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## **Capitalization, Regulation and the Poor**

Access to Basic Services in Bolivia

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### **Abstract**

This paper analyses the privatization of utilities in Bolivia, detailing the particularities of the capitalization mechanism which was used for this purpose. The analysis suggests that capitalization and regulation, and the liberalization of the utilities sector more generally, succeeded in attracting foreign investment, thus fulfilling one of the central goals of the reforms of this sector. Foreign investment made possible the increase in access to basic services in urban areas, although access in rural areas still remains very low. In terms of connection, service expansion in the urban areas did not bypass the poor. On the contrary, in some cases, access improvements appear to have been particularly beneficial to low-income households. Some reform-related price increases did have adverse welfare effects. Nevertheless, the findings in this area are affected by data limitations, and in any case do not seem to outweigh the benefits brought about by greater access.

Keywords: privatization, regulation, utilities, poverty

JEL classification: L100, L500, L900

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## 1 Introduction

Like other Latin American countries, Bolivia included privatization in the package of structural reforms that has significantly liberalized its economy over the last 15 years. And as elsewhere, in an effort to attract investment and increase efficiency, utilities were among the key enterprises transferred to the private sector.

As Estache *et al.* (2000) note, there is growing interest on how such transfers affected lower-income households, their access to basic services, and their welfare in general. While this has not yet been a major concern in Bolivia, the economic slowdown of the past two years has resulted in growing criticism of the entire liberalization process. Thus, further analysis of the ‘social’ impact of privatization could usefully inform ongoing policy discussions.

In this context, this paper describes Bolivia’s privatization process, with emphasis on the particularities of ‘capitalization’, one of the mechanisms used for privatization, and its complementary regulatory framework. Against this background, the paper then analyses the impact of reforms on lower-income households along two dimensions: i) access, understood as connection, and ii) affordability, as determined by changes in consumption and pricing patterns. The study focuses on urban households because of data availability, but rural areas are included whenever feasible.

The general picture that emerges from the analysis points to the following observations:

- i) Capitalization and regulation, and liberalization of the utilities sector in general, have succeeded in attracting foreign investment, thus fulfilling one of the central macroeconomic goals of the reforms.
- ii) Overall, the evidence suggests that this investment has facilitated the expansion of access to basic services in urban areas. Access in rural areas, however, remains very low, which partially reflects that privatization was rarely meant to affect service provision in this realm.
- iii) In terms of connection, service expansion in the *urban* areas has not bypassed the poor. On the contrary, the lower-income quintiles in many cases seem to have benefited the most.
- iv) The fact that these reforms had a much smaller effect in the rural areas, however, indicates that the higher-income groups, when compared to the poor at the *national* level, gained more from these expansions.
- v) Some reform-related price increases did have adverse effects on households’ welfare. The findings in this area are affected by data limitations, but in any case, price increases do not seem to have outweighed the benefits brought about by greater access.

This is a relatively optimistic prognosis of capitalization and regulation. But it is also consistent with the fact that while criticism of economic liberalization is increasing within Bolivia, it is rarely aimed at the direct consequences of the utility sector reform on the poor. Some isolated incidents in the water sector are an exception.

The paper is organized as follows. Section 2 provides general background on the economic performance and poverty in Bolivia. Section 3 describes the privatization process of the mid-1990s, and section 4 explores the privatization’s impact on access

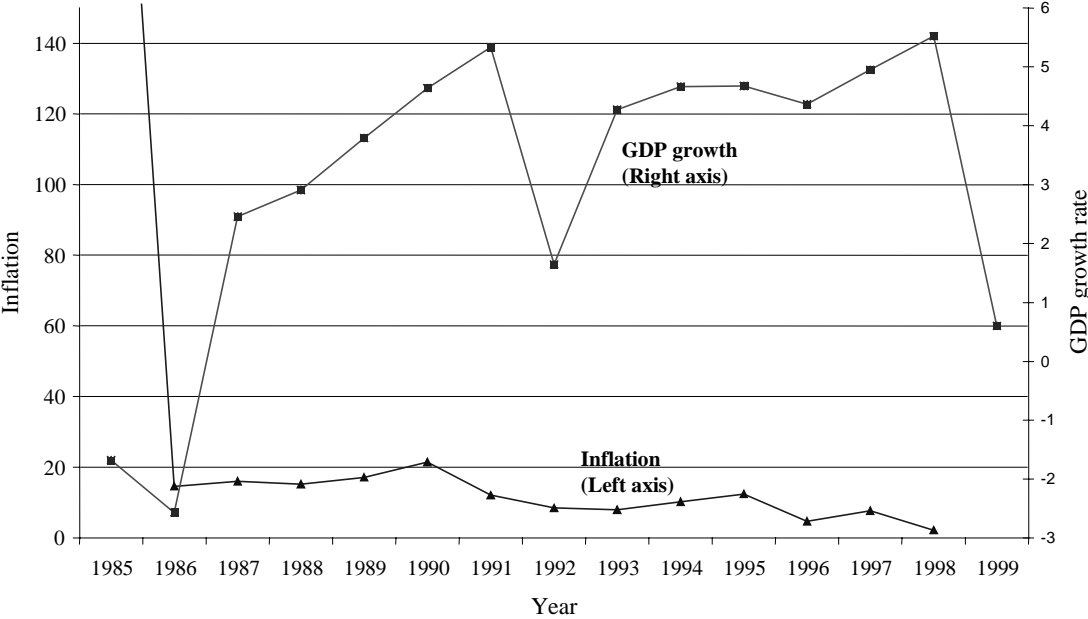
and affordability, with particular attention to the situation of poor households. Section 5 explores the changes in consumer welfare, and section 6 reviews macroeconomic effects of privatization. Section 7 discusses the challenges facing the regulatory system, and section 8 concludes.

**2 General background: a simple characterization of poverty**

After the severe crisis that began in the late 1970s, Bolivia implemented substantial economic liberalization measures in 1985, ending hyperinflation and setting the basis for a moderate but sustained growth. Figure 1 summarizes this development.

Given an annual population growth rate of about 2.3 per cent, the economic growth rates observed did not make a major dent on poverty, as illustrated in Table 1.<sup>1</sup> As this table shows, the incidence of poverty is significantly higher in urban areas outside department capitals and in rural areas where in 1999 it is estimated at roughly 80 per cent.

Figure 1  
Inflation and economic growth in Bolivia, 1985-99



<sup>1</sup> For an early assessment of how growth and changes in income distribution have affected poverty, see Urquiola (1994). For an update using more recent methodologies, see Hernany (2000).

Table 1  
Headcount and poverty gap measures in urban Bolivia

| Headcount measure (% of hhlds. poor) | 1989 | 1993 | 1997 | 1999 |
|--------------------------------------|------|------|------|------|
| National                             | —    | —    | 63.2 | 62.7 |
| Department capitals                  | 52.9 | 52.0 | 50.7 | 47.0 |
| Other urban areas                    | —    | —    | 63.7 | 65.8 |
| Rural areas                          | —    | —    | 77.3 | 81.7 |

Sources: Urquiola (1994) is the source for the 1989 figure, and World Bank (2000) for the others. For definitions on the measures used, see either of these publications.

Table 2  
The Probability of being poor or extremely poor by group, 1999

|                             | Department capitals |                 | Other urban areas |                 | Rural areas |                 |
|-----------------------------|---------------------|-----------------|-------------------|-----------------|-------------|-----------------|
|                             | Poverty             | Extreme poverty | Poverty           | Extreme poverty | Poverty     | Extreme poverty |
| Years of schooling:         |                     |                 |                   |                 |             |                 |
| None                        | 60.9                | 27.4            | 75.6              | 44.0            | 92.1        | 80.3            |
| 1-5                         | 56.0                | 27.2            | 78.7              | 40.8            | 86.4        | 74.3            |
| 6-8                         | 55.5                | 23.1            | 70.2              | 37.3            | 76.6        | 61.7            |
| 9-12                        | 43.2                | 18.1            | 65.2              | 30.7            | 65.5        | 47.1            |
| More than 12                | 19.5                | 6.7             | 27.0              | 7.7             | 25.9        | 10.6            |
| Gender:                     |                     |                 |                   |                 |             |                 |
| Male                        | 45.9                | 19.7            | 70.5              | 37.7            | 80.9        | 57.6            |
| Female                      | 47.4                | 21.6            | 72.4              | 36.2            | 82.5        | 60.0            |
| Ethnicity:                  |                     |                 |                   |                 |             |                 |
| Non-indigenous              | 44.8                | 19.3            | 72.5              | 34.9            | 80.9        | 56.8            |
| Indigenous                  | 50.6                | 23.6            | 69.8              | 40.5            | 82.5        | 60.7            |
| Migration:                  |                     |                 |                   |                 |             |                 |
| Non-migrant since birth     | 45.0                | 19.8            | 72.1              | 36.4            | 85.2        | 63.9            |
| Migrant since birth         | 44.8                | 19.1            | 66.1              | 33.6            | 69.8        | 41.9            |
| Non-migrant in last 5 years | 45.2                | 20.1            | 68.1              | 34.0            | 81.9        | 58.9            |
| Migrant in last 5 years     | 42.5                | 13.8            | 79.1              | 44.5            | 65.9        | 38.6            |
| Employment:                 |                     |                 |                   |                 |             |                 |
| Employed                    | 39.9                | 16.1            | 62.0              | 28.8            | 80.2        | 57.2            |
| Not in labour force         | 45.8                | 20.7            | 71.5              | 36.7            | 77.0        | 50.3            |
| Unemployed                  | 50.3                | 23.9            | 76.9              | 47.3            | 41.4        | 34.5            |
| Type of employment:         |                     |                 |                   |                 |             |                 |
| Worker, blue-collar         | 53.3                | 11.6            | 73.6              | 31.8            | 71.5        | 42.1            |
| Employee, white-collar      | 28.3                | 8.9             | 49.7              | 17.4            | 40.2        | 18.8            |
| Self-employed               | 47.0                | 22.3            | 61.8              | 29.4            | 78.5        | 54.5            |
| Employer                    | 21.3                | 7.9             | 60.3              | 24.6            | 51.5        | 20.7            |
| Unpaid family work          | 57.5                | 34.1            | 74.7              | 45.2            | 88.1        | 67.3            |
| Domestic worker             | 30.2                | 6.4             | 66.7              | 27.6            | 36.0        | 16.3            |
| Informal                    | 50.4                | 23.6            | 73.9              | 39.5            | 83.3        | 60.6            |
| Formal                      | 32.5                | 9.3             | 58.1              | 22.6            | 57.4        | 30.7            |

Source: World Bank (2000).

Poverty in the department capitals, for which more historical data are available, has experienced a moderate but sustained decline since 1989.<sup>2</sup> Table 2 complements this information presenting the probabilities of being poor that are associated with certain variables in each of the areas considered. These include characteristics such as schooling, sex, ethnicity, migration, and employment-related traits. The results are based on cross-sectional variation of individuals' characteristics and poverty status, and they should not be interpreted in a causal manner. Nevertheless, the information is illustrative of the traits associated with being poor. As expected, factors such as having a limited education, being female, indigenous, or employed in the 'informal' labour market, stand out.

After a description of the basic features of the privatization process, this study focuses on its effects on the poor. For this purpose, the analysis classifies households according to their income quintile. This provides for a richer analysis than the simple classification of poor or non-poor households. In addition, it is useful to bear in mind that poor households in urban areas are generally in the bottom two or three quintiles.

### **3 Capitalization and regulatory reform**

Despite the relatively early success with liberalization (Figure 1), Bolivia did not adopt sustained privatization measures until the mid-1990s. When the government finally embarked on the transfer of state-owned firms, it used traditional methods in some instances, but relied mainly on *capitalization*. This section describes how the traditional approach to privatization differs from capitalization, and provides information on the legal framework that underpinned their implementation. This section briefly outlines the specific changes that took place in the electricity, natural gas, telecommunications, and water and sanitation sectors.

#### **3.1 Capitalization and privatization<sup>3</sup>**

Under traditional privatization, the government transfers majority ownership of a state-owned firm to the private sector, and has freedom over how to spend the proceeds. Under capitalization, the state transfers 50 per cent of a company's shares to the investor with the winning bid. It transfers an additional 45 per cent of the shares to a private pension fund for the accrued benefit of the public in general,<sup>4</sup> with the remaining 5 per cent going to the company employees. The investor takes over the management of the firm, and commits to *invest* the amount it offered to acquire its 50 per cent share, in the development of the firm. It must carry out this investment within a specific time period (typically 6-8 years). In addition, the investor agrees to fulfil obligations that encompass expansion and quality goals, to operate under tariff

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<sup>2</sup> As evident in Figure 1, the regional slowdown in GDP growth induced by the Brazilian crisis was noticeable in Bolivia by 1999. This may have partly caused the reversal of the positive development in poverty alleviation noted in Table 1.

<sup>3</sup> For more on the capitalization experience, see Baldivia (1998) and Peirce (1997).

<sup>4</sup> A reform to the pensions system accompanied capitalization and funds derived from this source were used to pay old-age benefits to complement those originating from individual retirement schemes.

regulation, and to fulfil other clauses specified in a long-term contract (typically 40 years).

Table 3  
Resources generated by privatization and capitalization

| Firms created by the reform:        | Year | Privatization value | Capitalization value | Investment as of               | Company/institution in charge of investment |
|-------------------------------------|------|---------------------|----------------------|--------------------------------|---|
|                                     |      | (Millions of US\$)  |                      | June 2000 (as % of commitment) |   |
| <b>Oil and gas</b>                  |      |                     |                      |                                |   |
| Chaco S. A. <sup>(3)</sup>          | 1997 |                     | 306.66               | 100.0                          | Chaco S. A.                                 |
| Andina S. A. <sup>(4)</sup>         | 1997 |                     | 264.77               | 154.2                          | Andina S. A.                                |
| Transredes S. A. <sup>(5)</sup>     | 1997 |                     | 263.50               | 213.0 <sup>(1)</sup>           | Transredes S. A.                            |
| EBR S. A. <sup>(6)</sup>            | 2000 | 102.00              |                      |                                | TGN-Investment                              |
| Oil Tanking S. A. <sup>(7)</sup>    | 2000 | 12.05               |                      |                                | TGN-Investment                              |
| <b>Electricity</b>                  |      |                     |                      |                                |   |
| Corani S. A. <sup>(8)</sup>         | 1995 |                     | 58.79                | 86.6                           | Corani S. A.                                |
| Guaracachi S. A. <sup>(9)</sup>     | 1995 |                     | 47.13                | 139.2                          | Guaracachi S. A.                            |
| Valle Hermoso S. A. <sup>(10)</sup> | 1995 |                     | 33.92                | 115.6                          | Valle Hermoso S.A.                          |
| TDE S. A. <sup>(11)</sup>           | 1997 | 39.90               |                      |                                | ENDE Residual                               |
| Elfec S. A. <sup>(12)</sup>         | 1995 | 50.30               |                      |                                |   |
| <b>Telecommunications</b>           |      |                     |                      |                                |   |
| ENTEL S. A. <sup>(13)</sup>         | 1995 |                     | 610.00               | 76.9                           | ENTEL S. A.                                 |
| <b>Transportation</b>               |      |                     |                      |                                |   |
| LAB S. A. <sup>(14)</sup>           | 1997 |                     | 47.47                | 100.0 <sup>(2)</sup>           | LAB S.A.                                    |
| FCO S. A. <sup>(15)</sup>           | 1996 |                     | 25.85                | 160.6                          | FCO S.A.                                    |
| FCA S. A. <sup>(15)</sup>           | 1996 |                     | 13.25                | 103.1                          | FCA S.A.                                    |
| <b>TOTAL</b>                        |      | <b>90.2</b>         | <b>86.57</b>         |                                |   |

Sources: Authors' summary of various documents:

- (1) Includes de *Cuiabá* pipeline;
- (2) According to the Transportation Superintendence;
- (3) Capitalized by *Amoco*;
- (4) Capitalized by *YPF-Pérez Compac-Plus Petrol*;
- (5) Capitalized by *Enron-Shell*;
- (6) Privatized in favour of *Petrobras* and others;
- (7) Privatized in favour of *Oil Tanking*;
- (8) Capitalized by *Dominion Energy Inc.*;
- (9) Capitalized by *Energy Initiatives Inc.*;
- (10) Capitalized by *Constellation Energy Inc.*;
- (11) Privatized in favour of *Unión Fenosa*;
- (12) Privatized in favour of *EMEL S.A.*;
- (13) Capitalized by *ETI Euro Telecom N.V.*;
- (14) Capitalized by *VASP*;
- (15) Capitalized by *Cruz Blanca*.

Under this scheme, therefore, investment is the priority, and the government does not receive disposable income. This may reflect the fact that capitalization was introduced relatively late in Bolivia's road to liberalization, and was not seen as a means to cover deficits, but rather as an option for attracting foreign investment and improving management in key areas of the economy. Table 3 summarizes the results of both privatization and capitalization, the financial resources generated, and the investments actually made.

As this table illustrates, the capitalization process raised significant amounts of capital. Total commitments are about two billion dollars, roughly equivalent to 30 per cent of GDP, thus contributing to a significant increase in investment. In addition, several capitalized firms have exceeded their commitments ahead of time, and are announcing ambitious investment programmes for the future.

### **3.2 Capitalization and regulation: the framework for sectoral reforms**

Capitalization<sup>5</sup> was complemented with changes to some sectors' industrial organization, and with the implementation of a regulatory framework seeking to promote competition and efficiency. The main tool in this regard was the *Sistema de Regulación Sectorial* (SIRESE) Law (1994), which created a regulatory system for the entire infrastructure sector. In essence, this legislation defined the regulatory institutional structure, including the role of five regulatory agencies (*superintendencias*) for the electricity, telecommunications, hydrocarbons, potable water, and transportation sectors. It also established an overseeing agency responsible for system-wide coordination, appeals and evaluation, and introduced market competition as one of the foundations of the infrastructure sector. Lastly, the law formulated the procedures for appeals, hearings, and conflict resolution.

This framework is supplemented by four specific laws—Electricity (1994), Telecommunications (1995), Hydrocarbons (1996) and Potable Water (2000)—that introduced changes in the organization of each sector. These laws govern issues related to tariff regulation, entry, service quality and sanctions, and are administered by the sectoral regulatory agencies of SIRESE. Next we summarize the most important changes introduced by this legislation in each of the industries cited.

#### *3.2.1 Electricity*

Prior to reform, the electricity industry was conformed by the National Interconnected System (NIS) and other independent networks, a distinction that still remains today. NIS supplies the largest cities, while the independent networks concentrate on secondary urban and rural areas.<sup>6</sup> This paper focuses on the NIS, where the state-owned *Empresa*

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<sup>5</sup> As Table 1 reflects, capitalization has been the more important mechanism in the transfer of state assets, so this term will be used from here on to refer to privatization as well. For more information on regulation and regulatory institutions in Bolivia, see Barja (2000) and SIRESE (2000).

<sup>6</sup> This distinction is used extensively. In Bolivia, the main cities are the administrative capitals. The three largest have populations close to one million and form the so-called central axis: Cochabamba, La Paz-El Alto (El Alto is independent jurisdictionally, but linked geographically and economically to La Paz), and Santa Cruz. Therefore, Bolivia, unlike its neighbours, does not have a dominant urban



*Nacional de Electricidad* (ENDE) was responsible for the generation, transmission and part of the distribution of electricity through ELFEC for the city of Cochabamba. The *Compañía Boliviana de Energía Eléctrica* (COBEE), a private company, covered generation and distribution in La Paz and Oruro. Other firms concentrating in distribution were *Cooperativa Rural Eléctrica* (CRE) in Santa Cruz, *Servicios Eléctricos de Potosí*, a municipal company (SEPSA) in Potosí and *Cooperativa Eléctrica Sucre* (CESSA) in Sucre. Competition existed only between ENDE and COBEE, and was limited to the direct provision of electricity to a few mining and industrial businesses.

The Electricity Law introduced vertical separation between the generation, transmission, and distribution of electricity. The law promoted competition in generation by creating three firms with exclusive rights (*Corani*, *Guaracachi* and *Valle Hermoso*) and by limiting the market share of each to 35 per cent of NIS's domestic market capacity. By 1999, however, entry was liberalized and *Synergia*, *Hidroeléctrica Boliviana* and *Río Eléctrico* entered the market.

In transmission, the network operation was transferred from ENDE to the private firm *Transportadora de Electricidad*, but without exclusive rights. Furthermore, the Electricity Law forbids transmission firms to be involved in purchasing or sales activities, and established open access and tariff regulation.

Finally, firms handling distribution were established as independent regional monopolies subject to tariff regulation and quality control: CRE; privatized ELFEC; privatized SEPSA; CESSA (still a cooperative); ELECTROPAZ and ELFEO. The last two are the outcome of the sale of COBEE's distribution facilities. COBEE now concentrates in generation only. Tariff regulation consists of several average cost caps with productivity factors which, when multiplied by their respective units, add to produce total income. Tariffs are reviewed quarterly, but productivity factors are set using a four-year lag to allow a passthrough of changes in energy costs. These reforms, together with the introduction of a coordination office, have created a wholesale electricity market that seeks to simulate competitive conditions.

### 3.2.2 Hydrocarbons

The pre-reform hydrocarbons industry (oil and natural gas) was dominated by the state-owned *Yacimientos Petrolíferos Fiscales Bolivianos* (YPFB), a vertically integrated monopoly involved in all activities of the industry. Limited private participation was possible through joint ventures with YPFB.

Since then, the governmental priority has been to remove YPFB from production activities, and to promote foreign investment to foster a natural gas export industry directed mainly to southern Brazil. The state intends this industry to become the engine of development for other sectors of the national economy. With this goal in mind, reforms and foreign investment have been targeted to exploration and the creation of new infrastructure. The opening of a pipeline to Brazil in 1999 made this vision a

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centre, and has one of the lowest ratios of urban concentration in the region. For further discussion, see Urquiola *et al.* (1999).

reality. A general policy promoting private control of all phases of hydrocarbons, including retail commercialization, was adopted for the domestic market.

To implement these objectives, the Hydrocarbons Law places few restrictions on the export and import of petroleum products, and stipulates that exploration, production and commercialization be executed through joint ventures with YPFB. The administration of gas and oil pipelines was transferred, without exclusive rights, to the capitalized *Transredes*. The administration of other pipelines (*poliductos*) was entrusted to the private *Oil Tanking*. Most of YPFB's refinement units were transferred to the private *Empresa Boliviana de Refinación*, while the wholesale of petroleum products continues under YPFB.

Further, YPFB's storage terminals were transferred to *Oil Tanking*, but other private firms are also active. The distribution of bottled liquefied gas is fully private, but about 85 per cent of bottling plants still operate under YPFB. All compressed natural gas service stations are private, while approximately 15 per cent of service stations for liquids continue under the state firm. Imports of liquids (mainly diesel) and lubricants are handled by private firms. Private companies continue to participate in network-based distribution of natural gas.<sup>7</sup> Nonetheless, this industry is still relatively underdeveloped; in 1999, it had only about 6,000 connections.

Except for restrictions to vertical integration imposed on firms operating in gas pipeline transportation, and on mergers and acquisitions (which are subject to government approval), the industry's structure is relatively flexible and responsive to export market needs. This has enabled PETROBRAS—and others—to integrate several phases of the natural gas export to Brazil, while simultaneously participating in the domestic refinement business.

As part of the regulatory package, rate-of-return regulation is applied to pipeline transportation, with tariffs set at the 1997 level with a four-year lag. Tariff regulation has not been implemented thus far for network-based natural gas distribution. Finally, regulation in this sector embodies some particularities, since as opposed to the utilities considered in the rest of this paper, the hydrocarbons industry produces a tradable good for which Bolivia is clearly a price taker. Under a policy dictating that domestic prices reflect opportunity costs, international price fluctuations affect the domestic market significantly.

### 3.2.3 Telecommunications

In the pre-privatization era, the telecommunications industry was divided among the state monopoly, *Empresa Nacional de Telecomunicaciones* (ENTEL) which provided national and international long distance communication services, 15 cooperatives with monopolies in fixed local telephone services, and *Telecel*, a private monopoly in the cellular market. The Telecommunications Law maintains this division until the end of 2001, when entry is liberalized. Until then, ENTEL and the cooperatives have exclusive rights, but the cellular market was opened to competition with the entry of ENTEL-Movil (a division of capitalized ENTEL). Furthermore, the legislation mandates tariff

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<sup>7</sup> SERGAS in Santa Cruz, EMCOGAS in Cochabamba, EMDIGAS in Sucre and EMTAGAS in Tarija.

regulation, until liberalization, for firms controlling more than the 60 per cent of a given market. This scheme has a similar structure in all areas, establishing an initial price cap for different baskets of services, adjusted for inflation and a productivity factor with a three-year lag. In addition, the law defined the standards to be achieved by the year 2000 on expansion, service quality, and technological modernization (Table 4).

Finally, the Telecommunications Law also encompassed incentives for the exploitation of economies of scope by the most efficient firms. This objective is pursued through two mechanisms: i) cooperatives failing to achieve improvement goals lose a percentage of their market to ENTEL, and ii) authorization for mergers, acquisitions and stock swaps.

To date, the entry of Nuevatel, a joint venture between COMTECO (the Cochabamba cooperative) and *Western Wireless International*, has been the only modification to this industrial structure. Nuevatel was created for the acquisition of a PCS license, and began operations in December 2000, intensifying competition in the mobile market. Currently, other incumbents and potential entrants are preparing for the liberalization of entry and the loss of their exclusive rights.

Table 4  
Established goals for long distance and local services  
(Percentages are accumulated to the year 2000)

| ENTEL: Long distance service   | Cooperatives: Local service   |
|--|---|
| Failure in rented circuits: 90% of failures are repaired in 24 hours and 100% in three days in rural areas.  | Failure in rented circuits: 90% of failures are repaired in 24 hours and 90% in three days in rural areas.    |
| Digitalization and network renovation of long distance; secondary connections, satellite connections, and 100% of the national commutation system. | 100% substitution of manual and analogical equipment by digital or another technology                         |
| 75% completion of long-distance national calls (LDN).<br>70% completion of long-distance international calls (LDI)                                 | 80% of failures repaired in 24 hours in local service<br>30% of failures presented during the year            |
| 80% of complaints answered before 10 seconds in LDN<br>70% answered calls in 10 seconds in LDI   | 80% completion of local calls, 75% LDN, 70% LDI<br>80% complain calls answered before 10 seconds              |
| 1% congestion during 99% of the days of the year since 1997  | 2% congestion during 95% of the days of the year<br>Tone in less than 5% of intents with more than 3% waiting |
| 99.99% of network availability for satellite services  |   |
| Rural area expansion: 100% installation of a telephone line in all communities with population greater than 350 and less than 10,000               | 95% of requests solved in 15 days<br>100% of population covered in rural areas                                |
| Failure correction in rural areas: 100% of failures repaired in three days.  |   |

Source: Telecommunications Superintendence

### 3.2.4 Water

While other sectors have undergone capitalization and the introduction of regulation, the water industry experienced limited changes and encountered several difficulties. The intention of the reform in this sector was the creation of several concessions (as opposed to actual privatization) for the administration of state assets. However, in practice, only one municipal firm, SAMAPA (La Paz-El Alto), was transferred to the private sector in 1997 for administration by *Aguas del Illimani*.<sup>8</sup>

It was expected that within a prudent period of time, the necessary legislation would be in place to incorporate the remaining firms to a similar model. However, the long delay in formulating the Potable Water and Sewerage Law (finally approved in 2000), together with a significant failure to create a second concession through the transfer of the municipal firm (SEMAPA) to a consortium *Aguas del Tunari* in Cochabamba, has deferred reforms and somewhat redirected change in this sector. Nevertheless, during 1998 and 1999, the Water Superintendence was able to incorporate the new regulatory regime and sign concessions with the existing municipal water firms in Santa Cruz, Oruro, Sucre, and other smaller cities.

Under the new model, the concession approach seeks to improve internal efficiency and achieve expansion and quality goals. The contract signed with *Aguas del Illimani* reflects these aims. Objectives for the 1997-2001 period include: i) 100 per cent access to potable water or sewerage (public fountains excluded) in the areas of Achachicala and Pampahasi, which cover the city of La Paz, ii) 82 per cent access to potable water in the city of El Alto by 2001, of which 50 per cent should be expansion connections, and 41 per cent access to sewerage; and iii) compliance with the long-term expansion goals given in Table 5.

Table 5  
Expansion goals for potable water and sanitation services in La Paz  
and El Alto (Percentage of households)

| Zone          | 2001 | 2006 | 2011 | 2016 | 2021 | 2026 |
|---------------|------|------|------|------|------|------|
| Potable water |      |      |      |      |      |      |
| Achachicala   | 100  | 100  | 100  | 100  | 100  | 100  |
| Pampahasi     | 100  | 100  | 100  | 100  | 100  | 100  |
| El Alto       | 82   | 85   | 90   | 90   | 90   | 90   |
| Sewerage      |      |      |      |      |      |      |
| Achachicala   | 81   | 84   | 90   | 94   | 95   | 95   |
| Pampahasi     | 83   | 85   | 90   | 94   | 95   | 95   |
| El Alto       | 41   | 43   | 47   | 71   | 90   | 90   |

Source: *Aguas del Illimani* contract.

<sup>8</sup> The main shareholder is *Lyonnaise Des Eaux*, with 35 per cent.

Quality control includes norms related to the source of water, its quality, abundance and pressure, continuity of service, infrastructure efficiency, consumer attention, and emergencies. Tariff regulation was established under a rate-of-return mechanism with a five-year regulatory lag. Prices thus calculated are designed to assist the company to meet its contractual obligations and expansion goals. Although the lag promotes internal efficiency, no productivity factors were incorporated. Furthermore, tariffs were set in dollar terms, payable in bolivianos.<sup>9</sup>

Finally, the new Potable Water and Sewerage Law's most important elements are:

- i) Responsibility for the provision of these services is assigned to the municipal governments, but can be transferred to water and sewerage providers (WSPs) that are private, municipal, or mixed firms, cooperatives, or other civil associations recognized by law;
- ii) The territory is divided into concession and non-concession areas. The concession areas are financially sustainable and services are provided only by WSP's. Non-concession areas are not financially sustainable, and the service can be provided by a local government;
- iii) Regulation of WSPs includes tariff regulation using the rate-of-return criteria, investment and efficiency targets, and a five-year regulatory lag; and
- iv) Universal access in non-concession areas will be supported by public investment.

#### **4 The effects on access: Connection and consumption**

In most countries, reforms to the utilities sector raise a number of concerns, including the impact these reforms have on poor households' access to basic services. This section addresses these issues in two stages. First, it focuses on how access, defined as *connection*, has evolved after capitalization, and then analyses how changes in pricing policies may have affected the poor.

##### **4.1 Data and coverage**

The analysis is based on data from three household surveys carried out by the *Instituto Nacional de Estadística* (INE) (Table 6). These allow an examination of the 1994-99 period, during which major capitalization efforts and regulatory reforms were under way. In addition, they make possible simple comparisons with the 1989-94 period when the country experienced similar economic performance, but reforms had not taken place.

One drawback of the 1989 and 1994 surveys is that these cover only the major urban areas: eight department capitals and El Alto (a city neighbouring La Paz). Comparisons will focus only on these areas. This certainly limits the analysis, but may be appropriate to the extent that capitalization affected mainly urban areas. To complement this

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<sup>9</sup> This clause was lifted in December 2000 because of pressure from the El Alto inhabitants.

information, this section also includes rural data from the 1999 survey, as well as from other studies.

Table 6  
Household surveys used

| Data set   | Year collected | Coverage                           | Sample size (households) |
|--|----------------|------------------------------------|--------------------------|
| Encuesta Integrada de Hogares, 1 <sup>st</sup> round | 1989           | Department capitals <sup>(1)</sup> | 3,765                    |
| Encuesta Integrada de Hogares, 7 <sup>th</sup> round | 1994           | Department capitals <sup>(1)</sup> | 6,268                    |
| Encuesta Continua de Hogares                         | 1999           | National                           | 1,324 <sup>(2)</sup>     |

Notes: (1) Includes the country's nine department capitals (excluding Cobija) and El Alto.  
(2) For comparability, this sample size is the number of households in the department capitals.

## 4.2 Changes in connection rates

In examining connection rates, this section focuses on access to electricity, telephone, and water and sewerage services. Gas is excluded because: (i) gas for domestic consumption is distributed in most cities in liquefied 'bottled' form. Thus, its use does not imply a network connection, but rather reflects household's (potentially temporary) decision to use this fuel; (ii) even in areas where network distribution is available, its coverage is too small to be reliably captured in household surveys; and (iii) the capitalization reforms in natural gas were targeted for expanding exports instead of improving domestic distribution.

With this caveat noted, Table 7 shows the aggregate development of access to basic services in the larger cities. The precise survey questions used to construct these connection rates are given in the appendix. The cases of electricity and telephone are the simplest, as they are based on households' straightforward response as to whether or not they consume this service. Sewerage is considered to be available only if the dwelling is actually connected to a network.

Finally, we include two definitions for water. In the first case, a household is considered connected if it reports having a pipe connection either within the dwelling *or* in the same building where the dwelling is. In the second case, only the households in the first category—those having a pipe connection within the dwelling—are considered connected. The difference between the two is substantial: coverage is at least twice as large using the first definition; in contrast, the improvement between 1994 and 1999 is greater under the second definition. In part, these differences in access rates may reflect the fact that the wording of the questions used for the second definition has changed somewhat between surveys. Additionally, accuracy in the case of the second criterion relies on survey administrators and respondents making somewhat subtle distinctions as to the nature of water connections. In light of this, and since this paper focuses on changes in connection rates, we focus only on the first definition, but note it may overstate coverage levels.

As might be expected in light of the investments recorded, basic access increases for all services considered. Furthermore, increases have been significant for those households with initially lower coverage of sewerage, water, and particularly telephone. It is

important to note that the observed expansions took place in an environment of rapid urbanization,<sup>10</sup> which places additional pressure on the cities' infrastructure because of the inflow of rural migrants who, on average, have significantly lower incomes than urban residents. In other words, coverage rates, in the absence of adequate investment, would probably have declined during this period.

Table 7  
Department capitals and El Alto:  
Percentage of households connected to basic services, 1994-99

| Service     | Percentage of households with access |      |          |
|-------------|--------------------------------------|------|----------|
|             | 1994                                 | 1999 | % change |
| Electricity | 96.0                                 | 98.8 | 2.9      |
| Telephone   | 20.6                                 | 42.5 | 106.3    |
| Water (1)   | 80.7                                 | 92.0 | 14.0     |
| Water (2)   | 26.7                                 | 42.1 | 57.6     |
| Sewerage    | 47.3                                 | 57.4 | 21.4     |

Source: Authors' calculations.

### 4.3 Are these changes actually due to utility sector reforms?

While Table 7 suggests that the reforms have promoted an expansion in access, it does not necessarily imply that these *caused* the phenomenon. Indeed, other factors such as income growth or technological change could have had similar positive effects for connection rates, even in the absence of liberalization.

It is impossible to strictly isolate the effects of liberalization measures because no counterfactual is available for assessing what would have happened had *none of the measures been in place*. If this information were available, a simple comparison would reveal the effects of reform. In its absence, simple conclusions are not feasible. One can, nevertheless, attempt to resolve this problem by comparing sectors subject to reform ('treated' cases) with sectors/periods where no reform took place ('control' cases). This section presents two exercises that attempt this.

One method is the comparison of changes in access for the pre-reform and post-reform periods, as in Figure 2, which shows the access rates for 1989, 1994, and 1999 for each utility sector.<sup>11</sup> In this case, the years 1989-94 are considered the 'control' period with respect to the capitalization years, 1994-99. This comparison is feasible because, as indicated by Figure 1, both periods were marked by relatively low inflation, moderate economic growth, and political stability.

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<sup>10</sup> Between the 1976 and 1992 censuses, the urbanization rate increased from 42 to 58 per cent.

<sup>11</sup> The 1989 survey did not have a specific question on telephone access, so households were considered to be connected if they reported positive expenditures for telephone service. Using the same approach in subsequent years does not qualitatively affect the conclusions drawn from Figure 1.

Figure 2  
Percentage of households in the department capitals  
with access to basic services, 1989-99

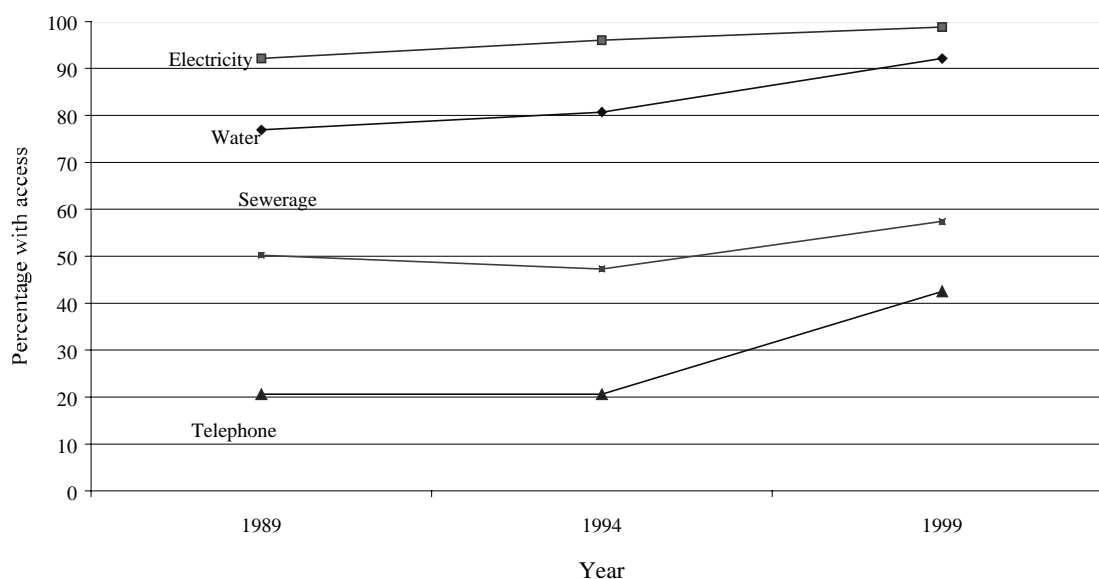
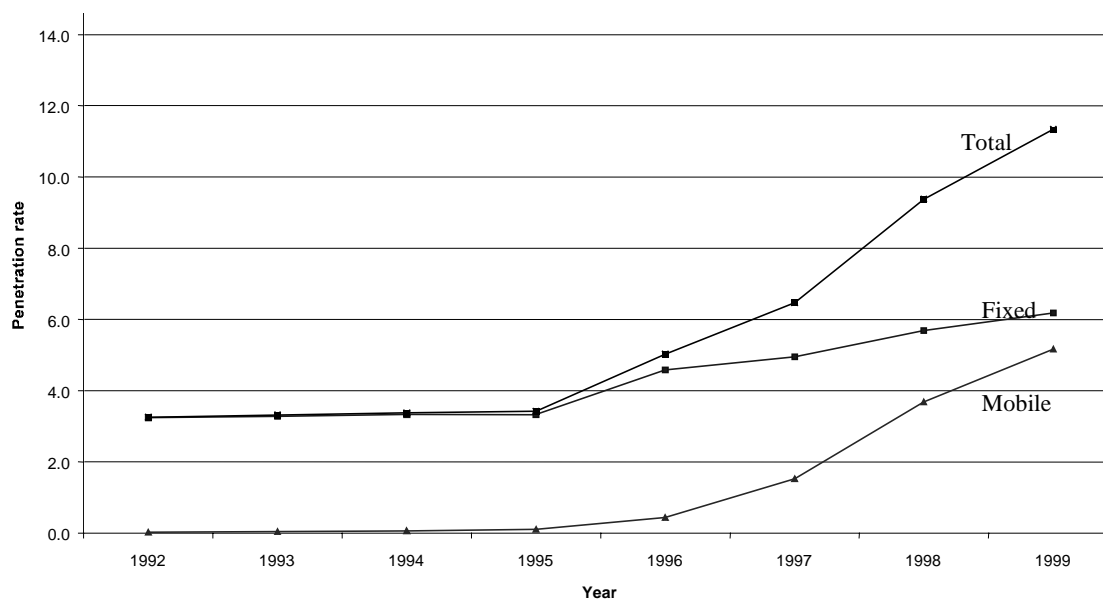


Figure 3  
National telephone penetration rates, 1992-99



This simple evidence suggests a positive effect of capitalization in the case of sewerage, telephone, and water services. Access rates are either ‘stable’ or decreasing between 1989 and 1994, but display significant increases thereafter. In contrast, access rates for electricity show gradual growth for the entire 1989-99 period, with no particular acceleration taking place during the capitalization phase. In fact, Figure 2 may underestimate the ‘capitalization effect’ because the legal reforms underpinning capitalization were in place already in 1994 and 1995 (Table 3), but the actual investments did not start until 1996, 1997, or even 1998 depending on the sector.



In the case of telephone services, some conclusions can be drawn from national data on penetration rates. These data allow a distinction between fixed line and cellular connections, a distinction which is not feasible with the household survey data. See Figure 3. This figure also displays stagnant performance early on with a break in 1995-96. From this year on, mobile telephone coverage has increased rapidly. Although fixed connections have been less dynamic, the overall penetration rate has essentially tripled in four years.

It bears repeating that the effects observed in each sector cannot be attributed to capitalization alone. As outlined in section 3, other relevant changes included the implementation of regulation in all these sectors, other liberalization measures such as the introduction of competition in the cellular sector, and concessions in the case of water and sewerage. These issues are discussed further in the next section.

A second way to study these reforms' impact is to compare cities where reforms would be expected to have greater consequences with those urban centres where the effects might have been less clear. La Paz-El Alto is the only city with an on going concession for water and sewerage services, and here increases in access are expected to exceed other urban centres (Figure 4).

In both cases there are no major differences between the evolution of La Paz-El Alto and other urban areas. Coverage for water in these areas appears to have converged over this period, and in some cases differences are not statistically significant. In the case of sewerage, after 1994 coverage appears to have risen somewhat faster in La Paz-El Alto than in all other major urban areas combined. In short, the evidence in these sectors is inconclusive, but does not seem to suggest a strong capitalization/privatization effect. In the cases of electricity and telephone services, the distinction between the 'treatment' and 'control' urban centres is not always clear, and is omitted here for reasons of space.

In the end, none of these comparisons are conclusive. It is always possible to think of concurrent events or trends that could distort the evidence. Nevertheless, the overall evidence does tend to support the widespread perception that the capitalization process contributed to an increase in infrastructure investment and improved access to basic services in Bolivia.

In the next sub-section, we examine whether these changes have bypassed the poor, but it is relevant to note that despite the relatively optimistic picture of connection rates observed in this study for Bolivia, the analysis is focused only on the administrative capitals because of data limitations.<sup>12</sup> This caused national welfare levels to be overstated because other urban areas, and the rural areas in particular, have lower connection rates. This is illustrated in Figure 5. The significant differences across regions reflect the substantial variation in income levels and population densities.

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<sup>12</sup> It is also possible that a household can overstate its welfare in this dimension, but as long as this type of misrepresentation is consistent from period to period, it should not affect any conclusions based on the trends.

Figure 4  
Water and sewerage: Evolution of access rates in La Paz-EI Alto  
and other urban areas, 1989-99

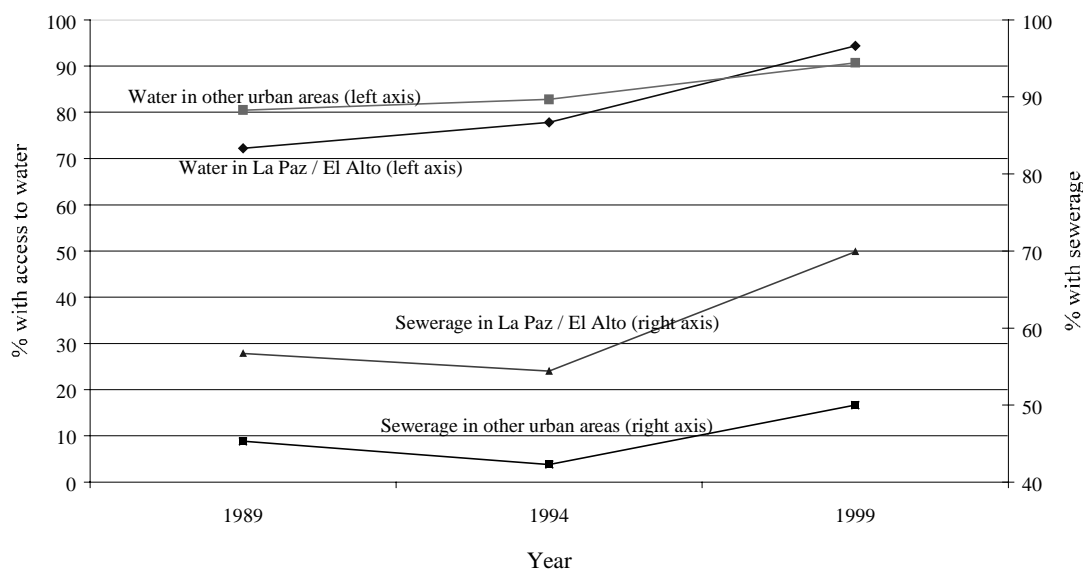
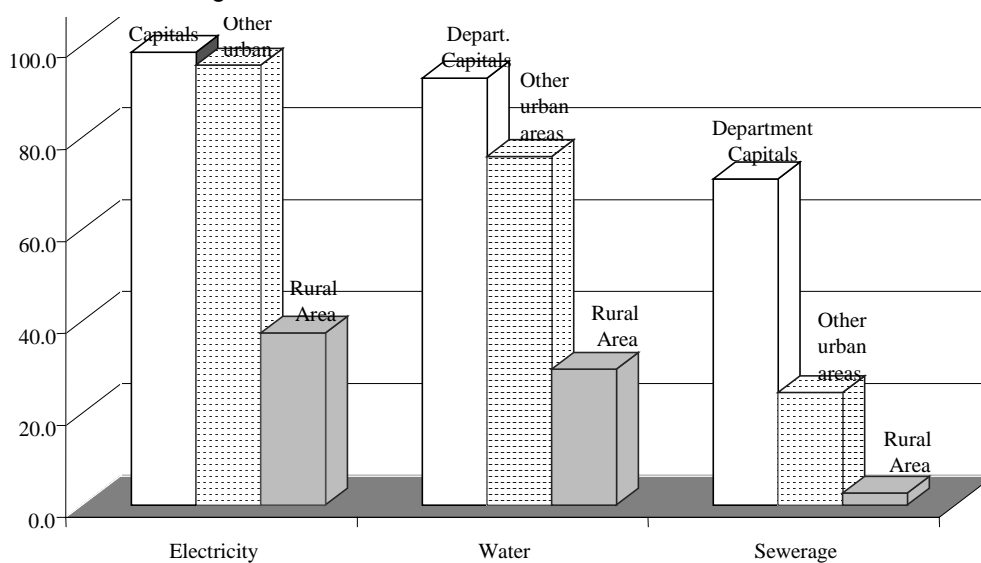


Figure 5  
Percentage of households with access to basic services in Bolivia



#### 4.4 Did the expansion in access bypass or benefit the poor?

The aggregate changes reviewed thus far are consistent with a number of scenarios regarding the *distribution* of the benefits. However, they provide no insight as to what changes in access were experienced by poor households. As mentioned above, the impact of capitalization reforms was mainly in the department capitals. This fact, combined with the information in Table 1, prompts a simple 'yes' answer to the question, 'Have these expansions bypassed the poor?' This reflects the fact that

capitalization had a relatively limited impact in the rural areas, where the majority of the poor population is concentrated.

Ajwad and Wodon (2000) make this point indirectly but formally, by studying the benefits that poor Bolivian *municipalities* (some 300 in all) receive from expansions in education, health or infrastructure services. They conclude that the *non-poor* clearly benefit more from sewerage, electricity, and phone connections, water being the only exception. In short, if the capitalization process did lead to improvements in access rates, it is unlikely that these were particularly beneficial to the poor, at least not from a *national* perspective.

Nevertheless, it is still relevant to determine whether access expansions bypassed the urban poor because this could be the real (and perhaps a more reasonable) measure of the equity aspect of capitalization. Furthermore, low coverage rates in rural areas may reflect inequity, but also economic rationality: supplying these services can be extremely expensive when population density is below a certain threshold level. Thus, the following figures demonstrate how well or badly households have fared according to the income quintiles to which they belong. This approach was adopted because it provides more detail than simply separating households into the categories of poor and non-poor.

We start with electricity (Figure 6), the sector with the smallest improvement in access, partially due to the relatively favourable initial conditions. A clear ‘convergence’ is obvious. The quintiles with the lowest access levels in 1989 have shown the greatest increases during 1989-99, an observation that also holds for the 1994-99 timeframe. In 1989, households in the lowest quintile had an access rate of 86 per cent, by 1994 it was over 95 per cent in all five groups. It is surprising to note, in fact, that by 1999 the lowest income group seems to have surpassed all but the richest. This may in part be a reflection of sampling issues: all groups have similar high access rates, thus these differences are likely to be statistically insignificant.

We now review the experience with telephone access (Figure 7), where the evolution has been somewhat different. As mentioned earlier, during the pre-capitalization period, 1989-94, there were no major changes in telephone access rates. As Figure 7 reveals, this aggregate behaviour, in fact, hides an increase in access for the highest income quintile as well as a drop in connections for the lower-income households.

These trends, however, change significantly after capitalization. Between 1994 and 1999 access rates increase appreciably for all income groups. Despite the fact that the absolute difference in percentage points has remained fairly constant, the relative gap between the 2-3 lowest quintiles and the richest has decreased considerably. In short, this suggests that liberalization in the case of telephone access has not only included the poor, but may have also reversed trends that were detrimental to them.

Figure 6  
Percentage of households with access to electricity,  
by income quintiles in the department capitals, 1989-99

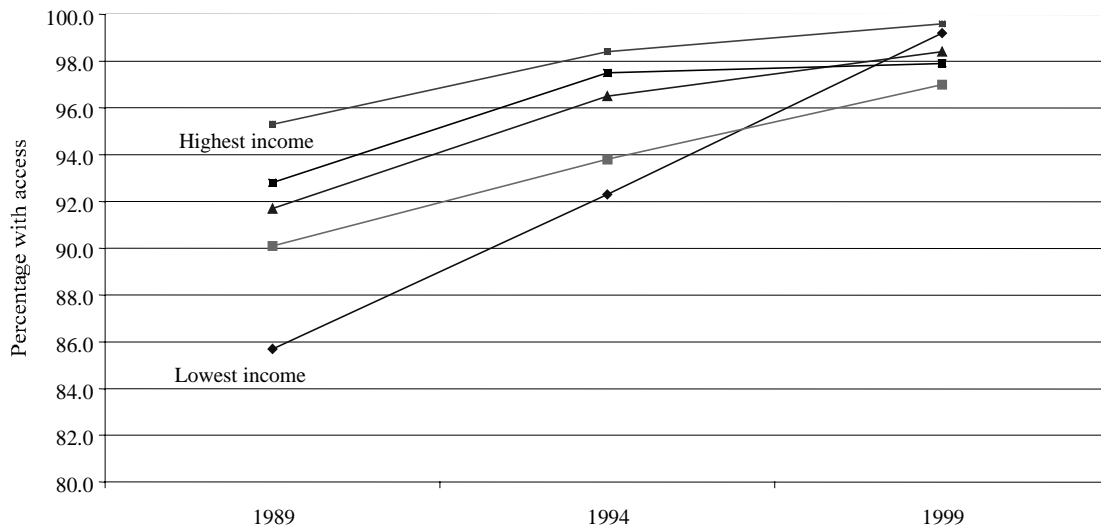
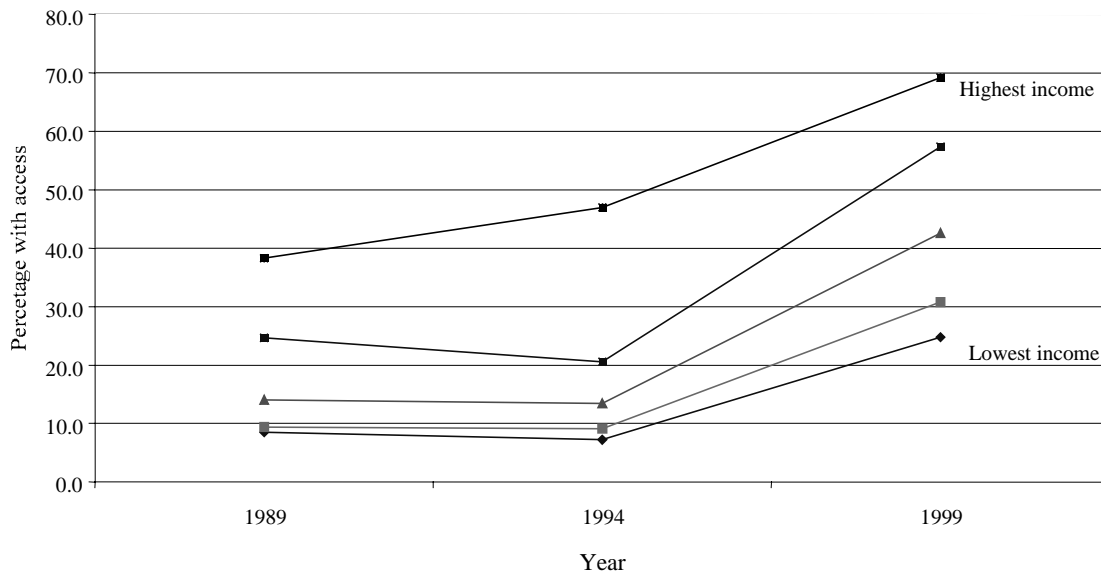


Figure 7  
Percentage of households with access to telephone services,  
by income quintiles in the department capitals, 1989-99



In the case of water, Figure 8 below shows a development similar to that of the telephone services. Access rates remain relatively stable in the control period, 1989-94, but show an increase between 1994 and 1999. The ‘convergence’ of connection rates is more marked: access exceeds 90 per cent for households in all quintiles by 1999, and the difference between the groups is often statistically insignificant.<sup>13</sup>

<sup>13</sup> It might seem surprising to observe that access rates are not closer to 100 per cent for the top quintiles. While this may reflect data problems, there are concrete reasons behind it. In the largest cities, for

Finally, the evolution of access to sewerage is summarized in Figure 9 above, with an overall improvement and convergence observed in the 1994-99 period. To summarize, despite some data limitations, household survey data suggest that the capitalization/regulation reforms induced improvements in connection rates which have not bypassed poor households.

Figure 8  
Percentage of households with access to water services, by income quintile in the department capitals, 1989-99

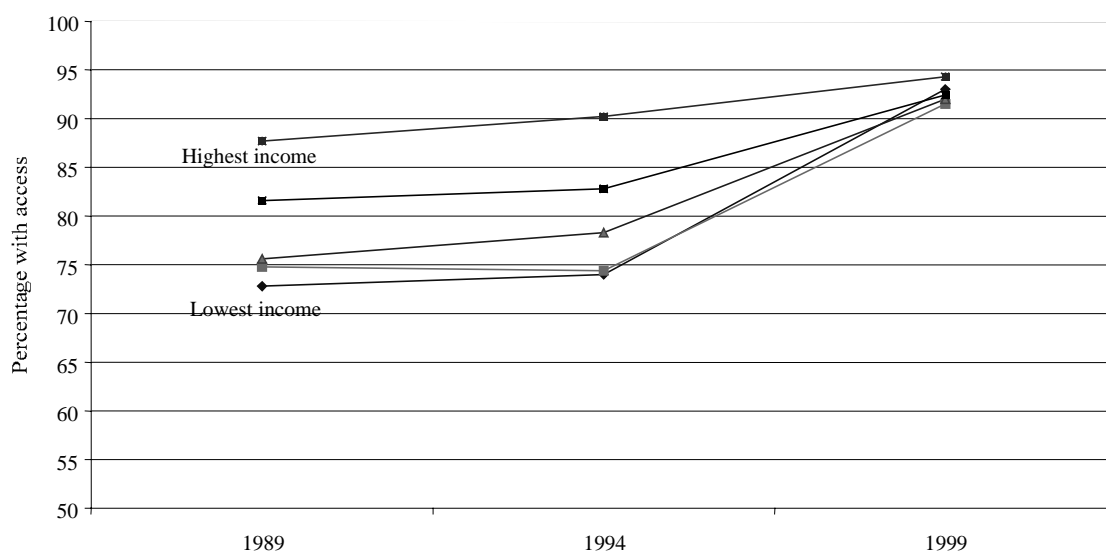
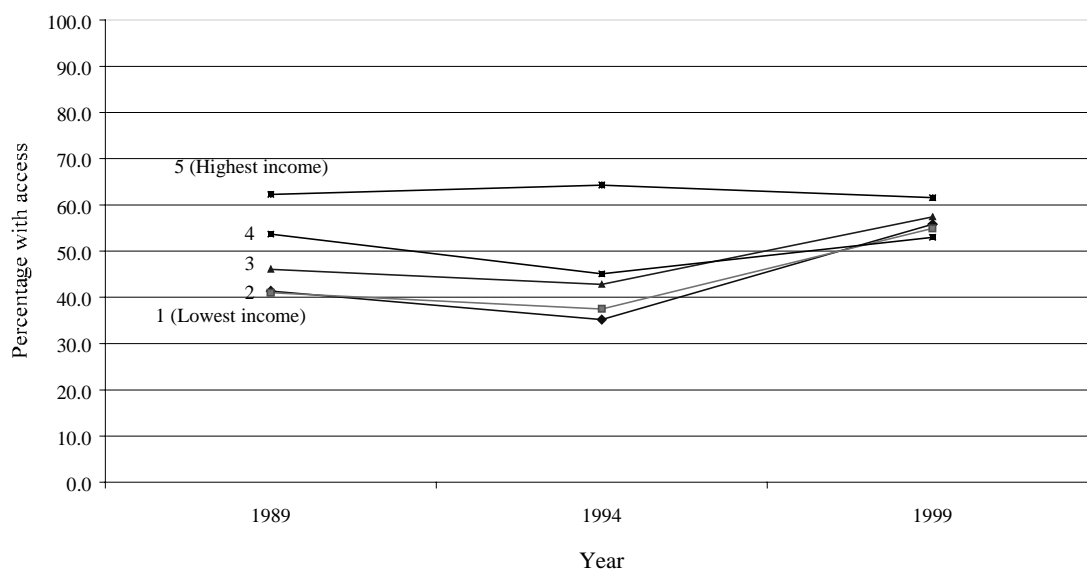


Figure 9  
Percentage of households with access to sanitation services, by income quintiles in the department capitals, 1989-99



instance, high-income developments are sometimes built outside the reach of water networks. These households use truck-delivered water, and despite having all the standard facilities, are considered as not connected to a network.

## 4.5 Access as affordability: prices and expenditure

The previous section concentrated on access defined as connection but as Foster (1999) and Waddams Price and Hancock (1998) note, there are a number of other price-related channels through which a process like capitalization can adversely affect the poor:

- i) *Average tariff levels may increase* because of cost recovery requirements and the necessity of financing quality improvements. This section of our study shows that while average prices increased in some utility sectors, changes in general are not dramatic, partly because capitalization was not intended to raise funds for reducing the budget deficit. Consequently, the state potentially had fewer incentives to build high tariffs into privatization contracts. Additionally, the parallel implementation of a regulatory framework, and the promotion of competition may have helped to keep price increases in check.
- ii) *Tariff structures may be readjusted as direct or cross-subsidies disappear*, either as an explicit policy or as a consequence of market forces, as illustrated by Waddams Price and Hancock (1998) for the United Kingdom. Although the data below suggest that some rebalancing did take place in Bolivia, there are reasons to believe that the incentives to rebalance were, for several reasons, not as strong as in the UK. First, at the time the reforms took place, utilities were not exclusively state owned. Some firms affected by reforms were already private (e.g. COBEE in electricity); some others were organized as cooperatives. Thus, these firms were not subjected to the same distributional goals as state-owned enterprises, so these goals were not there to 'abandon' after the reforms. Second, the vertical separation that some industries displayed before privatization may imply that cross-subsidies were less prevalent than in other countries. For instance, it is common to subsidize local telephone charges with expensive rates for long-distance calls. In Bolivia, the long-distance state provider, ENTEL, was always separate from the local cooperatives.
- iii) *As the industry becomes more 'formal', improvements in revenue collection and discouragement of illegal connections are likely to result in price increases*. Once again, the existence of private firms or cooperatives may have meant that there was not as much room for improvement in this regard.
- iv) *Privatization may affect the availability and prices of substitutes or complements*.

The next section, despite significant data limitations, looks at the issue of tariff changes in the context of electricity, water, and telephone services.

### 4.5.1 Electricity

Figure 10 outlines the development of electricity tariffs for private consumption (up to 20 Kwh/month) in the three largest cities. Data for 1992 are included for comparison, even though reforms were not introduced until 1994. These are not average tariffs, but are likely to be relevant for poor households. As rates evident in Cochabamba have decreased by about 14 per cent since capitalization, while Santa Cruz shows a 15 per cent increase and La Paz-El Alto a 7 per cent rise.

Figure 10  
 Tariffs for private consumption (0-20 Kwh) in the central axis cities,  
 1992-99

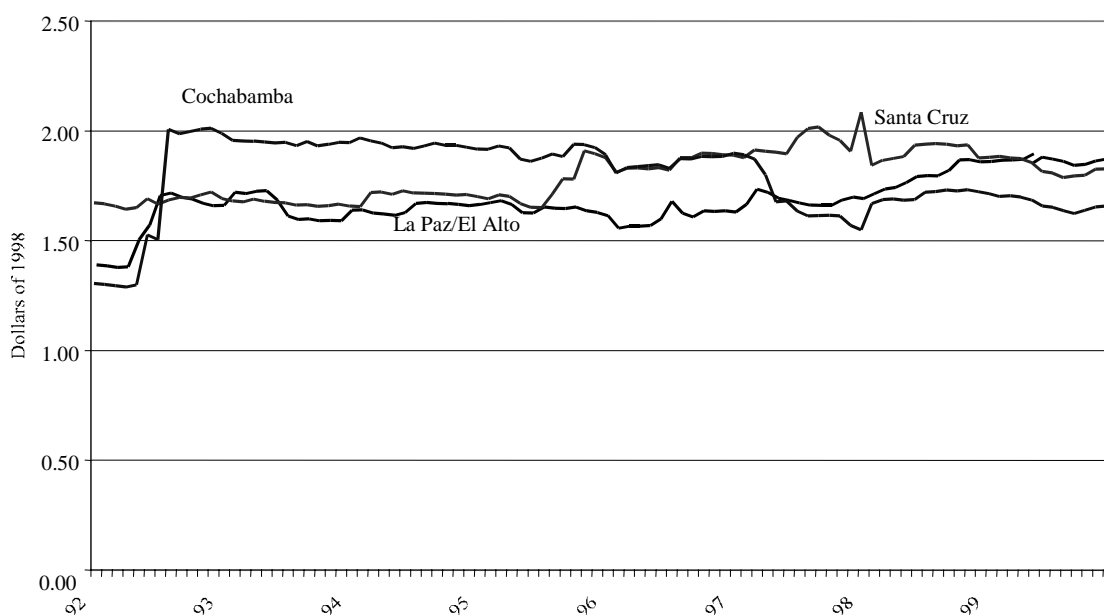


Table 8  
 Residential rates for electric distributors in La Paz-EI Alto, Cochabamba,  
 and Santa Cruz

|      | Tariff rates                 |               |                  | Percentage change in the residential sector |       |      | Percentage change in all sectors |       |      |
|------|------------------------------|---------------|------------------|---|-------|------|----------------------------------|-------|------|
|      | Electropaz (La Paz -El Alto) | Eifec (CBBA.) | CRE (Santa Cruz) | Electropaz                                  | Eifec | CRE  | Electropaz                       | Eifec | CRE  |
| 1992 | 3.96                         | 5.62          | 4.45             | —   | —     | —    | —                                | —     | —    |
| 1993 | 4.30                         | 5.52          | 4.47             | 8.6   | -1.8  | 0.0  | 9.8                              | -0.6  | 1.4  |
| 1994 | 4.60                         | 5.66          | 4.56             | 7.0   | 2.5   | 2.0  | 5.3                              | 1.2   | 1.8  |
| 1995 | 4.89                         | 6.04          | 4.86             | 6.3   | 6.7   | 6.6  | 5.2                              | 5.4   | 5.9  |
| 1996 | 5.04                         | 6.25          | 5.45             | 4.2   | 3.5   | 12.1 | 2.9                              | 1.9   | 6.8  |
| 1997 | 5.34                         | 6.31          | 5.71             | 5.9   | 0.9   | 4.8  | 6.3                              | 2.6   | 4.4  |
| 1998 | 5.74                         | 6.65          | 5.71             | 7.5   | 5.4   | 0.0  | 7.4                              | 3.4   | -0.4 |
| 1999 | 6.08                         | 6.45          | 5.52             | 5.9   | -3.0  | -3.3 | 5.4                              | -1.6  | -1.9 |

Distribution is still conducted through local monopolies which may experience less pressure to engage in rebalancing. This issue is analysed in Table 8, which provides the *mean* tariffs in cents per Kwh for the three largest distributors by customer type. Both the pre- and post-capitalization periods have been characterized by overall real price increases in the residential sector. This trend, nevertheless, seems to be reversing as

price reductions (or zero increases) are observed for Cochabamba and Santa Cruz for 1998, which is consistent with the development seen in Figure 10.

The issue of rebalancing is analysed in the last six columns of Table 8, and even though customer classification varies across the cities, the data suggest that the residential sector has suffered greater increases. The differences, however, do not always follow a similar trend and generally are not large.

#### 4.5.2 Water

As pointed out earlier, ‘privatization’ in the case of water took the form of a concession, and has affected only La Paz-El Alto. Until 1996, the state-owned SAMAPA applied a complicated tariff structure that included more than 150 categories, 15 of which were for metered customers. Under this arrangement, consumers were not charged for the first 10m<sup>3</sup>, and according to a study from that period, the mean tariff was approximately US\$ 0.32/m<sup>3</sup>.

In December 1996, the National Council of Tariffs undertook steps to amend and simplify this arrangement. The new policy was to become effective in December 1996, but was not implemented by *Aguas del Illimani*, the winning consortium operating water and sanitation services in La Paz/El Alto, until May 1997, when an additional 19 per cent increase awarded to the company on take-over also became effective. The prevailing tariff structure is given in Table 9.

The arrangement is relatively progressive, but clearly the customers who had enjoyed the ‘free’ 10m<sup>3</sup> were hurt. Nevertheless, cross-subsidies persist, and even though higher tariffs were the ultimate outcome, increases in La Paz were smaller than in Santa Cruz where no reform has taken place. This is illustrated in Figure 11.<sup>14</sup>

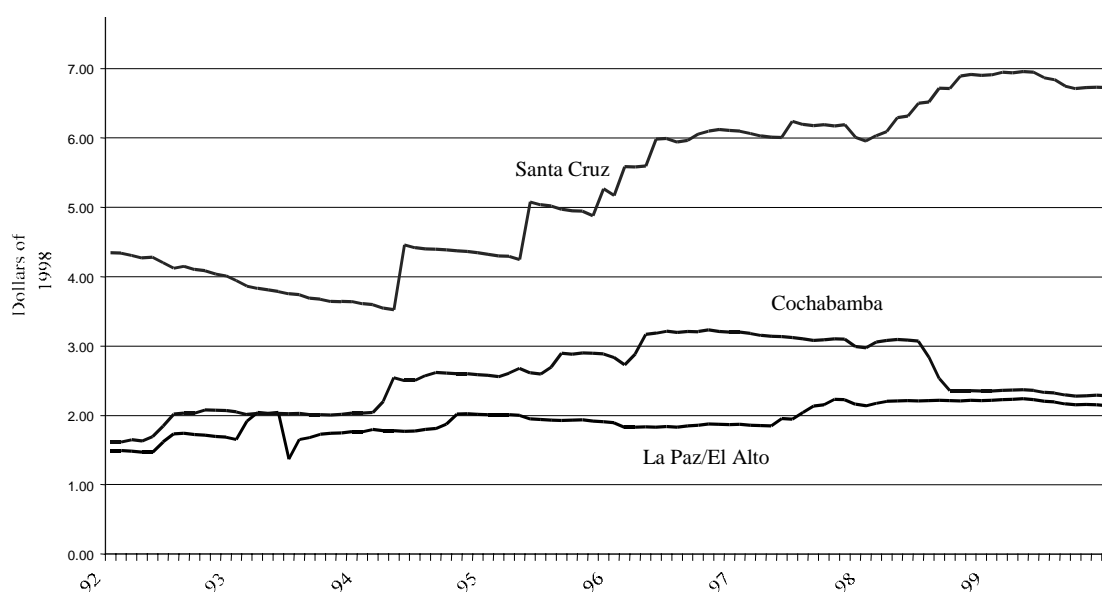
Table 9  
Tariff structures for SAMAPA and Aguas del Illimani

| Type of consumer (m <sup>3</sup> /month) |            |            | Tariff (\$US/m <sup>3</sup> ) |                    | Percentage change |
|--|------------|------------|-------------------------------|--------------------|-------------------|
| Domestic                                 | Commercial | Industrial | SAMAPA                        | Aguas del Illimani |                   |
| 1 to 30                                  |            |            | 0.1850                        | 0.2214             | 19.7              |
| 31 to 150                                |            |            | 0.3719                        | 0.4428             | 19.1              |
| 151 to 300                               | 1 to 20    |            | 0.5579                        | 0.6642             | 19.0              |
| 301 or more                              | 21 or more | 1 or more  | 0.9964                        | 1.1862             | 19.0              |

<sup>14</sup> Cochabamba actually experienced a decline in real tariffs during the reform period, a development not unrelated to the fact that concession was a failure in this city.



Figure 11  
Water tariffs for 10m<sup>3</sup> in the central axis cities, 1992-99



#### 4.5.3 Telephone services

Coverage expansion has been greatest in the case of telephones, so one might expect to find significant price reductions that partially reflect technological innovations and the effects of competition. For instance, prior to reform, *Telecel*, had the monopoly in cellular services, and priced accordingly. The fixed monthly tariff for the standard service offered (without free time) from the early 1990s to October 1996 was US\$ 29.90 (Figure 12), and the per-minute tariff was US\$0.41 for both incoming and outgoing calls. In addition, there was a charge of US\$417 for the initial connection. Once ENTEL-Movil, a subsidiary of the capitalized ENTEL, entered the market, prices dropped significantly. Competition became so intense that both firms began on average to charge rates at roughly 5 per cent of the price cap set by the regulator.

Figures 12 and 13 are based on special tariff arrangements: ENTEL's 'Family Plan' and *Telecel's* 'Economy Plan'. Under these arrangements, fees for digital lines are free, the fixed monthly tariff with no free minutes dropped to US\$1.93 in November 1996, and the per-minute tariff increased to 0.45. Initially, tariffs were set in dollars and later on, in bolivianos. By December 1999, the dollar value of the fixed tariff had dropped to 1.67, and the per minute tariff value to 0.39. At the same time, both ENTEL and *Telecel* introduced various new plans and prepayment schedules, which further contributed to increases in coverage.

These price reductions, in conjunction with the availability of low-cost cellular phones, have dramatically lowered the cost of access, as compared to the local telephone cooperatives which charged more than US\$ 1,000 for fixed connection/share. With the first PCS operator having entered the market at the end of 2000 and with market liberalization being targeted for the year 2001, these downward price trends are expected to continue or to intensify.

Figure 12  
Minimum fixed monthly tariffs with no free minutes in cellular telephony, 1992-99

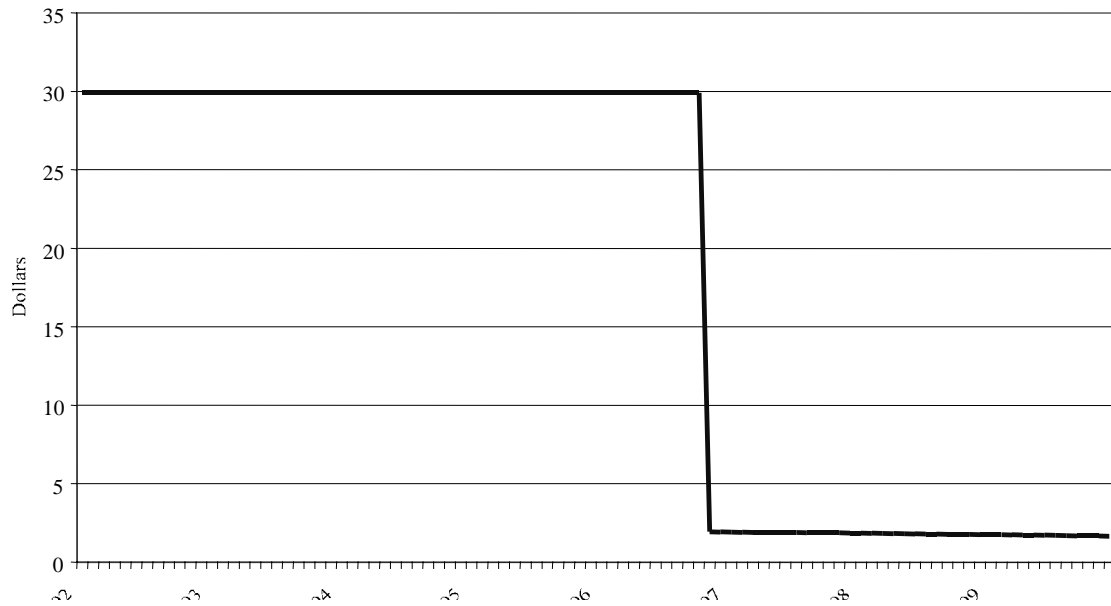
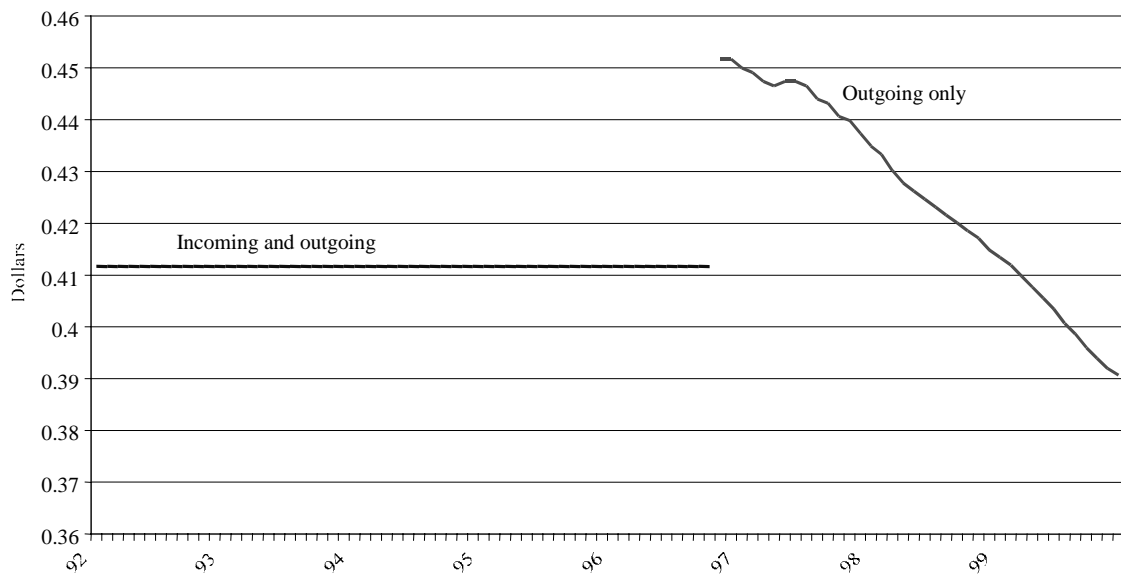


Figure 13  
Minimum tariffs per minute in cellular telephony, 1982-99



Combining evidence for all these sectors, Table 10 summarizes the average expenditure levels for water, electricity and telephone services for the different income quintiles. All have increased in real terms, but there seems to be no consistent pattern on how these increases have been distributed across income groups. The next section explores this question using standard welfare measures.

Table 10  
Expenditures on basic services by income quintiles, 1994-99

| Income quintiles | Expenditures in dollars: |             |           |       |             |           | 1994-99  |             |           |
|------------------|--------------------------|-------------|-----------|-------|-------------|-----------|----------|-------------|-----------|
|                  | 1994                     |             |           | 1999  |             |           | % change |             |           |
|                  | Water                    | Electricity | Telephone | Water | Electricity | Telephone | Water    | Electricity | Telephone |
| 1                | 2.9                      | 6.1         | 7.9       | 4.5   | 8.8         | 11.6      | 52.9     | 44.5        | 47.9      |
| 2                | 3.4                      | 6.7         | 9.0       | 5.5   | 10.1        | 14.0      | 62.4     | 49.5        | 56.5      |
| 3                | 3.8                      | 7.7         | 9.0       | 6.7   | 12.4        | 14.5      | 75.0     | 61.7        | 61.2      |
| 4                | 4.5                      | 9.3         | 12.2      | 7.6   | 13.3        | 17.5      | 69.6     | 42.9        | 43.1      |
| 5                | 7.0                      | 14.1        | 20.0      | 11.1  | 20.3        | 30.7      | 58.3     | 43.5        | 53.3      |
| Total            | 4.4                      | 8.8         | 13.6      | 7.1   | 12.8        | 19.0      | 62.3     | 45.5        | 39.9      |

Source: Authors' calculations

## 5 The distributional impact of tariff structure changes

As was suggested earlier, price changes have affected different income groups differentially. Unfortunately, data limitations make this issue in Bolivia difficult to examine. To assess the impact of rebalancing, one needs i) household-level observations on a range of socioeconomic variables, ii) data on expenditure and physical consumption of utility services; and iii) information on households that are informally or not at all connected (Estache *et al.* 2000).

These requirements, however, are not covered by the surveys on hand, which have several of the disadvantages discussed by Gomez-Lobo *et al.* (1999). The central problem is that the *quantity* of electricity, water, telephone services consumed is not recorded. In the case of electricity and water, assessing the effects of price changes would require a breakdown of the tariff rate paid annually by each household, a difficult task without information on the quantities consumed, particularly with some of the intricate tariff structures prevalent before reform. This problem is even more severe with telephone services, since it is impossible to differentiate between expenditures on fixed line and mobile phone services.

Despite these difficulties, this section of the study makes some assumptions to implement the methodology used by Waddams Price and Hancock (1998). This approach is summarized in the expression:

$$\Delta W = x^* (p_1 - p_2)$$

where  $\Delta W$  is the change in consumer welfare;  $p_1$  and  $p_2$  are the average prices in periods 1 and 2, respectively, and  $x^*$  is average consumption estimated from expenditure and tariffs; a number between  $x_1$  and  $x_2$  (with  $x_1 > x_2$  when  $p_2 > p_1$ ).

One limitation is that the methodology does not take into account changes in access, and while this may not be a problem for the UK, it is clearly important for Bolivia. As a result, for Bolivia,  $x^*$  is average consumption between  $x_1$  and  $x_2$ , which biases the measure of welfare change. Furthermore, the lack of information on average prices, which is compensated with available minimum tariffs instead, may cause an underestimate. In view of these restrictions, the results should be taken merely as an approximation on the distribution of welfare changes over quintiles and regions.<sup>15</sup>

In general, Table 11 shows that larger absolute losses occurred in Santa Cruz; Cochabamba had some welfare gains. From a distributional perspective, the absolute losses of the richest quintile were roughly two or three times that of the poorest. But as the last row (relative average incomes) demonstrates, the impact *relative to household income* was clearly more adverse for poorer households. The reforms appear regressive in this sense.

Table 11  
Average monthly variation of consumer surplus quintiles, 1994-99 (in dollars)

| Location   | Total | Quintile 1 | Quintile 2 | Quintile 3 | Quintile 4 | Quintile 5 |
|--|-------|------------|------------|------------|------------|------------|
| La Paz/EI Alto-LP/EA                             |       |            |            |            |            |            |
| Water  | -0.68 | -0.47      | -0.45      | -0.58      | -0.62      | -1.23      |
| Electricity                                      | -1.39 | -0.93      | -0.97      | -1.25      | -1.31      | -2.49      |
| Bottled gas                                      | -0.06 | -0.06      | -0.06      | -0.06      | -0.06      | -0.06      |
| Total gain                                       | -2.13 | -1.46      | -1.48      | -1.89      | -1.99      | -3.78      |
| Cochabamba-CBBA                                  |       |            |            |            |            |            |
| Water  | 0.34  | 0.26       | 0.27       | 0.34       | 0.33       | 0.50       |
| Electricity                                      | 1.52  | 1.21       | 1.40       | 1.39       | 1.57       | 2.21       |
| Bottled gas                                      | -0.07 | -0.06      | -0.07      | -0.07      | -0.07      | -0.07      |
| Total gain                                       | 1.80  | 1.41       | 1.60       | 1.66       | 1.84       | 2.63       |
| Santa Cruz-SCZ                                   |       |            |            |            |            |            |
| Water  | -5.68 | -4.06      | -6.03      | -4.56      | -5.15      | -7.09      |
| Electricity                                      | -1.18 | -0.93      | -0.97      | -1.00      | -1.15      | -1.48      |
| Bottled gas                                      | -0.06 | -0.06      | -0.07      | -0.06      | -0.06      | -0.07      |
| Total gain                                       | -6.93 | -5.05      | -7.07      | -5.62      | -6.36      | -8.63      |
| LP/EA-CBBA-SCZ                                   |       |            |            |            |            |            |
| Water  | -2.05 | -1.23      | -1.57      | -1.80      | -2.09      | -3.19      |
| Electricity                                      | -0.54 | -0.35      | -0.40      | -0.48      | -0.55      | -0.83      |
| Bottled gas                                      | -0.06 | -0.06      | -0.06      | -0.06      | -0.06      | -0.07      |
| Total gain                                       | -2.65 | -1.64      | -2.03      | -2.34      | -2.71      | -4.09      |
| Average income relative<br>to that of quintile 1 | 443   | 100        | 212        | 303        | 497        | 1104       |

Source: Authors' calculations.

<sup>15</sup> See, for instance, Wolak (1996) for the methodologies for correcting for this bias. However, as some of the data requirements they pose also created problems in the Bolivian context, so that instead of becoming involved in ever increasingly complicated assumptions, we decided to stay with the simpler results, and subsequently recommend that these be interpreted with caution. In any case, access—not price change—is the main focus of the study on Bolivia.

## 6 Macroeconomic impact

Looking beyond the direct effects on consumers, it is relevant to note that capitalization also had significant impact on macroeconomic variables, and is one element of the broader transformation process of the Bolivian economy. The most obvious outcome is the increase in foreign direct investment (FDI) from 1994 onward, which is partly explained by the capitalized firms' activities (Figure 14).

Figure 14  
FDI registered in the balance of payments

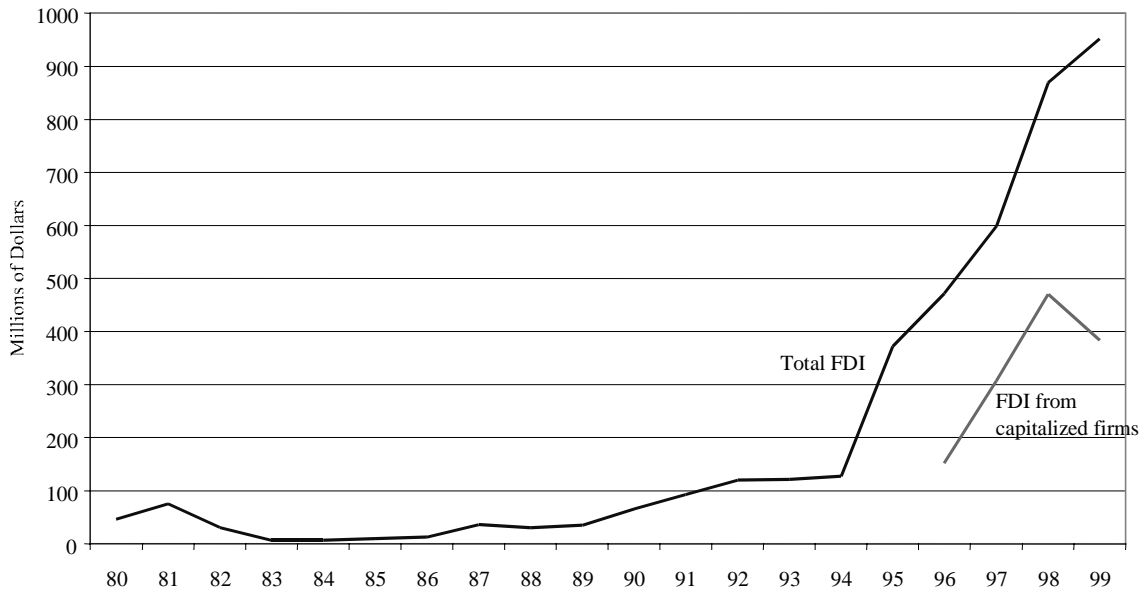
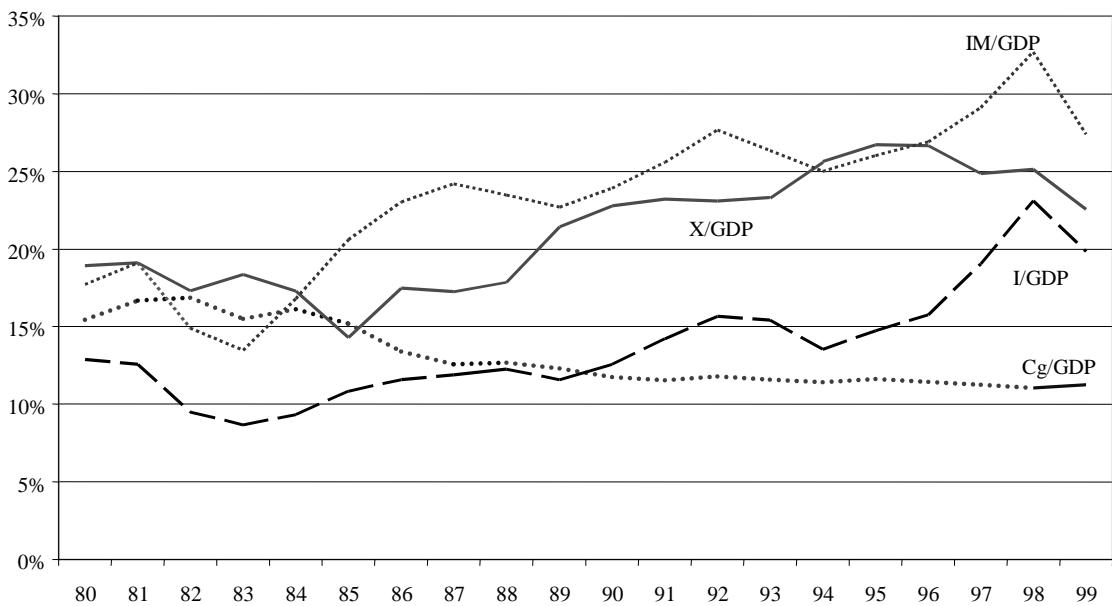


Figure 15  
Main macroeconomic variables as per cent of GDP



This strengthened the balance of payments accounts, enhancing their sustainability. The resilience of total FDI to the 1999 downturn (Figure 1) is an important factor in explaining why the recession was not as severe in Bolivia as in some of the neighbouring countries.<sup>16</sup>

In the national accounts, FDI helped to raise investment from 13.5 per cent of GDP in 1994 to 19.8 in 1999 (Figure 15). This investment was concentrated in oil and natural gas, electricity, bottled gas and oil derivatives, as well as telecommunications and transportation and, as one would expect, these sectors gained in importance in relation to the more ‘traditional’ activities like mining.

Furthermore, the decision to capitalize state firms was considered the ‘second phase’ of the reforms introduced in 1985, and incorporated the common objective of allowing the private sector to take responsibility for productive activities in an environment of open markets and competition. The state, remained responsible for regulating, administering the law, ensuring macroeconomic stability, and investing in social sectors; all of these in an environment of greater decentralization and local participation.

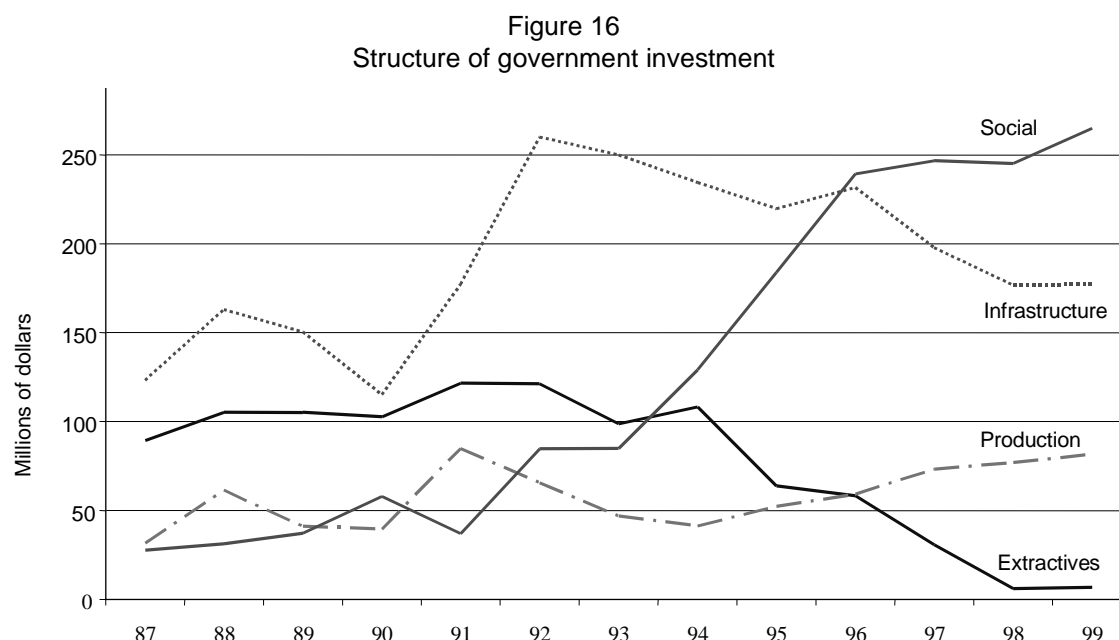


Figure 16 shows how the composition of public investment gradually started to reflect these priorities. Although total public investments increased only 3.4 per cent, the social sectors went up from 25 per cent in 1994 to 50 in 1999. Investment in production also increased from 8.1 to 15.4 per cent, largely due to greater support to the agricultural sector. However, investment in primary activities (natural resource exploitation) dropped from 21.1 per cent in 1994 to 1.3 in 1999, mainly because of the diminishing hydrocarbons production. The decline in infrastructure from 45.7 to 33.5 per cent partially reflects the government’s withdrawal from the electricity, telecommunications,

<sup>16</sup> Preliminary data suggest GDP growth began a slow recovery in the year 2000.

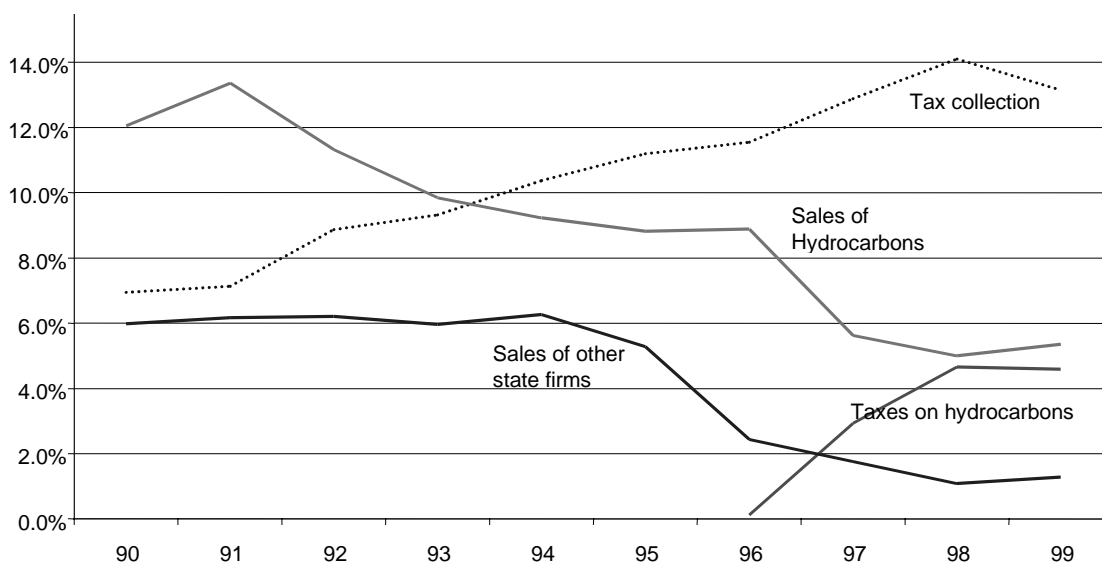
and transportation sectors. At the same time, there was a sustained decrease of government participation in GDP.

Capitalization also had an impact on the government's budget deficit. In 1990 the deficit (before pensions) was 4.4 per cent of GDP, by 1994 it was 1.8 and by 1999 the government had a 0.2 per cent surplus. An increase in government income, first in 1994, and again in 1998 contributed to closing the gap. However, the pension reform caused the budget deficit to increase again from 1997 onward, reaching 3.9 per cent of GDP in 1999.

According to Figure 17, the increase in government income was accrued mainly in tax collection, particularly the new hydrocarbons tax. On the other hand, income from hydrocarbons sales and its derivatives and sales from other government firms diminished substantially from 1995 onward because of reform. In addition, the regulated sectors (crude oil, natural gas, oil derivatives, electricity, bottled gas, communications and transportation) became the largest contributors to tax revenue in 1995.

To summarize, capitalization reforms were part of a broad programme of restructuring the economy that had multiple indirect effects on poor households. In this context one important element to highlight is the increased share of social sectors in total public expenditures, an increase that capitalization seems to have made possible. In the long run, this may be more important for the poor than continued government investment in state-controlled firms.

Figure 17  
Government income as per cent of GDP



## 7 Regulatory challenges

The regulatory system has faced several challenges since its inception in the mid-1990s. Its consolidation has been affected by the fact that different sectoral superintendencies were created at different points in time. Other factors are the availability of financial resources, the relationship of the regulator with the government, the availability of trained personnel, and the nature of the collaboration between the general and sectoral superintendencies.

One major source of conflict has been the lack of sectoral laws in the cases of transportation and water services. In electricity, telecommunications and hydrocarbons, further legislation is needed, particularly with regard to anti-trust issues. Another difficulty is the expected information asymmetry: firms tend to be more knowledgeable than the regulator in key areas like operation costs, demand conditions, investment valuation, and service quality.

Relations with consumers have improved as they begin to understand their rights and obligations, and to become familiar with complaint procedures channelled through the consumer protection offices (which handled more than 140,000 cases in 1998 alone). Despite this activity, it is possible that the system can do more for consumers by aggressively promoting competition, and by introducing productivity-related incentives in some sectors. Furthermore, anti-trust regulation is under consideration on an economy-wide basis.

Conflicts also arise between the regulatory system and the government, because at times certain governmental decisions are taken without the technical expertise of the superintendencies. In other instances, norms introduced or proposed by the government conflict with existing regulations, creating uncertainty and regulatory risk. Furthermore, direct communications between government and current (or potential) operators can, in some cases, weaken the system and its credibility.

Finally, there is the issue of the general superintendence's responsibility to evaluate the operations of the sectoral organizations, a task which requires the development of efficiency and efficacy indicators. This has been a challenge, mainly because it requires large amounts of information and can involve significant time lags. In addition, the general superintendence has continued in its role as a second instance for appeals, albeit the legal system still retains the final recourse. This activity is reviewed in Table 12.

Table 12  
Accumulated appeals with resolution until 1998

| Regulated sectors  | First instance appeals | Second instance appeals |
|--------------------|------------------------|-------------------------|
| Hydrocarbons       | 12                     | 6                       |
| Electricity        | 23                     | 8                       |
| Telecommunications | 78                     | 21                      |
| Transportation     | 5                      | 2                       |
| Water              | 8                      | 3                       |
| Total              | 126                    | 40                      |

Source: General Superintendence



## 8 Conclusions

In the past decade and a half, Bolivia has undergone sustained economic liberalization. During the past five years, this process finally encompassed the utilities sector, where it has brought about extensive industrial reorganization, privatization/capitalization, and regulation. This paper has presented an initial exploration of how these processes have directly and indirectly affected the poor, as well as how they continue to evolve.

The following conclusions emerge with relative clarity:

- i) Capitalization was effective in attracting foreign investment, and has had significant and generally beneficial macroeconomic effects.
- ii) Capitalization seems to have contributed to increased connection rates in the urban area, reversing declines observed at least in the early 1990s.
- iii) These improvements have not bypassed the poor, and in some cases seem to have been particularly beneficial to this group.

The conclusion, due partly to data constraints, is less clear with regard to the equity implications of changes in pricing policy. While there seems to be evidence of average price increases and rebalancing with regressive effects, their magnitude is not large, particularly when compared to the large welfare gains that were prompted by increased access.



Questions for 1994

| Service     | Type of access | Questions posed in the survey   | Possible answers   | Coding  |
|-------------|----------------|---|--|---|
| Water       | Connection     | How does your household obtain its water? Public or private network   | <ol style="list-style-type: none"> <li>1. Within the home</li> <li>2. Outside the home, but within the house or building where the household is located</li> <li>3. Outside the home, outside the house or building (public faucet).</li> <li>4. Delivery truck</li> <li>5. Well</li> <li>6. River, lake or spring</li> <li>7. Other source</li> </ol> | The household is connected if responses 1 or 2 were given, and not connected otherwise. |
|             | Consumption    | How much do you pay for this each month?  | Amount in bolivianos   | [Same]  |
| Electricity | Connection     | Does your household have access to electricity?   | Yes or no  | [Same]  |
|             | Consumption    | How much do you pay for this each month?  | Amount in bolivianos   | [Same]  |
| Telephone   | Connection     | Household equipment: Does your household have a phone connection?   | Yes or no  | [Same]  |
|             | Consumption    | In the last month, how much did you or any of the members of your household spend on communications (phone, mail services)? | Amount in bolivianos   | [Same]  |
| Gas         | Connection     | What type of fuel do you use to cook?   | <ol style="list-style-type: none"> <li>1. Firewood</li> <li>2. Animal by-products</li> <li>3. Coal</li> <li>4. Kerosene</li> <li>5. Bottled, liquefied gas</li> <li>6. Electricity</li> <li>7. Network-supplied natural gas</li> <li>8. Other</li> <li>9. We do not cook</li> </ol>  |   |
|             | Consumption    | How much did you, or any of the members of your household spend on cooking fuel (liquefied gas, kerosene, other)?           | Amount in bolivianos   | Expenditures for gas were calculated for households that advise using it.               |

Questions for 1999

| Service     | Type of access | Question in the survey  | Possible answers  | Coding   |
|-------------|----------------|---|---|--|
| Water       | Connection     | What is the origin of the drinking and cooking water your household uses?     | <ol style="list-style-type: none"> <li>1. Network that reaches the building</li> <li>2. Public faucet</li> <li>3. Well without a pump</li> <li>4. Well with a pump</li> <li>5. River or spring</li> <li>6. Lake</li> <li>7. Delivery truck</li> <li>8. Other</li> </ol> | The household is connected if response 1 was given, and not connected otherwise. |
|             | Consumption    | In the last month, how much did you pay for potable water?                    | Amount in bolivianos  | [Same]   |
| Electricity | Connection     | Do you use electricity to light your dwelling?                                | Yes or no   | [Same]   |
|             | Consumption    | In the last month, how much did you spend on electric service?                | Amount in bolivianos  | [Same]   |
| Telephone   | Connection     | Does your household have a fixed or cellular phone connection?                | Yes or no   | [Same]   |
|             | Consumption    | In the last month, how much did you spend on fixed or cellular phone service? | Amount in bolivianos  | [Same]   |
| Gas         | Connection     | What type of fuel do you use to cook?   | <ol style="list-style-type: none"> <li>1. Firewood</li> <li>2. Animal by-products</li> <li>3. Kerosene</li> <li>4. Bottled, liquefied gas</li> <li>5. Network-supplied natural gas</li> <li>6. Other</li> <li>7. Electricity</li> <li>8. We do not cook</li> </ol>      |  |
|             | Consumption    | In the last month, how much did you spend on cooking fuel?                    | Amount in bolivianos  | Expenditures for gas were calculated for households that report using it.        |



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