequality measures															
Gini coefficient	0.556	0.557	0.557	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Atkinson indices															
A (0.5)	0.265	0.266	0.266	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
A (1.0)	0.428	0.430	0.430	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
A (2.0)	0.634	0.636	0.636	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Poverty measures															
Head count ($\alpha = 0$)	0.352	0.351	0.352	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Poverty gap ($\alpha = 1$)	0.145	0.146	0.146	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Distribution sensitive ($\alpha = 2$)	0.081	0.082	0.082	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	

n.a. = not available

a. Water results are reported for Bolivia only and effects of the La Paz and El Alto and Cochabamba privatizations are reported separately; the La Paz and El Alto results assume that privatization is the cause for all increased access (see Barja, McKenzie, and Urquiola [2002] for results under alternate assumptions). In Bolivia, city-level, counterfactual poverty and inequality measures are scaled to be comparable to overall urban levels (first column). Sources: Argentina: Ennis and Pinto (2002); Bolivia: Barja, McKenzie, and Urquiola (2002); Nicaragua: Freije and Rivas (2002).

6 lie below the poverty line.)³⁰ In Nicaragua, electricity reforms had essentially no effect on poverty and inequality, with increased price counteracting improved access.

The overall findings that emerge from table 2.10 are that (1) privatization generally has little effect on inequality (change in the Gini coefficient is 0.02 or less), and (2) in three of the four countries studied, privatization either reduced poverty or had no effect on it (that is, the popular perception that privatization is responsible for large increases in inequality and is particularly harsh on the poor is not borne out by the cases considered here).

Evaluating Worker Effects

For a representative worker of any given category (defined by skill, employment sector, age, or gender), the economic rent or surplus depends on the wage rate and employment levels applicable to that category. Therefore, an evaluation of privatization's implications for income distribution must include effects on employment and wage rates. Ideally, employment effects would include job layoffs and changes in hours worked and tenure (i.e., the duration of employment relationships, which would affect level of economic insecurity, search costs, and investment in firm-specific relationships). The distributive effect of privatization requires one to assess effects (1) on average levels of these variables across the entire worker population (insofar as it pertains to the functional distribution of income between labor and capital) and (2) across worker categories to determine the effect on earnings distribution.

The data used for these evaluations are based on either employment or household surveys, which are subject to severe limitations. Therefore, our assessment of wage-employment effects is piecemeal, whereby available data on dimensions are evaluated separately at various levels of precision. In particular, the data do not permit any comprehensive assessment of the distributional effect across categories or income classes comparable to this study's consumer-side analysis.

Employment Layoffs

Job layoffs are typically widely publicized and involve large income changes for the workers affected, at least over the short term. Direct data on layoffs were unavailable for the privatized enterprises examined. The authors of the

30. The poverty line is taken from the World Bank (1996), which uses the August 1993, overall urban poverty line of 219.9 Bolivianos per person per month. While city-specific poverty lines are likely to reduce the measured head-count poverty to about 0.52 to 0.54, this change would have little effect on the counterfactual comparisons.

country studies collected data on employment levels directly from most of the privatized utilities in Argentina, Bolivia, and Mexico and supplemented these data with household and employment surveys for selected years at various stages of the privatization process. Therefore, discussion on employment effects excludes Nicaragua, whose many privatized enterprises precluded collecting data on firm-level employment levels.

We assume that all employment reductions corresponded to layoffs, as we were able to observe only net changes in employment and were unable to distinguish resignations or voluntary retirement from layoffs or determine whether larger layoffs were offset by new hires. Thus, this section uses the terms employment reduction and layoff interchangeably. In what follows, we summarize evidence from the country studies on employment reduction after privatization in absolute numbers and relative to preexisting levels of employment in these enterprises. One can also estimate the significance of layoffs relative to the overall labor force in the economy and to changes in unemployment occurring at that time. Upper bounds to the effects of layoffs on inequality and poverty were available for Argentina.

Argentina

Ennis and Pinto report in chapter 5 that, in Argentina, privatized enterprises were subject to a significant number of job losses: Employment fell about 75 percent (from 223,000 jobs to 73,000) between 1987–90 and 1997. Most of these losses were concentrated in Greater Buenos Aires, where the total labor force is approximately 4.2 million. Since the privatized enterprises tended to be capital-intensive, the proportion of the labor force affected was small (no more than 2 percent of the aggregate labor force and 3.5 percent of the labor force in Greater Buenos Aires).

The 1990s were a period of rising unemployment in Argentina; the rate of urban unemployment grew from 7.6 percent in 1989 to 9.6 percent in 1993 and 17.4 percent in 1995, subsequently falling to 14.9 percent in 1997. Between 1987–90 and 1997, the 150,000 jobs that privatized enterprises eliminated in the utilities—electricity, natural gas, water, telecommunications, airlines, and railways—and oil and gas sectors constituted an estimated 13 percent of increased unemployment in the Argentine economy, substantially exceeding the proportion of the economywide labor force originally employed in these sectors (7 percent for private and public enterprises combined in 1987–90). Hence, employment cutbacks in the privatized enterprises were greater than those occurring elsewhere in the economy, suggesting that the privatization process increased unemployment beyond the effect of general macroeconomic shock.

Most of the cutbacks were concentrated in the railway industry, where employment fell from 92,000 jobs in 1987–90 to 17,000 in 1997, accounting for 6.6 percent of increased unemployment in the economy over this period. In other sectors, the cutbacks were far smaller: in the oil sector,

cutbacks accounted for only 2.57 percent of increased unemployment and less than 1.5 percent in each of the other sectors. Electricity, telecommunications, water, and gas together generated only 3.6 percent of additional unemployment.

The effect of layoffs on income distribution cannot be estimated without knowing the subsequent job experience of laid-off workers or of the nature of unemployment benefits. Ennis and Pinto use employment surveys to estimate an upper bound to the effect of these job reductions by assuming that all laid-off workers earned zero income. Alternatively, this assumption can be interpreted as the short-term effect if most laid-off workers were unemployed in the year of privatization, with no fiscal assistance in terms of severance packages or unemployment benefits. For 1989—the year before privatization—replacing incomes reported by a randomly selected set of workers in the privatized sectors (whose proportion equals that of job contractions in those sectors) increased the Gini coefficient of earnings distribution from 0.5375 to 0.5545 or about 3 percent. Not surprisingly, the effect on the proportion below the poverty line was somewhat larger, rising from 29.47 to 31.95 percent or about 8 percent.

Some workers who lost jobs in the privatized enterprises might subsequently have been rehired elsewhere in the private sector. Numerous anecdotal reports indicate that many employees in the vertically integrated SOEs who left at the time of privatization joined smaller private companies that became subcontractors of the privatized enterprises. One can estimate a lower bound to the extent of such rehiring by focusing only on employment in the sectors privatized (that is, ignoring laid-off employees who may have found new jobs in other sectors). The employment surveys allowed Ennis and Pinto to estimate the proportion of the Argentine labor force accounted for by the sectors privatized over successive years (aggregating across public and private enterprises). This proportion declined from 7.32 percent in 1989 to 5.14 percent in 1992, owing to contractions in both the SOEs (from 1.95 to 0.58 percent) and the private sector (from 5.37 to 4.56 percent). After 1992, however, private-sector employment grew to nearly 7 percent in 1994, and remained at that level during 1996–97. The share of these sectors in the economywide labor force nearly recovered to its former level (7.06 percent in 1997 versus 7.32 percent in 1989), suggesting that the overall employment contractions in the privatized sectors over a longer time horizon were similar to those occurring in other sectors of the economy. In short, after controlling for macroeconomic changes, expanded private-sector employment eventually absorbed most of the workers laid off in the privatized enterprises.³¹ Viewed from this interpretation, the

31. The rise in private-sector employment could also have been accounted for employees shifting in from other sectors or new entrants to the labor force, rather than reemployment of workers displaced from the public sector.

income losses resulting from layoffs were temporary, lasting a maximum of three years after privatization. Thus, the inequality effects on long-term income distribution are negligible, as even the 3 percent increase in the Gini coefficient calculated for the year of privatization would largely disappear by 1994.

Analysis of the distribution of employment reductions in the privatized enterprises by skill level reveals that the cutbacks were greater for less skilled employees; however, the extent to which this was so is similar to the changes in skills bias that occurred in other sectors of the economy. Tenure declined disproportionately in the privatized sector, with duration of employment declining almost 70 percent between 1989–95 (from an average of 194 months to 57 months), as opposed to a 27 percent decline (from an average of 96 months to 70 months) for the labor force at large. Average hours worked increased, reflecting the general trend in these sectors for privately employed workers to work more, on average, than employees of SOEs (55 versus 45 hours per week).

Bolivia

The extent of privatization in Bolivia was much narrower than in Argentina. Because information was unavailable on the employment effects of the water concessions, Barja, McKenzie, and Urquiola, in chapter 4, focus on privatizations in the electricity and telecommunications sectors, which represented less than 0.5 percent of the economy's labor force before privatization (about 5,800 jobs of the 1.3 million employed in the capital cities). Thus, these privatizations are unlikely to have exerted a significant effect on economywide employment or wage levels.

Within the privatized Bolivian enterprises, employment levels fell. In electricity generation, the state firm ENDE (Empresa Nacional de Electricidad) split into three privatized enterprises, in addition to leaving an ENDE residual. While data for the residual firm are unavailable, the three privatized enterprises together employed 180 workers, compared with ENDE's 540 employees before privatization. In electricity transmission, data limitations prevented us from obtaining a complete picture; however, we established a 15 to 20 percent upper bound of job losses for 1995–97. In telecommunications, employment in ENTEL's long distance segment rose from 1,745 in 1995 to more than 2,000 in 1997 (likely reflecting growth of the new cellular business), and fell steadily thereafter to about 1,000 by 2000. In the local segment, the number of jobs dropped from about 2,000 in 1995–96 to 1,600 in 2000. The aggregate change in these two sectors was a drop of about 1,700 jobs, implying a job contraction rate of about 30 percent within the privatized enterprises in the five years following privatization.

As a proportion of the total labor force in the capital cities, the job losses in these two sectors are miniscule: about 0.13 percent or 1 out of every 1,000 jobs. Bolivia's ratio stands in sharp contrast to that of Argentina, where

job losses in Greater Buenos Aires amounted to 3.5 percent of the labor force or 35 out of every 1,000 jobs.

Data on unemployment rates in the overall Bolivian economy reveal a rise from 3 percent in 1995 to 4.43 percent in 1997, and then to 7.5 percent in 2000. Assuming that unemployment rates in the capital cities were similar to those in the rest of the economy (an assumption borne out for the last year, 1995, for which data on unemployment rates in capital cities are available) and using the estimated size of the labor force in the capital cities (1.3 million in 1995), Barja, McKenzie, and Urquiola estimate 58,000 job losses in the economy as a whole between 1995 and 2000. In the electricity and telecommunications sectors, job losses thus amounted to approximately 3 percent of the aggregate job losses in capital cities. Bolivia's percentage is comparable to the corresponding contributions of these two sectors in Argentina, and is substantially higher than the proportion of the labor force originally accounted for by these sectors. In short, privatization in Bolivia had a contracting effect on employment, even after correcting for overall macroeconomic shocks, but—like the case of Argentina—the effect was small.

No further details are available on the likely effects of these layoffs on income distribution, tenure, hours worked, or skill distribution of the work force. The relatively small scale of the employment cutbacks in these sectors, relative to the rest of the economy, suggests that these effects are unlikely to be significant.

Mexico

Privatization's effect on employment in Mexico falls between Argentina and Bolivia. López-Calva and Rosellón (2002) report that, in 1983, when privatization began, SOEs employed more than 4 percent of the economy's work force; a decade later that percentage had fallen by more than half. The proportion of the labor force involved in enterprises undergoing the first two phases of privatization was thus about 2 percent of Mexico's entire work force. The fraction of the work force—both white- and blue-collar workers—laid off from these enterprises during these two phases was about 50 percent, according to firm-based surveys reported in La Porta and López-de-Silanes (1999). The employment declines started before privatization and were accentuated in the subsequent two or three years. Hence, the fraction of job losses that occurred within a four-year window of privatizations amounted to about 1 percent of the economy's workforce (10 jobs out of every 1,000), compared with 2 percent in Argentina and .13 percent in Bolivia.

Unlike Argentina and Bolivia, however, Mexico witnessed a decline in overall unemployment during the first two phases of privatization. The open (urban) unemployment rate decreased from 5 percent in 1985 to 4 percent in 1994. Applied to the entire economy, this rate is comparable to that of jobs lost in privatized enterprises, suggesting that, without privatization, the drop in the unemployment rate would have doubled.

The rotating panel feature of Mexico's employment surveys permitted López-Calva and Rosellón (2002) to follow the job experience of laid-off SOE workers over one subsequent year. About 45 to 50 percent of those laid off found jobs within the same sector within a year, without loss of social security or health benefits. This data suggests that even the short-term effect of job losses is approximately half the figure given above—that is, about 5 out of every 1,000 workers were unemployed for a full year after privatization. Furthermore, some remaining workers would have shifted into the informal sector or self-employment, sectors whose importance grew within the labor market (together accounting for 49 percent of the labor force in 1980 and 60 percent in 1996).

Summing Up

The proportion of the labor force laid off was small, ranging from a low of 0.13 percent in Bolivia to 2 percent in Argentina; the cutbacks were large within the privatized enterprises, ranging from 30 percent in Bolivia to 75 percent in Argentina; and their effect on unemployment was larger than that of other sectors of the economy. In Argentina and Mexico—the two countries where cutbacks were largest—a significant proportion of laid-off workers was eventually reemployed within the same sector (45 to 50 percent within one year in Mexico and 80 to 90 percent within four years in Argentina).

Wage Rates

Ennis and Pinto find that, in Argentina during 1989–95, average (real) wages rose 50 to 60 percent in both private and public sectors, reflecting recovery resulting from macroeconomic stabilization. The effect of privatization on wages, however, depends on the difference in average wage levels in the two sectors. Public-sector wage rates were higher, on average, by about 10 percent in 1989 and 16 percent in 1995. The labor reallocation created by privatization represented a downward effect on the average wage rate for the work force as a whole. This effect is likely insignificant, however, given that only 2 percent of the workforce was shifted in this manner. Moreover, average hours worked increased by about 25 percent for those workers who shifted sectors, which more than outweighed the drop in the wage rate. Consequently the effect on average wage income was positive for the representative employed worker.

Reallocation's effect on economywide wage inequality is complicated by two counteracting effects. On the one hand, greater wage inequality within the private sector, compared with the public sector, exposed the transferred workers to greater wage dispersion. On the other hand, the deviation between the average public-sector wage rate and the mean wage in the economy was greater than the corresponding deviation between the

average private-sector wage and the economywide wage rate, so the transferred workers moved closer to the economywide average.³² The former effect dominated in Argentina, irrespective of the year chosen as the base. Hence, the labor reallocation increased wage inequality; however, to reiterate, the extent of this effect was insignificant, given the small proportion of workers transferred across sectors.

From 1989 to 1995, the Gini coefficient of the wage rate fell 16 percent, mainly because of a drop in inequality in both the public and private sectors. Based on the above argument, it would have fallen even faster without privatization; however, the extent of the difference caused would probably have been negligible. The fall in inequality within the public and private sectors was similar to the economywide fall: 14 and 17 percent, respectively. Thus, within-group changes are likely to override the effects privatization had on labor reallocation. Unfortunately, analyzing the role that privatization may have played in reducing inequality within each sector requires more detailed data on intrafirm wage distribution than are available for Argentina to date.

No information is available on the wage effects of privatization in Bolivia. In Mexico, La Porta and López-de-Silanes (1999) use intrafirm data to show that wage rates rose in enterprises after privatization, mainly because of rises in worker productivity. The contrast to the general stagnation of wage rates in the economy in 1983–94 is striking. Even more surprising is that the rise in wage rates was significantly higher for blue-collar, than for white-collar, workers (approximately 122 percent versus 77 percent over the same period). This finding suggests that privatization per se reduced wage inequality within the privatized enterprises. The full effect, of course, includes the effect of labor reallocation between public and private sectors (that is, the wage implications for those who lost their jobs in the privatized enterprises and were subsequently hired elsewhere in the private sector). The rotating panel analysis carried out by López-Calva and Rosellón (2002) indicates that those who left the privatized enterprises lost because they were reemployed at a lower wage rate; however, they protected their incomes by working longer hours. On the other hand, most lost access to health care and social security benefits, which must be counterbalanced against the trends in within-sector wage dispersions.

The extent of labor reallocation resulting from the privatization process was substantially larger in Nicaragua than in the other three countries. Over the 1993–98 period, that country's private-sector share in the labor force rose from 77 to 86 percent in urban areas and, during 1993–99 from

32. The economywide variance equals the weighted sum of within-group variances, added to the variance of the two group means from the economywide mean, with the employment shares of the two sectors acting as weights. Hence, the effect of a change in the employment shares equals the sum of two effects: the difference in within-group variances and the difference in variance of group means from the economywide mean.

89 to 96 percent in rural areas. Thus, the proportion of the overall labor force reallocated was at least 7 to 9 percent, and probably higher if the entire privatization period were taken into account. This finding reflects the transition from a socialist economy that was under way. Given the country's many privatized enterprises, it was not feasible for Freije and Rivas (chapter 3) to obtain intrafirm data on wages and employment. Therefore, they relied on national household surveys conducted in 1993 and 1998–99.

As is typical, the average public-sector wage was above that of the private sector, such that the labor reallocation lowered the average wage in the economy. In the rural sector, the difference was large and growing: average public-sector wages were 29 percent higher than in the private sector in 1993 and 59 percent higher in 1998. In the urban sector, the differential was negligible in 1993³³ and 20 percent in 1999. Wage rates rose in the urban sector and fell sharply in the rural sector within both private and public employment. Hence, the privatization process is likely to have significantly accentuated the downward drift in the average rural wage.

In Nicaragua's case, the effect on wage inequality is particularly complicated because the choice of sector, base year, and unit matters. Freije and Rivas found that the ordering of variances and means in the public and private sectors depended on whether the urban or rural sector were considered, whether the base or final year were chosen for comparison, and whether the wage or the log of the wage were chosen as the unit. Since the log normal distribution is usually a better approximation than a normal distribution to distributional data, it perhaps makes sense to focus on the log of the wage rate as the relevant unit. In that case, wage dispersion is uniformly higher in private versus public employment, with the difference especially pronounced in the rural sector. This effect contributes to increased inequality stemming from the labor reallocation. On the other hand, the transferred workers moved closer to the economywide average wage, which tended to reduce inequality.

In the rural sector, the balance between the two effects depended on whether base year or final year weights were chosen. Using final year weights, the overall effect on rural wage inequality was negative, but positive if base year weights were chosen. In the urban sector, the effect was positive in both cases, but the magnitude of the effect was sensitive to choice of the base year. Thus, it is difficult to infer the overall effect of labor reallocation on wage inequality.

Within the public sector, wage dispersion rose in both urban and rural areas. It was especially sharp in the urban sector, where the variance of the public-sector log wage rose from 0.501 in 1993 to 0.736 in 1999. This find-

33. The arithmetic mean of the wage rate was slightly lower in the public sector, while the geometric mean was slightly higher in 1993.

ing reflects wage-structure convergence of the public and private sectors. Public-sector managers and professionals, in particular, experienced sharp increases in wages, which moved toward parity with private-sector wages for these categories. However, wages for clerical workers, salespersons, and manual workers changed little. Thus, it is plausible that wage structures within the public sector were responding to market pressures at the upper end, causing inequality within the public sector to grow.

Freije and Rivas conducted a decomposition analysis of the wage structure in the two sectors, following Juhn, Murphy, and Pierce (1993); the exercise confirmed the validity of this hypothesis, even after controlling for a range of worker characteristics that affect wages, such as age, gender, schooling, employment sector, and nature of position held. Specifically, the convergence of public-sector wage structures to the private sector at the upper end tended to explain one-third of the rise of the variance of log wages in the urban sector, a proportion reasonably robust across choice of inequality measure (such as generalized entropy measures or Atkinson indices corresponding to differing degrees of inequality aversion). This effect is not related to the privatization process per se, but to increasing market pressures on public-sector wage structures. The dominant source of upward pressure on inequality—far outweighing the effect of changing public-sector wage structures—was the rise in market-wage sensitivity to worker characteristics, which is not surprising in a transition economy.³⁴ Compared with these changes, the privatization process and changes in public-sector wage structures are modest contributing factors.

Summing up, overall labor reallocation associated with privatization was significant in Nicaragua, but not in Argentina and Mexico.³⁵ Reallocation tended to lower the average wage since public-sector wages were higher, on average, than private-sector wages. The effect of reallocation on wage inequality was complicated by a set of opposing effects, with no simple pattern emerging across countries. Changes in public- and private-sector wage inequality likely dominated these effects. Over the privatization period, within-sector inequality fell in Argentina (for reasons not yet well understood), within-firm inequality fell in privatized enterprises in Mexico (partly because of the privatization process), and within-sector inequality rose significantly in Nicaragua (probably owing to increased market pressures associated with the political transition).

34. Increased sensitivity of wages to worker characteristics typically constitutes 130 to 250 percent of the change in overall wage inequality in the urban sector for 1993–99, in contrast to a 33 to 60 percent contribution from changed public-sector wage structures and 16 to 76 percent of labor reallocation resulting from privatization.

35. Data were not available for Bolivia; the wage employment effect in that country would likely be negligible.

Fiscal Implications

Even though their distributive effect is less visible and difficult to estimate, privatization's fiscal consequences can be just as important as the direct effects on consumers and workers. For example, the often large proceeds from privatization may be used to retire public debt or reduce fiscal deficit, thereby serving as useful accompaniment to macroeconomic stabilization programs aimed at reducing inflation and future debt burdens. The inflation tax often falls disproportionately on the poor, while reductions in debt service burdens can free up resources for social spending programs (e.g., old-age pensions, public schooling, or health clinics). In addition, many SOEs incur operating losses funded by fiscal-budget subsidies. Privatization often leads to elimination of these losses, and profitable private enterprises contribute tax revenues instead of absorbing public subsidies.

Argentina

In Argentina, privatization proceeds were considerable at both the federal (\$19 billion) and provincial (\$4 billion) levels. Of these amounts, \$10 billion was used to reduce public debt (\$6.7 billion coming from the 1990 telecommunications privatization and \$2.7 billion from the 1992 electricity and natural gas privatizations). This amount equaled about one-eighth of the country's public debt at that time, which fell from \$78.9 billion in 1990 to \$69.6 billion in 1993. Interest payments on debt fell from 2.98 percent of GDP in 1989 to 1.70 percent in 1993 and 1.61 percent in 1994. Since the early 1980s, social spending programs have tended to be negatively correlated with debt-service payments; following this general pattern, social spending increased by an almost equivalent amount, from 17.63 percent of GDP in 1989 to 19.24 percent in 1994. The fiscal deficit dropped from 3.8 percent of GDP in 1989 to 0.1 percent in 1994 and 0.5 percent in 1995, partly as a result of the additional \$13 billion privatization proceeds in the form of cash. Privatization proceeds played a role in the general macroeconomic stabilization that occurred at this time, although it is virtually impossible to disaggregate the specific amount. Concerning annual fiscal transfers between enterprises and government budget, the state-owned sector as a whole received fiscal transfers of 1.92 percent and 1.06 percent of GDP in 1989 and 1990, respectively. Some privatized enterprises were profitable before the privatization; however, data concerning this lost revenue, as well as postprivatization transfers, have not yet been collected.

Bolivia

The Bolivian privatization process was unique insofar as the government treasury did not receive any funds from the capitalizations. The proceeds

were earmarked for new investment in the companies, while 45 percent of the shares went to a collective capitalization fund devoted to retirement benefits. Fund dividends amounted to 0.5 percent of GDP in 1997 and 1999, the bulk of which accrued from the telecommunications sector. The fund financed a program called Bonosol, which made cash payments equivalent to \$248 per citizen above the age of 65, to approximately 320,000 people. These payments were significant, compared with the country's per capita income of approximately \$1,000. Between 1998 and 2000, the payments shrank to about \$60, and reached fewer citizens (about 150,000). To date, the total outlay on these cash payments has amounted to approximately \$57 million. The collective capitalization fund also supported private pension accounts, through an individual capitalization fund, amounting to \$15 million, and paid out another \$23 million for funeral expenses.

Mexico

In Mexico, privatization proceeds totaled about \$23 billion during 1984–93 and \$10 billion in 1994–2000. These were used to retire public debt, reduce fiscal deficit (which fell from more than 15 percent of GDP in 1982–83 to 10 percent in 1984 and near zero during 1993–96), and increase social spending (which rose from 6 percent of GDP in 1990 to 9 percent in 1994 and 9.5 percent in 2000). Many privatized enterprises were converted from loss-making units to profit-making entities, which presumably would have reversed the nature of fiscal transfers.

Nicaragua

Unlike the other three countries, Nicaragua was characterized by a marked lack of transparency in use of first-phase privatization proceeds. These funds, equivalent to about 2.5 percent of annual GDP, had no fiscal (including social spending) implications. More recent phases improved on this dimension, with privatization of electricity distribution raising 5 percent of GDP, 80 percent of which accrued to the government budget “below the line.” While these proceeds did not reduce the fiscal deficit, they provided a potential cushion, in the form of reserves, for future crises. Fiscal transfers, on the other hand, were improved on many fronts. Three large companies that had together contributed 1.1 percent of GDP in revenues during the early 1990s increased their contribution to 2 percent in the four years following privatization. In the two fiscal years following the CORNAP privatization, 20 percent of total revenue contributed by large firms came from newly privatized firms. In addition, the Central Bank of Nicaragua reported that, during the 1980s, direct and indirect subsidies to the CORNAP enterprises (later privatized) amounted to 11.2 percent of GDP, the elimination of which has enormous fiscal implications.

Sources of Public Misperception

The statistical evidence presented in this chapter contrasts sharply with popular perceptions of privatization's effects on lower- and middle-income classes in the region. This discrepancy could stem, in part, from limitations in the data, insofar as they overlook key welfare dimensions; it could also reflect biases in the formation of public perceptions.

Data Limitations

As noted above, the data on privatization's distributional effects are limited in key aspects. The most important data qualification involves accurately representing privatization's effect on prices and access. Doing so involves a counterfactual: What would the price path or evolution of access have been without privatization? Answering such a question is intrinsically difficult amid macroeconomic changes, widespread deregulation, and trade liberalization, which affected prices of utility services relative to other goods and services. Moreover, the respective governments may have raised prices before privatization in order to attract private investors, which would artificially exaggerate the fall in prices following privatization. For this reason, as well as to avoid periods of excessive macroeconomic instability, we chose surveys conducted a few years before and after privatization. For example, we chose 1985–86 as the preprivatization year for Argentina. But this decision raises another potential problem: Prices may have fallen after the preprivatization survey but before privatization, in which case, part of the measured price change occurred before privatization. The same problems arise with access data; that is, some access changes attributed to privatization might have occurred without privatization because of technology changes (e.g., the advent of cellular services in the telecommunications industry). Furthermore, a portion of increased access may reflect legalization of previously illegal connections, which resulted in increased expenditure by the poor rather than increased access.

Despite these concerns, no clearly superior method is available for measuring privatization's effect on prices and access. Whenever possible, these country studies attempt to address the above issues. In the case of Bolivia, for example, one could compare price evolution in privatized regions with nonprivatized regions. In both Bolivia and Nicaragua, access to electricity was measured directly rather than by whether households incurred positive expenditures on the service. Certain data problems applied only to particular sectors or countries. For example, the likelihood that measured access improvements masked the legalization of illegal electricity connections was not an issue in Bolivia and Nicaragua, where access is measured directly. Finally, the broad conclusions are similar across most sectors and countries, despite the particularities of each case.

Lack of household-level price data means that the studies had to use a single price for each service in a given region. Consequently, the distributive effects of tariff rebalancing, which usually accompany privatization, could not be incorporated. For example, as Birdsall and Nellis noted in chapter 1, if local telephone rates rise while long distance rates fall, different population groups may be variously affected, depending on their patterns of usage.

Another shortcoming of the analyses is that they ignored privatization's potential environmental effects. For example, private operators might neglect safety and health considerations or inappropriately maintain public facilities.³⁶ Yet this issue can cut both ways. For example, health hazards may have been reduced if privatization led to the legalization of illegal electricity connections. As noted, Galiani, Gertler, and Schargrodsky (2002) found that Argentina's water privatization had a positive effect on child mortality. The drop was highest (24 percent) for the poorest groups, and it resulted mainly from a reduction in deaths from waterborne parasitic and infectious diseases.

Biases in Popular Perception

While data inadequacies limited inferences, the divergence between study results and popular opinion could also stem from biases in the process through which popular perceptions are formed, as well as use of standards of fairness that differ from those economists customarily apply. Among the many potential sources of bias, lack of adequate information is probably the most important. Popular views are shaped by extreme cases that invite media attention, while widely diffused benefits are rarely noticed. Many benefits accrue to a wide range of customers, each of whom may benefit moderately; their improved welfare is overshadowed, however, by the dramatic losses of a few workers or customers. Fiscal benefits are even more diffuse and invisible. This type of bias reflects the tension between statistical evaluation of economic outcomes and the way that mainstream views emerge on public policy issues, which Tom Schelling eloquently describes as the tension between personal and statistical lives (or, in this case, between a few personal tragedies and the widespread benefits calculated by aggregating the fortunes of diverse individuals within any given income or expenditure class).

Psychological biases also tend to pervade popular opinion. First, the psychological phenomenon of loss aversion causes individuals to react more

36. For example, one story reported that the flooding of a Buenos Aires restaurant following water privatization might have been caused by poor maintenance of the water pipes. See "As Multinational Runs the Taps, Anger Rises over Water for Profit," *New York Times*, August 26, 2002.

sharply to losses relative to the status quo than they do to gains. They tend to focus on immediate, short-term implications, such as job layoffs, without following through to the intermediate term (e.g., when laid-off workers may be rehired). Second, the public commonly lumps privatization together with other promarket reforms, such as fiscal contraction and trade liberalization, which collectively constitute the Washington Consensus. Disentangling the distinct roles of these elements of policy reform is a forbidding exercise for academic experts, let alone the common citizen. It is also difficult to isolate privatization's effects from those stemming from macroeconomic shocks or technological changes, which occurred often throughout the 1990s. Such negative associations may cause citizens to overlook the benefits of privatization. Moreover, there is a tension between deeply held ideological principles with regard to basic needs—for example, that water or electricity should not be subject to the profit calculus of multinational corporations—and how SOEs perform with regard to meeting them. That popular discontent is most severe in the case of water privatization, which lends credence to this view. Suspicions that shares in public enterprises were diverted to cronies of political elites or that privatization proceeds have not been used in the public interest likely fueled the discontent. Finally, there is widespread pessimism concerning the ability of market pressure, the media, and regulatory oversight to constrain private enterprises to meet the public interest, which, though realistic in some instances, is exaggerated in many others.

Summary and Conclusions

The country studies summarized in this chapter, and presented in detail in the following three chapters, focus mainly on privatization's effects on consumers, workers, and public finances. The exercises are severely constrained by data limitations; thus, they represent an attempt to extract whatever inferences are possible from available data sources. The analyses ignore effects on ownership, the environment, or other spillover and general equilibrium effects. Ownership changes may conceivably have distributive effects and play a large role in public discussions of the fairness of privatizations, particularly the methods of allocating and pricing shares in the privatized enterprises. However, the absence of data on ownership distribution prevents any assessment of its effect. Moreover, the ownership effects are unlikely to affect the bottom half of the income distribution. To the extent that the latter is of primary interest, consumer and worker effects are more important.

Overall, the studies could not identify, on the basis of their distributive effect, the reasons for popular discontent with the privatization process. Privatization's most widespread effects are on consumers of essential utility services. Much of the public's disenchantment stems from concerns

over price increases resulting from privatization. As this chapter shows, however, there is no clear pattern concerning price changes, with prices falling in about half of cases. More important, perhaps, is the finding that, even if prices rose, their effects were outweighed by the corresponding increased access that occurred in the bottom or lower half of the distribution. The only exception was Bolivia's failed water concession in Cochabamba. Most cases displayed no evidence of a significant increase in poverty, and we found evidence of noticeable improvements in service quality following privatization.

In contrast, workers were adversely affected, mainly in the form of layoffs associated with privatization. Employment contractions were significant within privatized enterprises relative to the rest of the economy, with cutbacks ranging from 30 to 75 percent. As the privatized enterprises were typically capital intensive, however, employment contractions were small in relation to size of the aggregate labor force (2 percent in Argentina, 1 percent in Mexico, and 0.13 percent in Bolivia). The only exception was Nicaragua, which underwent more widespread privatization as part of the transition from a socialist economy. In Argentina and Mexico, a significant proportion of laid-off workers found jobs in other private enterprises in the same sector of activity. Thus, the medium-term effect was much lower than the immediate one. No simple inference could be made about the effects on wage levels and inequality; however, the relatively small scale of labor reallocation in Argentina, Bolivia, and Mexico makes it unlikely that these were significant. The most significant effects arose in Nicaragua, where at least 7 to 9 percent of the labor force was reallocated throughout the urban and rural sectors. This reallocation likely had a modest downward effect on the average wage rate, and raised wage inequality in the urban sector. However, these effects were dwarfed by increasing market pressure on wage structures within both public and private sectors of the economy.

The fiscal effect of reforms were generally favorable. In addition to aiding macroeconomic stabilization, the privatization process supported a shift in public spending away from expensive debt-service obligations and the funding of operating losses in SOEs (which eventually subsidize middle-income workers and consumers) toward increased social spending (which directly targets the poor and elderly).

In sum, the only signs of an adverse distributive effect on the bottom half of the distribution, aside from the failed Cochabamba water concession, involved the small proportion of workers displaced from their SOE jobs, and many of these probably found jobs elsewhere in the economy fairly quickly. This factor must be weighed against the advantages derived from lower prices, widened access for poorer consumers, enhanced service quality, and a changed structure of public finances encompassing a variety of increased benefits for the poor.

Future privatization programs can be designed specifically to minimize the adverse distributive effect. Such design includes three key steps:

(1) establish regulatory institutions for the privatized enterprises (to ensure that prices are kept low; firms operate under competitive pressure and are induced to innovate and keep costs low; and requirements are set for service expansion, quality, and access); (2) fund severance packages, unemployment benefits, retraining, and job search assistance for laid-off employees (to cushion privatization's employment effect); and (3) use privatization proceeds in a transparent way to retire public debt and increase social spending (the earmarking mechanisms featured in Bolivia's capitalization process are notable in this respect).

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Appendix 2A

Public Perception of Privatization

Through the LAC region, a common belief among the general populace is that privatization of public utilities has not resulted in welfare improvements. Results from the Latinbarometer polls of 1998 and 2000 identify the percentage of country populations that disagrees or strongly disagrees with the following statement: “Privatization of state companies has been beneficial to the country.” Table 2.A1 presents results from seven countries, four of which were summarily assessed in this chapter.

Table 2A.1 Citizens who disagree that privatization has been beneficial, by country (percent) 1998 and 2000

Country and year of poll	Gender		Age in 2000				Educational level			Socioeconomic class ^a					
	Total	Male	Female	20–24		40–44		60–64		Illiterate	Primary	Tertiary	Upper	Middle	Lower
				20–24	40–44	60–64	60–64								
Argentina															
1998	49	49	50	47	47	51	50 ^b	49	47	47	42	48	50 ^b		
2000	68	68	68	66	69	70	65 ^b	67	61	61	71	68	62 ^b		
Bolivia															
1998	40	38	42	43	31	44 ^b	36	46	30	30	26	44	50 ^b		
2000	59	58	59	50	59	59	53	54	52	52	67 ^b	57	50 ^b		
Brazil															
1998	45	46	43	45	41	31	43	49	40	40	39	50	29 ^b		
2000	62	59	64	67	61	58	47	71	50	50	54	62	20 ^b		
Chile															
1998	41	44	38	37	54	39	24 ^b	45	37	37	35	43	30 ^b		
2000	58	60	56	58	61	56	46 ^b	66	56	56	39	60	59 ^b		
Mexico															
1998	39	41	38	38	37	29	40	46	39	39	34	39	40		
2000	56	57	55	54	65	59	52	60	60	60	56 ^b	55	53		
Nicaragua															
1998	47	47	47	48	45	63	50 ^b	42 ^b	37 ^b	37 ^b	34	50	55		
2000	52	54	50	51	62	55	40	49	55	55	53	48	46 ^b		
Peru															
1998	50	50	50	51	56	52	35 ^b	57	45	45	36	53	62		
2000	57	54	61	54	63	61	77 ^b	68	52	52	43 ^b	62	41 ^b		

a. Socioeconomic class is self-reported; “upper,” “middle,” and “lower” correspond to the respondent answering whether his or her socioeconomic class was “very good,” “average,” or “very bad,” respectively.

b. Fewer than 30 observations were available.

Source: Authors’ calculations from Latinbarometer data.

Appendix 2B

Welfare Changes with Repeated Cross-Sections

The household surveys for Argentina, Bolivia, and Mexico only provide access information for the survey years. Since different households were surveyed each year, it is not possible to determine which households experienced a change in access to privatized services. Evaluation of the welfare change from privatization therefore requires further approximating assumptions.

One can divide the sample into deciles, where N_t^d represents the total number of households sampled from decile d in time t , where $t = 0$ denotes the preprivatization period and $t = 1$ denotes the postprivatization period. $A_{h,t}$ can then indicate whether household h has access ($A_{h,t} = 1$) or not ($A_{h,t} = 0$) at time t . At time t , F_t^d households in decile d have access to the service, while I_t^d households in decile d lack access. Thus, the expected welfare change to household h in decile d from privatization would be

$$\begin{aligned} E\Delta U_h^d = & P(A_{h,0} = 1, A_{h,1} = 1)\Delta U(A_{h,0} = 1, A_{h,1} = 1) \\ & + P(A_{h,0} = 0, A_{h,1} = 1)\Delta U(A_{h,0} = 0, A_{h,1} = 1) \\ & + P(A_{h,0} = 0, A_{h,1} = 0)\Delta U(A_{h,0} = 0, A_{h,1} = 0). \end{aligned} \quad (2B.1)$$

Here $P(\cdot, \cdot)$ is the probability distribution function for household h . The last term in equation 2B.1 will be 0 unless the prices of substitutes change. If one assumes that households with access in period 0 do not lose access in period 1, then taking means of equation 2B.1 across all households in decile d in time 0 gives the mean expected change in welfare in decile d :

$$\begin{aligned} E\Delta U^d = & \frac{F_0^d}{N_0^d} \frac{1}{F_0^d} \sum_{h:A_{h,0}=1} \Delta U(A_{h,0}=1) + \frac{1}{N_0^d} \sum P(A_{h,0}=0, A_{h,1}=1) \\ & \Delta U(A_{h,0}=0, A_{h,1}=1). \end{aligned} \quad (2B.2)$$

In equation 2B.2, the first term is the proportion of households with access in period 0, multiplied by the mean change in welfare for those without access. One must estimate the second term using the period 1 survey data. We make the simplifying assumption that, within a given decile, all households with access in period 1 had equal probability of having lacked access in period 0.³⁷ For households with access in period 1,

37. One could compare the observable characteristics of those households within a decile that have access in period 0 to the characteristics of households with access in period 1 to identify dimensions along which increased access has occurred. This information could then be used to allow the probability of moving from no access to access to differ across households within a

$$P(A_{h,0} = 0 | A_{h,1} = 1) = \left(\frac{F_1^d}{N_1^d} - \frac{F_0^d}{N_0^d} \right). \quad (2B.3)$$

Plugging equation 2B.3 into equation 2B.2, replacing the second term of equation 2B.2 with period 1 reference values, and rearranging the order results in

$$\begin{aligned} E\Delta U^d &= \frac{F_0^d}{N_0^d} \frac{1}{F_0^d} \sum_{h:A_{h,0}=1} \Delta U(A_{h,0} = 1) + \left(\frac{F_1^d}{N_1^d} - \frac{F_0^d}{N_0^d} \right) \\ &\quad \frac{F_1^d}{N_1^d} \frac{1}{F_1^d} \sum_{h:A_{h,0}=1} \Delta U(A_{h,0} = 1, A_{h,1} = 1). \end{aligned} \quad (2B.4)$$

In equation 2B.4, the second term is the conditional probability of having no access in period 0 given access in period 1, multiplied by the probability of access in period 1, multiplied by the mean value of gaining access for households with access in period 1. The first-order approximation of the mean decile change in welfare is therefore

$$\begin{aligned} E\Delta U^d &= \frac{F_0^d}{N_0^d} \frac{1}{F_0^d} \sum_{h:A_{h,0}=1} (\Delta \log p_j) w_{h,j0} x_{h,0} \\ &\quad + \left(\frac{F_1^d}{N_1^d} - \frac{F_0^d}{N_0^d} \right) \frac{F_1^d}{N_1^d} \frac{1}{F_1^d} \sum_{h:A_{h,1}=1} (\log p_{j1} - \log p_{h,vj}) w_{h,j1} x_{h,1}, \end{aligned} \quad (2B.5)$$

and the second-order approximation to mean decile welfare change is similarly

$$\begin{aligned} E\Delta U^d &= \frac{F_0^d}{N_0^d} \frac{1}{F_0^d} \sum_{h:A_{h,0}=1} (\Delta \log p_j) w_{h,j0} x_{h,0} \left(1 + \frac{\Delta \log p_j}{2} \frac{\partial \log w_{h,j0}}{\partial \log p_j} \right) \\ &\quad - \left(\frac{F_1^d}{N_1^d} - \frac{F_0^d}{N_0^d} \right) \frac{F_1^d}{N_1^d} \frac{1}{F_1^d} \sum_{h:A_{h,1}=1} (\log p_{j1} - \log p_{h,vj}) w_{h,j1} x_{h,1} \\ &\quad \left(1 + \frac{(\log p_{j1} - \log p_{h,vj})}{2} \frac{\partial \log w_{h,j1}}{\partial \log p_j} \right). \end{aligned} \quad (2B.6)$$

decile that have access in period 1. (This extension is not pursued here.) The various political, strategic, geographic, and economic reasons that determine where increased access occurred can counterbalance one another to make our assumption a reasonable approximation.

Appendix 2C

Poverty and Inequality with (Repeated) Cross-Sections

For households with access prior to privatization, one can use the first- and second-order approximations to estimate the change in utility resulting from the price changes after privatization. One can take the preprivatization, per capita expenditure for these households, and add the estimated change in welfare divided by household size to obtain the household per capita welfare after privatization. However, one cannot determine which households that lacked access before privatization gained access after privatization. Instead, as above, we use the postprivatization households with access, and calculate their mean welfare change if they gained access. The first- and second-order approximations of this mean welfare change are

$$\begin{aligned}
 E(\Delta U_h^d | A_{h,0}=0, A_{h,1}=1) &= -\frac{1}{F_1^d} \sum_{h, A_{h,1}=1} (\log p_{j1} - \log p_{h,vj}) w_{h,j1} x_{h,1}, \text{ and} \\
 E(\Delta U_h^d | A_{h,0}=0, A_{h,1}=1) &= -\frac{1}{F_1^d} \sum_{h, A_{h,1}=1} (\log p_{j1} - \log p_{h,vj}) \\
 &\quad w_{h,j1} x_{h,1} \left(1 + \frac{\log p_{j1} - \log p_{h,vj}}{2} \frac{\partial \log w_{h,j1}}{\partial \log p_j} \right) \quad (2C.1)
 \end{aligned}$$

We make the simplifying assumption that all households without access in period 0 had equal chance of gaining access in period 1. We then randomly choose households without access from the preprivatization survey and add the expected welfare change from access in equation 2C.1 divided by their household size to their preprivatization per capita expenditure. The fraction of households without access for which this is done, τ , is the conditional probability of having access in period 1, given no access in period 0, and is given by

$$\tau = \frac{\left(\frac{F_1^d}{N_1^d} - \frac{F_0^d}{N_0^d} \right)}{\left(1 - \frac{F_0^d}{N_0^d} \right)}.$$

The remaining fraction, $1 - \tau$, of households without access before privatization will only have a welfare change if the prices of substitutes change. Otherwise, this fraction is assigned zero welfare change.