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CAPITALIZATION AND PRIVATIZATION IN BOLIVIA: AN APPROXIMATION TO AN EVALUATION

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Contents

Introduction and summary.....	1
Capitalization/privatization: The process and its direct effects.....	3
Capitalization and privatization: general overview.....	4
Regulation as a complementary reform.....	5
Changes in industrial organization and regulatory arrangements.....	5
Other characteristics of the regulatory system.....	11
Pension reform and further ownership effects.....	12
Effects: Firms' performance.....	13
Employment and labor productivity.....	14
Profitability and flows of funds.....	16
Effects: Access, Prices, and Welfare.....	20
Changes in Access.....	20
Valuing the Joint Welfare Impact of Price and Access Changes.....	30
Political Economy.....	40
Conclusion.....	49
References.....	52
Appendix 4A – Household surveys.....	54
Appendix 4B – Access definitions and expenditure on utilities.....	55

Introduction and summary

During the 1990s, Latin America experienced a wave of privatizations, which were an integral part of stabilization programs and a general reordering of the role of states in the regional economy. Over the past few years, these privatizations have come under increasing fire. Adverse effects ascribed to them range from an increase in utility service prices, to aggravating or even causing the recession currently affecting the region. In short, they are sharing in criticism directed at the entire liberalization process.

In this context, accurate knowledge on the real consequences of privatization can be of considerable value. But while research has been carried out on some of its economic effects, there is less information on privatization's broader "social" consequences. The goal of this chapter is to try to fill in some of these gaps as they concern the case of Bolivia.

We first describe Bolivia's privatization process, placing emphasis on the particularities of the *capitalization*² mechanism that was used, and the regulatory framework introduced as its essential complement. We then detail the changes in the industrial organization and ownership patterns in the electricity, oil and gas, telecommunications, transportation, and water industries. Our concern is mainly with the large privatizations in infrastructure, in part because of their economic size and in part because of the availability of data and methods allowing one to estimate the social and distributional impact of these transactions.

The discussion then turns to these processes' economic and social consequences. In the first case, the key issues are which agents benefited from the transfer of assets, and the effects on firm-level variables like investment, profitability, and transfers to the State. With regards to social outcomes, we focus on the effects on employees and consumers. For the first, interest centers on what happened to employment and wages in the sectors affected; for the second, on what occurred to access, prices, and service quality for privatized utilities, and to consumer welfare more generally.

This chapter touches on all these issues, and additionally tries to provide a sense of the Bolivian population's changing assessments of the entire process. Although in several cases data limitations make a full treatment impossible, the available information leads to the following broad conclusions (roughly in the order they appear):

- 1) By design, capitalization and privatization generated significant transfers of assets to foreign firms. The Bolivian population was not excluded from this benefit, however, since it collectively received a 45 percent share in most of the transferred enterprises. Dividends from this ownership have been used to pay old-age benefits.
- 2) These processes, combined with the introduction of a regulatory framework, seem to have delivered on their central stated goal: to substantially

² The nature of these two processes, privatization and capitalization, is described in detail below. In terms of the amount of assets transferred, the latter was clearly the more important. In part because of this, the discussion often uses the two terms interchangeably.

increase investment (as well as competition, in some cases) in the sectors affected.

- 3) These investments have been associated with significant increases in capacity and output – from improvements in utility access rates, to a ten-fold rise in proven gas and oil reserves within five years of the reforms.
- 4) Productivity also increased significantly across all sectors, in part due to employment reductions. We find, however, that these reductions were small relative to the economy as a whole. Unless the indirect effects were very large, therefore, privatization simply cannot account for the increasing unemployment observed in recent years.
- 5) Tax receipts from regulated firms appear to have increased after reform. In the current recession, however, there is pressure for further increases, particularly from the oil and gas sector.
- 6) While most capitalized firms do report positive profits, their returns on equity have declined in recent years, again, particularly during the ongoing recession.
- 7) We find that in the urban areas, capitalization is associated with increases in households' access to utility services. Especially for electricity and water, these expansions have not bypassed the poor. On the contrary, in many cases it is the lower income deciles that seem to have benefited the most. For telephone services, improvements have been greater further up the income distribution. Several of these findings persist when we try to isolate only those effects due to privatization itself.
- 8) Concerning prices, there are large gaps in the information available. On balance, it seems that price increases have not been large, with the exception of those attempted as part of the water concession in Cochabamba.
- 9) Taken together, the access improvements seem to dominate the price increases, resulting in welfare gains for many households. Not surprisingly, these gains are largest for those services and income groups for which access grew most. In particular, in electricity there are significant gains for the lower deciles in the income distribution. For phone services, improvements are observed almost across the board. For water, we find that the La Paz/Alto concession seems to have produced welfare gains as well. Not surprisingly, in the case of the failed concession in Cochabamba, we find that welfare effects would—had the concession continued—been rather negative unless substantial improvements in access would have accompanied the proposed tariff increases.
- 10) The regulatory framework seems to have strengthened the rule of law and promoted competition and transparency in some sectors. Nevertheless, it is clearly still necessary to improve the regulatory and broader institutional framework.
- 11) As elsewhere, privatization/capitalization and the introduction of regulation were part and parcel of a broader restructuring of the economy. In Bolivia, privatization lagged behind stabilization significantly, but it was still crucial in the shift in the state's focus from productive to social sector activities. Nevertheless, after about seven to eight years of reform and four of recession, private investment has slowed down and a consensus seems to be reemerging for greater state involvement in the economy.

These findings provide a brief and admittedly incomplete evaluation of privatization in Bolivia. We emphasize, further, that it was the combination of *privatization/capitalization*, on the one hand, and *regulation*, on the other, that was substituted for state ownership, although for conciseness we will often refer to the collection of these as “privatization.” Further, we note it is impossible to fully disentangle the effects of these processes from those of associated events, like the introduction of new technologies.

That said, our findings suggest that on the whole these reforms met with relative success. The fact remains, however, that they are not popular, at least to judge by polls and politicians’ pronouncements. In the final part of the paper, we provide some hypotheses to explain this, as well as some detail on the political economy of the reforms.

An aspect we highlight is the popular suspicion that, even if output and productivity have improved, the capitalized enterprises are being run with only the best interests of the majority (foreign) owners in mind, and that the regulatory system has been unable to adequately restrain this natural tendency. The recent worldwide focus on corporate malfeasance has helped bring these concerns to the forefront.

This standard issue has gained salience in Bolivia because, as stated, the population collectively owns a 45 percent share in capitalized firms, and the dividends accruing to this ownership are used to finance old-age benefits. Because these dividends have been declining (partially due to a recession), the amounts collected have been insufficient to adequately fund benefits in the amount promised initially.

Another issue we emphasize is our impression that the government that implemented these reforms “oversold” them, promising more, on the job creation front for instance, than they could reasonably deliver. Finally, the reform’s entire reputation has been hurt by a couple of high profile failures, one regarding the national airline and another a water concession in the city of Cochabamba.

None of these issues might have been salient in a healthy economic environment, but in the economic slowdown Bolivia has been experiencing since 1999, they have significantly contributed to privatization’s bad reputation. Further, the persistence of the economic slowdown is to an important degree due to fiscal rigidities introduced by other reforms, such as decentralization and pension reform. For example, the fiscal deficit created by the transition away from the old “pay as you go” pension system reached five percent of GDP by 2002, and is not expected to decrease for at least a decade. This generates pressures for economy wide tax increases and thus contributes to further questions regarding structural reform as a whole.

Capitalization/privatization: The process and its direct effects

Bolivia initiated significant economic liberalizations in 1985, primarily in an effort to tame hyperinflation and emerge from a deep recession. Despite success with these early market-friendly initiatives, the country did not engage in

significant and sustained privatization until about ten years later. When it finally embarked on this process, the government employed traditional privatization in some instances, but mainly relied on *capitalization* as a mechanism for the transfer of state-owned firms.

This section first describes how these approaches differ, and how the introduction of regulatory mechanisms served as a key complement to both. For each of the affected sectors, the discussion also covers changes in industrial organization and regulatory arrangements, as well as ownership patterns

Capitalization and privatization: general overview

Under traditional privatization, the government transfers a majority of ownership in a state firm to the private sector, receives the sale proceeds, and has freedom over how to spend them. Under Bolivian capitalization, the state transferred shares (mainly in infrastructure firms) equivalent to 50 percent of the firm to the investor with the winning bid. It also yielded between 45 and 50 percent to private pension fund administrators who represent the general citizenry, and who use the funds derived from this share to pay old-age benefits complementary to those stemming from individual retirement accounts.³ The remainder (about 4 percent, on average) accrued to the company's employees.

By its payment, the investor gains the right to manage the firm, and commits to *investing* its capital contribution, the total amount it offered for its 50 percent share, in the firm's development. It must carry this out within a specified period (typically six to eight years), agree to fulfill obligations that encompass expansion and quality goals, and operate under regulation and a long-term (typically 40 year) contract.⁴

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.

Taken together, capitalization and privatization raised significant amounts of capital: total commitments add up to about two billion dollars, roughly equivalent to 30 percent of GDP. Capitalization accounted for most of these proceeds, however, 1.7 billion dollars, as opposed to 0.3 billion from traditional privatization.⁵

³ As this suggests, a reform to the pensions system accompanied capitalization in Bolivia. We discuss this in detail below.

⁴ The investor made a bank deposit with this payment, and was instructed to keep records on its use. Government audits of investment, firm management and performance took a long time to be initiated, and are currently under way.

⁵ While privatization started in 1992 with about 50 percent of its proceeds concentrated in 1999, capitalization occurred in the 1994-1997 period.

Regulation as a complementary reform

Capitalization was complemented with reforms to each sector's industrial organization, and with a regulatory framework that has the stated goal of promoting competition and efficiency.⁶ The key legislation was the SIRESE (Sistema de Regulación Sectorial) Law (1994), which created a regulatory system for the infrastructure sector. In essence, it defines the institutional structure, including the role of five regulatory agencies (*Superintendencias*) for the electricity, telecommunications, hydrocarbons (oil and gas), potable water, and transportation industries. Additionally, it sets up an overseeing agency responsible for system-wide coordination, second instance appeals and evaluation; and introduces market competition as one of the guiding principles in the infrastructure sector.

Four more specific laws round out the legal framework: Electricity (1994), Telecommunications (1995), Hydrocarbons (1996) and Potable Water (2000). These introduced changes in each sector's industrial organization, and govern aspects related to tariff regulation, entry, service quality, and sanctions. The sector-specific regulatory agencies created as part of SIRESE administer each law.

Changes in industrial organization and regulatory arrangements

We briefly describe the more important changes implemented in each sector.

Electricity

Prior to reform, the electricity industry was divided into the National Interconnected System (NIS) and other independent networks, a distinction which remains today.⁷ The NIS covers the largest cities, while the other networks serve other urban and some rural areas.⁸ This paper focuses on the NIS, where the state-owned *ENDE*⁹ was active in generation and transmission. Additionally, it had some distribution activities, mainly through *ELFEC*¹⁰ in the city of Cochabamba. *COBEE*¹¹, long a private company, participated in generation and distribution in the cities of La Paz and Oruro. Other distribution firms or cooperatives were, *CRE*¹² in Santa Cruz, *SEPSA*¹³ in Potosí and *CESSA*¹⁴ in Sucre. Competition existed only between *ENDE* and *COBEE*, and was limited to the direct provision of electricity to a few mining and industrial concerns.

⁶ For more on regulation and regulatory institutions in Bolivia, see Barja (2000) and SIRESE (2000).

⁷ The NIS accounts for close to 90 percent of electricity consumption.

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, and Santa Cruz. This reflects the fact that Bolivia does not have a single dominant urban center, and has one of the lowest urban concentration ratios in the region.

⁹ Empresa Nacional de Electricidad.

¹⁰ Empresa de Luz y Fuerza Eléctrica Cochabamba.

¹¹ Compañía Boliviana de Energía Eléctrica.

¹² Cooperativa Rural Eléctrica.

¹³ Servicios Eléctricos de Potosí, a municipal company.

¹⁴ Compañía Eléctrica Sucre, a municipal company.

The Electricity Law vertically separated generation, transmission, and distribution, with some firms privatized in each of these. In generation, capitalization created three firms: *Corani*, *Guaracachi* and *Valle Hermoso*, with a total value of about 140 million US dollars. Each of these received part of *ENDE*'s generation activities, with the law limiting the market share each can achieve to 35 percent of the NIS. Exclusive rights were initially granted to these companies, but by 1999 entry was liberalized and some smaller firms began operations as well.

In transmission, network operation 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. The privatization transfer was for a value of about 40 million US dollars.

In distribution, several types of firms exist after the reform, all of which operate under tariff regulation and are subject to quality controls. First, there is *CRE*, a pre-existing distribution cooperative that remained as an independent regional monopoly. Second, there are pre-existing municipal distribution firms that also retained their monopolies: *CESSA* and *SEPSA*. *ELFEC*, previously a municipal company, now operates as a private firm transferred for about 50 million US dollars. Finally, as stated, the private *COBEE* operated in both generation and distribution. Its divestiture from distribution produced two private local distributors, *ELECTROPAZ* (La Paz), and *ELFEO* (Oruro). For all of these distribution firms, tariff regulation consists of several average cost caps with productivity factors set using a four-year lag. Tariffs are updated every semester to allow for "pass-through" of energy cost increases.

These reforms, together with the introduction of a load dispatch coordination office, have created a wholesale electricity market that seeks to simulate competitive conditions. Partially as a result, the NIS has experienced excess capacity since 1999.

Oil and gas

Prior to reform, virtually all of the hydrocarbons (oil and natural gas) industry was under the control of state-owned *YPFB*¹⁵, a vertically integrated monopoly. Limited private participation in exploration, as well as in crude oil and natural gas production, took place through joint ventures with this company.

With the capitalization process and the introduction of the Hydrocarbons Law, the priority became to remove *YPFB* from production, and to promote a natural gas export industry directed towards southern Brazil. The state intended this industry to support (through taxes and royalties) the development of other sectors of the economy, and with this goal in mind, reforms and foreign investment were focused on exploration and infrastructure. The inauguration of a pipeline to Brazil in 1999 made this vision a reality.

¹⁵ Yacimientos Petrolíferos Fiscales Bolivianos.

Further, these reforms were associated with a substantial increase in natural gas reserves. Proven and probable reserves increased from about 5.7 trillion cubic feet in 1997, to 52.3 in 2002, putting Bolivia in first place in Latin America in free reserves. With reserves now exceeding the served Brazilian and domestic market demand, the government is considering new projects, including liquefied natural gas exports to the U.S. and Mexico,¹⁶ petrochemical and thermoelectric plants, and new export pipelines to Brazil, Argentina, Paraguay and Chile.¹⁷ 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 (upstream) be executed only by private firms in joint ventures with *YPFB* (which remains as the upstream regulator), while placing few restrictions on the export and import of petroleum products. The most important operators in the upstream, in terms of reserves (based on 2001 data), are: *Petrobras* (34.8 percent), *Maxus* (29 percent), *Total Exploration* (19.8 percent), *Andina* (5.9 percent), and *Chaco* (4.6 percent). Capitalization resulted in the creation of two firms in the upstream sector: *Chaco* and *Andina* with a value of 306 and 265 million US dollars respectively.

The 1996 Hydrocarbons law stipulates that the government is entitled to a share of the value of production which depends on whether the field in question was discovered before or after capitalization: 50 percent of the value of production from old fields (at wellhead), and 18 percent from new fields.¹⁸ In both cases firms are also required to pay a 25 percent profit tax, a 25 percent surtax,¹⁹ and a 12.5 percent remittance tax.

In the downstream area, the gas and oil pipelines owned by YPFB were transferred to the capitalized *Transredes*, without exclusive rights and a total value of 264 million US dollars.²⁰ The administration of other pipelines (poliductos) was entrusted to the private *Oil Tanking*, with the remaining still under *YPFB* control. In refinement, most of *YPFB*'s units were transferred to the private *Empresa Boliviana de Refinación (EBR)*.²¹

In commercialization, most of *YPFB*'s storage terminals were transferred to *CLHB*²² of *Oil Tanking* as well, but other private firms are also active. Bottled liquefied gas distribution plants are all private, and about nineteen percent of bottling capacity continues under YPFB, but is expected to be privatized. Compressed natural gas service stations are all private, and about 15 percent of

¹⁶ Given Bolivia's landlocked condition, at present one of the most debated issues is the choice of an export port in either Chile or Peru.

¹⁷ A regional distributional issue has emerged because most of the new reserves are in the Department of Tarija, which stands to receive significant royalty revenues.

¹⁸ The 1990 Hydrocarbons Law required that all fields pay 50 percent in royalties, plus a profit tax.

¹⁹ The surtax base is equal to the profit tax base minus 33 percent of accumulated investments and minus 45 percent of the value of production at each field, up to a maximum of \$40 million per year.

²⁰ Other operators are *Gas Trans Boliviano*, *Gas Oriente Boliviano*, *Transierra*, and *Petrobras*.

²¹ Owned by the Accidental Association Petrobras Bolivia S.A.

²² Compañía Logística de Hidrocarburos Boliviana.

service stations for liquids continue under the state firm. Airport service stations nationwide were also transferred to the private sector. Except for Transredes, all other transfers in the downstream were privatizations that reached a total amount of 125 million US dollars.

Mixed ownership continues in network-based natural gas distribution: *SERGAS*²³ in Santa Cruz, *EMCOGAS*²⁴ in Cochabamba, *EMDIGAS*²⁵ in Sucre and *EMTAGAS*²⁶ in Tarija. *YPFB* operates in La Paz, Potosi and Oruro. The expectation is that these companies will also be eventually privatized.²⁷ Despite this activity, the network-based natural gas industry is still underdeveloped: by 2001 it included only 14,435 connections. Nevertheless, current policy is to increase this to up to 250,000 connections in the next five years, as part of an effort to direct energy consumption towards natural gas.

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 through *EBR* in refinement for the domestic market.

Rate of return regulation (with a four year lag) is used for pipeline transportation, with a tariff structure that differentiates between domestic and export-related transportation. In natural gas network distribution, tariff regulation has not been implemented thus far. Consumer prices for all petroleum derivatives were initially calculated by starting with an international reference price and then adding the costs of processing, transportation and commercialization, plus an oil derivatives tax. In response to price volatility, liquefied gas, diesel oil, and gasoline have been subsidized since 2000. Further, in a decree (January, 2003) the government froze all consumer prices, eliminated the refining margin, and increased the oil derivatives tax -- with the effect of lowering prices for the upstream firms. However, due to fiscal pressures generated by subsidies, in a recent decree (February, 2004) the government is slowly promoting the return to market determined consumer prices.

Telecommunications

Prior to reforms, the telecommunications industry was divided between *ENTEL*,²⁸ which covered national and international long distance services, 15 cooperatives with monopolies in fixed local telephone services, and *Telecel*, a private monopoly in the cellular market. Capitalization created the private *ENTEL* with a value of 610 million US dollars and the Telecommunications Law maintained these separations until entry was liberalized at the end of 2001. Until then, *ENTEL* and the cooperatives retained exclusive rights, but the mobile market

²³ Empresa de Servicios de Gas Santa Cruz S.A.M.

²⁴ Empresa Cochabambina de Gas S.A.M.

²⁵ Empresa Distribuidora de Gas Sucre S.A.M.

²⁶ Empresa Tarijeña de Gas.

²⁷ The first privatization attempt failed in April 2002.

²⁸ Empresa Nacional de Telecomunicaciones, the State monopoly.

was opened gradually by allowing the entry of *ENTEL-Movil*²⁹ in 1996, and *Nuevatel-Viva*³⁰ in 2000.

For the period prior to entry liberalization, legislation mandated tariff regulation for firms that control more than 60 percent of a given market. This scheme had 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 stipulated annual expansion, quality, and technological goals.

November 2001 marked the end of exclusive rights in all markets.³¹ Entry occurred in the long distance market through *AES Corporation* (in association with *Cotel*), *Teledata*, a division of *COTAS*, *Boliviatel*, a division of *COMTECO*, *Telecel*, *Nuevatel* and *ITS*. Additionally, *Cotas-Movil* has entered the mobile market, while *Entel* has expanded its local network to business clients. Most of these companies are also expanding in the data transmission and internet markets. Up to the end of 2001, registers show 14 firms providing public phone services, 29 in cable TV, 28 in value added services, 217 in television, 496 in radio, 6 in data transmission, and 478 private nets.

Additionally, market liberalization was accompanied by a four-year restriction on mergers, acquisitions and stock swaps that account for 40 percent or more of total local fixed lines in service in the country by one firm (or a group of related firms). Tariff regulation continues where a firm controls more than 60 percent of a given market, although this is expected to change with the introduction of dominant firm regulation rules, and new rules are being implemented to facilitate inter-connection agreements. A Universal Access and Service Fund has also been proposed (not yet implemented), which would be financed by foreign aid and operators' contribution with the broad objective to reach the rural areas and the urban poor.

Transportation

As elsewhere, the Bolivian transportation industry is divided into air, rail, road and water segments. Thus far, capitalization and regulation have only affected the first two. Additionally, the long awaited new Transportation Law has not yet been approved.

In the air market, prior to reform the state-owned *LAB*³² and the private *AEROSUR*³³ competed in the main regular route domestic market. *LAB* also participated in the international market, and the national airport system was administered by the state monopoly *AASANA*.³⁴ *LAB* was capitalized creating a new private firm, also *LAB*, with a capital contribution of 47 million US dollars,

²⁹ A division of capitalized *ENTEL*.

³⁰ A joint venture between *COMTECO* (the Cochabamba cooperative) and Western Wireless International.

³¹ The so-called *Decretos de la Apertura* where approved by the government a year before.

³² Lloyd Aéreo Boliviano.

³³ Compañía Boliviana de Transporte Aéreo Privado.

³⁴ Administración de Aeropuertos y Servicios Auxiliares a la Navegación Aérea.

and the main three airport terminals of Santa Cruz, La Paz/El Alto and Cochabamba, were transferred to the private *SABSA*³⁵ as concessions. *AASANA* retains administrative control of 34 small airports, and *AEROSUR* has entered the international market.

In the case of rail, before reform the sector was dominated by the state monopoly *ENFE*,³⁶ which administered passenger and freight services in the Andean and Eastern regions. In this case, reform created two separate regional firms, *FCA*³⁷ and *FCO*,³⁸ which were then capitalized generating two firms that received a total capital contribution of 87 million US dollars.

The lack of a sector law has limited the regulatory activities of the Transportation Superintendence. Nevertheless, it was able to advance some actions based on existing norms and a few government decrees. In air transportation, a tariff band was set for the regular domestic market, with the stated objective of discouraging anticompetitive practices. Some airport terminal tariffs are also regulated. In rail transportation, there are regulations concerning economic, technical and security aspects of service.

Water

While the above sectors experienced capitalization and the introduction of regulation, the water industry has undergone limited changes and encountered significant difficulties. Only one municipal firm, *SAMAPA* (La Paz/El Alto), was transferred as a concession in 1997, to *Aguas del Illimani*.³⁹ Under the new model, the concession seeks to improve internal efficiency, coverage, and quality. The characteristics of the *Aguas del Illimani* contract reflect this, and the objectives established for the 1997-2001 period included: i) 100 percent access to potable water or sewerage (excluding public fountains) in the areas of Achachicala and Pampahasi, in 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 percent access to sewerage; and iii) compliance with long-term expansion goals. Quality norms cover aspects related to the sources of water, its quality, abundance and pressure; continuity of service, infrastructure efficiency, customer service, and emergency preparedness. Tariff regulation was established under a rate of return mechanism with a five-year regulatory lag and no productivity factors. Additionally, tariffs were set in dollar terms payable in bolivianos.⁴⁰

The expectation was that within a short period, legislation would be in place to incorporate the remaining firms into a similar model. However, the long wait for a Potable Water and Sewerage Law (finally approved in 2000), together

³⁵ Servicios Aeroportuarios Bolivianos.

³⁶ Empresa Nacional de Ferrocarriles.

³⁷ Empresa Ferroviaria Andina.

³⁸ Empresa Ferroviaria Oriental.

³⁹ The main shareholder is *Lyonnaise Des Eaux*, with 35 percent.

⁴⁰ This last feature has generated wide protest from the inhabitants of El Alto.

with significant failure in a second transfer of a municipal firm (*SEMAPA*) to *Aguas del Tunari*⁴¹ in Cochabamba, significantly slowed change in this sector.⁴²

Nevertheless, up to 2000 the Water Superintendence was able to incorporate the new regulatory regime and sign concessions with existing municipal water firms in Cochabamba, Oruro, Sucre, and Potosi -- and with existing cooperatives in Santa Cruz, Montero, Trinidad and Guayaramerin. Some features of the new Law are that municipal governments are responsible for the provision of water and sewerage services, a responsibility they can perform through private or municipal firms, cooperatives, civil organizations and any existing organization in rural communities. The Bolivian population is divided between areas subject to concession or not, depending on whether they are financially viable. Concessions are subject to rate of return regulation with a five year regulatory lag, while universal access in non-concession areas should be accomplished with government investment.

Other characteristics of the regulatory system

Thus, the regulatory system (SIRESE) consists of five sector-specific offices (electricity, hydrocarbons, telecommunications, water and sewerage, and transportation), and one General Superintendence. By design, the system is financially and administratively independent, and Superintendents are appointed by congress for five-year periods.⁴³ The functions of each Superintendence vary by sector, although they generally include: granting rights, regulating tariffs, promoting competition, monitoring operator obligations, resolving controversies among firms, imposing sanctions, hearing first instance appeals, and receiving consumer claims. It is important to point out that the regulatory system only administers the law – its design is left to the corresponding government ministries (although the system can propose legislation).

The General Superintendence evaluates each sector Superintendence once a year, considering factors that include compliance with general functions, internal organization, and sector performance relative to regulatory objectives. Aside from its impact on specific regulatory activities, SIRESE has also been successful in improving the availability of transparent information, and in strengthening the rule of law.

In terms of appeals, the system has a first instance where any operator can appeal a decision made by its sector Superintendence. If the decision is upheld, the operator has a second chance to appeal before the General Superintendence. Even after these stages, the operator retains recourse to the judiciary system. Up to 2001, there had been 453 first instance and 148 second instance appeals and 25 cases in the judiciary system.

As for consumer protection, the system sets up a first reclamation instance directly with the operator. If the dispute is not settled, the consumer has a second chance before the sector Superintendence. This set-up has revealed a large

⁴¹ A private firm with the British *International Water* (with 55 percent) as the main shareholder.

⁴² Described in detail below.

⁴³ Seven years in the case of the General Superintendent.

number of consumer complaints in some sectors, particularly telecommunications and electricity.

The cost of the entire regulatory system was estimated at 0.2 percent of GDP in 2001, and is fully financed by operators from a levy on gross income (usually less than 1 percent). This investment has brought important advances, but its effectiveness has been hampered by various factors: instances of instability and lack of continuity of Superintendents due to political pressures, lack of a sector law in the cases of water (until 2000) and transportation (until today), and slow approval of detailed regulations in most sectors. Additionally, at times operators have successfully lobbied the executive and legislative branches to bypass the regulatory system. Consumers often feel they do not have enough representation, participation or protection. Some Superintendencies have also been slow to produce transparent information, and/or lacked specialized human resources in their earlier stages. In recent years the system has also had to reduce its costs in response to similar initiatives in the rest of the government.

Pension reform and further ownership effects

To summarize, Capitalization transferred 50 percent of state enterprises (and their control) to foreign firms. Additionally, 45-50 percent of shares in the capitalized firms were given to the *Collective Capitalization Fund* (CCF), to be held for the benefit of the population at large (we discuss the creation of the CCF and the associated pension reform in greater detail below). Table 4.1 lists the enterprises capitalized in the utilities and hydrocarbons sectors, the number of shares issued, and their distribution between the capitalizing firm (always 50 percent), the CCF (46.4 percent on average), and the employees of each enterprise (3.6 percent on average). It bears repeating that in the second case the shares are made out to the CCF and are represented by the private pension fund administrators. These are not owned by the administrators, the state, or any individual citizen.

Table 4.1.

Distribution of share ownership for the capitalized firms

Firm (Sector)	Total number of shares	Percent owned by the capitalizing firm	Percent owned by the CCF and represented by the fund administrators	Percent owned by the firms' workers
<i>Ferroviana Oriental</i> (Transportation)	2,296,982	50	49.91	0.09
<i>Ferroviana Andina</i> (Transportation)	1,322,448	50	49.93	0.07
<i>Valle Hermoso</i> (Electricity)	2,927,322	50	49.87	0.13
<i>Guaracachi</i> (Electricity)	3,358,284	50	49.83	0.17
<i>Corani</i> (Electricity)	3,144,486	50	47.23	2.77
<i>Transredes</i> (Oil and gas)	10,048,120	50	33.55	16.45
<i>Petrolera Chaco</i> (Oil and gas)	16,099,320	50	48.94	1.06
<i>Petrolera Andina</i> (Oil and gas)	13,439,520	50	48.92	1.08
<i>ENTEL</i> (Telecommunications)	12,808,988	50	47.47	2.53
<i>LAB</i> (Transportation)	2,293,764	50	48.64	0.99
Mean		50	46.42	3.57

Source: Boletín de Pensiones 1999, Superintendencia de Pensiones, Valores y seguros.

The CCF receives the dividends due to it from its shares in the capitalized firms. Between 1997 and 2000, these represented between 0.39 and 0.55 percent of GDP per year, with the most important contribution coming from the telecommunications sector. In 2001 dividends grew to 0.65 percent of GDP with the most important contributions coming from the energy sector, however, in 2002 they dropped to 0.45 percent of GDP.

The fund has a significant social impact as a source of transfers to private citizens. These include the *Bonosol* (an old-age benefit), funeral expenses, investment in *Individual Capitalization Funds* (pension plans actually owned by individual citizens), and subsequently, the *Bolivida*. The *Bonosol* was a cash payment equivalent to 248 US dollars in 1997, directed at all citizens 65 or older – a substantial transfer given that Bolivia’s GDP per capita is about 1,000 dollars.⁴⁴ In total, 56.5 million dollars were paid to about 320,000 people.

The *Bonosol* was only paid once before the administration that implemented the capitalization process left government. Immediately a debate began on whether the CCF in fact had enough funds to continue payments at that pace. The next administration did not make payments for a period and then switched to the *Bolivida*, which it began disbursing in December of 2000. It consists of 60 US dollars for every citizen above the age of 65. Retroactive payments for 1998 and 1999 (\$60 per year) were also made, and by March of 2001 had benefited 150,000 individuals.

The year 2002 witnessed the return to government of the administration that originally implemented capitalization, and hence a desire to return to the original (roughly \$240) *Bonosol*. Because of further reductions in the flow of dividends, however, the CCF now clearly does not have sufficient funds to make payments at this level. We return to this issue, including how the government plans to make up the shortfall, below.

Effects: Firms’ performance

Capitalization and privatization entailed major changes to the industrial organization of the sectors they affected, and to the conditions under which the firms in each of them operate. In this section, we study these reforms’ effects on several aspects of firm performance.

Investment

Investment is a key parameter in any evaluation of the capitalization process, since increasing it was an explicit objective. Table 4.2 summarizes the sector-specific information presented earlier, but complements it with the investment activity observed in each case. The privatization values presented correspond only to the oil and gas, electricity, telecommunications and transportation sectors.

⁴⁴ By December 31, 1999, the CCF had also been used to acquire shares of the ICF for approximately 14.7 million dollars, and for the payment of funeral expenses worth 2.3 million dollars.

Table 4.2.

Resources/investment generated by privatization and capitalization

Firms created by the reform	Year	Privatization value (Millions of \$US)	Capitalization value (Millions of \$US)	Investment as of 2002 (as percent of commitment)(1)	Company / institution in charge of investment
Oil and gas					
<i>Chaco S.A.</i>	1997		306.66	89.2	Chaco S.A.
<i>Andina S.A.</i>	1997		264.77	108.9	Andina S.A.
<i>Transredes S.A.</i>	1997		263.50	102.5	Transredes S.A.
<i>EBR S.A.</i>	2000	102.00			TGN-Investment
<i>CLHB S.A.</i>	2000	12.05			TGN-Investment
<i>Airport Service Stations</i>	2000	11.10			TGN-Investment
Electricity					
<i>Corani S.A.</i>	1995		58.79	74.7	Corani S.A.
<i>Guaracachi S.A.</i>	1995		47.13	150.0	Guaracachi S.A.
<i>Valle Hermoso S.A.</i>	1995		33.92	111.9	Valle Hermoso S.A.
<i>TDE S.A.</i>	1997	39.90			ENDE
<i>Efec S.A.</i>	1995	50.30			Residual
Telecommunications					
<i>ENTEL S.A.</i>	1995		610.00	21.4	ENTEL S.A.
Transportation					
<i>LAB S.A.</i>	1997		47.47	100.0	LAB S.A.
<i>FCO S.A.</i>	1996		25.85	241.6	FCO S.A.
<i>FCA S.A.</i>	1996		13.25	167.6	FCA S.A.
Total		215.35	1,671.34		

(1) Based only on the amounts accepted by the regulatory system, Delegado para la Capitalización

As this table illustrates, most firms have exceeded their investment commitments, and from this perspective the process seems to have delivered. Firms under concession agreements (*Aguas del Illimani*, and *SABSA*), furthermore, have also made investments in order to comply with specific contractual goals that are not registered in the table.

Employment and labor productivity

A frequent critique of privatization is that it leads to unemployment. In this section, we use administrative information to explore the extent to which this is true for Bolivia. As context, the economy-wide unemployment rate went up significantly after 1997, more than doubling (to about 8 percent) by 2002. Naturally, external or other macroeconomic shocks may account for this; we postpone a discussion of these until later. The focus in this section is simply to

see if the employment changes brought about by privatization and capitalization could account for this change. Due to data restrictions, in this section we arrive only at a partial answer. Additionally, we include information on the evolution of labor productivity, and once again we proceed through the analysis by sector. Due to space restrictions, we omit a fair amount of quantitative data from the following discussion; for interested readers, this is available in Barja, McKenzie and Urquiola (2004).

Electricity

In generation the number of employees in each firm remained more or less constant between 1995 and 1998, with some declines by 1999. Associated with increases in output, these trends have resulted in increases in labor productivity, which for the 1995-1999 period, range between 14 and 100 percent.

In distribution enterprises can be split into two groups: *ELECTROPAZ*, *CRE* and *ELFEC*, which operate in the three largest cities (La Paz/Elto, Santa Cruz, and Cochabamba, respectively), and *CESSA*, *SEPSA* and *ELFEO*, which operate in smaller markets. Overall there was a downward trend in employment and a more consistent, increasing trend for labor productivity. In La Paz/El Alto, for instance *ELECTROPAZ* consistently reduced its employment level between 1996 and 1999, and increased its productivity by 59 percent in the same period. In Santa Cruz, *CRE* reduced personnel up to 1997 and raised its productivity by 43 percent (it increased employment in 1998, but this did not reverse the productivity increases). In Cochabamba, *ELFEC* reduced employment up to 1998, and increased its productivity by 105 percent in the same period. Two firms, *CRE* and *SEPSA*, actually increased their employment levels between 1995 and the most recent observation.

To summarize, both generation and distribution firms seem to, on average, have experienced relatively moderate decreases in employment levels, particularly two or three years after they initiated operations (in the case of capitalized firms), while at the same time enjoying significant and consistent increases in labor productivity.

Telecommunications

In *ENTEL*, employment peaked in 1997. *ENTEL-Movil* initiated its operations in 1996 and possibly completed hiring in 1997, which may account for an increase in the number of workers between 1996 and 1997. In the subsequent years, there is a continuous decline at relatively large and increasing annual rates, 15 percent in 1998, and 19 and 30 percent in 1999 and 2000, respectively. Labor productivity, as measured by long distance minutes per employee continued to grow until 1998, but a decline took place in 1999 despite falling employment levels. This reflects weakening demand for long distance services, induced by the recession and perhaps by growing internet use.

In the case of cellular services, the data record is incomplete, but one might venture that the experience of *Telecel* reflects that of both operators. *Telecel* increased its employment levels continuously up to 1996, but then reduced

them in 1997, partially reacting to *ENTEL-Movil's* entry and the onset of price competition. Increases in labor productivity also display an upward trend during this period, reaching 152 percent by 1996. *Telecel* resumed its employment increases after 1997, and its personnel count in 2000 was practically double that of 1996. In spite of this, labor productivity continued to increase, by 57 percent in 1997 and 172 percent in 1998. These positive results reflect expansion due to price competition and quality-related improvements.

For local telephony, in all cases there is consistent growth in labor productivity, reflecting increases in the number of connections. Nevertheless, some operators reduced personnel in some years, such as *COTEL* in 1995, *COTAS* in 1993-96 and 1998-99, and *COMTECO* during 1998-99.

So far, we have reviewed the electricity and telecommunications sectors, concluding that employment peaked around 1997, so that one cannot rule out that capitalization might have caused some reductions in personnel. The employment levels in these sectors are quite small, however – they account for less than six thousand jobs out of more than 1.3 million people working in the capital cities alone. Nonetheless, the job losses in the previous tables can account for about 3 percent of the aggregate job losses in capital cities between 1995 and 2000, so the effect, while small, is not negligible.

Oil and gas

YPFB did display employment decreases after the 1997 reforms, but it is important to distinguish between the upstream (exploration and production) and downstream (transportation and commercialization) activities. Before reform, the number of employees in the upstream sector fluctuated around 25 percent of the total. These were substituted by the capitalized *ANDINA* and *CHACO*, which in 1998 operated with about 40 percent of the total upstream personnel *YPFB* had in 1996. The continuing decrease in employment for *YPFB*, even beyond 1999, happened as one by one all of the activities in the downstream sector were being privatized.

Although the number of employees in oil and gas transportation (represented by *TRANREDES*) is known, there is no available information for the rest of the downstream activities (industrialization, storage, distribution and commercialization).

Taken together, the evidence on employment levels suggests that capitalization was indeed associated with reductions in employment, amid increasing output and labor productivity. In the context of the broader Bolivian employment picture, however, there is (incomplete) evidence that the *direct* employment losses do not account for more than a small proportion of the unemployment increases that started in 1998.

Profitability and flows of funds

Financial results are another relevant firm-level outcome. In this section we cover issues related to the performance of state and private enterprises in the

industries of interest. Table 4.3 presents descriptive statistics for the main state firms for 1990-2001. One has to keep in mind that part of *YPFB* was capitalized in 1997, *ENDE* and *ENTEL* in 1995 and *ENFE* in 1996. However, except for *ENTEL* and *LAB*, residuals of these firms remained, with privatization of parts of them occurring at a later time. If one looks at *current* expenditures over revenues up to the capitalization year, the data show that except for *ENDE* and *ENFE* in 1995,⁴⁵ the firms considered did cover their operating expenses and were capable of making short term transfers to the state, although some, like *ENDE* and *ENTEL*, were in a more comfortable position. When one considers total (which includes capital) expenditures over revenues, however, in most cases the state firms were in deficit, except for *YPFB* in 1995-97, *ENDE* in 1991 and 1993-94, and *ENTEL* in 1992 and 1994-95. Thus, most of the time state firms had to finance their investments through debt,⁴⁶ and in many years there were investment shortfalls.

Table 4.3.
Cash flow statistics for government firms, 1990-01

Firms	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
YPFB												
Exp./C. Rev.												
T. Exp./T. Rev.	0.90	0.89	0.90	0.95	0.90	0.88	0.90	0.95	1.05	0.97	0.95	0.97
I/GDP percent	1.08	1.05	1.06	1.08	1.07	0.99	0.97	0.96	1.06	0.98	0.95	0.97
T/GDP percent	2.17	2.16	1.86	1.65	1.67	0.98	0.63	0.10	0.05	0.08	0.00	0.01
	7.92	8.85	7.21	6.47	5.93	5.52	5.79	3.34	3.41	3.09	-0.18	-0.30
ENDE												
Exp./C. Rev.												
T. Exp./T. Rev.	0.65	0.63	0.63	0.58	0.62	1.31	0.87	0.55	1.12	1.02	2.05	2.15
I/GDP percent	0.94	1.14	1.43	0.95	0.82	1.16	1.64	0.82	1.35	0.69	1.39	1.54
T/GDP percent	0.32	0.55	1.01	0.53	0.33	0.52	0.32	0.09	0.03	0.01	0.00	0.01
	0.06	0.07	0.02	0.15	0.19	0.73	0.16	0.04	0.00	-0.02	0.00	-0.01
ENTEL												
Exp./C. Rev.												
T. Exp./T. Rev.	0.72	0.70	0.72	0.84	0.88	0.87						
I/GDP percent	1.23	1.04	0.89	1.15	0.98	0.93						
T/GDP percent	0.57	0.40	0.24	0.45	0.14	0.09						
	0.41	0.49	0.44	0.63	0.80	0.71						
ENFE												
Exp./C. Rev.												
T. Exp./T. Rev.	0.97	0.84	0.77	0.95	0.88	1.03	0.97	2.68	2.33	6.91	1.88	4.26
I/GDP percent	1.44	1.05	1.07	1.12	1.05	1.11	0.86	1.33	1.39	1.42	1.33	1.49
T/GDP percent	0.39	0.28	0.32	0.24	0.18	0.09	0.00	0.01	0.00	0.00	0.00	0.00
	0.06	-0.10	0.12	-0.09	0.07	0.06	-0.20	-0.02	-0.01	0.00	0.00	0.00
ALL												
I/GDP percent	3.87	3.75	4.08	3.29	2.63	2.15	1.69	0.66	0.33	0.22	0.17	0.17
T/GDP percent	8.65	9.50	8.00	7.44	6.57	7.75	6.14	3.46	3.34	3.13	-0.22	-0.33

Note: C. Exp. = Current expenditures including current transfers; C. Rev = Current revenues including current transfers and operational revenues; T. Exp. = Total expenditures including current and capital expenditures; T. Rev. = Total revenues including current and capital revenues; I = Investment; T = Taxes, royalties and net transfers to government.

Source: Unidad de información fiscal.

⁴⁵ *ENDE* was capitalized in 1995.

⁴⁶ In general state firms could not obtain commercial credit, and their debt consisted mainly of concessionary credits from bilateral or multilateral agencies, with government guarantees.

The magnitude of these firms' investment can be observed as a percentage of GDP, and in relation to all state enterprise investment.⁴⁷ Additionally, the table describes the level of taxes, royalties and net transfers to the government, also as a percentage of GDP. In both of these areas, YPFB stands out in size.

During the post-capitalization period, the picture for residual firms in terms of investment and net contributions changes substantially, as one would expect. However, it is worrisome that the other indicators worsen dramatically, particularly for the residuals of *ENDE* and *ENFE*.

Moving on to private firms and to the 1997-2000 period, Table 4.4 presents: i) operational costs over revenues – a rough measure of internal efficiency, and ii) net profit over equity. In electricity generation, *Corani* and *COBEE* show better performances than *Guaracachi* and *Valle Hermoso* under both of these criteria (note that the first two are hydroelectric and the latter two thermoelectric). In distribution, the year 2000 shows *ELECTROPAZ* with the lowest expenditure to revenue ratio and the highest return on equity, followed by *ELFEC* and *ELFEO*. The remaining firms are cooperatives (*CRE*) or have municipal participation.

Table 4.4.
Performance indicators of main firms in regulated sectors

Sector/Company	Operational costs / Op. revenues					After tax profit / Equity				
	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001
Electricity generation										
CORANI	0.38	0.40	0.38	0.48	0.6	12.2	7.2	9.3	8.0	5.2
VALLE HERMOSO	1.02	0.90	1.02	1.01	2.5	2.6	4.8	4.7	3.7	-0.9
GUARACACHI	0.99	0.94	0.94	0.82	0.8	3.6	5.6	4.4	5.3	2.7
COBEE	0.65	0.69	0.59	0.63	0.5	11.1	7.2	11.6	9.8	14.3
TDE-Transmission			0.66	0.65	0.65			5.2	6.2	6.6
Electricity distribution										
ELECTROPAZ	0.81	0.78	0.77	0.84	0.86	11.1	10.9	14.2	14.4	6.9
CRE	0.90	0.89	0.89	0.93	0.94	6.0	6.8	3.0	2.8	2.3
ELFEC	0.82	0.83	0.83	0.92	0.95	10.1	9.1	10.3	14.2	7.2
CESSA	0.93	0.90	0.77	0.97	0.97	4.6	8.4	0.6	7.5	5.7
SEPSA	0.98	0.92	0.92	0.90	0.94	6.8	6.5	6.3	4.4	4.2
ELFEO	0.81	0.77	0.82	0.91	0.87	12.4	16.9	12.4	8.2	4.6
Oil and gas										
Andina ⁽¹⁾		0.92	0.91	0.75	0.00		0.7	1.3	6.1	0.0
Chaco ⁽¹⁾		0.76	0.54	0.38	0.37		-2.1	6.1	9.6	8.5
Transredes ⁽²⁾	0.58 ⁽³⁾	0.57	0.61	1.60	0.87	7.3	6.0	8.3	-4.0	2.5
Telecommunications										
ENTEL	0.80	0.83	0.94			6.2	8.9	5.3		
TELECEL	0.95	0.84	N/d			-24.3	33.4	N/A		
COTEL	1.32	1.29	1.30			-30.5	-9.4	-11.0		
COTAS	0.89	0.89	0.88			1.7	0.5	0.6		
COMTECO	0.85	0.73	0.98			3.3	5.2	2.8		

⁴⁷ Infrastructure sectors, hydrocarbons, mineral and industrial.

Continuation Table 4.4.

Airlines and airports										
LAB	0.97	1.00	0.99	1.03		2.5	-5.8	0.4	-14.0	
AEROSUR	1.18	0.98	1.04	0.83		-19.3	1.6	-9.4	0.0	
SABSA	0.93	0.97	1.10	1.16		33.3	12.0	-15.7	-83.9	
Rail transportation										
FCA	0.85	0.85	0.93	0.86		13.6	7.3	8.7	8.2	
FCO	0.57	0.59	0.71	0.68		27.0	28.5	15.5	15.2	
Water										
Aguas del Illimani	0.86	0.85	0.84	0.64	0.65	0.9	15.0	18.4	4.9	-4.9

Source: General Superintendence.

(1) For years ending in March.

(2) Includes revenues from the deferred account.

(3) Corresponds to seven months of operations.

For oil and gas we only have information on *Chaco*, *Andina*, and *Transredes*. In the upstream activities both *Chaco* and *Andina* have increasingly improved their internal efficiency and return on equity over the years. *Transredes*, the main firm in pipeline transportation, has managed to generate annual surpluses, except for the year 2000 when it incurred a capital loss due to an oil spill.

Moving on to telecommunications, the data shows that internal efficiency in *ENTEL* and *COMTECO* deteriorated in 1999 relative to previous years. This result has determined a drop in our measure of profitability from 8.9 to 5.3 percent, and from 5.2 to 2.8 percent respectively. For *COTAS* and *COTEL* the efficiency indicator has remained stable, but *COTEL* has generated losses every year, compared to weak profits for *COTAS*. Further, *TELECEL* improved its internal efficiency between 1997-98 (with no available information for 1999).

In the airline sector, the data show that *LAB* managed to break even in 1999, but incurred significant losses by 2000. The company that capitalized it, *VASP*, departed in 2002 under allegations of asset stripping. At that point *LAB* was taken over by Bolivian investors who allegedly paid a “gift” price for it. *AEROSUR*, which participated in the domestic market only, produced a profit on only one of the years considered. *SABSA*, the airport terminal operator, has experienced deteriorating performance since 1997, when it had a positive margin, to 2000, when it experienced a dramatic loss.

For the years covered, rail transport presents a more positive picture. *FCA* made a 13.6 percent return on equity in 1997, although by 2000 this fell to 8.2 percent. For *FCO*, the 1997-98 profit rate fluctuated around 28 percent, and fell to 15 percent by 1999-2000. Nonetheless, it has been identified as the most profitable firm among those capitalized. This may partially reflect the fact that it monopolizes the Santa Cruz-Puerto Suarez route, where it does not face trucking competition.

Finally, the table also presents performance indicators for *Aguas del Illimani*, the only privately administered firm in the water industry. The indicators show a constant tendency toward improvement during the 1997-99 period; however, the numbers drop significantly in 2000.

Effects: Access, Prices, and Welfare

Clearly, capitalization and privatization substantially affected the utilities sector. To assess their impact from a social point of view, it is key to know how these processes affected the consumers of these services. Specifically, privatization can affect consumers in three main ways. First, if it results in expansions of utilities' networks, then previously unserved households might start consuming the services. Second, for consumers who already have access, privatization may bring about changes in prices. Third, privatization may affect the quality of service provided. This section considers the joint effect of access and price changes on consumer welfare, and also discusses quality changes. We focus on the utilities sectors of electricity, telecommunications and water, for which direct consumer expenditure data is available. Data on transportation is not available by type of transport,⁴⁸ while the privatization of oil and gas is likely to have had less direct effects on consumers due to its export-intensive nature.⁴⁹

It is worth mentioning first that increasing access to infrastructure, especially water and electricity, has long been regarded as an essential component of poverty reduction strategies. Unsatisfied basic needs poverty measures are in fact directly based on access to such services. Additionally, electricity supply helps to generate income among the poor, as reflected in the fact that 78 percent of all municipal workshops in Bolivia's rural areas identified rural electrification as the most important action in combating poverty (GOB, 2001).

Changes in Access

The fifth and seventh rounds of the *Encuesta Integrada de Hogares* (EIH), taken in 1992 and 1994 respectively, and the first round of the *Encuesta Continua de Hogares* (ECH), taken in 1999, can be used to examine changes in access to utilities service in periods before and after the capitalization reforms (of 1995 and 1996). These data are described in detail in Appendix 4A, while Appendix 4B details the specific questions used to construct different definitions of access.

Table 4.5 shows the evolution of access to basic services from 1992 to 1999 in the department capitals, by income decile. Access to telephone and electricity is determined by a question directly asking whether the household has the service or not. Calculations for communications, which include telephone and mail, are based on whether the household reports positive expenditure on this item in the past month. A household is considered to have access to water if it has a pipe connection to the building its dwelling is part of.

⁴⁸ This is unfortunate to the extent that transportation tends to be a greater part of poor households' budgets.

⁴⁹ Although the price volatility introduced by liberalization could have important welfare consequences.

Table 4.5.
Access to infrastructure in Bolivia (urban capitals)
by household per capita deciles

Decile	Percentage of Households in Decile with Access										
	Telephone		Communications			Electricity			Water		
	1994	1999	1992	1994	1999	1992	1994	1999	1992	1994	1999
1	0.9	8.3	1.2	2.9	13.5	85.4	89.2	98.9	52.2	64.5	89.1
2	4.5	15.8	2.7	7.2	18.0	88.5	93.3	95.0	59.8	68.1	82.5
3	4.5	20.4	6.6	8.1	27.4	90.3	93.2	97.9	67.4	74.7	89.1
4	6.4	30.7	8.1	9.4	45.0	90.9	94.6	96.9	72.5	73.2	89.0
5	8.8	38.6	13.9	13.4	57.4	94.1	96.6	100.0	71.9	76.4	87.8
6	16.1	51.1	18.5	22.3	62.5	94.8	97.7	100.0	79.4	83.0	95.7
7	20.8	60.4	21.7	27.4	69.4	96.0	98.1	100.0	85.0	85.1	98.7
8	28.6	62.1	29.6	35.6	75.7	97.3	98.0	100.0	84.9	91.1	97.7
9	41.5	72.2	45.0	48.6	86.0	98.5	98.8	99.9	88.4	91.5	95.7
10	60.3	77.4	53.5	69.7	85.1	97.6	99.7	100.0	92.0	95.5	97.8
Total	20.0	42.5	21.1	25.5	52.7	93.6	96.0	98.8	76.3	80.6	92.1

Notes:

Access to Telephone, Electricity and Water is based on direct questions as to whether the household owns a phone, has electricity or uses electricity for lighting, and has the water network come to the building where they live. Access to communications (telephone and mail) occurs if the household had positive expenditure on this item in the last month. Access to telephones is not available separately for 1992.

Access to all services increased between 1994 and 1999. Note that this was in the context of one of the more rapid urbanization process in Latin America, which puts pressure on urban infrastructure as low-income rural immigrants move into cities. In the absence of significant investment, coverage rates would in all likelihood have declined.

Changes in access by per capita household expenditure decile are also reported in Table 4.6. Coverage for electricity was the highest pre-privatization, with more than 98 percent of the top half of the distribution having access in 1994. As a consequence, improvements were mainly concentrated on the poor, with an additional 9.6 percent of the poorest decile gaining access between 1994 and 1999.

Access to water was also initially very high among the richer deciles, but lower than access to electricity among the poor. Each of the bottom seven deciles had an increase in access of more than 10 percent between 1994 and 1999, with a remarkable additional 24.6 percent of the poorest decile gaining access to water. In contrast, access to telephones is much less common, and the increase in access is seen to have occurred mainly for the mid and upper parts of the overall distribution.

While one sees increases in access following the privatization, Table 4.6 shows that access was also increasing before privatization. To estimate whether privatization caused a change in the rate of increase, one can consider the difference between the annual growth rate in access between 1994 and 1999 (post-privatization) and the annual growth rates in access between 1992 and 1994 (pre-privatization).

This simple counterfactual will tend to bias downwards any effect of privatization, as access rates cannot grow beyond 100 percent, and one would hence expect growth rates to fall as coverage grows. Nevertheless, the two panels in Table 4.15 do show positive double-differences for most deciles for communications and for the middle deciles for water. The rate of growth in access to electricity in contrast has slowed, but as access is now 97 percent or above for all but the second decile, this is to be expected.

Table 4.6.
How much of the change in access is due to privatization?

<i>Difference in Differences</i>									
(1994-99 annual change less 1992-94 annual change)									
Decile	Communications			Electricity			Water		
1	1.3			0.0			-1.2		
2	-0.1			-2.1			-1.3		
3	3.1			-0.5			-0.8		
4	6.5			-1.4			2.8		
5	9.0			-0.5			0.1		
6	6.1			-1.0			0.7		
7	5.5			-0.7			2.6		
8	5.0			0.0			-1.7		
9	5.7			0.1			-0.7		
10	-5.0			-1.0			-1.3		
Total	3.2			-0.6			0.1		
Access to Water by Region and Expenditure Quintile									
	La Paz/El Alto			Other main cities			Difference in Difference		Triple Difference
Quintile	1992	1994	1999	1992	1994	1999	92-94	94-99	
1	53.3	66.1	88.8	57.4	66.4	82.5	3.8	6.6	-0.6
2	70.7	73.3	93.3	69.8	74.2	86.9	-1.8	7.4	2.4
3	76.0	77.4	95.6	75.7	80.6	89.4	-3.5	9.5	3.6
4	87.1	89.8	100.0	84.1	87.5	97.3	-0.7	0.4	0.4
5	96.2	94.6	100.0	87.8	93.1	95.4	-6.9	3.1	4.1
Overall	78.1	81.7	94.4	75.6	80.3	90.7	-1.0	2.2	1.0

Notes: The difference-in-difference is the change in La Paz/Alto less the change in the other main cities of Cochabamba and Santa Cruz. The Triple difference is the difference between one-fifth the double difference over 1994-99 and one half the double difference over 1992-94.

A second attempt to determine whether privatization increased access is to compare changes in access to water in La Paz/El Alto, the only city with a sustained concession, to changes in other main cities. This is particularly relevant because the government chose to award the concession in La Paz/El Alto on the basis of bids for the number of new connections to be offered at a predetermined tariff level, which suggests that increases in access were one of the goals of this process.

The second panel of Table 4.6 shows that, for the top four quintiles, access to water increased faster in the other cities from 1992 to 1994 than it did in La Paz/El Alto. However, following the water concession, access increased more between 1994 and 1999 in La Paz/El Alto. The resulting triple difference is positive overall for the richer four quintiles, suggesting privatization did increase access. In contrast, the access of the poorest quintile in La Paz/El Alto increased at a faster rate than that of the poorest quintile in other main cities, both before and after privatization, so that the overall triple difference is small.

In the case of telephone service, the increase in access is also observed when one looks at penetration rates for the whole country, not just the largest cities. Growth is fairly stagnant until 1996, after which there was extremely rapid growth in cellular and internet, and some growth in both fixed line and public phone provision. Cellular subscribers per 100 inhabitants grew from 0.27 in 1996 to 6.96 in 2000, overtaking the number of residential main lines per inhabitant in this period (ITU, 2001). Over the years, there has also been an effort to extend telephone coverage to the rural area, and in fact the capitalization contract with *ENTEL* contained clauses in this regard. Rural lines saw some growth, from 0.65 lines per 1000 rural inhabitants in 1997 to 2.03 lines per 1000 rural inhabitants in 2000.⁵⁰ While the number of connections is quite low, these new connections can have substantial welfare impacts for the rural population.

Although improvements in technology are likely to be responsible for some of these increases, it is likely that the rapid growth rates observed would not have been achieved without liberalization in general, and the introduction of competition in cellular services in particular. Access gains from cellular are particularly important in Bolivia, due to the fact that the local telephone cooperatives were charging \$1200-1500 for access to local lines (an amount which entitles the buyer to one share of the cooperative).⁵¹ Given that the GDP per capita in 1996 was about \$1,000, this put the cost of a local fixed line beyond the reach of many consumers. The introduction of cellular competition dramatically reduced these access costs of access, as will be described in the next section.

Changes in Prices

In spite of the popular perception that privatization results in price increases, its theoretical impact in this regard is uncertain. Much depends on the details of the process itself, as the government has a choice of awarding the contract on the basis of highest amount bid, or lowest tariff offered. The existing amount of direct government subsidies will also determine whether the private firm needs to raise prices to cover losses. Prices may also change due to rebalancing, if there is cross-subsidization prior to privatization. Private firms may also act to reduce illegal connections, resulting in de facto price increases for consumers who previously obtained the service illegally. The amount of competition and regulation is also important: if private management is more

⁵⁰ Rural lines from the Telecommunications Superintendent, SITTEL, <http://www.sittel.gov.bo>.

⁵¹ See Fernando Cossio Muñoz (1999) "Bolivia: Telecommunications Sector", TradePort Industry Sector Analysis Reports, <http://www.tradeport.org/ts/countries/bolivia/isa/isar0001.html>, accessed 5 September 2002.

efficient and the private firm faces competition or regulation, then prices can fall.⁵²

In Bolivia, there are several reasons to believe that prices should not have increased dramatically after the privatizations. First, because capitalization proceeds were not used by the government to cover deficits, there were fewer incentives to build high tariffs into the contracts. Second, the promotion of competition and the implementation of regulation may have also helped reduce the pressure for price increases.

Furthermore, as existing firms were often cooperatives or private already (e.g. COBEE in electricity), the government's distributional goals were not always being implemented through utility prices. Moreover, the autonomous nature of the existing firms is likely to have made illegal connections less of a problem, although our surveys do not enable us to look at changes in this regard. Finally, in telecommunications, the state long distance provider ENTEL was always separate from the local cooperatives, so that the typical cross-subsidization of long distance and local rates was not an issue.

The household surveys used in this chapter do not collect information on the prices paid by individual households for infrastructure services, but instead only on their expenditure. As a consequence, we are forced to use aggregate price indices at either the city or the national level to assess the changes in prices after privatization.

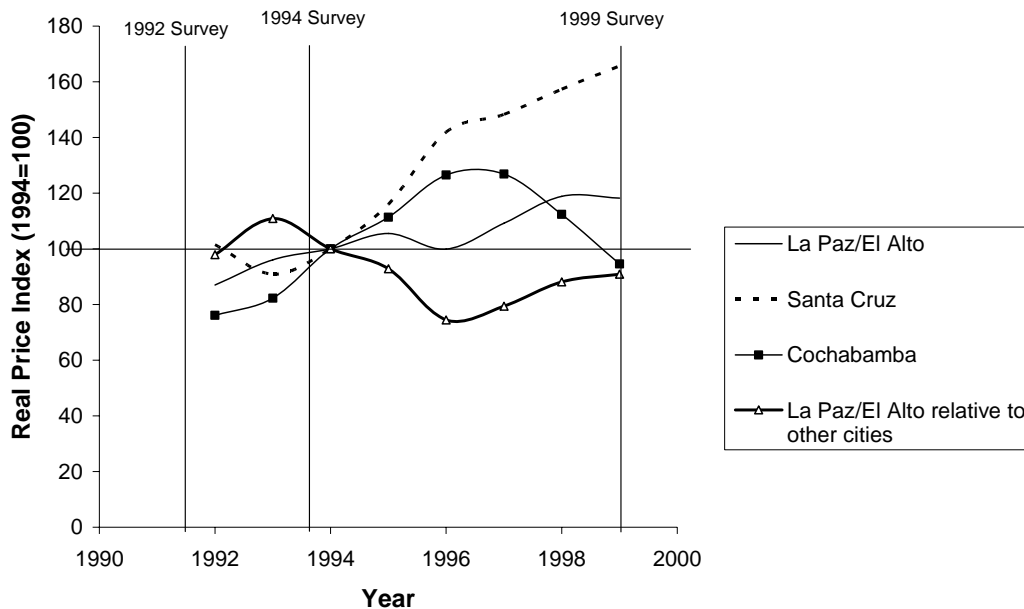
Figure 4.1 displays the evolution of an index of the tariff of 10 cubic meters of water, relative to the consumer price index, for the central axis cities of La Paz/El Alto, Cochabamba and Santa Cruz.⁵³ Prices are seen to be rising in La Paz/El Alto prior to the concession in 1997, and to continue to rise until 1998. However, prices rose faster in Santa Cruz, where reforms did not take place, and so relative to the other cities, privatization resulted in slower increases in La Paz/El Alto. Using the weighted average price in Cochabamba and Santa Cruz to predict what price increases would have been in La Paz/El Alto in the absence of privatization, we therefore find that privatization lowered prices by 10.5 percent relative to the average in other cities.⁵⁴

⁵² See Chapter 2 of Estache et al. (2002) for more discussion of these issues.

⁵³ Data supplied by the Instituto Nacional de Estadística (INE).

⁵⁴ See Table 18 in Barja, McKenzie and Urquiola (2004) for full details of this calculation.

Figure 4.1: Water Prices in Bolivia 1992-99



Source: Water Prices for 10 cubic metres from INE, Bolivia

In the case of water, price increases are especially interesting because they led to what is surely the most spectacular failure in the privatization process. In 1999, *Agua de Tunari*, a subsidiary of Bechtel Enterprises, was the sole bidder in an auction for a water concession in the city of Cochabamba. The city faced a chronic water shortage, with many poor households unconnected to the network, while state subsidies went mainly to the middle class and industry.⁵⁵

When the first monthly bills arrived in January 2000, consumers experienced price increases that averaged 51 percent, with some households experiencing increases in their water bills of more than 90 percent due to small increases in their usage coupled with the large rise in price.⁵⁶ Figure 4.1 shows water prices had fallen during 1997-99, so that the price rises came as even more of a shock to consumers. The poorest consumers, for whom water usage consisted of only an indoor toilet and outside water tap, experienced price rises of 43 percent on average, with some consumers reporting a doubling of their bill.⁵⁷ Prices rose even more for richer consumers, with the middle class experiencing average price increases of 57 percent and commercial users experiencing price increases of 59 percent.

⁵⁵ See "Letter from Bolivia: Leasing the Rain" by William Finnegan, in the *New Yorker*, April 8 2002.

⁵⁶ Source: <http://www.democracyctr.org/bechtel/waterbills/waterbills-global.htm>

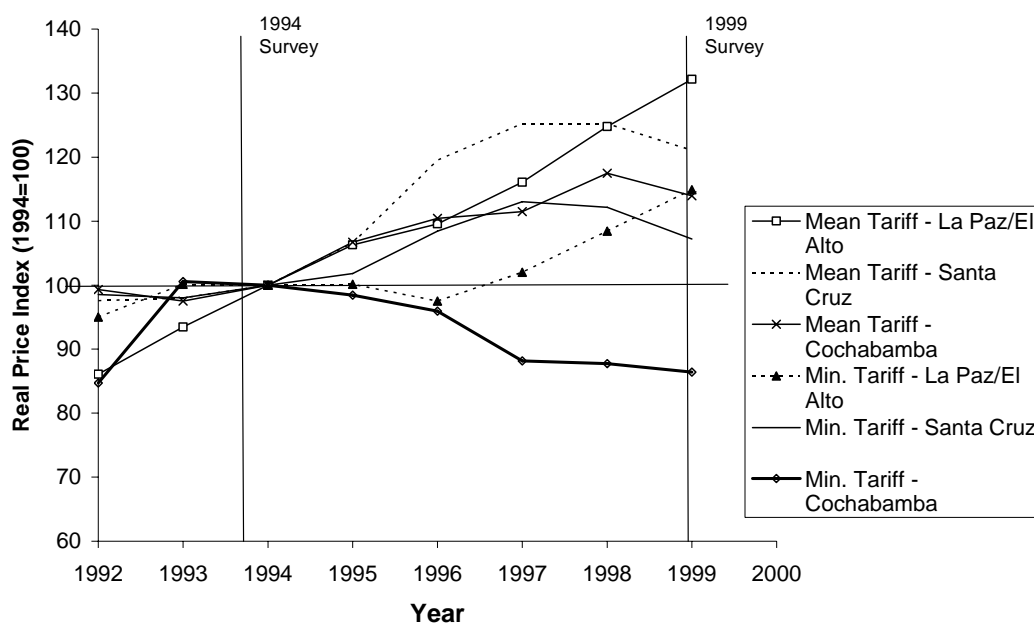
⁵⁷ Source: SEMAPA analysis reported in "Bechtel Vs. Bolivia: The Water Rate Hikes by Bechtel's Bolivian Company (*Agua del Tunari*) The Real Numbers", The Democracy Center, <http://www.democracyctr.org/bechtel/waterbills/waterbills-global.htmw>, accessed August 20, 2002.

In addition, the exclusive rights granted to the concessionaire affected local interests, including those of people who had invested in private wells and distribution systems. An added element was that *Aguas del Tunari* had agreed to invest \$200 million in the popular *Misicuni* water provision project, 30 percent of which had to come from equity and the rest from debt. The tariff increase occurred while the company had not yet complied with the equity commitment, and the debt financing had yet to be lined up. The perception arose that the firm was trying to finance its equity share off the tariff increases.

In this context, the so-called “water war” took place, and involved local labor strikes, demonstrations, and violent confrontations that ended with the cancellation of the concession and the expulsion of *Aguas del Tunari* from Cochabamba. Control of the water network reverted to SEMAPA, the old public utility.

Moving on, Figure 4.2 presents the evolution of electricity prices in Bolivia over the 1990s for each of the central axis cities. Price indices relative to the overall CPI are plotted for the mean residential tariff, and for the minimum electricity tariff for 0-20 Kwh/month, which is likely to be most relevant for poorer households.

Figure 4.2: Electricity Prices in Bolivia 1992-99

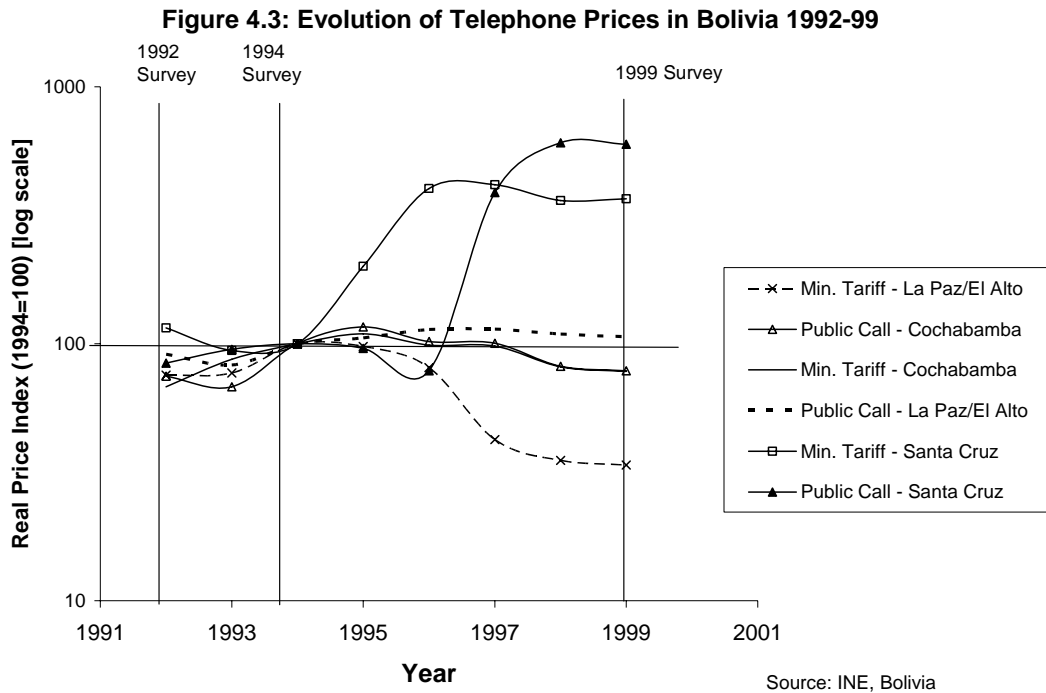


Source: INE, Bolivia, Superintendencia de Electricidad,

Prices have generally risen since the reforms of 1994/95, except for the minimum tariff in Cochabamba, which decreased 14 percent between 1994 and 1999. Nevertheless, since 1998 some price decreases have been realized. On average, prices increased by 26.2 percent between 1994 and 1999. As prices were increasing prior to privatization, we use the trend of price increases before

privatization (over 1992-94) and extrapolate to predict 1999 prices. Comparing these to the actual 1999 prices enables one to determine an approximation of the privatization effect. Overall, privatization is found to have raised prices by 5.6 percent over 1994-99, with prices increasing in La Paz/El Alto and decreasing relative to trend in Cochabamba and Santa Cruz.⁵⁸

In telecommunications, Figure 4.3 shows that the local cooperatives reacted differently, with COTAS, the Santa Cruz telephone cooperative raising both their minimum tariff and the price of a public phone call by more than 250 percent between 1994 and 1999. In contrast, prices fell in La Paz/El Alto, which is not unrelated to COTEL, the La Paz cooperative, later falling into financial distress. Averaging across cities and weighting for population, one finds an 8.3 percent drop in the minimum tariff, whereas the cost of national long distance calls increased 83 percent between 1994 and 1999.

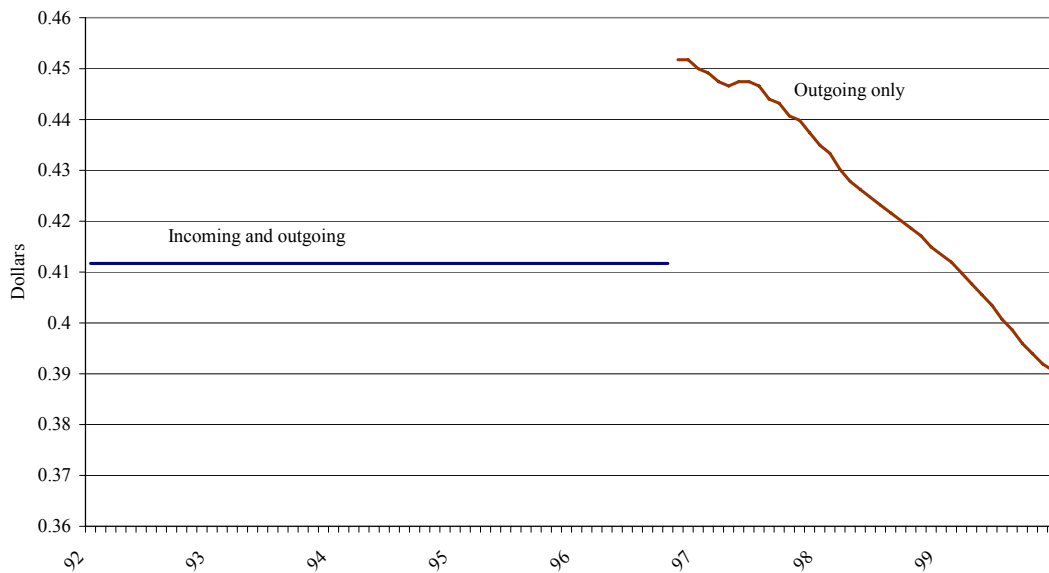


The mobile market was opened to competition by allowing the entry of ENTEL-Movil in 1996. From the early 1990's to October 1996, the incumbent, *Telecel*, charged a fixed monthly tariff of \$29.9, which did not include free minutes, and a tariff per minute of \$0.41 for both incoming and outgoing calls. Additionally, *Telecel* charged \$417 for the initial connection. An aggressive marketing campaign which accompanied the entrance of *ENTEL-Movil* dramatically lowered the cost of cellular services. Under *ENTEL's* "Family Plan" and *Telecel's* "Economy Plan", connection fees for digital lines were free, the monthly fixed tariff without free minutes dropped to \$1.93 in November 1996,

⁵⁸ See Table 19 in Barja, McKenzie and Urquiola (2004) for more details of this extrapolation.

and the tariff per minute increased to \$ 0.45. While tariffs were previously set in dollars, after competition, they were set in bolivianos, becoming subject to depreciation. Figure 4.4 shows the resulting change in per-minute cellular rates. By December 1999, the dollar value of the fixed tariff dropped to \$1.67 and 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. Competition was so effective that although the regulator set a price cap of \$ 180 for access and \$ 51 for use, both firms began charging average rates that were roughly five percent of this level.

Figure 4.4
Minimum tariff per minute in cellular telephony



These 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 fees in excess of \$1,000 for a fixed connection/share. As a new operator entered the market at the end of 2000, and as all these markets were liberalized in 2001, these trends are expected to continue.

Service Quality

Aside from access and prices, consumers also care about service quality. Here again there are data limitations, but we review the existing evidence for selected sectors. For electricity, the 1994 sector law introduced regulation on the quality of distribution,⁵⁹ establishing four stages for its implementation. In a first stage (January 1996 to October 1997), the distribution firms helped establish the

⁵⁹ Rules for the Quality of Distribution (1995).

methodology for measurement and control of the quality indicators. In the second, trial period (November 1997 to April 1998), the distributor tested the methodology, and in the third, transition period (November 1997 to April 1998), the firms had to comply with the quality indicators established in the rules, subject to monetary penalties. In the fourth stage (May 2001 on), the distribution firms must comply with more demanding levels of the quality indicators established in the rules, with similar financial penalties for non-compliance.

Table 4.7 presents the admissible limits for the indicators established in these rules. It also covers the results reached by the six firms that are part of the NIS. The indicators are divided into three groups: commercial, technical, and product quality. The data are simple averages from two periods, November 1988 -- April 1999, and May 1999 -- October 1999. Unfortunately, these data were not collected pre-privatization.

Table 4.7.
Distribution quality indicators in the transition stage, 1999⁽¹⁾

Quality measure	Limit allowed	CRE	ELECTRO-PAZELFEC	ELFEO	CESSA	SEPSA	
Commercial service quality							
Index of technical complaints among users	10	6.2	2.8	1.1	1.4	3.6	-
Index of commercial complaints among users	12	2.5	1.7	0.3	1.2	0	-
Index of billing quality	30	1.8	4.9	1.1	5.1	0.7	-
Index of estimated billing	25	5.4	16.4	15.6	20	58.5	-
Average response time -- users' technical complaints (hours)	3 hours	2.7	2.3	3.8	1.4	1.1	-
Average response time -- users' commercial complaints (hours)	48 hours	35.3	35.7	5.5	0	0.7	-
Technical service quality							
Average interruption frequency per user	25 y 35 ⁽²⁾	5.9	3.5	3.4	3.2	7.5	4.5
Total interruption time per user (hours)	20 y 35 ⁽²⁾	6.9	4.2	3.1	3.6	7	3.3
Technical quality (percentage of cases analyzed by penalty)⁽³⁾							
Phase disequilibrium		22.4	3.3	5.3	5.6	-	8.3
High voltage supply		0	0	25	20.8	-	0
Medium voltage supply		5.5	6.4	32.5	11.1	61.1	55.9
Centers in medium and low tension		26.1	2.9	30.3	15.5	66.7	70.8
Low tension supply		28.1	6.7	62.3	25	75	56.3

Source: Memoria 1999, Superintendencia de Electricidad.

All the distribution enterprises are complying with almost all the commercial and technical quality indicators, the exceptions being *CESSA* for the index of estimated billing, and *ELFEC* for the average time to respond to technical complaints. Regarding the quality of technical production, practically all firms present cases of non-compliance, and in the cases of *CESSA* and *SEPSA*, these seem rather grave.

All this information can do is establish that the electricity sector has seen recent efforts to improve quality. We do not know if these levels are better than those one would have observed pre-privatization, especially since the firms themselves appear to have helped draft the quality guidelines under which they now operate. For what it is worth, anecdotal evidence indicates that distribution problems, particularly blackouts (which may have their ultimate genesis in the generation sector), are down since capitalization, and that overall consumers are more satisfied.

In the case of telecommunications, we omit the specific information for reasons of space,⁶⁰ but nonetheless note that in this sector there were also goals for expansion, quality, and modernization, and the degree of fulfillment by operators in long distance, local, and cellular services.

In long distance, *ENTEL* was in full compliance up to 1998. In local services, the 1998 goals were achieved by the three largest cooperatives. In some cases, the goals were fulfilled easily, as in the case of the percentage of digitalization achieved by *COTAS* and *COTEL*, or the percentage of completed calls attained by *COTEL* and *COMTECO*. In others the objectives were just met, as in the percentage of calls completed at *COTAS*. Only the case of *COTEL* reveals incomplete goals by 1999.

In the case of cellular phone service, in all cases the operators, *ENTEL-Movil* and *Telecel*, achieved the 1998 expansion and quality goals. In fact, most of these were achieved by 1997, which in part reflects the competitive pressures in this sector. Indeed, available data cannot really account for the fact that substantial welfare improvements may have come thanks to the mere existence of new services or substitutes like cellular telephony. To the extent that capitalization facilitated their arrival, one can credit it with welfare consequences along this dimension as well.

Valuing the Joint Welfare Impact of Price and Access Changes

We have shown that privatization is associated with increases in access and with a mixture of price increases and decreases. As (almost) all consumers do not produce water, electricity, or telephone services, Deaton (1989) notes that non-parametric estimation of Engel curves will approximate the average welfare changes to consumers from price changes. Ignoring changes in access then, the expenditure shares allocated by households to each infrastructure service will allow determination of which consumers are most affected by price changes.

Examining expenditure shares by household expenditure decile, we find electricity to be a necessity, with expenditure shares falling with total expenditure.⁶¹ With access rates high across all deciles, changes in the electricity price will have the most impact on the poor. Water expenditure shares fall slightly with expenditure levels, and with access to water high, water price changes will

⁶⁰ Again, this information is available in Barja, McKenzie and Urquiola (2004).

⁶¹ Table 23 in Barja, McKenzie and Urquiola (2004) provides a detailed break-down of budget shares by expenditure decile.

also impact the poor most. Communications (telephone) is more of a luxury good, especially in 1999. Given access to telephones is also higher among richer deciles, price changes for telephone will clearly have the most impact on the rich.

The expenditure share details the impact of a price change on consumers provided that they do not adjust the quantity of the service consumed. Banks, Blundell and Lewbel (1996) refer to this as the first-order approximation of a welfare change. Let x_0 be a household's initial total expenditure per capita, w_{j0} be their initial budget share on service j , p_j be the price of service j , and U be household's utility. Then the first-order approximation of the relative change in utility for a change in the price of service j is:

$$\frac{\Delta U}{x_0} = -(\Delta \log p_j) w_{j0} . \quad (1)$$

Intuitively, a change in the price of a service will have the greatest impact on consumers who devote a larger share of their total budget to that service. Of course in practice consumers often will adjust the quantity consumed when prices change, and so Banks, Blundell and Lewbel (1996) provide a second-order approximation to the change in welfare, which does allow some quantity response:

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

The elasticity $\partial \log w_j / \partial \log p_j$ is estimated by γ_{ij}/w_{j0} , where the coefficient γ_{ij} is obtained from estimation of the Engel equation for household h

$$w_{hj} = \alpha_j + \sum_{i=1}^k \gamma_{ij} \log p_i + \beta_j \log \frac{x_h}{n_h} + \phi_j \left(\log \frac{x_h}{n_h} \right)^2 + \lambda_j' Z_h . \quad (3)$$

where n_h is the household size for household h , Z_h contains other demographic control variables, and p_i for $i \neq j$ is the price of good i . Detailed information on the price of substitute goods is not available, and so we do not include other prices in estimating (3).

As presented, equations (1) and (2) would allow estimation of the first and second-order approximations of the welfare effects of price changes for households with access to the infrastructure service both before and after privatization. In order to value the welfare benefit to consumers of gaining access to a service, McKenzie and Mookherjee (2003) suggest using the *virtual price* of the service for those who gain access. The virtual price is obtained from the Engel equation (3) as the price at which the household would have chosen to consume zero units of the service prior to privatization if they had had access to the service in question. The effective price change for a household, which gains access, is then the fall from the virtual price to the post-privatization price.

Two additional complications must be resolved to estimate the value of access. The first is that equation (3) is estimated only for households with access,

leading to inconsistent estimates if omitted variables correlated with access also influence demand. A Heckman two-step selection correction is therefore used to estimate (3).

The second complication is that the Bolivian household surveys are repeated cross-sections, rather than a panel. Thus, it is not possible to identify specific households who gained access between 1994 and 1999, since the 1999 survey contains different households from the 1994 survey. McKenzie and Mookherjee (2003) provide a methodology for estimating the average change in welfare for a decile, incorporating changes in access, with repeated cross-sections. We employ their method here.

Table 4.8 presents probit regressions for access to each of the three services. Access is greater in households that are richer, have bigger houses, have more household members, are renting, and have less children. These probits can then be used to correct for selection in the Engel equation (3).

Table 4.8.
Probits for access to infrastructure 1992-99

	Water		Electricity		Communications		
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	
Head's Age	0.0023	0.0053	-0.0024	0.0076	0.0094	0.0054	*
Head's Age Squared	0.0000	0.0001	0.0000	0.0001	-0.0001	0.0001	
Head is Male	-0.2005	0.0321	***-0.0291	0.0466	-0.0397	0.0309	
Household Size	0.0408	0.0107	***0.0690	0.0170	***0.0458	0.0102	***
Per capita Expenditure Decile	0.1052	0.0049	***0.0950	0.0075	***0.2107	0.0053	***
# rooms in house	0.1549	0.0100	***0.2924	0.0188	***0.2455	0.0083	***
Dummy if rent house	0.3787	0.0292	***0.3644	0.0440	***0.1395	0.0295	***
# in household aged < 15	-0.0740	0.0134	***-0.1194	0.0210	***-0.0469	0.0137	***
# in household aged > 65	0.0501	0.0437	-0.0728	0.0653	0.0792	0.0383	**
Constant	-0.0621	0.1145	0.6178	0.1636	***-3.0524	0.1226	***
Number of Observations	17581		17581		17581		
Pseudo-R2	0.0964		0.1281		0.2565		

Source: own calculations from EIH waves 5, 6 and 7 (1992, 1993 and 1994) and from ECH 1999.

Table 4.9. presents the results estimating the Engel equation by OLS for households with positive expenditure shares, and after the Heckman two-step correction. In the case of communications services, there are over 12,000 households with zero expenditure shares compared to 2,500 households with positive shares, and the resulting price elasticity under the two-step method is positive and insignificantly different from zero. We use the elasticity estimated under OLS in this case.

Table 4.9.
Engel equations

Dependent variable: expenditure share of specified infrastructure service

Variable	Water		Electricity		Communications		
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	
OLS Regression Results							
Log price	0.175	0.146	-0.118	0.320	-0.156	0.178	
Log expenditure per capita (Log expenditure per capita) ²	-1.512	0.244	*** -2.749	0.398	*** -1.286	1.061	
Log household size	0.077	0.021	*** 0.122	0.035	*** 0.092	0.086	
	-0.427	0.041	*** -0.741	0.067	*** -0.491	0.131	***
Heckman Two-step Results							
Log price	-0.582	0.260	** -0.162	0.319	0.289	0.280	
Log expenditure per capita (Log expenditure per capita) ²	-4.726	0.512	*** -0.844	0.408	** -4.624	1.851	**
	0.305	0.042	*** -0.013	0.036	0.335	0.146	**
Log household size	-1.027	0.089	*** -0.527	0.080	*** -1.369	0.245	***
Lambda	-2.016	0.275	*** 3.364	0.025	*** -0.660	0.197	***

Note: regressions also include dummy for male head, city dummies, and the proportion of the household aged 0-4, 5-9, 10-14, and 65 and above.

As described above, the household surveys do not report the specific prices paid for each service by individual households, and so we are forced to use aggregate indices when estimating the welfare effects in (1) and (2). We have city-specific price indices only for the central axis cities of La Paz/El Alto, Cochabamba, and Santa Cruz, and so we restrict our analysis to these cities.

For communications, we use the city-specific actual change in the minimum tariff between 1994 and 1999 as the change in price for households with access. For electricity, we present results under two scenarios: the first uses the actual change in the city-specific mean tariff rate between 1994 and 1999, while the second uses only the increase in tariff rates relative to that predicted by the trend over 1992-94. For the water concession in La Paz/El Alto, we use the change in price relative to the average price in Santa Cruz and Cochabamba, while for the second water concession in Cochabamba in 2000 we use the average 43 percent price change reported for poorer households.

Table 4.10 presents the estimated overall joint welfare effects of the price and access changes for communications and electricity. The estimated value of gaining access to telephones is estimated to be 80 percent of per capita monthly expenditure for the poorest deciles, and up to 180 percent of per capita monthly expenditure (PCME) for the richest deciles. In contrast, the price increases in Santa Cruz and decreases elsewhere had a welfare impact of less than two percent of PCME, since budget shares allocated to telecommunications are small. The overall impact of price and access changes in communications is positive for all but the top decile, for which access did not increase enough to offset the price increases in Santa Cruz. Deciles 5-9 benefited the most from the expansion of access and price changes, and their average welfare impact was around five percent of one month's per capita expenditure.

Table 4.10.
First and second order approximations to welfare change
(as a percentage of per capita household expenditure)

COMMUNICATIONS						
1994 Expenditure Decile	Households with access both periods		Households who gain access		Overall mean effect	
	1st-order approx.	2nd-order approx.	1st-order approx.	2nd-order approx.	1st-order approx.	2nd-order approx.
1	0.59	0.62	53.10	80.64	0.23	0.34
2	1.81	1.88	20.87	39.55	0.13	0.13
3	1.73	1.79	56.88	88.25	0.50	0.70
4	1.35	1.41	54.03	82.77	1.80	2.69
5	1.79	1.86	57.25	83.17	4.06	5.80
6	0.77	0.84	85.41	120.17	4.05	5.65
7	0.47	0.55	99.98	131.57	3.55	4.65
8	-0.09	-0.02	88.97	124.42	2.62	3.71
9	-0.40	-0.31	146.99	182.68	8.38	10.51
10	-0.86	-0.77	142.51	181.82	-7.44	-9.27

ELECTRICITY						
a. Results based on part of price change attributable to privatization						
1994 Expenditure Decile	Households with access both periods		Households who gain access		Overall mean effect	
	1st-order approx.	2nd-order approx.	1st-order approx.	2nd-order approx.	1st-order approx.	2nd-order approx.
1	-0.50	-0.50	139.04	195.54	12.80	18.19
2	-0.27	-0.27	102.95	151.32	1.46	2.26
3	-0.23	-0.23	96.95	144.58	4.19	6.35
4	-0.21	-0.21	115.29	163.85	2.30	3.36
5	-0.23	-0.23	88.68	130.94	2.83	4.29
6	-0.20	-0.20	84.54	128.42	1.75	2.76
7	-0.18	-0.18	93.21	133.31	1.59	2.34
8	-0.15	-0.15	83.37	124.34	1.51	2.33
9	-0.19	-0.18	78.16	113.02	0.71	1.12
10	-0.15	-0.15	61.51	91.99	0.04	0.13
b. Results assuming all of price change is due to privatization						
1994 Expenditure Decile	Households with access both periods		Households who gain access		Overall mean effect	
	1st-order approx.	2nd-order approx.	1st-order approx.	2nd-order approx.	1st-order approx.	2nd-order approx.
1	-1.44	-1.43	139.04	195.54	11.97	17.36
2	-1.02	-1.02	102.95	151.32	0.76	1.56
3	-0.99	-0.99	96.95	144.58	3.48	5.64
4	-0.96	-0.95	115.29	163.85	1.60	2.65
5	-0.99	-0.98	88.68	130.94	2.11	3.57
6	-1.00	-1.00	84.54	128.42	0.97	1.98
7	-0.92	-0.92	93.21	133.31	0.86	1.62
8	-0.89	-0.89	83.37	124.34	0.78	1.60
9	-0.89	-0.89	78.16	113.02	0.02	0.42
10	-0.69	-0.68	61.51	91.99	-0.50	-0.41

Recall that average electricity prices increased in all three cities between 1994 and 1999, which had a negative impact on consumers with access. The price change hurt consumers in the poorer deciles more, with an average cost of 1.4 percent of PCME for the bottom decile. If one allows that only part of the increase in prices may be a result of privatization (scenario 1), then the direct privatization effect on consumers with access is at most a welfare loss of 0.5 percent of PCME. Gaining access to electricity is valued relatively more by poorer deciles, with the welfare gain from getting access estimated at 150-200 percent of PCME for the poorest deciles. Increases in access were concentrated on the poor, and as a result, the overall impact of privatization is seen to be positive and largest for the poorest deciles. These groups experienced an average welfare gain of 17 percent between 1994-99 from electricity access and price changes, whereas the richest decile, for which access was already above 99 percent, experienced an overall welfare loss of 0.4 percent of PCME.

Table 4.11 presents separate results for the welfare changes from the water concessions in La Paz/El Alto, and in Cochabamba. Two scenarios are presented for the concession in La Paz/El Alto: the first assumes that privatization is responsible for all of the increase in access which occurred, while the second values only increases in access relative to access increases in Santa Cruz and Cochabamba. Gaining access to water is valued at 11-25 percent of PCME for the poorest 5 deciles, while the relative price decrease has only minor welfare effects. Overall, privatization is seen to have benefited the poor most, particularly if one ascribes all of the increases in access to it.

Table 4.11.
Welfare changes from water privatizations
as a percentage of per capita household expenditure

1. Results for La Paz and El Alto only									
Scenario 1: All of increase in access is due to privatization									
Scenario 2: Only increase in access relative to increase in Santa Cruz and Cochabamba is due to privatization									
	Households with		Households who		Overall mean effect		Overall mean effect		
1994	access both periods		gain access		<i>scenario 1</i>		<i>scenario 2</i>		
Expenditure	1st-order	2nd-order	1st-order	2nd-order	1st-order	2nd-order	1st-order	2nd-order	
Decile	approx.	approx.	approx.	approx.	approx.	approx.	approx.	approx.	
1	0.290	0.293	14.48	24.83	4.12	6.93	0.94	1.48	
2	0.218	0.222	5.48	11.48	0.83	1.58	0.31	0.50	
3	0.193	0.196	11.60	17.49	2.01	2.96	0.46	0.63	
4	0.170	0.174	5.08	10.81	1.30	2.63	0.43	0.77	
5	0.181	0.185	8.19	12.82	1.29	1.94	0.87	1.29	
6	0.194	0.198	5.31	9.09	1.15	1.86	0.47	0.70	
7	0.202	0.206	4.52	7.39	0.85	1.29	0.17	0.17	
8	0.196	0.200	6.52	10.12	0.60	0.83	0.18	0.19	
9	0.195	0.199	2.53	4.65	0.42	0.62	0.26	0.33	
10	0.159	0.163	6.18	8.89	0.42	0.54	0.15	0.16	
2. Results for Cochabamba									
Impact of a 43 percent price change with no changes in access as percentage of per capita household expenditure									
	Mean impact		Maximum impact						
1999	1st-order	2nd-order	1st-order	2nd-order					
Expenditure	1st-order	2nd-order	1st-order	2nd-order					
Decile	approx.	approx.	approx.	approx.					
1	-0.99	-0.95	-3.69	-3.65					
2	-1.08	-1.04	-3.52	-3.49					
3	-0.55	-0.52	-2.30	-2.26					
4	-0.69	-0.66	-2.72	-2.68					
5	-0.95	-0.92	-3.04	-3.00					
6	-0.76	-0.72	-1.98	-1.95					
7	-0.75	-0.71	-3.77	-3.73					
8	-0.38	-0.34	-1.03	-0.99					
9	-0.50	-0.46	-1.01	-0.97					
10	-0.57	-0.53	-2.12	-2.08					

In contrast, the failed privatization in Cochabamba was a definite welfare loss for consumers. Prices increased, and the short-lived nature of the privatization meant that the expansions in the water-network agreed upon under the concession contract were not realized. Nevertheless, our estimates of the average welfare losses are not nearly as large as some press reports suggested. (For example, Finnegan (2002) reported in *The New Yorker* that “ordinary workers now had water bills that amounted to a quarter of their monthly income.”)

Table 4.11 shows the estimated average cost of a 43 percent price rise is at most one percent of PCME. The maximum expenditure share on water observed in Cochabamba in the 1999 household survey was 10.5 percent, with an average

expenditure share of 1.6 percent and the 95th percentile at 5.4 percent. Table 4.11 reports the maximum welfare losses in each decile, which is the welfare loss for the households with largest water expenditure shares in our sample in each decile. The maximum welfare loss of a 43 percent price rise for the households in our sample is 3.8 percent of PCME. Although some households experienced larger price increases, most households' expenditure shares were simply too low for even a doubling of price to result in the water bill reaching a quarter of income. The numbers reported in the press therefore represent the possible maximum impact on a very limited number of consumers, whereas the average consumer had much smaller welfare losses.

Poverty and Inequality

The consumer welfare changes estimated here are household level money metric measures of the change in welfare if one assumes there are no income effects (Banks, Blundell and Lewbel, 1996). McKenzie and Mookherjee (2003) therefore suggest that these estimated changes can be used to evaluate the impact of privatization on inequality and poverty.

The approach is to first calculate the pre-privatization Gini coefficient, Atkinson inequality indices, and Foster, Greer and Thorbecke (1984) measures of poverty using the pre-privatization household per capita expenditures. Counterfactual inequality and poverty measures can then be estimated by adding the estimated per capita change in consumer welfare to pre-privatization household expenditure, and recalculating the Gini coefficient and other measures. Again the use of repeated cross-sections means one is unable to identify the specific households, which gained access to the privatized service, and so McKenzie and Mookherjee (2003) provide a method for calculating the counterfactual inequality and poverty measures in this case.

Table 4.12 uses this method to present the overall impact of each of the privatizations on inequality and poverty. Privatization of electricity is found to have reduced inequality slightly and reduced poverty by 1-1.5 percent. This is mainly a result of increases in access to electricity among the poor. The privatization of telephone services is found to have had larger effects, increasing inequality but reducing headcount poverty by five to six percent.

Table 4.12.
Inequality and poverty effects of privatization

	Inequality Measures				Poverty Measures		
	Gini	Atkinson Indices			Foster-Greer-Thorbecke index		
	Index	A(0.5)	A(1)	A(2)	a=0	a=1	a=2
Actual measure in 1994 (4 main cities)	0.442	0.164	0.278	0.660	0.625	0.259	0.136
After Telecoms Privatization							
first-order approximation	0.455	0.171	0.293	0.641	0.572	0.240	0.129
second-order approximation	0.464	0.176	0.303	0.641	0.566	0.240	0.128
After Electricity Privatization							
<i>a. based on price change due to privatization</i>							
first-order approximation	0.439	0.161	0.275	0.650	0.612	0.250	0.130
second-order approximation	0.442	0.163	0.277	0.648	0.607	0.249	0.130
<i>b. based on entire price change</i>							
first-order approximation	0.440	0.162	0.275	0.652	0.615	0.253	0.132
second-order approximation	0.442	0.163	0.278	0.649	0.610	0.251	0.132
Actual measure in La Paz/EI Alto in 1994	0.434	0.158	0.269	0.633	0.691	0.305	0.168
After Water Privatization							
<i>a. assuming all of access increase due to privatization</i>							
first-order approximation	0.427	0.153	0.260	0.626	0.683	0.295	0.160
second-order approximation	0.422	0.150	0.255	0.621	0.677	0.289	0.155
<i>b. assuming only increase in access relative to Santa Cruz/Cochabamba is due to privatization</i>							
first-order approximation	0.432	0.156	0.266	0.631	0.691	0.302	0.165
second-order approximation	0.431	0.156	0.265	0.629	0.688	0.299	0.164
Actual measure in Cochabamba in 1999	0.378	0.116	0.210	0.437	0.290	0.086	0.036
after water privatization							
first-order approximation	0.378	0.116	0.210	0.437	0.300	0.088	0.037
second-order approximation	0.378	0.116	0.210	0.437	0.300	0.088	0.037

The explanation for this decrease in poverty occurring along with an increase in inequality is that access increased mainly for the middle deciles in Bolivia. This increased inequality, but as Bolivia has a very high level of poverty, even households in the fifth and sixth deciles lie below the poverty line, and so poverty is reduced when they gain access. The distribution sensitive ($\alpha=2$) Foster-Greer-Thorbecke poverty measure shows less of a reduction in poverty as a result.

Inequality and poverty are also seen to have fallen as a result of the successful water concession in La Paz and El Alto. Increases in access to water primarily benefited the poor here, while water prices decreased slightly relative to those in non-concession cities. In spite of the media attention and widespread protests, the water privatization in Cochabamba is not found to have had any impact on inequality, and only an additional one percent of households fell below the poverty line as a result. As with the estimated welfare effects, the expenditure shares of most households on water were simply too small for the price changes in water to have dramatic effects on household poverty levels.

Macroeconomic consequences

The Bolivian economy has been in recession roughly since 1999. This began with external shocks that hit the export and later the construction sector, and was further aggravated by reductions in investment and aggregate demand. It is key to notice that this macroeconomic environment has established two distinct periods in which to analyze the capitalization reforms' performance.

Of course, capitalization in turn had significant impacts on macroeconomic variables, and was part of a broader transformation of the economy. The most visible consequence in this area is the increase in foreign direct investment (FDI) observed since 1994, which is partly explained by the capitalized firms' activities. Capitalization-related FDI reached a maximum of 7.5 percent of GDP by 1998, and total FDI peaked at 11.9 percent in 1999. This helped raise total investment from 14.9 percent of GDP in 1994, to a maximum of 23.2 in 1998. This investment was mainly focused on the energy and infrastructure sectors, which gained importance relative to traditional activities like mining. Moreover, the resilience of FDI to the downturn is an important factor in explaining why the recession in Bolivia has by some measures been less severe than that in some neighboring countries.

FDI has been greater than domestic private investment since 1995, and of course also contributed to total private investment surpassing government investment during 1995-2000.⁶² This is important considering the vision of private sector-led growth that has accompanied the capitalization process, and the traditionally greater importance of government investment. Additionally, FDI also strengthened the balance of payments accounts and enhanced their sustainability.

⁶² See Table 29 in Barja, McKenzie and Urquiola (2004) for a detailed breakdown of the source and structure of investment over the period 1990-2001.

However, this process ran out of steam with the recession and the end of capitalization-related investment commitments. By 2001 total investment dropped to 13.9 percent of GDP with a tendency for total government investment to decrease less rapidly than that of the private sector, implying a return to foreign debt financing. Even though FDI has remained fairly strong, private domestic investment has fallen quite fast, providing some evidence of capital flight.

Aside from seeking to stimulate investment, the decision to capitalize was considered a “second generation” reform, 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.

The composition of government investment gradually came to reflect these priorities. Although total investment has decreased as percent of GDP, the social sectors’ participation went up from 2.2 percent in 1994 to 3.7 percent in 2001. Investment in production also increased from 0.7 to 1.4 percent of GDP, largely reflecting greater support of the agricultural sector. However, investment in the production of extractives decreased from 1.8 percent in 1994 to basically 0 percent in 1999, mainly due to withdrawal from hydrocarbons production. The decline in infrastructure from 3.9 to 2.9 percent of GDP partially reflects withdrawal from the electricity, telecommunications, and transportation sectors. Of course, here again one cannot exclusively attribute these changes to capitalization, particularly given restrictions to government investment imposed by foreign lenders and HIPC obligations. Capitalization also affected the revenue side of the state’s finances. An increase in government income occurred mainly through tax collection, with taxes and later royalties on hydrocarbons being its additional post-1996 component. In contrast, income from the sales of hydrocarbons decreased substantially from 1995 on.

The net effect of these changes was to lower the fiscal deficit substantially, particularly if considered in isolation of the impact of pension reform (which arrived at roughly the same time as capitalization). The deficit was low by 1996, and the government even attained a very modest surplus (always without considering pensions) in 1999-2000.⁶³ The situation has severely deteriorated with the recession, and including pension costs the deficit had reached 9 percent of GDP by 2002.

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

⁶³ See Figure 11 in Barja, McKenzie, and Urquiola (2004) for more detail on the evolution of the fiscal deficit.

Political Economy

We now turn to the political economy aspects of the implementation of capitalization. We also venture a few hypotheses on why this reform has proved unpopular, when by several technical standards, it would seem relatively successful.

The promise of capitalization

As reviewed above, Bolivia initiated the transition from a state-led to a more market-driven economy in 1985. Initially, this process focused on the liberalization of key prices and the promotion of market allocation mechanisms, with the goal of stopping hyperinflation and returning to macroeconomic stability.

The Paz Estenssoro administration (1985-89) focused on the achievement and defense of stability, strict fiscal discipline, and the onset of structural reforms. These included tax reform and a move towards the independence of monetary authorities. These measures had some of the intended result, since GDP growth recovered from negative numbers in 1985, to 3.8 percent in 1989, with an investment level of 11 percent of GDP at the end of this period.

In the next administration (Paz Zamora, 1989-93) the emphasis changed at least in principle from stability to growth, always within the general outlines of the economic model introduced in 1985. During this period, the most important initiatives were a new Investment Law (to promote domestic and especially foreign investment), the Hydrocarbons Law and Mining Code (to attract foreign investment via joint ventures with *YPFB* and *COMIBOL*) and the Privatization Law. The latter provided the framework to initiate privatizations with small state firms that were generally owned by (public) regional development corporations. For this purpose, the government also organized an office devoted to “reordering” state enterprises, establishing their number and characteristics in preparation for eventual privatization. By 1993, growth reached 4.3 percent, with a 15.7 investment rate.

Still, the consensus was that despite having achieved stability, Bolivia needed significantly higher growth to achieve substantial poverty reduction. In the free market setting that had been adopted, this essentially implied the need to further promote foreign direct investment and technological change. It was clear that since stabilization in 1985, domestic private investment had advanced slowly. In the main, domestic firms did not seem to have developed the capacity to compete in global markets.

Further, macroeconomic stability itself was repeatedly in question, given that various levels of government were still heavily involved in production, and that public investment remained the principal engine of growth. This investment, further, had to meet multiple needs such as those in electricity, water, sewerage, telecommunications, transportation, and oil exploration – let alone growing priorities in health and education. This situation, coupled with pressure from

international organizations like the World Bank, made it clear that privatization was the path to follow.

The Sanchez de Lozada administration (1993-97) was perhaps the most aggressive in structural reform. Capitalization was only a part of overall changes that included greater local participation, and pension reform. In general, there were two emphases: 1) the transfer of productive activities to the private sector, and 2) the sharing of social area responsibilities with local jurisdictions. The first required sector-by-sector reform to establish the conditions under which the private sector would participate. The second required reform of the government itself. While the first was mostly efficiency oriented, the second was directed to distributional issues. This plan responded to a vision of economic development in which the private sector would lead investment and growth, and the state would regulate markets and increase its efficiency in the provision of public and quasi-public goods.

The capitalization mechanism initially promised that a 51 percent share of each firm would remain in Bolivian hands. This would accomplish a double objective: democratizing business ownership and stimulating investment and broad-based growth. Thus, together with regulation, the promise was one of growth and efficiency under private sector leadership, coupled with a sense of social equity embodied in the effort to avoid further wealth-concentration.

At the time of implementation, the promise of majority control by Bolivians at large had to be abandoned. Foreign enterprises demanded at least a 50 percent share and control of each company, and without this concession it would have been difficult to allay their fear of politically-based interference and intervention. Majority private control, the argument went, guaranteed managerial and technological improvements. In addition, the fact that foreign firms' payments would be invested (rather than go into government coffers), would solve long-standing capital constraint problems and promote increases in coverage rates, quality, and employment.

This last argument was directed towards reducing the fear that the government, awash in "found money" would immediately spend it on social or infrastructure projects that, however well-intentioned, would not have a positive, enduring impact on growth and responsible financial management (ignoring the possibility that corrupt officials might turn these resources to personal ends).

Conflicts during the capitalization process

The approval of the capitalization law in March of 1994 initiated the process. This law authorized the executive power to contribute the assets of state firms to the creation of *Sociedades Anónimas Mixtas* (SAM's) or mixed enterprises. The Law authorized the transfer of portions of these firms to their workers, and to the population at large. Additionally, it allowed the government to sell new, capital increasing shares, in international auctions.

The Law's approval was feasible because the governing party enjoyed a congressional majority through a coalition with some smaller parties.⁶⁴ This majority was also key for the approval of all the other relevant laws mentioned above, which enabled the executive to then detail their application through extensive *decretos reglamentarios* (detailed regulatory decrees). The opposition parties⁶⁵ then and later claimed that the laws promoted by the government, including the capitalization law, were prepared and approved without regard to any opposition or debate.

A critical issue was the position of organized labor. Two forces came into play. On the one hand, the Central Obrera Boliviana (COB), the broadest labor organization, expressed its opposition to the whole process. On the other, the government made the decision to turn the workers into partial owners, as a way of obtaining their support.

From the start, the COB, which had been much weakened since the 1980's, rejected the idea of capitalization, arguing instead for a strengthening of the state firms' financial and managerial condition. While it was steady in this position, it was unable to stop direct contacts between the government and the workers and employee unions in the firms that were to be capitalized. While these in turn initially stuck by the COB, one by one their respective leaders initiated direct contacts with the government, seeking to achieve the best deal for their members.

Capitalization itself began with *ENDE*, perhaps in part because its workers were not as organized as those in other state firms. In any event, they were the first to agree to partial ownership in exchange for supporting (or at least not actively opposing) the process. *ENTEL* workers were the second group to fall in line, after negotiating an agreement by which benefits as well as job security were guaranteed. *YPFB*'s capitalization was made viable in a similar way, and the workers obtained a particularly important share in *Transredes*.

In the case of *ENFE*, the government guaranteed job security for a seven-month period, but the workers obtained a relatively small ownership share. The sale price of this firm was well below book value, an outcome that the workers perhaps foresaw. The *LAB* union posed the strongest opposition to capitalization. In the event, it also came around once guarantees of job security were offered.

Industry-specific conflict rose particularly in the telecommunications sector, where the government aimed at transferring *ENTEL* (with a period of exclusivity) in the long distance market, as well as introducing competition in the local sector. However, the independent cooperatives that provided local phone services strongly opposed giving up their monopolies. Government then asked that they at least transform into fully private firms in order to attract private investment and eventually compete in open markets. This was also rejected by

⁶⁴ The main political party in government was the Movimiento Nacionalista Revolucionario (MNR), which acted in coalition with Unión Cívica Solidaridad (UCS), Movimiento Bolivia Libre (MBL), and Movimiento Revolucionario Tupaj Katari (MRTK).

⁶⁵ Mainly the Movimiento de Izquierda Revolucionaria (MIR) and Acción Democrática Nacionalista (ADN).

the cooperatives. In addition, they continued to demand a period of exclusivity in the local service. The government went along with this, but imposed price cap regulation together with expansion and quality goals.

Criticisms of capitalization

Not surprisingly, the capitalization process spawned considerable criticism. The following issues were the focus of much debate:

- 1) The notion that the state enterprises to be capitalized had been run in such a way as to benefit only a small group of bureaucrats and politicians – and that even prior to capitalization these firms had been a source of corruption and rent-seeking behavior. The workers of state enterprises rejected this idea, arguing that some of the corruption and inefficiency previously seen in these firms had been introduced or aggravated by the free market reforms the government now wanted to carry even further.
- 2) The concept that Bolivians would have a majority stake in the new enterprises, one that would never be less than 51 percent. As noted, government eventually settled for the retention of 50% of equity, divided between workers and private pension funds. Since management's 50% of equity was concentrated while the remainder was dispersed, management effectively controlled the firms. Some citizens were upset by this, claiming that a promise of domestic control had been broken. The government objected to this characterization, arguing that investors in fact wanted 51 percent, but that thanks to its negotiation, they settled for less.
- 3) The idea that foreign management would allow technological and managerial skill transfer, and that (among other things) this would reduce corruption. This affirmation caused strong reactions among the workers, since state firms (some more than others) had historically propelled modernization in different sectors. Union leaders claimed that factors exogenous to the firms, such as the 1980's debt crisis, accounted for why their sources of funding had dried up. Indeed, it was the lack of investment capital and foreign funding that was the key justification for capitalization.
- 4) The possibility that state enterprises might be transferred in a hasty "fire sale." Several observers made the point that perhaps the government itself had created the conditions for a fire sale, by publicizing the poor state of some of these firms. People suspected that the government would have to absorb substantial debts, and in the case of gas and oil, investors would be rewarded with risk-free reserves.

Change of government

The next administration (Banzer-Quiroga, 1997-2000)⁶⁶ had campaigned on the promise to undo the capitalization process. After taking office it proposed some changes in the contracts, and in the functioning of the regulatory system. This created unease in the affected sectors and among potential investors. The issue was put to rest by the World Bank's recommendation that the contracts

⁶⁶ Hugo Banzer was the President for four years out of the five-year term. He resigned due to ill health and amid significant opposition (dying before the end of this period). Jorge Quiroga, the vice-president, took over for the remaining year.

should not be altered; and the American Embassy's advocacy in favor of the sanctity of contracts of the U.S. firms.

This led the Banzer-Quiroga government to coexist with capitalization. But it was a very non-peaceful coexistence, with constant criticisms of the arrangement, with key officials expressing that the government firms had been given away for nothing, that their transfer limited the government's income, and reduced expenditure and social investment. Latterly, it was alleged that capitalization was the main cause of the recession that started in 1998-99, and accounted as well for the government's inability to spend the country's way out of it.

The MNR (the ruling party during capitalization), now in opposition, retorted that the capitalization process had not met all expectations in part because it did not have the necessary continuity. It argued that reform was left in the hands of people that did not understand or stimulate it. It also made the case that the recession was due to external factors, and that in fact it would have been worse had capitalization not taken place.

Nevertheless, the MNR also admitted that the reforms had not been perfect and might require some adjustments, particularly the strengthening of laws and regulation. For instance, while capitalization/regulation may have made possible the increase in natural gas reserves from 5 to 53 TCF, adjustments were necessary to improve the government's share in revenues and to prevent the emergence of vertical monopolies.

Why is capitalization not popular? The collapse of the Sanchez de Lozada administration

As described, the conception and implementation of capitalization involved a fair amount of controversy and acrimony, and the constant public carping between proponents and opponents can be seen as a major source of the program's unpopularity. In addition, we offer further hypotheses that fall into four general areas: i) unfulfilled expectations, ii) high profile failures, iii) ownership and corporate governance issues, and iv) problems induced by associated structural reforms, particularly pension reform.

First, it is possible that capitalization was "oversold" by the administration that implemented it, offering excessive claims as to the employment growth it would generate, and the financial dividends it would eventually produce for the population at large. Performance on these fronts, while perhaps not bad, has proven disappointing compared to the expectations generated.

In the case of employment, for instance, intuition tells us to expect declines in employment with privatization, to the extent that (all else equal) state firms typically have an inefficiently large number of workers. Our analysis shows that declines were quite modest, especially in the context of the size of the whole labor force. An economist's conclusion, therefore, might be that employment outcomes were not so bad, especially since these firms' investment focused on capital-intensive non-tradeables.

The general population, however, was told (or it was implied) that capitalization would lead to large and rapid improvements both in the quantity and quality of jobs available. In fact, the rate of employment growth during the post-capitalization years (even those before the current recession) was not qualitatively different from that experienced in previous periods of stability, and the average voter may therefore feel disappointed.

Similarly, citizens may have been led to expect that foreign and domestic private investment would boom with capitalization. As discussed above, while investment did increase, it then declined significantly with the recession and the end of foreign investment commitments under capitalization, to the point that the state's role in this area is showing a tendency toward once again being larger than the private sector's (especially if investment in oil and gas is not considered), with the implied need for greater public in-debtedness.

Second, a few high profile failures among foreign firms involved in capitalization/privatization have increased public suspicions as to the entire process. This was the case of the Brazilian airline *VASP*, which failed in the administration of *LAB*. *VASP* departed amidst allegations of asset stripping and accounting fraud. Additionally, there was the case of the *Aguas del Tunari* consortium, which led to the "water war" (described above) and an end to water-related concessions.

A third set of problems concerns corporate governance issues. Our reading is that the population suspects that even if output, productivity, and consumer welfare have improved, the capitalized enterprises are being run mainly with the interests of the majority (foreign) owners in mind, and that the regulatory system has been unable to adequately restrain this natural tendency. Of course, these problems have been accorded further salience by news of the deluge of corporate scandals in the U.S.

This issue has gained particular salience with respect to ownership. The population seems to have expected that through its (roughly 45 percent) share in the capitalized enterprises, it would come to share, again rapidly and greatly, in profits flows. In the event, the firms have not paid dividends as large as were predicted and these have had a direct impact only on the old-age population. The suspicion, fed by assertions of political opponents, is that the firms have found ways to transfer profits to their home countries rather than pay them out in Bolivia.

This became a particular headache for the Sanchez de Lozada administration, which had at its helm both the President and the party that initially implemented capitalization. This return to power occurred after an acrimonious election in which the MNR captured only about 20% of the vote, but by virtue of gaining the first place, was nonetheless able to put together a coalition in parliament. From the beginning, this made the administration quite vulnerable. Like the preceding Banzer-Quiroga government, it was buffeted by periodical waves of protests, particularly from rural unions, including those tied to coca-growing regions.

One of the administrations key campaign promises was to return the *Bonosol* (the old-age payment described above) to its initial level of about 240 dollars. Due to the low flow of dividends, however, the Common Capitalization Fund (FCC), which must pay for this benefit, simply could not afford it.

As a short-term solution, the government tried to force individuals, through their individual retirement accounts (FCI), to buy commitments from the FCC. There was much debate over this arbitrary measure, which in the extreme can be seen as a confiscation and forceful redistribution of private property by the very administration that in previous times was its staunch defender.

More generally, the recession and a large budget deficit severely constrained the administration's ability to spend and stimulate the economy. The deficit was substantially related to the pension reform that, as stated above, the original Sanchez de Lozada administration had introduced along with Capitalization.

Prior to reform, the Bolivian social security system consisted of a basic pension fund and several complementary funds, all of which were of the pay-as-you-go variety. Coverage (about 12% of the economically active population) and the worker to retiree ratio (3 to 1) were low. Additionally, there was little financial transparency, investments were subject to political interference, and the 80's hyperinflation had substantially eroded reserves. Management costs, at about 17% of contributions, were high, as were evasion and debt. By 1995 the system was insolvent. The Secretaria Nacional de Pensiones estimated that the government would have to absorb a pension system deficit which would reach 0.6% of GDP by 2016, increasing up to 4.3% of GDP by 2060.

In 1996 the Pension Law introduced the individual capitalization fund (ICF) and the collective capitalization fund (CCF) system, both administered by private pension fund administrators. The Pension Law also created a transition regime with the following characteristics: (1) the benefits of current pensioners and of those who fulfill requirements under the old system are financed by the national treasury, (2) persons who have contributed to the old system and do not yet qualify for retirement pass to the new system with pension adjustments, (3) agreements with strategic sectors like the military, police, judiciary and universities also require financing by the treasury, (4) later, the Caracollo and Patacamaya agreements, the result of an episode of social unrest, resulted in a substantial increase in the average pension, also requiring financing by the treasury.

By 2002 the new system had almost doubled coverage (which is still low by international standards), mobilized savings in an amount above one billion US dollars, and introduced greater transparency in the management of the funds. However, the transition costs have been substantially higher than expected. In 2002 the direct financial cost of the reform represented five percent of GDP, an amount not expected to decrease for an additional decade.

This put the government under substantial fiscal pressure. The administration attempted to raise taxes in February of 2003, but after substantial violence was forced to withdraw the initiative.

In the following months, there was also a national discussion on: i) whether Bolivia should enter into a sale of natural gas to the U.S., Mexico, and possibly other countries, and ii) whether in the event it did, the necessary pipeline should be constructed through Peru or through Chile.⁶⁷ For many in the population, this commercial deal seemed to add insult to injury with respect to all the damage that they perceived had been done by Capitalization. A first issue was the feeling that Bolivians should be the first to benefit from the country's natural resources. In this case, through the installation of domestic natural gas networks, the transformation of vehicles to natural gas, and the installation of industrialization plants within Bolivian territory (thereby generating local value added). A second issue was the feeling that petroleum-related rents from Capitalization should effectively reach the population through investment in education, health and infrastructure. In both cases, there was a widespread perception that the government was representing corporate and political, rather than popular interests. A third, shorter term issue, was the pressure for greater oil and gas rents to help the government diminish its fiscal deficit.

In the end, these issues helped catalyze and unify all the opposition to the Sanchez de Lozada government, which in October of 2000 began to lose control of the country in the face of widespread protests, strikes, and road blockages. Attempts to reassert authority backfired, resulting in dozens of deaths and further opposition, and finally in the resignation of Sanchez de Lozada (who was replaced by his Vice-President). These conflicts were of course complicated and multifaceted,⁶⁸ and it is impossible to say what the exact role the opposition to Capitalization, or even the export of natural gas controversy, played in the eventual collapse of the government.

In the event, one of the very first actions of the new government was to declare that any decision on natural gas exports would be taken only after a referendum. In addition, the government promised a new *Asamblea Constituyente* (a constitutional convention) in order to redefine the Bolivian State in a manner that would make it more representative of the people's interests. Other short run goals include increases on the tax burden on private oil sector firms, and a stronger role for YPF, the original State oil company.

A further wrinkle on this issue arises in the case of the gas industry. On the one hand the public is told that Bolivia's proven and expected reserves have expanded enormously since capitalization, and that this will generate great wealth for the country. On the other, they might wonder if and how this wealth will ever reach them. Those who look carefully, for instance, will find that those

⁶⁷ Bolivia is landlocked, having lost its coastal territories to Chile in the 1879 war. Because of this fact, a substantial proportion of the population was strongly opposed to the pipeline going through Chile, while technical studies seemed to suggest that from a commercial point of view that was the optimal outcome. In the end, there was never clear information as to the precise cost differential.

⁶⁸ Many other issues played into the mix, including land tenure, inter-regional, and ethnic conflicts.

companies in which the population owns shares, mainly *Chaco*, *Andina* and *Transredes*, are arguably no longer the central players in this industry, so that the vaunted windfall gains may in fact accrue to firms in which they have no stake.

Further, recent developments suggest that the system may evolve in a way that will result in further losses in the population's participation. At the moment, the population can be said to be gaining from relatively high royalties on gas production, and what seems to be an ex-post high price for the gas sold to Brazil (this price was previously negotiated). On the other hand, in the 1990 legislation, royalties were equal to 50 percent of wellhead value; but in the 1996 law this was reduced to 18 percent for new wells. Thus, in the future royalties will fall as "old" wells, those discovered prior to privatization, become less important, a process, which is already well underway.

Although in principle these drops are to be compensated by profit taxes and the introduction of a so-called surtax, in practice these sources of revenue have not and are not expected to fully make up the shortfall. For that, the country will need substantially increased export volumes.

Aside from these issues, there is also a public perception that the capitalized firms are very adept at evading taxes. Recently, for instance, a prominent politician made the charge (to our knowledge left uncontested and/or unexplained by the capitalized firms), that the Bolivian Catholic University pays more taxes than any of the capitalized oil enterprises.

Further, the gas industry has provided popular opinion with other examples of alleged corporate malfeasance in collusion with government officials. For instance, in the negotiations with Brazil, the giant San Alberto and San Antonio fields were classified as new (hence paying substantially lower royalties), but YPFB workers insisted these had long been discovered. While the status of these fields was never entirely clarified, substantial parts of the public were left with the impression that excessive and costly concessions had been made.

Conclusion

Bolivia responded to its 1982-85 recession and instability by initiating a transition from a state-led to a market-driven economy. By 1989, it had liberated key prices in the economy, and by 1993 a Privatization Law was in place. However, the state continued to be the main investor in the economy, and remained dependent on foreign debt. Although growth had resumed, it did so at rates that would not significantly reduce poverty levels.

The 1993-97 period was the most aggressive in structural reforms, concentrated in two areas: 1) a redefinition of the state-market frontier, as government firms were replaced by privatization and regulation, and 2) a redefinition of central-local frontiers within the state, as local jurisdictions were given greater funding and responsibilities. These two redefinitions implied that the private sector (particularly the foreign one) would lead investment and growth, while the state would regulate markets and increase its efficiency in the provision of public and quasi-public goods.

Aside from the precise mechanism used to attract foreign investment (mainly capitalization), the result was the substitution of government foreign debt with foreign direct investment as the engine of growth. Growth did increase somewhat, and by the end of 1998 reached 5.3 percent. At that point, the country was hit by a series of external shocks that began with the Asian crisis and continued with the Brazilian, and later the Argentine crises. Though the domestic response to these external events is still a matter of debate, the fact is that the economy was pulled into a recession that persists to date. By the end of 2002, private investment had fallen substantially, forcing a return to government (debt-financed) investment as the main source of growth—this time in an environment where its limited resources can only be directed towards the production of public and quasi-public goods.

The importance of this bit of history is that any evaluation of capitalization must consider it as part of a structural reform aimed at broader objectives. It also highlights the existence of two different periods under which capitalization/regulation had to perform. The first, from 1994 to the end of 1998, is a period of reform implementation and initial positive results in an environment of stability and economic growth. The second, from 1999 to present corresponds to a period of reform consolidation in an environment of economic recession and increasing political difficulties.

A complete evaluation of capitalization and privatization is a difficult task, and this paper admittedly provides only initial insights into this issue. At the simplest level, the key goal of capitalization seems to have been to attract foreign investment into the affected sectors, and the evidence suggests the process met with success on this dimension.

In combination with regulation, additional positive outcomes would seem to include an increase in access to utilities' services and significant expansions in proven gas reserves – both positive outcomes the benefits of which have not bypassed the poorer segments of society. In fact, we find welfare improvements for households that in some cases are greatest in the lower income quintiles. Additionally, we find evidence of productivity increases almost across the board; and most firms have remained moderately profitable.

On the negative side, one observes employment decreases, though these are the partial flipside of the productivity increases, and in any case seem to be rather small, particularly relative to the economy as a whole. We also find evidence of price increases for some utilities, although except for the case of the Cochabamba water concession, they seem to be overwhelmed by increases in access in the welfare calculations.

We want to be clear regarding various caveats to these conclusions. First, it is difficult to disentangle the effects of capitalization/privatization on the one hand, and the introduction of regulation, on the other. Second, it is impossible to fully isolate the effects of these processes from those of concurrent events, like the introduction of new technologies and enhanced competitive forces. As stated, another crucial “concurrent event” is the economic slowdown that started in 1999,

which has introduced substantial strains in the performance of the capitalized sector. In its absence, our assessments of these reforms might be rather different. A third caveat is that many of our results, particularly those regarding consumer welfare, refer only to the population in the department capitals. Access and welfare in general remain significantly lower in the rest of the country.

Despite these concerns, on balance our assessment suggests these reforms were fairly successful. Popular opinion does not seem to agree with this conclusion. Here we venture that this may be due to the fact that the government that implemented these reforms “oversold” them, promising more, on the job creation front for instance, than they could reasonably deliver. Additionally, the reform’s entire reputation has been hurt by a couple of high profile failures, and by a perceived weakness in the regulatory and corporate governance frameworks in Bolivia.

Our speculative impression is that a key lesson from the Bolivian experience is that private ownership should be kept as a credible threat and a real option to any other firm organization and in any activity. We think that the existence of the threat allows privatization to generate spillovers; for instance, several cooperatives have improved their management and become more competitive. Finally, Bolivian experience reaffirms the old adage: in many sectors introducing private participation and market forces is no panacea, and the specifics under which privatization is carried out matter a great deal.

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Appendix 4A – Household surveys

For household and individual-level data, including socio-economic characterizations, we use three rounds of the *Encuesta Integrada de Hogares* (EIH) (5th, 6th and 7th rounds) and the 1999 round of the *Encuesta Continua de Hogares* (ECH) (1st round). The EIH was collected in department capitals, and has a sample size of 5,829 households in 1992, 4,270 households in 1993 and 6,128 households in 1994. Although the ECH has national coverage, for comparability we use only the 1,324 households which correspond to the same department capitals as the EIH.

These surveys contain the essential access and consumption information. Earlier rounds of the EIH contain some information on access and expenditures on utilities, but do not contain comparable questions on other expenditure items, meaning that these surveys can not be used in the consumer welfare calculations which require expenditure shares.

As the telecommunications, telephone, and water reforms took place in 1995 and 1996, the 1994 survey is our “before” observation, and 1999 the “after” one. We also focus on the 1992 survey and use annualized changes over the 1992-1994 period as a “control” for annualized changes over the 1994-99 privatization period. This comparison is aided because the country had a similar economic performance and relatively stable political structure during both periods. The 1993 wave of the EIH is used only in the Engel curve regressions: we use it to provide more points of temporal and spatial price variation over which to estimate price elasticities.

For employment and wage information, we note that the firms in the privatized sectors considered here (water, electricity, and telecommunications) are relatively small employers in Bolivia, and so the household surveys offer only very small samples of workers in these industries. The 1999 survey actually asked respondents to state not only the sector but also the precise firm which they worked for. In the electric sector, we did not find a single respondent that declared he or she worked for the electric firms mentioned in the section II. Rather, many of them worked in the “electric” sector, but as electricians or electric appliance vendors. In light of this, administrative information on employment and wage levels was collected from firms and regulatory agencies, and provides the basis for our analysis of the labor market effects of the privatizations. Additional administrative information on quality-related issues was also collected directly.

Appendix 4B – Access definitions and expenditure on utilities

The household surveys ask a variety of questions concerning access to different utilities. In all cases we are forced to measure access based on whether households actually *have* the utility in question, rather than if they *have the option* of connecting. In Argentina, Ennis and Pinto (2002) find average take-up rates of 99.9 percent for electricity and 97.4 percent for water, so determining access based on what households are actually using should be a reasonable approximation. Based on the household survey questions, we define measures of access which are fully consistent across the different surveys listed in Appendix 4A, unless noted otherwise:

Access to Water: a household is considered to be connected to the water network and therefore have access if it declares it has a water connection either inside its dwelling or otherwise within the building the dwelling is a part of. Households obtaining water from a public faucet, well, delivery truck, river, lake or other source are not considered to have access to the water network.

Expenditure on Water: the surveys directly ask total monthly expenditure on water from all sources.

Access to Electricity: the 1992 and 1994 EIH surveys ask directly whether the dwelling has electricity, while the 1999 ECH asks whether the household uses electricity for lighting. A household is therefore defined as having access if it has electricity, or uses electricity for lighting. Most users of electricity will use it for lighting, and given access rates of almost 100 percent in 1999, we do not believe there is much understatement in the 1999 measure compared to the earlier measures.

Expenditure on Electricity: the surveys directly ask total monthly expenditure on electricity service.

Access to Telephone: the 1994 EIH survey asks directly whether a household possesses a telephone, while the 1999 ECH asks whether the household has fixed line or cellular telephone service. A household possessing a telephone or with telephone service is defined to have access. The 1992 and 1993 EIH surveys do not contain a comparable question, and so access to telephones is only available for 1994 and 1999. Expenditure on telecommunications is only asked separately in the 1999 survey, so instead we use expenditure on communications (see below).

Access to and Expenditure on Communications: All surveys ask consumers for expenditure on communications, which includes telephone and mail expenses. Households reporting positive communications expenditure are defined as having access to “communications”, which proxies for access to telephone. Although using communications expenditure is likely to overstate somewhat access to telephones, the *change* in access to communications between 1994 and 1999 has a 0.945 correlation at the decile level with changes in access to telephones over the same period. This measure should therefore be a good proxy.