Capitalization, regulation and the poor: access to basic services in Bolivia

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1 April 2001

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Research funded by the United Nations University/
World Institute for Development Economics Research

Draft/preliminary - March, 2001

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I. Introduction

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

As Estache et al. (2000) review, increasing interest centers on how such transfers affected lower income households' access to basic services, and their welfare more generally. 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, and further information on the "social" impact of privatization might usefully inform ongoing policy discussions.

In this context, this paper describes the privatization process as it took place in Bolivia, placing emphasis on the particularities of the "capitalization" mechanism that was used for this purpose, and the regulatory framework that was introduced as its complement. With this background, the document then analyzes the impact of reforms on poor or lower income households along two dimensions: i) access, understood as connection, and ii) affordability, as determined by changes in consumption and pricing patterns. Due to data availability issues, the emphasis is on urban households, though information on the rural area is included where feasible.

The general picture that emerges points to the following conclusions:

1) Capitalization and regulation, and the liberalization of the utilities sector more generally, have been effective as far as attracting foreign investment, thereby fulfilling one of these reforms' central macroeconomic goals.

2) Overall, the evidence suggests that this investment facilitated an expansion of access to basic services in the urban area. Access rates in the rural area, however, remain at very low levels, which partially reflects that privatization was rarely meant to affect service provision in this realm.

3) In the *urban* area and in terms of *connection*, the service expansions observed have not bypassed the poor. On the contrary, in many cases it is the lower income quintiles that seem to have benefited the most.
4) The fact that these reforms had a much smaller effect in rural areas, however, implies that if one focuses on the poor at a *national* level, these expansions have probably benefited higher income groups to a greater extent.
5) As far as the effects of pricing changes on households' welfare, the information presented does suggest some adverse effects. Nevertheless, the findings in this area are affected by data limitations, and in any case would not seem to outweigh the benefits brought about by greater access.

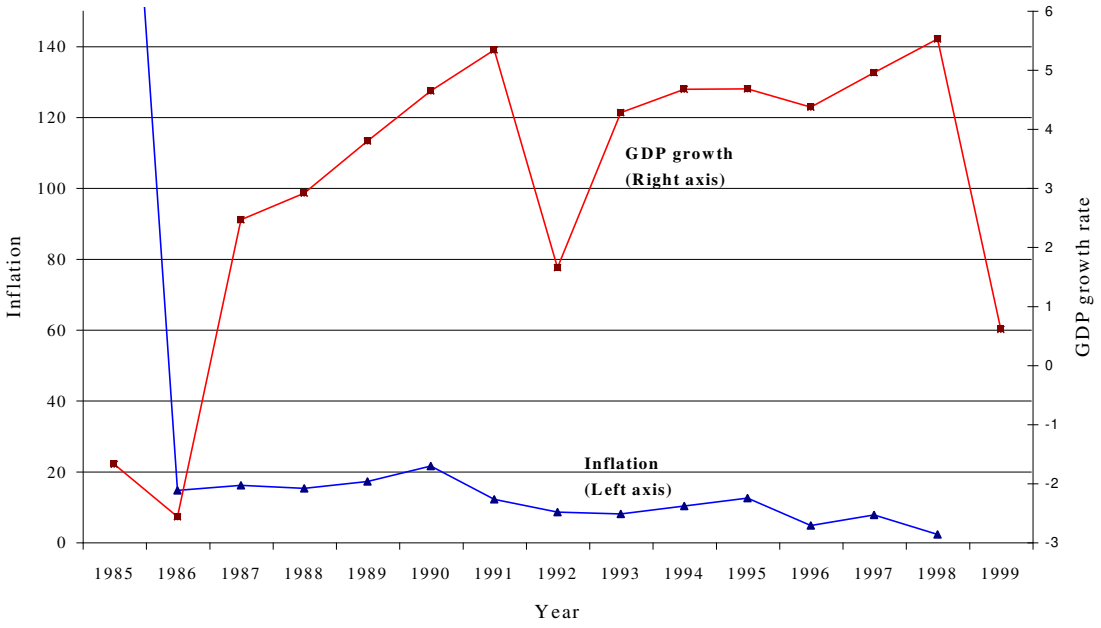
While this is a relatively optimistic prognosis as to the effects of capitalization and regulation, it seems to be consistent with the fact that while increasing criticism is aimed at economic liberalization within Bolivia, it is rarely focused on the direct consequences of utility sector reform on the poor, except maybe for some localized exceptions in the water sector.

The remainder of the paper is organized as follows. The next section provides general background on economic performance and poverty in Bolivia. Section III describes the privatization process of the mid-1990's, and section IV explores its impact on access and affordability, paying particular attention to poor households' situation. Section V explores changes in consumer welfare, and section VI reviews macroeconomic effects. Section VII discusses challenges facing the regulatory system, and section VIII concludes.

II. General background: a simple characterization of poverty

After a severe crisis that began in the late 1970's, Bolivia implemented substantial economic liberalization measures in 1985, ending hyperinflation and setting the basis for moderate but sustained growth. Figure 1, which presents basic information on inflation and economic growth during this period, illustrates this development.

Figure 1
Inflation and economic growth in Bolivia - 1985-1999



Given an annual population growth rate of about 2.3 percent, the observed economic growth rates would not be expected to make a major dent on poverty. Table 1 illustrates this point presenting basic information on its level and evolution.[2] As the table shows, the incidence of poverty is significantly greater in urban centers outside the department capitals, and in the rural area, where in 1999 it is estimated at roughly 80 percent.

Table 1
Headcount and poverty gap measures in urban Bolivia

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

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

[2] For an early assessment of how growth and changes in the income distribution affected poverty, see Urquiola (1994). For an update using more recent methodologies, see Hernany (2000).

In department capitals, where more historical evidence is available, poverty has experienced a moderate but sustained decline since 1989.[3]

Table 2 complements this information presenting the simple probabilities of being poor that are associated with given characteristics in each of the realms considered.

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

	Department capitals		Other urban		Rural	
	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
Sex:						
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 labor 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
EmployeeWhile 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: The World Bank (2000).

These cover aspects like schooling, sex, ethnicity, migration, and employment-related characteristics. The results observed are based on cross sectional variation in individuals' traits and their poverty status, so it is inappropriate to interpret them in a causal manner.

[3] As evident in figure 1, the regional slowdown induced by the Brazilian crisis was already underway in Bolivia by 1999. This may have reversed some of the poverty reductions observed in table 1.

Nevertheless, the information is illustrative as to the characteristics that are associated with being poor, and the expected ones stand out: low education, being female, indigenous, or participating in the labor market's "informal" segment.

After describing the essential features of the privatization process, the remaining sections focus on its effects on the poor. For this purpose, the analysis distinguishes between households according to which income quintile they belong to. While this provides for a richer analysis than simpler poor/non-poor distinctions, it is useful to bear in mind that as the previous tables suggest, in urban areas, poor households will generally be those in the bottom two or three quintiles.

III. Capitalization, and regulatory reform

Despite the relatively early success with liberalization illustrated in figure 1, Bolivia did not engage in sustained privatization efforts until the mid-1990's. When it finally embarked on this process, the government employed traditional procedures in some instances, but mainly relied on *capitalization* as a mechanism for the transfer of State-owned firms. This section describes how these approaches differ, provides information on the legal framework that underpinned their implementation, and briefly details the specific changes that took place in the Electricity, Natural Gas, Telecommunications, and Water and Sewerage industries.

A. Capitalization and privatization[4]

Under traditional privatization, the government transfers a majority of ownership in a State firm to the private sector, and has freedom over how to spend the proceeds. Under capitalization, the State transfers shares equivalent to 50 percent of a firm to the investor with the winning bid. It also yields about 45 percent to private pension fund administrators, so that the citizenry in general gains this portion,[5] with the remaining

[4] For more on the capitalization experience, see Baldivia (1998) and Pierce (1997).

[5] As this step suggests, a reform to the pensions system accompanied capitalization in Bolivia. The pensions fund administrators use the funds derived from this share to pay old-age benefits that complement those stemming from individual retirement accounts.

going to the company's employees. The investor gains the right to manage the firm, and commits to *investing* its capital contribution, the amount it offered for its 50 percent share, in its development. It must carry out this investment within a specified period (typically six to eight years), agree to fulfill obligations that encompass expansion and quality goals, and operate under regulation and other clauses specified in a long term contract (typically 40 years).

Under this scheme, therefore, investment is given a high priority, and the government gains no disposable income. This reflects the fact that having come relatively late in Bolivia's liberalization, capitalization was not seen as a means to cover deficits, but rather as a way to attract foreign investment and improve management in key areas of the economy. Table 3 presents a summary of the privatization and capitalization outcomes, including the firms that were created as a result of both, the financial resources they generated, and the investments actually executed.

As this table illustrates, this process raised significant amounts of capital: total commitments add up to about two billion dollars, roughly equivalent to 30 percent of GDP. As detailed below, capitalization contributed to a significant increase in investment. Additionally, several capitalized firms have exceeded their commitments ahead of schedule, while announcing ambitious investment programs for subsequent periods.

Table 3
Resources generated by privatization and capitalization

Firms created by the reform	Year	Privatization value (Millions of $us)	Capitalization value (Millions of $us)	Investment as of 06/2000 (as % of commitment)	Company / institution in charge of investment
Oil and gas					
Chaco S.A. (3)	1997		306.66	100.0	Chaco S.A.
Andina S.A. (4)	1997		264.77	154.2	Andina S.A.
Transredes S.A. (5)	1997		263.50	(1) 213.0	Transredes S.A.
EBR S.A. (6)	2000	102.00			TGN-Investment
Oil Tanking S.A. (7)	2000	12.05			TGN-Investment
Electricity					
Corani S.A. (8)	1995		58.79	86.6	Corani S.A.
Guaracachi S.A. (9)	1995		47.13	139.2	Guaracachi S.A.
Valle Hermoso S.A. (10)	1995		33.92	115.6	Valle Hermoso S.A.
TDE S.A. (11)	1997	39.90			ENDE Residual
Elfec S.A. (12)	1995	50.30			
Telecommunications					
ENTEL S.A. (13)	1995		610.00	76.9	ENTEL S.A.
Transportation					
LAB S.A. (14)	1997		47.47	(2) 100.0	LAB S.A.
FCO S.A. (15)	1996		25.85	160.6	FCO S.A.
FCA S.A. (15)	1996		13.25	103.1	FCA S.A.
Total		**204.25**	**1,671.34**		

Source: 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 favor of *Petrobras* and others; (7) Privatized in favor of *Oil Tanking*; (8) Capitalized by *Dominion Energy Inc.*; (9) Capitalized by *Energy Initiatives* Inc.; (10) Capitalized by *Constellation Energy Inc*.; (11) Privatized in favor of *Unión Fenosa*; (12) Privatized in favor of *EMEL S.A*.; (13) Capitalized by *ETI Euro Telecom N.V*.; (14) Capitalized by *VASP*; (15) Capitalized by *Cruz Blanca*.

B. Capitalization and regulation: the framework for sectoral reforms[6]

Capitalization was complemented with reforms to different sectors' industrial organization, and with the implementation of a regulatory framework that seeks to promote competition and efficiency. The main tool in this regard was the SIRESE[7] Law (1994), which created a regulatory system for the whole infrastructure sector. In essence, this legislation defines the regulatory institutional structure, including the role of five regulatory agencies (Superintendencias) for the Electricity, Telecommunications,

[6] As Table 1 reflects, capitalization has been the more important mechanism in the transfer of State assets, so that in the remainder of the paper, this term will be used to refer to privatization as well. For more on regulation and regulatory institutions in Bolivia, see Barja (2000) and SIRESE (2000).

Hydrocarbons, Potable Water, and Transportation industries. Additionally, it sets up an overseeing agency responsible for system-wide coordination, appeals and evaluation; and introduces market competition as one of the guiding principles in the infrastructure sector. Finally, it specifies procedures for appeals, hearings, and conflict resolution.

This framework is rounded out by four more specific laws: Electricity (1994), Telecommunications (1995), Hydrocarbons (1996) and Potable Water (2000). These introduce changes in each sector's industrial organization, and govern aspects related to tariff regulation, entry, service quality, and sanctions. The sectoral regulatory agencies created as part of SIRESE administer each law. The remainder of this section briefly describes the central changes this legislation led to in each of the industries cited.

Electricity

Prior to reform, the electricity industry was divided into the National Interconnected System (NIS) and other independent networks, a distinction which remains today. The first covers the largest cities, while the second concentrates on secondary urban and rural areas.[8] This paper focuses on the NIS, where the State-owned ENDE[9] participated in generation, transmission, and part of the distribution of electricity, through ELFEC, to the city of Cochabamba. COBEE[10], a private company, was active in generation and distribution in the cities of La Paz and Oruro. Other firms operating in distribution were, CRE[11] in Santa Cruz, SEPSA[12] in Potosí and CESSA[13] 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.

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[7] Sistema de Regulación Sectorial.
[8] This distinction will be used extensively. In Bolivia, the main cities are the department 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 legally independent, but physically and economically linked to La Paz), and Santa Cruz. Unlike most of its neighbors, therefore, Bolivia does not have a dominant urban center, and has one of the lowest urban concentration ratios in the region. For further discussion, see Urquiola et al. (1999).
[9] Empresa Nacional de Electricidad.
[10] Compañía Boliviana de Energía Eléctrica.
[11] Cooperativa Rural Eléctrica.
[12] Servicios Eléctricos de Potosí, a municipal company.
[13] Cooperativa Eléctrica Sucre

The Electricity Law vertically separated generation, transmission, and distribution. In generation, it promoted competition by creating the three firms cited in table 3: *Corani*, *Guaracachi* and *Valle Hermoso*, limiting the market share each can have to 35 percent of the NIS domestic market capacity. Exclusive rights were initially granted to these companies, but by 1999 entry was liberalized and *Synergia*, *Hidroeléctrica Boliviana* and *Río Eléctrico* joined the market.

In transmission, network operation was passed from ENDE to the private *Transportadora de Electricidad*, without exclusive rights. Additionally, the Electricity Law forbids the participation of transmission firms in purchase or sale activities, and establishes open access and tariff regulation.

Finally, in distribution, firms 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 resulted from the sale of COBEE's distribution facilities, with the original company remaining only in the generation business. In this realm, tariff regulation consists of several average cost caps with productivity factors, which multiplied by their respective units, add to produce total income. The productivity factors are set using a four-year lag, although tariffs are revised every semester to allow passthrough of energy costs changes. These reforms, together with the introduction of a coordination office, have created a wholesale electricity market that seeks to simulate competitive conditions.

Hydrocarbons

Prior to reform, the hydrocarbons (oil and natural gas) industry was under the control of State-owned YPFB[14], a vertically integrated monopoly involved in all aspects of the industry. Limited private participation took place through joint ventures with this company.

Since then, the priority has been to remove YPFB from production, and promote foreign investment to foster a natural gas export industry directed mainly towards southern Brazil. The State intends this industry to support the development of other

[14] Yacimientos Petrolíferos Fiscales Bolivianos.

sectors of the economy, and with this goal in mind, reforms and foreign investment have been directed towards exploration and infrastructure. The inauguration of a pipeline to Brazil in 1999 made this vision a reality. As for the domestic market, a general policy of private control of all phases up to retail commercialization was adopted.

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

In the commercialization process, YPFB's storage terminals were transferred to *Oil Tanking* as well, but other private firms are also active. Bottled liquefied gas distribution plants are all private, and about 85% of bottled gas plants continue under YPFB. Compressed natural gas service stations are all private, and about 15 percent of service stations for liquids continue under the State firm. Imports of liquids (mainly diesel) and lubricants are carried out by private firms.

Mixed businesses continue to participate in network-based natural gas distribution: SERGAS in Santa Cruz, EMCOGAS in Cochabamba, EMDIGAS in Sucre and EMTAGAS in Tarija. Despite this activity, the network-based natural gas industry is still relatively underdeveloped: by 1999 it included only about 6,000 connections.

Except for restrictions to vertical integration imposed on firms in gas pipeline transportation, the industry structure is flexible and determined by export market needs, although mergers and acquisitions are subject to approval. This has permitted PETROBRAS, in association with others, to integrate several of the phases directed to the natural gas exports to Brazil, at the same time as this company participates in refinement directed to the domestic market.

As part of the regulatory package, rate of return regulation is applied to pipeline transportation, with tariffs set to their 1997 level with a four-year regulatory lag. In natural gas network distribution, tariff regulation has not been implemented thus far.

Finally, regulation in this sector does have some particularities, since as opposed to the utilities considered in the rest of this paper, the hydrocarbons industry produces a tradable for which Bolivia is a price taker. Under policies dictating that domestic prices reflect opportunity costs, international price fluctuations affect the domestic market significantly.

Telecommunications

Prior to reforms, the telecommunications industry was divided between ENTEL,[15] which covered 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 separation until entry is liberalized, at the end of 2001. Until then, ENTEL and the cooperatives retain exclusive rights, but the cellular market was opened to competition by allowing the entry of ENTEL-Movil (a division of capitalized ENTEL).

Additionally, for the period prior to liberalization, legislation mandates tariff regulation for firms that control more than the 60 percent 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. Further, the law stipulates requirements concerning expansion, service quality, and technological modernization. These were to be reached by the year 2000, and are detailed in Table 4.

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

[15] Empresa Nacional de Telecomunicaciones, the State monopoly.

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 correction in rented circuits: 90% of failures are repaired in 24 hours and 100% in three days in rural areas.	Failure correction in rented circuits: 90% of failures are repaired in 24 hours and 90% in three days in rural areas.
Digitalization and network renovation for long distance; of secondary connections, of satellite connections; 100% of the national commutation system; installation of required connections and signaling system 7.	100% substitution of manual and analogical equipment by digital or another technology
75% completion of long distance national calls (LDN). 70% completion of long distance international calls (LDI) 80% answered calls before 10 seconds in LDN 70% answered calls in 10 seconds in LDI 1% congestion during 99% of the days of the year since 1997 99.99% of network availability for satellite services	80% of failures repaired in 24 hours in local service 30% of failures presented during the year 80% completion of local calls, 75% LDN, 70% LDI 80% complain calls answered before 10 seconds 2% congestion during 95% of the days of the year Tone in less than 5% of intents with more than 3% waiting
Rural area expansion: 100% installation of a telephone line in all communities with population greater than 350 and less than 10,000. Failure correction in rural areas: 100% of failures repaired in three days.	95% of solicitudes attended in 15 days 100% of population attended in rural areas

Source: Telecommunications Superintendence

To date, the only modification of this industrial structure has been a joint venture between COMTECO (the Cochabamba cooperative) and *Western Wireless International* for the acquisition of a PCS license. This venture created *Nuevatel*, which began its operations in December 2000. This has resulted in an intensification of competition in the mobile market. Meanwhile, incumbents and potential entrants are devoting their energies to preparing for entry liberalization and the end of exclusive rights.

Water

While the other sectors experienced capitalization and the introduction of regulation, the water industry has undergone limited changes and encountered more difficulties. The intended result in this area was the proliferation of *concessions* (as opposed to actual privatizations) for the administration of State assets. In practice, only

one municipal firm, SAMAPA (La Paz/El Alto), was transferred to the private sector in 1997, for its administration by *Aguas del Illimani.*[16]

The expectation was that within a prudent amount of time, legislation would be in place to incorporate the remaining firms into a similar model. However, the long period used for the development of the Potable Water and Sewerage Law (finally approved in 2000), together with significant failure in a second transfer of a municipal firm (SEMAPA) to *Aguas del Tunari* in Cochabamba, has slowed 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 seeks to improve internal efficiency and attain expansion and quality goals. The characteristics of the *Aguas del Illimani* contract reflect this, and the objectives established for the 1997-2001 period include: i) 100 percent access to potable water or sewerage (excluding public fountains) in the areas of Achachicala and Pampahasi, which cover the city of La Paz, ii) 82 percent access to potable water in the city of El Alto by 2001, of which 50 percent should be expansion connections, and 41% access to sewerage; and iii) compliance with the long-term expansion goals presented in Table 5.

Table 5
Expansion goals for potable water and sewage services in La Paz and El Alto[17]
(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.

[16] The main shareholder is *Lyonnaise Des Eaux*, with 35 percent.
[17] El Alto was part of the city of La Paz until the mid 80´s.

Quality norms include aspects related to the sources 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 calculated this way are designed to permit the firm to comply with its contractual obligations and the expansion goals. Although the lag promotes internal efficiency, no productivity factors where incorporated. Additionally, tariffs were set in dollar terms payable in bolivianos.[18]

Finally, the following are among the most important characteristics of the new Potable Water and Sewerage Law: i) Responsibility for the provision of these services belongs to municipal governments, but can be transferred to Water and Sewerage Providers (WSP) which can be private, municipal, or mixed firms, cooperatives, or other civil associations recognized by law; ii) The territory is divided into concessionary and non-concessionary areas. The first are financially sustainable and the service is provided only by WSP´s, the second are not and the service can be provided by a local government; iii) Tariff regulation of WSP´s establishes the use of 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.

IV. The effects on access: connection and consumption

In most countries, reforms to the utilities sector raise a number of concerns, and recently these have included the impact 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 during the period following capitalization; it then analyzes how changes in pricing policies may have affected the poor.

A. Data and coverage

The analysis is based on data from three household surveys carried out by the Instituto Nacional de Estadística (INE), as detailed in table 6. These allow study of the

[18] This clause had to be lifted in December 2000 after pressures from the inhabitants of El Alto.

1994-1999 period, during which the major capitalization and regulatory reforms took place and had their initial effects. Additionally, they make feasible simple comparisons with 1989-94, a period during which as figure 1 illustrated, the country had a similar economic performance, but none of the reforms were yet implemented.

Table 6
Household surveys used

Data set	Year collected	Coverage	Sample size (households)
Encuesta Integrada de Hogares, 1st round	1989	Department capitals[1]	3,765
Encuesta Integrada de Hogares, 7th round	1994	Department capitals[1]	6,102
Encuesta Continua de Hogares	1999	National	1,325[2]

Note: 1. Includes the country's nine department capitals (excluding Cobija) and El Alto.
2. For comparability, this sample refers only to the department capitals covered in 1989 and 1994.

A drawback with the 1989 and 1994 surveys is that they only cover the major urban areas: eight department capitals and El Alto; so that between-year comparisons focus only on these urban centers. While this certainly limits the analysis, this restriction may be appropriate to the extent that capitalization effects should be most visible in this realm. To complement this information, this section also includes rural data based on the 1999 survey, as well as results from other studies. A final drawback is that the (relevant) sample size for the1999 survey is considerably smaller than the other two; this may explain some slightly anomalous results, as described below.

B. Changes in connection rates

In considering connection rates, this section focuses on access to electricity, telephone, and water and sewerage services. Gas is ignored for three reasons. First, In most cities, gas for domestic consumption is distributed in liquefied, "bottled" form. Thus, its use does not imply connection to a network, but rather reflects households' (potentially temporary) decision to use this fuel. Secondly, even in places where network distribution does take place, its coverage is too small to be reliably captured using household surveys. Finally, the emphasis of the capitalization processes in natural gas has been expanding exports rather than enhancing domestic distribution.

With this caveat, table 7 illustrates the aggregate facts on the evolution of connection to basic services in the larger cities. The precise survey questions used to construct these connection rates are featured in the appendix. In this regard, electricity and telephone are the simplest cases, as they are based on the household's straightforward declaration as to whether it has each service. Sewerage is considered available only if the household's dwelling is connected to the network.

Finally, we include two definitions in the case of water. In the first case, the household is considered connected if it declares it has a pipe connection either within its dwelling *or* in the building its dwelling is a part of. In the second case, only the households in the first category are considered connected. As evident, the difference between these 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 definition (2). In part, these differences in improvement rates may reflect that the wording of the questions used to prepare definition (2) has changed somewhat between surveys. Additionally, accuracy in the case of criterion (2) 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, in the remainder we focus only on definition (1), but note it may overstate coverage levels.

Table 7
Departmental capitals and El Alto:
Percentage of households connected to basic services, 1994-1999

Service	Percentage of households with access		
	1994 (a)	1999 (b)	% 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 using the surveys listed in table 6.
Note: The precise questions used to determine access definitions are detailed in the appendix.

Table 7 illustrates that, as might be expected in light of the investment record, basic access increased for all services considered. Furthermore, for those with initially

lower coverage, sewerage, water, and particularly telephone, the increases have been significant. Importantly, the observed expansions took place in the context of one of the more rapid urbanization processes in Latin America.[19] This puts pressure on cities' infrastructure because of the inflow of rural migrants who, on average, have lower incomes than urban residents. In other words, in the absence of adequate investment, coverage rates would have probably declined during these years.

C. Are these changes actually due to utility sector reforms?

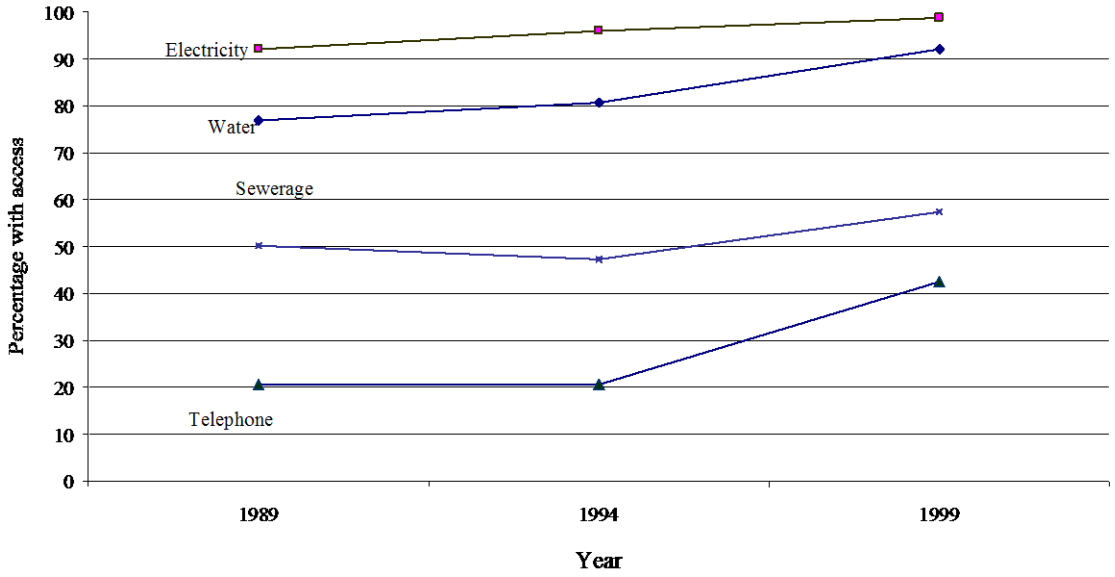
While table 7 suggests that the reforms described in section III have been associated with an expansion in access, it does not necessarily imply that these *caused* this phenomenon. Indeed, other factors such as income growth or technological change might have resulted in connection improvements even in the absence of any liberalization.

In a strict sense, it is impossible to isolate the effects these measures had, since no perfect counterfactual is available to assess *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 the reform "treatment"; in its absence, simple conclusions are not feasible. Nonetheless, one can attempt to circumvent this problem by comparing "treatment" and "control" sectors or periods. This section presents two exercises that attempt this.

A first possibility is to observe the changes in access prior to the reform period, comparing them to those that occurred thereafter. To implement this, figure 2 displays access rates for 1989, 1994, and 1999 for each of the sectors considered.[20] In this case, the 1989-94 period serves as "control" for the 1994-99 capitalization years. This comparison is enhanced because as suggested by figure 1, relatively low inflation, moderate growth, and relative political stability prevailed during both periods.

[19] Between the 1976 and 1992 censuses, the urbanization rate increased from 42 to 58 percent.
[20] The 1989 survey does not contain a direct question on telephone access, so households were considered connected when they declared positive expenditures on telephone service. Using the same approach in subsequent years does not qualitatively affect the conclusions that flow from Figure 1.

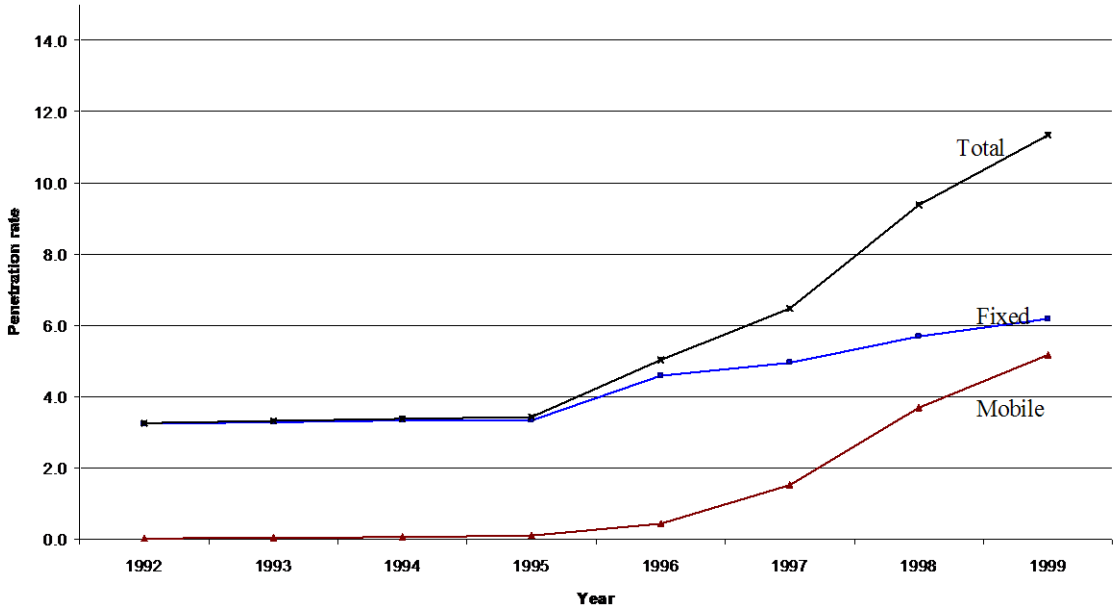
Figure 2
Department capitals: percentage of households with access to basic services, 1989-1999



This simple evidence is generally suggestive of a positive effect in the cases of sewerage, telephone, and water services. The access rates in these sectors were either "flat" or decreasing between 1989 and 1994, but display significant increases after this last year. In the case of electricity, in contrast, the entire 1989-99 period suggests gradual growth in access rates, with no particular acceleration taking place during the second phase. In fact, figure 2 may actually underestimate a "capitalization effect". This is because while the legal reforms underpinning capitalization began to take effect in 1994 and 1995, the actual investments, depending on the specific sector, did not start until 1996, 1997, or even 1998, as suggested in table 3.

In the case of telephone service, these issues are observed using conventional penetration data, as presented in figure 3. This allows, further, a distinction between fixed line and cellular connections, which is not possible with the household survey data. This figure also displays stagnant performance early on, with a break in 1995/1996. From this year on, mobile telephone coverage has increased rapidly, and although fixed connections have been less dynamic, the overall penetration rate essentially tripled in four years.

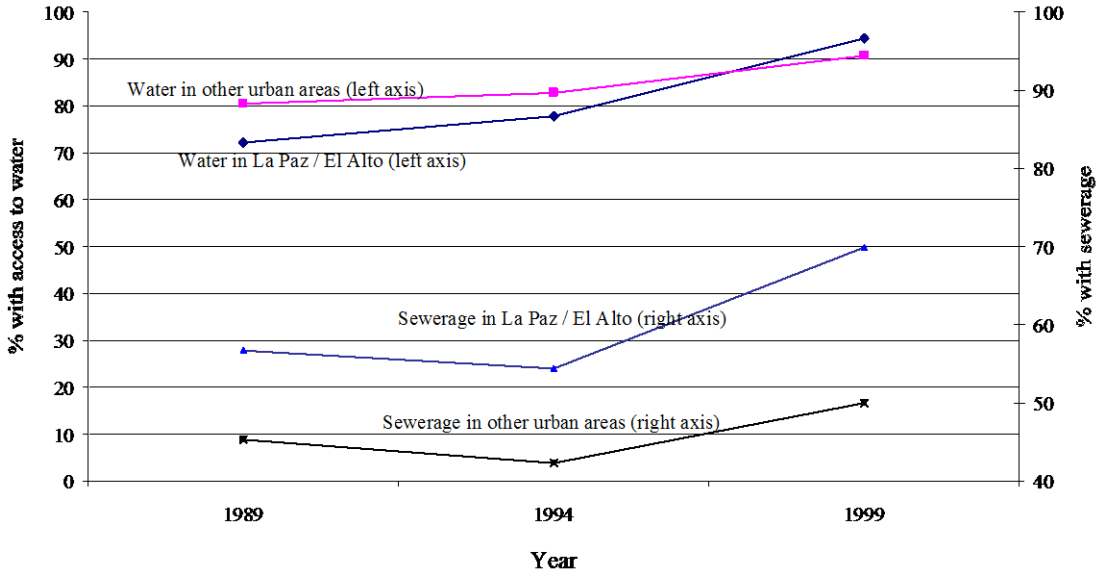
Figure 3
National telephone penetration rates, 1992-1999



It bears repeating that the effects observed cannot be attributed only to capitalization. As described in section III, other relevant changes include the implementation of regulation in all these sectors, but also other liberalizations like the introduction of competition in cellular (in relation to figure 3), and concessions in the case of water and sewerage. Some of these factors are discussed further in the next section.

Meanwhile, another way to attempt to isolate these reforms' impact is to compare cities in which they would be expected to have more consequences with those in which they might have had less of an effect. In the case of water and sewerage services, La Paz/El Alto was the only city with a sustained concession. Figure 4 presents the evidence on this case, where the expectation would be that increases in access would be larger in these than in other urban centers.

Figure 4
Water and sewerage: evolution of access rates in La Paz / El Alto and other urban areas, 1989-1999



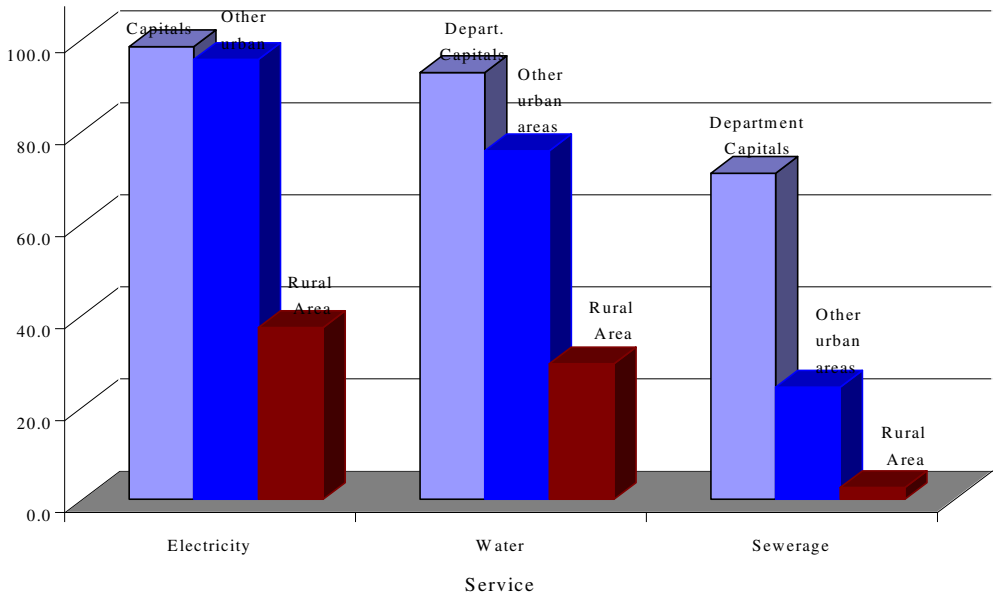
In both cases, there are no major differences between the evolution of La Paz / El Alto and other urban areas. For water, coverage in these areas appears to have converged over this period, and in some cases differences are not statistically significant. In the case of sewerage, after 1994 coverage appears to have risen somewhat faster in La Paz / El Alto than in all other major urban areas (taken together). 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 centers is not always clear, and is omitted here for reasons of space.

In the end, none of these comparisons is conclusive, since in all cases it is simple to think of concurrent events or trends that might confuse the interpretation. Nevertheless, taken together and combined with the investment levels cited, they lend support to the widespread perception that the capitalization processes did contribute to an expansion of access to basic services.

Before moving to whether these changes bypassed the poor, it is relevant to note that the information presented gives a relatively optimistic picture of connection rates in

Bolivia. To a large extent, this reflects that due to data limitations, the analysis concentrates only on department capitals.[21] This overstates national welfare levels because other urban areas, and the rural area in general, display lower connection rates. This is illustrated in figure 5, which shows access rates in departmental capitals, other

Figure 5
Percentage of households with access to basic services in the department capitals, other urban centers, and the rural area



urban areas, and rural locations. The significant differences between areas reflect, among other factors, substantial variation in income levels and population densities.

D. Did the expansion in access bypass or benefit the poor?

The aggregate changes reviewed thus far are consistent with a number of scenarios as to the *distribution* of the gains depicted. Specifically, they are not informative as to what changes in access poor households experienced. As stated above, the capitalization reforms have mainly affected the department capitals. This fact, combined with the information contained in table 1 suggests that a first approximation

[21] It is also possible that household could be overstating their welfare in this dimension. As long as such misrepresentation is consistent from period to period, however, it should not affect any conclusions based

answer to the question "have these expansions bypassed the poor?" is simply, "yes". This is a consequence of two facts: capitalization had relatively few effects on the rural area, and clearly a majority of the poor population is concentrated there.

Ajwad and Wodon (2000) make this point indirectly and formally, by studying to what extent poor *municipalities* (of which there are roughly 300 in total) benefit from expansions in education, health or infrastructure services. They conclude that in sewerage, electricity, and phone connections, the *non*-poor clearly benefit more, water being the only exception. In short, if the entire capitalization process did lead to some increase in access rates, it is unlikely to have been particularly beneficial to the poor, at least from a national perspective.

Nevertheless, it is still relevant to explore whether access expansions bypassed the poor in the urban area, since that would seem the real (and perhaps more reasonable) test as to the equity side of the capitalization process (as opposed to more general infrastructure investment). Furthermore, the low coverage rates in the rural areas reflect inequity but also economic rationality: providing these services can be extremely expensive when population density is below some threshold level. To this end, the following figures compare how households have fared according to the (department capital) quintiles to which they belong, where these are calculated using households per capita *labor* income.[22]. It might well have been desirable to construct these quintiles using consumption or a more complete definition of income, for instance, one that included transfers and asset-related payments. This was not done mainly because the questions necessary to construct such measures change between the different surveys considered.

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on the trends.

[22] It might be desirable to construct these quintiles using consumption or a more complete definition of income, for instance, one that included transfers and asset-related payments. This was not done mainly because the questions necessary to construct such measures change between the different surveys considered.

Figure 6
Department capitals: Percentage of households with access to electricity, by income quantile: 1989-1999

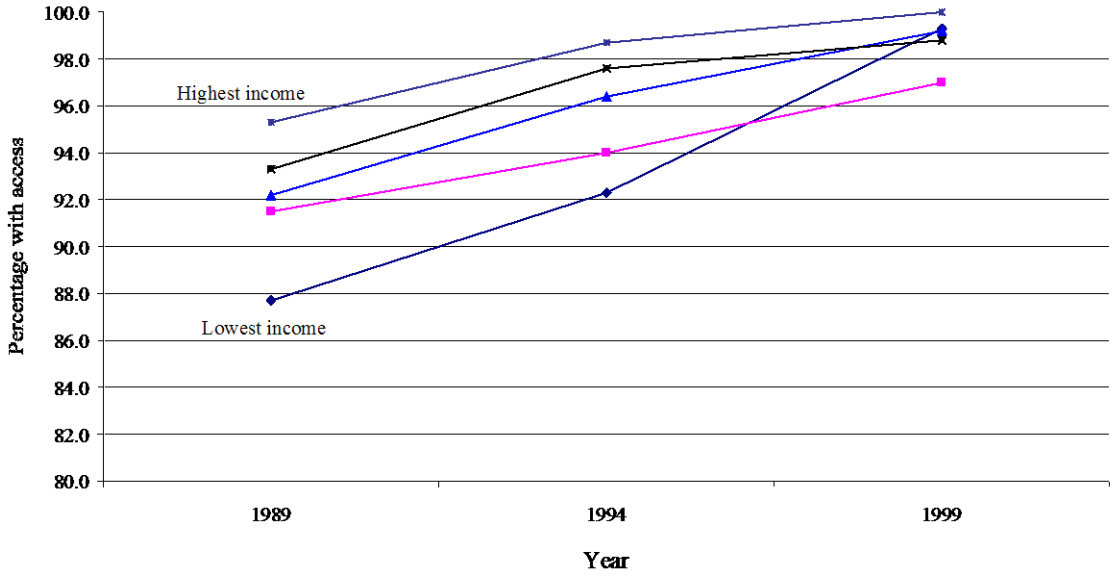


Figure 6 starts with the case of electricity, which has been the sector with the smallest improvements in access, partially reflecting relatively favorable initial conditions. The figure displays a clear "convergence": the quintiles with the lowest access levels in 1989 have been those with the greatest increases during 1989-99, an observation which also holds for the 1994-99 time frame. While in 1989 households in the lowest quintile had an access rate of only 86 percent, by 1994 all five had rates exceeding 95 percent. It is surprising that by 1999 the lowest income group seems in fact to have surpassed all but the richest. In part, this may reflect sampling issues, since when all groups have high and similar access rates, these differences can cease to be statistically significant; additionally, 1999 is the year with the smallest sample.

Taking a similar approach, figure 7 reviews the urban areas' experience with telephone access. The evolution here has been somewhat different from that observed in the case of electricity. As reviewed earlier, between 1989 and 1994 (the pre-capitalization period) access rates were essentially flat. Figure 7 reveals that this aggregate behavior in fact hides an increase in access for the highest income quintiles,

and *declines* in connection for the lower income households, where once again, this could reflect that many rural migrants enter the cities at the bottom of the income distribution.

Figure 7
Department capitals: percentage of households that have access to telephone services, by income quintile: 1989-1999

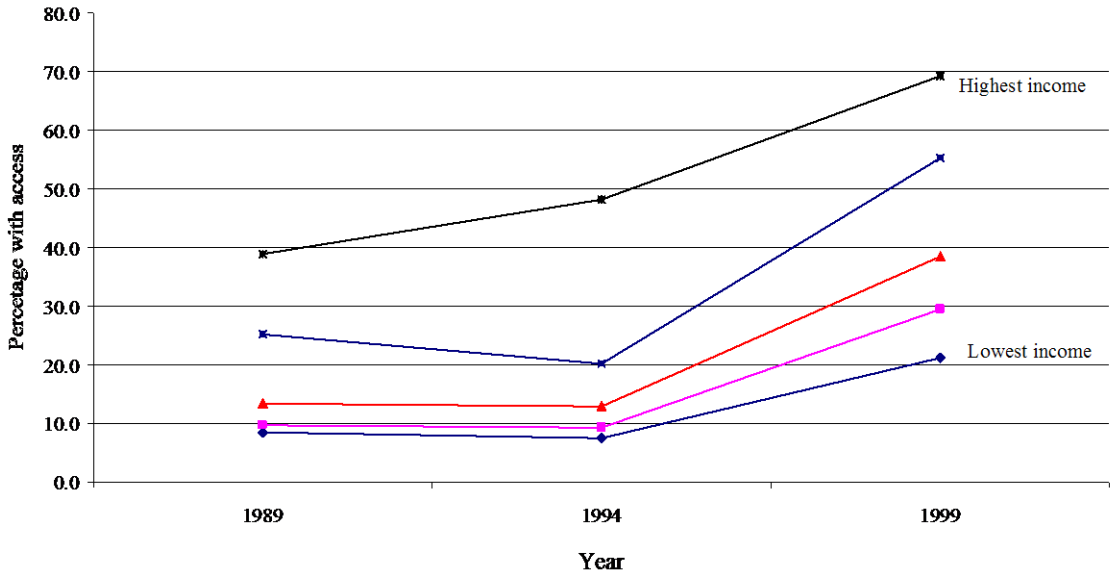


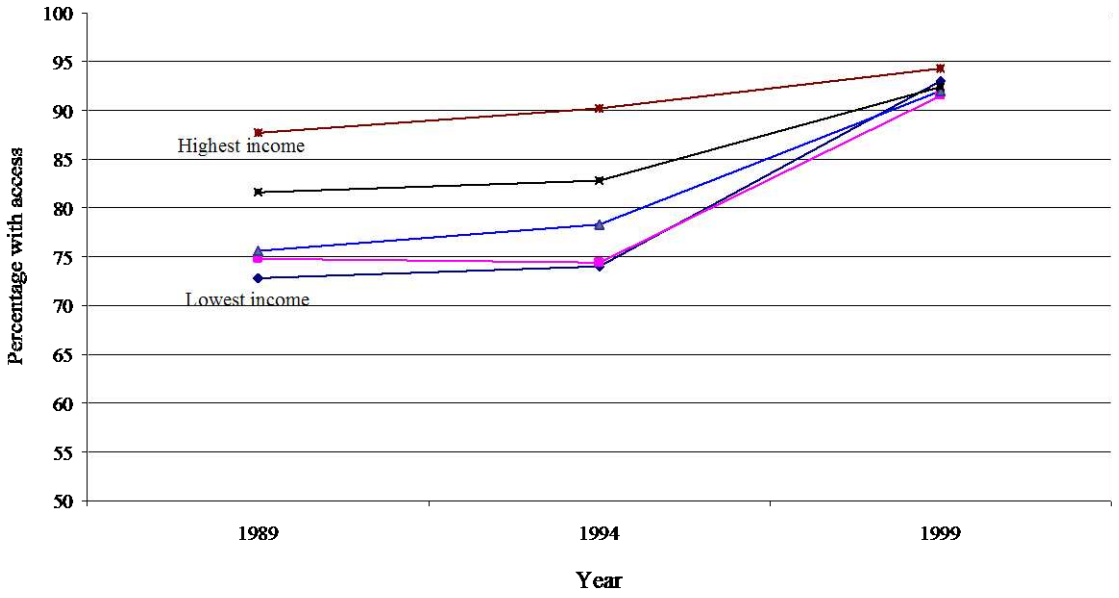
Figure 7 also shows, however, that these trends changed significantly after capitalization. Namely, between 1994 and 1999 access rates increased significantly for all income groups. The relative gap between the two or three bottom quintiles and the richest has decreased, even if the absolute difference in percentage points has remained fairly constant. In short, this simple evidence suggests that in the case of telephone access, liberalization has not merely included the poor, but may have actually reversed trends that were detrimental to them.

Moving onto the case of water, figure 8 shows an evolution not unlike that displayed by telephone services. Once again, access rates are relatively stable in the control period, but increase between 1994 and 1999. The "convergence" in connection rates is more marked: by 1999 households in all quintiles have access rates above 90 percent, and the differences between them are often not statistically significant.[23] It bears

[23] It might seem surprising that access rates are not closer to 100 percent for the top quintiles. While this may reflect data problems, there are "good" reasons for it. In the largest cities, for instance, high income

repeating that while these connection rates may seem rather high, this in part reflects the definition of access used, as detailed in the discussion surrounding table 7.

Figure 8
Departmental capitals: percentage of households with access to water services by income quintile: 1989-1999



Finally, figure 9 shows the evolution of access to sewerage. In this case the information is less consistent. A surprising observation is that some surveys suggest that the situation of the lowest income quintile is better than that displayed by quintile 2 or even 3. This may reflect measurement problems, and results in this realm must be viewed with caution.

To summarize, despite data limitations, the household survey data suggests that the capitalization/regulation reforms, to the extent that they caused increases in connection rates, have not bypassed poor households, and have in some cases tended to benefit poor households disproportionately. This has been particularly the case for phone services, where competition has made this service much more accessible, and reversed trends of increasing inequality.

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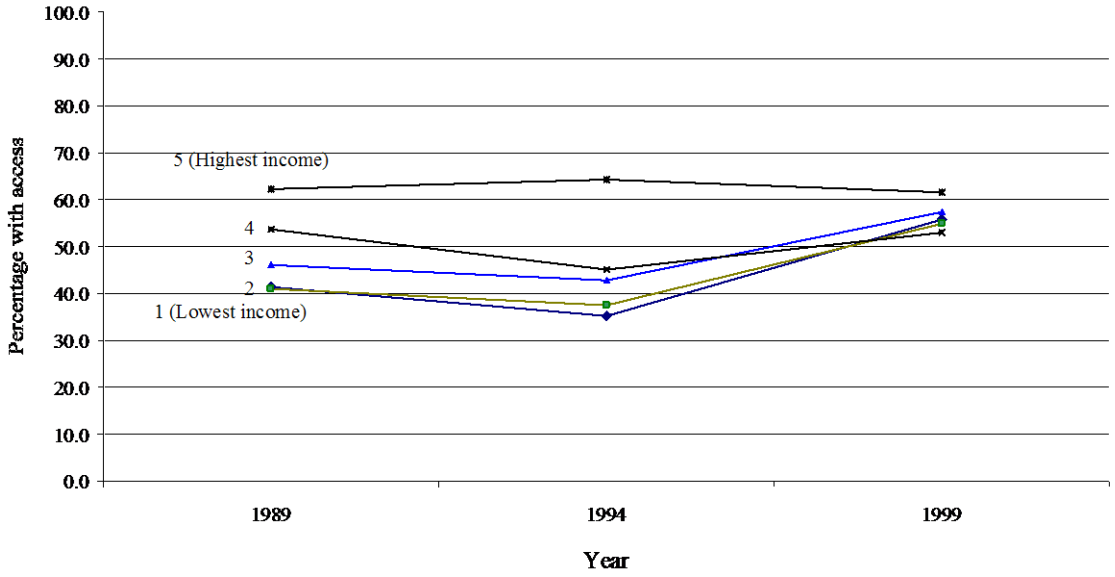
developments are sometimes built outside the reach of water networks. These households use truck-delivered water, and despite having all the standard facilities, will not be counted as connected.

Figure 9
Departmental capitals: percentage of households with access to sewerage by income quintiles: 1989-1999



E. Access as affordability: prices and expenditure

The previous section has concentrated on access as connection. As Foster (1999) and Waddams Price and Hancock (1998) review, however, there are a number of other price-related channels through which a process like capitalization could have adversely affected the poor. These include that as a consequence of such reforms:

1) *Average tariff levels can increase* due to cost recovery requirements and the need to finance quality improvements. This section shows that while average prices increased in some sectors, changes were generally not dramatic. In part, this reflects that because capitalization was not a means to raise deficit finance, there were fewer incentives for the State to build high tariffs into privatization. The concurrent implementation of a regulatory framework, and the promotion of competition may have also helped to keep price increases in check.

2) *Tariff structures may be readjusted as direct or cross-subsidies disappear*, either as an explicit policy or as a consequence of market forces. Waddams Price and Hancock (1998) empirically illustrate this for the United Kingdom. Although the data

below suggest some rebalancing did take place, there are reasons to believe that in Bolivia, the incentives to rebalance were not as strong. First, some firms affected by the reforms were private already (e.g. COBEE in electricity). Second, where they were not private, utilities often functioned as cooperatives. While these are not typical firms, they do not have the same distributional goals as State enterprises, so these were not there to "abandon" after the reforms. Finally, the vertical separation that some industries displayed before privatization may have meant that cross subsidies were less prevalent than in other countries. For instance, it is not uncommon for high long distance rates to subsidize low local charges. In Bolivia, the long distance state provider, ENTEL, was always separate from the local cooperatives

3) *As the industry becomes more "formal", 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.

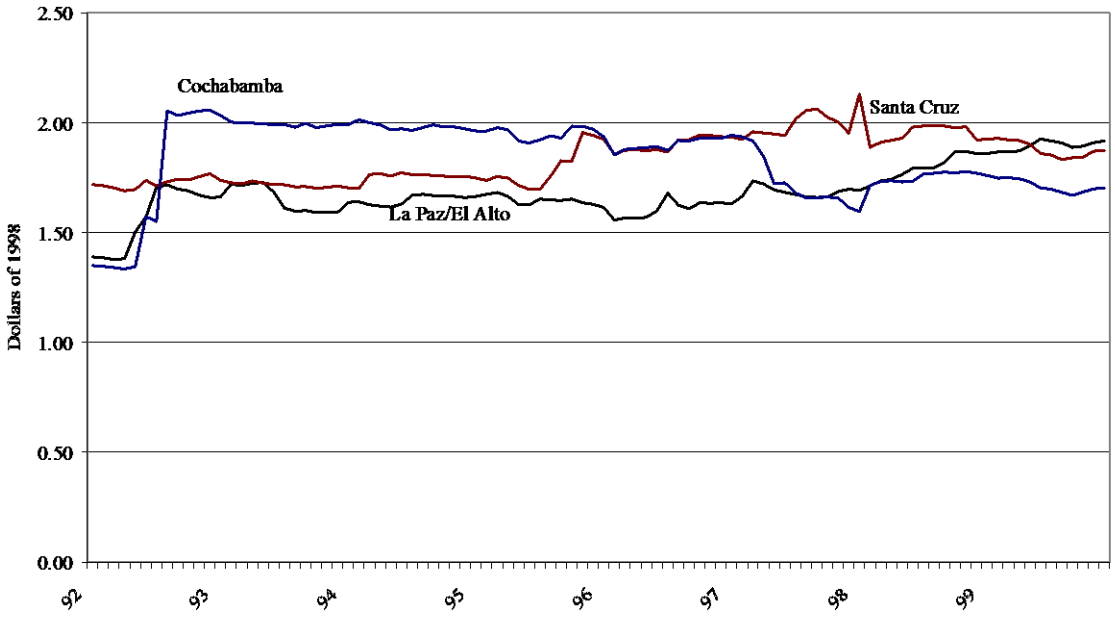
4) *Privatization may affect the availability and prices of substitutes or complements*.

Making an effort to deal with significant data limitations, this section looks at these issues in the case of electricity, water, and telephone services.

Electricity

Figure 10 presents the evolution of minimum electricity tariffs, up to 20 Kwh/month, in the three largest cities (for completeness, it includes data from 1992, while the reforms commenced in 1994). Although these are not average tariffs, they are likely to be most relevant for poor households. As evident, rates in Cochabamba have decreased by about 14 percent since capitalization. In contrast, prices have gone up by 15 percent in Santa Cruz, and by roughly 7 in La Paz/El Alto.

Figure 10
Tariffs for 0 - 20 Kwh in the central axis cities, 1992-1999



Regarding rebalancing, distribution is still carried out by local monopolies that may experience fewer pressures to engage in this behavior. To explore this issue and provide further evidence on average prices, table 8 shows the *mean* tariffs in cents per Kwh for the three largest distributors, distinguishing according to the type of customer. As the table shows, both the pre and post capitalization periods have been characterized by overall real price increases for the residential sector. Nevertheless, this trend seems to be reversing, with price decreases (or zero increases) visible in Cochabamba and Santa Cruz by 1998, a behavior consistent with that displayed by minimum prices in figure 10.

The last six columns explore the issue of rebalancing. Although the classification of customers varies between cities, the data suggest the residential sector has seen greater increases, but the differences do not always go in this direction and generally do not seem large.

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

Year	Tariff rates			Percentage change in the residential sector			Percentage change in all sectors		
	Electropaz (La Paz / El Alto)	**Elfec** (Cbba.)	**CRE** (Santa Cruz)	**Electropaz**	**Elfec**	**CRE**	**Electropaz**	**Elfec**	**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

Water

As stated, in the case of water "privatization" was really a concession, and only affected La Paz/El Alto. Up to 1996, the state-owned SAMAPA operated with a complicated tariff structure that contained more than 150 categories, 15 for metered customers and 135 for the rest. Under this arrangement, consumers were not charged for the first $10m^3$, and a study from the time suggests the mean tariff was approximately \$US $0.32/m^3$.

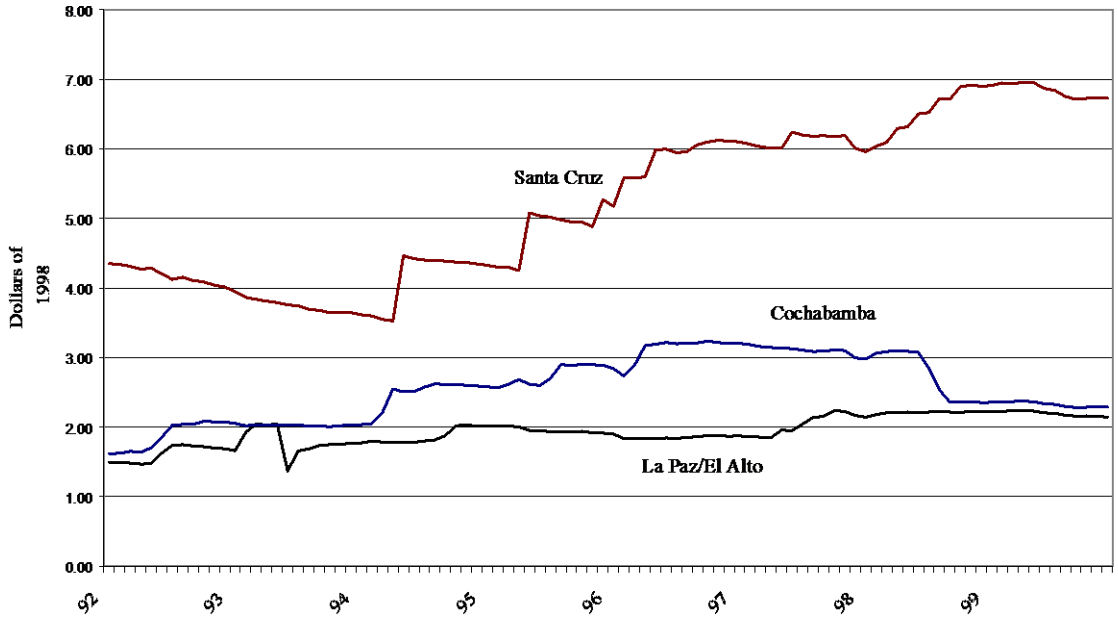
In December of 1996, the National Council of Tariffs voted to amend and simplify this arrangement. This policy was intended to become effective on December 1996, but in practice was implemented by *Aguas del Illimani* in May, 1997, along with a 19 percent increase it was granted upon taking over. The prevailing tariff structure is displayed in table 9.

Table 9
Tariff structures for SAMAPA and Aguas del Illimani

Type of consumer (m^3 / month)			Tariff (\$US/m^3)		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

While this arrangement is relatively progressive, clearly the customers that benefited from the "free" 10m^3 would have been hurt. Nevertheless, cross subsidies persist, and while the concession did result in higher tariffs, the increases are smaller than those in Santa Cruz, where no such reform took place. This is illustrated in figure 11.[24]

Figure 11
Water tariffs for 10 m3 in the central axis cities, 1992-1999



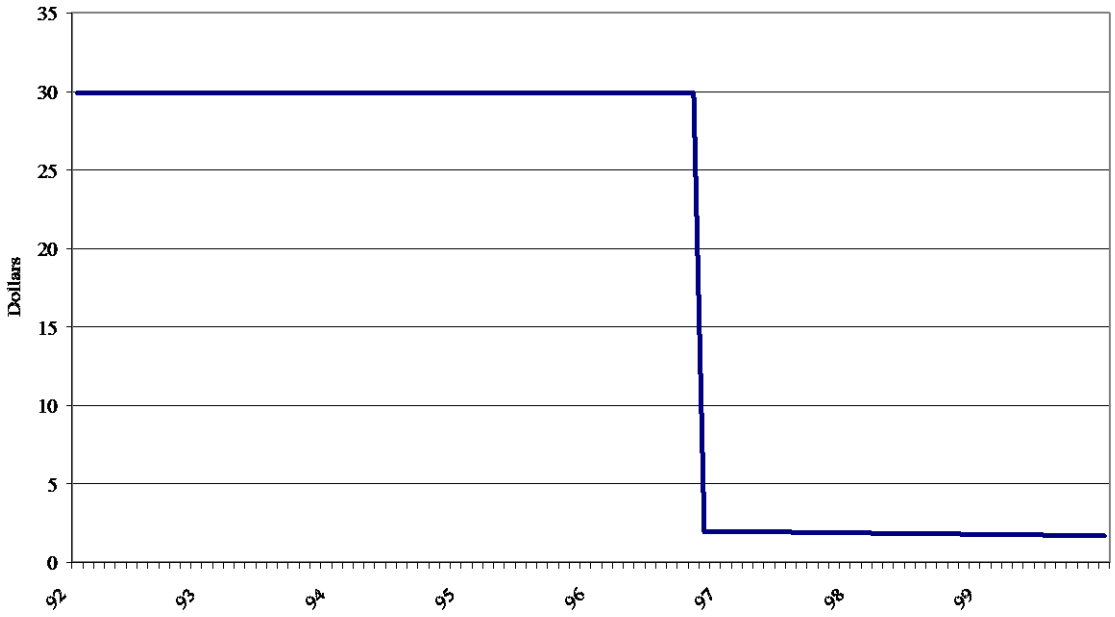
Telephone services

As indicated above, coverage expansions have been greatest in the case of telephones, so one might expect significant price reductions in this case. These partially reflect technological innovation and the effects of competition, which as in other countries seems to have allowed privatization to create rather than destroy service alternatives. In Bolivia, this happened because prior to reform *Telecel* had a (private) monopoly in cellular services, and there is evidence that it priced accordingly. Figures 12 and 13 show the dollar price for the standard service offered from the early 1990's to

[24] 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.

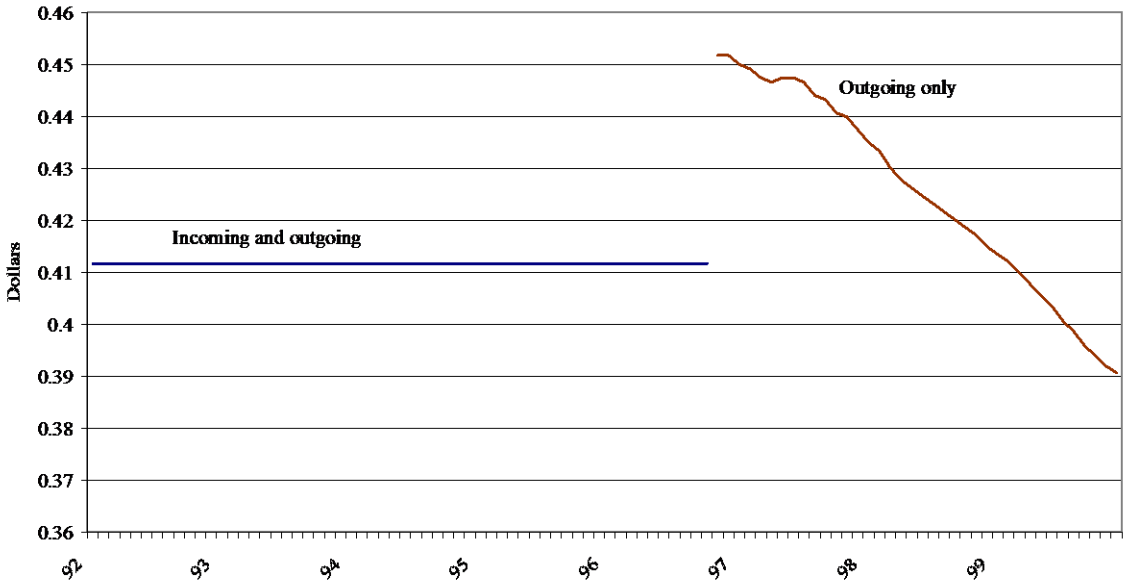
October 1996. The fixed monthly tariff of 29.9 dollars did not include free minutes, and the tariff per minute was 0.41, covering both incoming and outgoing calls. Additionally, Telecel charged 417 dollars for the initial connection. The entrance of capitalized ENTEL's subsidiary ENTEL-Movil, permitted the reductions observed. Competition was so effective that although the regulator set a price cap of $US 180 for access and $US 51 for use, both firms began charging average rates that were roughly five percent of this level.

Figure 12
Minimum fixed monthly tariff with no free minutes in cellular telephony



Figures 12 and 13 are based on ENTEL's "Family Plan" and *Telecel's* "Economy Plan". Under these connection fees for digital lines are free, the monthly fixed tariff without free minutes dropped to 1.93 dollars in November 1996, and the tariff per minute increased to 0.45. While in the first period tariffs where set in dollars, in the second period they were set in bolivianos, becoming subject to currency depreciation. By December 1999, the dollar value of the fixed tariff dropped to 1.67 and of the per minute tariff dropped to 0.39. Simultaneously, both ENTEL and *Telecel* introduced a variety of other plans and prepayment mechanisms, with the latter contributing to further penetration.

Figure 13
Minimum tariff per minute in cellular telephony



These price reductions, combined with the availability of low cost cellular phones dramatically lowered access prices, particularly compared to the historical performance of the local telephone cooperatives, which charge prices in excess 1,000 dollars for a fixed connection/share. As all these markets will be liberalized in 2001, and as the first PCS operator entered the market at the end of 2000, these trends are expected to continue if not intensify.

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

Table 10
Expenditures on basic services by income quintiles, 1994-1999

	1994 expenditure (dollars)			1999 expenditure (dollars)			1994-1999 (% change)		
	Water	**Elec.**	**Teleph.**	**Water**	**Elec.**	**Teleph.**	**Water**	**Elec.**	**Teleph.**
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.

V. The distributional impact of tariff structure changes

As suggested earlier, price changes may have affected different income groups differentially. Unfortunately, data limitations make getting a handle on this issue difficult in Bolivia. As Estache et al. (2000) point out, 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 which are not connected or are informally connected.

Unfortunately, these requirements are not met with the surveys at hand, which have several of the disadvantages discussed by Gomez-Lobo, Foster, and Halpern (1999). The central problem is that they do not record the *quantity* of electricity, water, or telephone services consumed. Specifically, in the cases of electricity and water, assessing the effects of price changes, as Waddams Price and Hancock (1998) do for the UK, would require knowledge of which tariff rate each household paid each year. This is difficult to determine without knowledge of the quantities consumed, particularly with the sometimes intricate tariff structures prevalent before reform. In the case of telephone services, this issue is even more severe, since it is impossible to differentiate between expenditures on fixed line and mobile phone services.

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

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

where ΔW 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 $p_2 > p_1$).

A limitation is that this methodology does not take into account changes in access, and while this may well not be a problem for the UK, it clearly matters in Bolivia. As a result, for the Bolivian case x^* is average consumption between x_1 and x_2, which biases the measure of welfare change. Additionally, lack of information on average prices and use of available minimum tariffs instead may cause an underestimate. Given these restrictions, the results must be taken as an approximation, but hopefully remain informative as to the distribution of welfare changes over quintiles and regions.[25]

Table 11 shows that in general, larger absolute losses are observed in Santa Cruz, while Cochabamba presents some welfare gains. From a distributional perspective, the absolute losses of the richest quintile are roughly two or three times that of the poorest. As the last row which describes relative average incomes makes clear, the impact *relative to household income* was clearly more adverse for poorer households, and the reforms appear regressive in this sense.

[25] There are methodologies to correct for the bias this may cause, see for instance Wollack (1996). However, some of the data requirements they pose also created problems in the Bolivian context. Instead of going down a path of ever more complicated assumptions, we decided to stay with the simpler results and advice they be interpreted with caution. In any case and as should be clear from the earlier sections, access rather than price changes are the main story in Bolivia.

Table 11
Average monthly variation of consumer surplus quintiles, 1994-1999
(in Dollars)

Location	Total	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
LaPaz/ElAlto-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 to that of quintile 1	443	100	212	303	497	1104

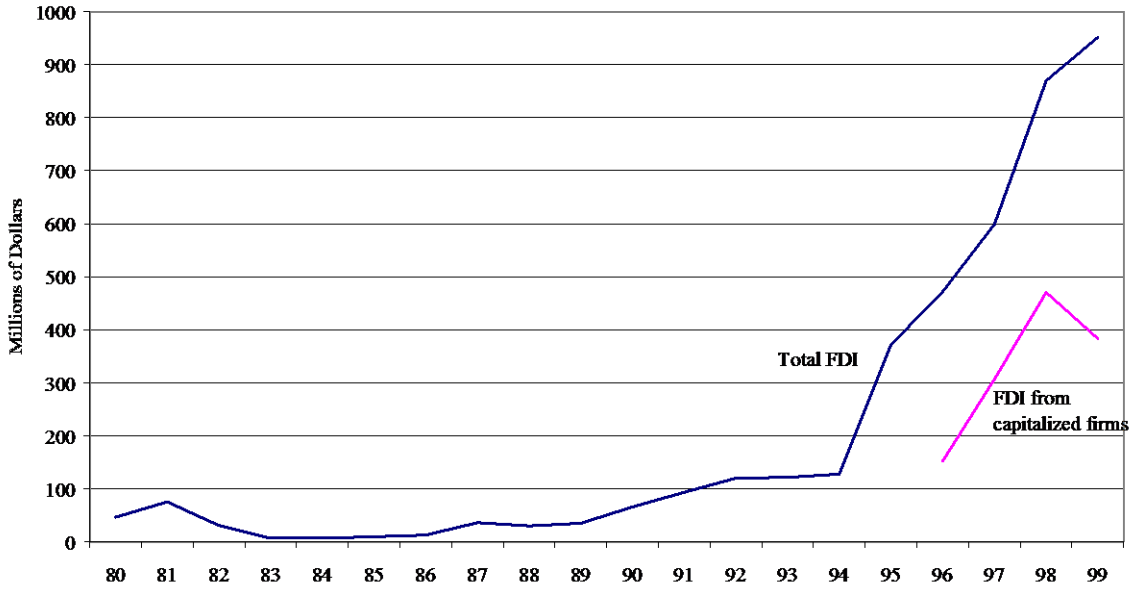
Source: Authors' calculations.

VI. Macroeconomic impact

Moving beyond the direct effects on consumers, it is relevant to note capitalization also had significant impacts on macroeconomic variables, and is part of a broader transformation in the Bolivian economy. The most visible is the increase in foreign direct investment (FDI) since 1994, partly explained by the capitalized firms' activities, as shown in figure 14. In the external sector, this had the effect of strengthening the balance of payments accounts and enhancing their sustainability. The resilience of total FDI to the downturn that began in 1999 (see figure 1) is an important factor in explaining why the recession in Bolivia was less severe than that in some neighboring countries.[26]

[26] Preliminary data suggests GDP growth began a slow recovery in the year 2000.

Figure 14
FDI registered in the Balance of Payments



In the national accounts FDI helped raised investment from 13.5 percent of GDP in 1994 to 19.8 in 1999 (see Figure 15). This investment concentrated in several sectors: oil and natural gas, electricity, bottled gas and oil derivatives, telecommunications and transportation. As one would expect, these sectors gained importance relative to more "traditional" activities like mining.

Furthermore, the decision to capitalize State firms was considered a "second generation" part of the reforms initiated in 1985, with the usual objective of leaving the private sector in charge of 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 decentralization and greater local participation.

Figure 15
Main macroeconomic variables as percent of GDP

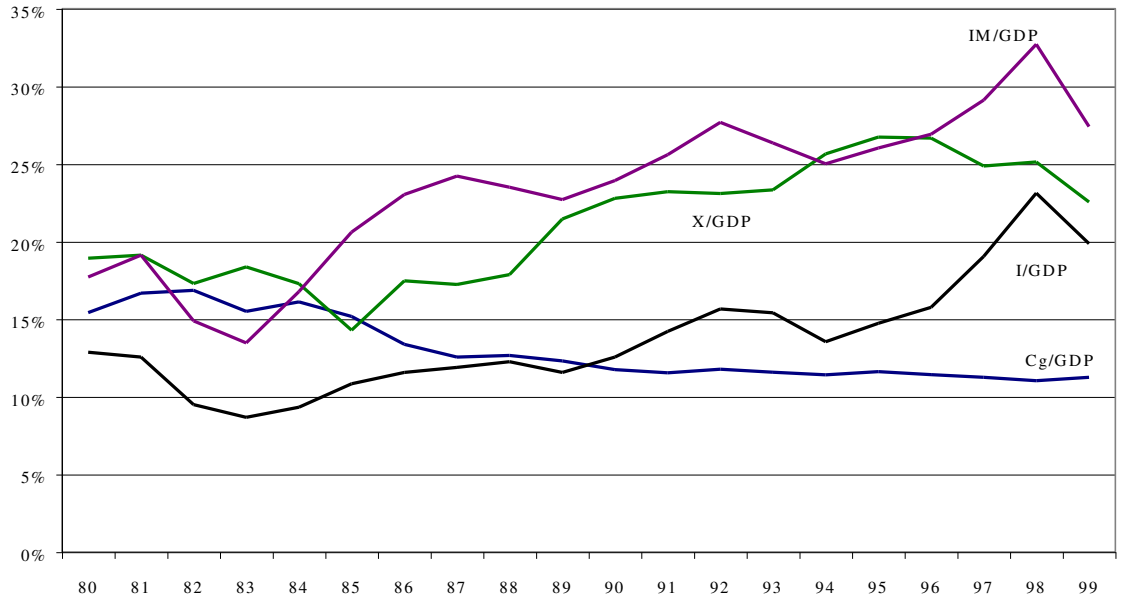
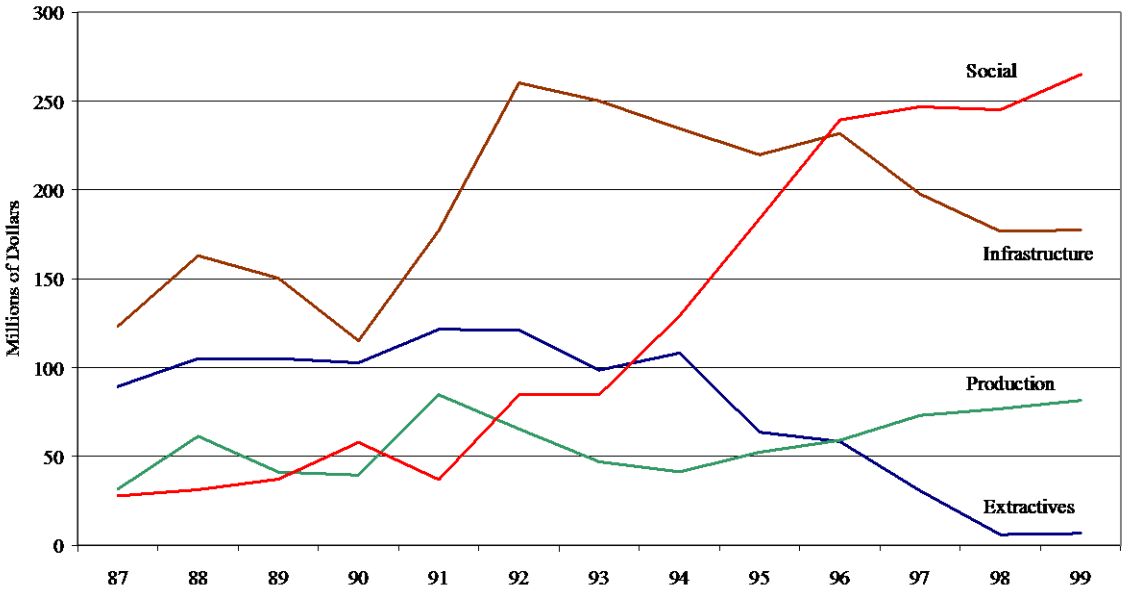


Figure 16 shows how the composition of public investment gradually came to reflect these priorities. Although total investment increased by only 3.4 percent, the social sectors' participation went up from 25 percent in 1994 to 50 in 1999. Investment in production also increased from 8.1 to 15.4 percent, largely greater support of the agricultural sector. However, investment in production of extractives decreased from 21.1 percent in 1994 to 1.3 in 1999, mainly due to withdrawal from hydrocarbons production. The decline in infrastructure from 45.7 to 33.5 percent partially reflects withdrawal from the electricity, telecommunications, and transportation sectors. At the same time, there was a sustained decrease of government's participation in GDP.

Figure 16
Structure of goverment investment



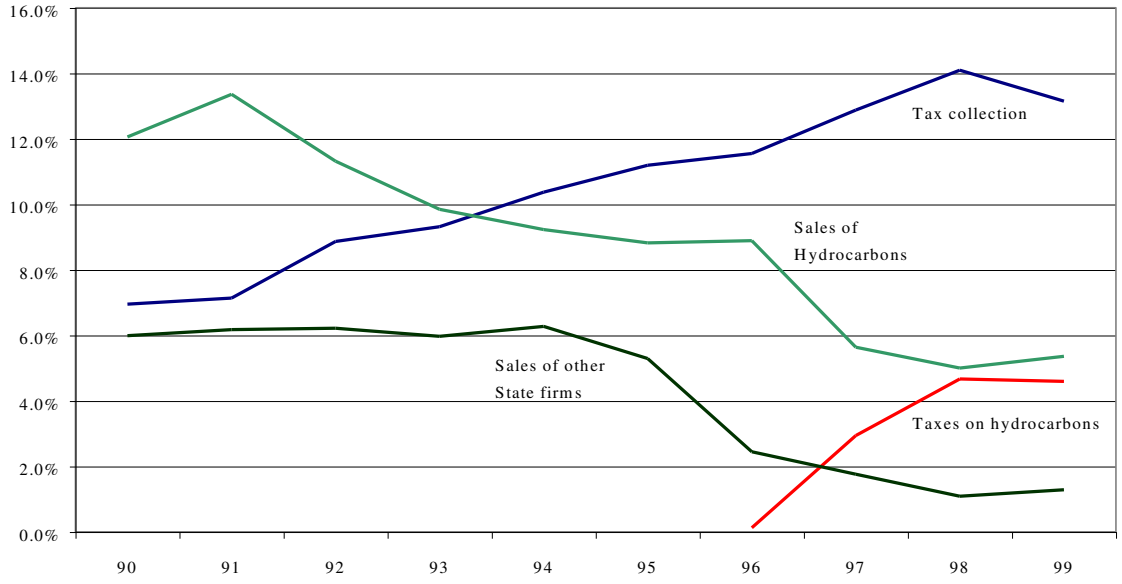
Capitalization also had an impact on the government's budget deficit. While in 1990 the (before pensions) deficit was 4.4 percent of GDP, by 1994 it decreased to 1.8 and by 1999 the government experienced a surplus of 0.2%. A first increase in government income in 1994 and a second increase in 1998 contributed in closing the gap. However, due to pension reform the budget deficit increased again from 1997 on, reaching 3.9% of GDP in 1999.

Figure 17 shows that the increase in government income occurred mainly in tax collection and due to a new hydrocarbons tax, while income from the sales of hydrocarbons and its derivatives and sales from other government firms decreased substantially from 1995 on, due to reform. Additionally, the regulated sectors (crude oil, natural gas, oil derivatives, electricity, bottled gas, communications and transportation) became first in tax contributions after 1995.

To summarize, the capitalization reforms were part of a broader restructuring of the economy that in all likelihood had multiple indirect effects on poor households. One highlight in this process is the increased importance of the social components in public expenditure, as aspect it seems to have helped bring about. In the long run, this might be

more beneficial to the poor than continued investment in sometimes inefficient State-controlled productive sectors.

Figure 17
Government income as percent of GDP



VII. Regulatory challenges

Since its inception in the mid-1990's the regulatory system has confronted several challenges. Its consolidation has been affected by the length of time each superintendence has been in existence, its financial resources, its relationship with the government, the availability of trained personnel, and other sector-specific characteristics. Restrictions to regulatory activity have been observed in the relationship of the system with firms, consumers, the government, and in the relations between the general and sectoral superintendeces.

In the first case, the main source of conflict has been the lack of sectoral laws in the case of transportation and water. In electricity, telecommunications and hydrocarbons, further legal development is necessary, particularly in relation to antitrust issues. A permanent difficult has also been the expected information asymmetry: firms

have better knowledge than the regulator in key areas like operation costs, demand conditions, investment valuation, and service quality.

Relations with consumers have progressed as they have come to understand their rights and obligations, as well as the complaint procedures channeled through consumers' defense offices (which handled more than 140 thousand cases during 1998 alone). Despite this activity, it seems the system can do more for consumers by aggressively promoting competition, and by introducing productivity-related incentives in some sectors. Further, antitrust regulation is under consideration in an economy-wide basis.

As far as relations between the regulatory system and the government, conflicts arise because in some cases the latter's decisions are taken without full consideration of the technical expertise accumulated by the Superintendences. In others, norms introduced or proposed by the government, are in conflict with existing ones, creating uncertainty and regulatory risk. Further, in some cases direct communications between the government and current (or potential) operators weaken the system and its credibility.

Finally, there is the issue of the General Superintendence's task of evaluating the sectoral ones, which requires the development of efficiency and efficacy indicators. This has been a challenging task, mainly because it necessitates large amount of information and sometimes involves significant time lags. Additionally, the general superintendence has continued in its role as a second instance for appeals, the legal system being the final recourse. The activity in this area, up to the end of 1998, 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.

VIII. Conclusions

For the past 15 years, Bolivia has undergone sustained economic liberalization. In the past five, this process has finally reached 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 play out and influence the economy.

Out of this review 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) It seems to have contributed to increased connection rates in the urban area, reversing declines observed at least in the early 1990's. iii) In this realm, improvements have not bypassed the poor, and in fact seem to have been particularly beneficial to them in some cases.

As for the equity implications of pricing policy changes, the evidence is less clear, in part due to data restrictions. While there does seem to be evidence of average price increases and rebalancing with regressive effects, their magnitude is not that large, particularly when compared to the large welfare gains that must have been induced by increased connection. Finally, further strengthening of the regulatory system is probably desirable to guarantee further benefits for the poor and consumers more generally.

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Appendix

Questions for 1994

Service	Type of access	Question in the survey	Possible answers	Coding
Water	Connection	How does you household supply itself with water? Public or private network:	1. Inside your dwelling 2. Outside your dwelling but within the house or building that the dwelling is part of. 3. Outside the dwelling, outside the house or building (public faucet). 4. Delivery truck 5. Well 6. River, lake or spring 7. Other	Definition (1): The household is connected if responses 1 or 2 were given, and not connected otherwise. Definition (2): The household is connected only if answer 1 is given
	Consump-tion	How much do you pay for this each month?	Amount in bolivianos	[Same]
Electri-city	Connection	Does you household have access to electricity	Yes or no	[Same]
	Consump-tion	How much do you pay for this each month?	Amount in bolivianos	[Same]
Tele-phone	Connection	Household equipment: Does your household have a phone connection?	Yes or no	[Same]
	Consump-tion	In the last month, how much did you or any of the members of your households spend on communications (phone, mail services)	Amount in bolivianos	[Same]
Gas	Use	What type of fuel do you use to cook	1. Firewood 2. Animal by-products 3. Coal 4. Kerosene 5. Bottled, liquefied gas 6. Electricity 7. Network-supplied natural gas 8. Other 9. We do not cook	
	Con-sumption	How much did you, or any of the members of your household spend on cooking fuel (liquefied gas, kerosene, other)	Amount in bolivianos	Expenditures on gas were calculated for households that declare 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 the household uses? In your dwelling, how is the water used to drink and cook distributed?	1. Network that reaches the building 2. Public faucet 3. Well without a pump 4. Well with a pump 5. River or spring 6. Lake 7. Delivery truck 8. Other 1. Pipe within the dwellling 2. Pipe outside the dwelling but within our land 3. No piped water	Definition (1) The household is connected if response 1 was given for the first question, and not otherwise. Definition (2): The household is connected only if answer 1 is given for both questions
	Consump-tion	In the last month, how much did you pay for potable water	Amount in bolivianos	[Same]
Electri-city	Connection	Does you use electricity to illuminate your dwelling?	Yes or no	[Same]
	Consump-tion	In the last month, how much did you spend on electric service?	Amount in bolivianos	[Same]
Tele-phone	Connection	Does your household have a fixed or cellular phone connection?	Yes or no	[Same]
	Consump-tion	In the last month, how much did you spend on fixed or cellular phone service?	Amount in bolivianos	[Same]
Gas	Use	What type of fuel do you use to cook	1. Firewood 2. Animal by-products 3. Kerosene 4. Bottled, liquefied gas 5. Network-supplied natural gas 6. Other 7. Electricity 8. We do not cook	
	Con-sumption	In the last month, how much did you spend on cooking fuel?	Amount in bolivianos	Expenditures on gas were calculated for households that declare using it.