The Effects of Privatization on Firms and on Social Welfare

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Abstract

In this study we analyze the Chilean privatization process as a whole. Since it has been a wide-ranging process, we examine its different aspects. After a historic review of the privatization process, we study the 37 Chilean State Owned Enterprises (SOE's) that were privatized during the period 1981-2000 and for which pre-privatization and post-privatization financial, employment and productive data are available. We show that these firms behaved no differently from the average firm in their economic sectors after privatization, implying that they were efficient SOE's. The large increase in profitability of privatized firms can be explained by the performance of firms in the regulated sector. In particular, employment in these firms increased after privatization, showing that they were no overmanned under government control. We show that the profitability in the sector is due to the more efficient use of physical capital and by the fact that the regulators were unable to transfer these gains to consumers. Next, we examine the effects of the privatization of social services. We analyze in detail the effects of privatization on the performance of telecommunications and the electric sector. We find confirmation of the fact that in the regulated, natural monopoly sectors profits increased, whereas sectors that are characterized by competition, profits have been lower. Nevertheless, regulated firms are fairly efficient, implying that incentive regulation has been successful. Another privatization process involved infrastructure, where the main highways and ports have been franchised successfully, and where the benefits in terms of reduced transportation costs will increase the efficiency of the economy as a whole. Next we study the effects of the privatization of the pension system, the health insurance system and of education through a voucher system. We find that the big benefit of the pension system is that pensions can no longer be expropriated by the political system, but that the system is expensive, though costs have fallen lately. The private health insurance system has not been a big success due to the information asymmetries that plague health care, but have had the beneficial effect of showing the inefficiencies of the public system and thus putting pressure on it to improve. Similarly, the use of vouchers has not been shown unequivocally to lead to a better education system (though there is some evidence that this is so), but has put pressure on the public system to improve. Moreover, vouchers would be more effective if parents were informed of the results of their children in standardized tests and if public schools were able to fire bad teachers. Finally, the increased competition in higher education has led to improvements in the quality of the traditional State financed institutions and to a large increase in the coverage of higher education.

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Contents

Chapter 1

Introduction

The object of this paper is to evaluate the effects of privatization on the efficiency of firms and institutions in Chile. The Chilean privatization process was one of the earliest –and probably the earliest– in the current worldwide trend towards privatization. One of its chief characteristics was that it was all-encompassing. In the three decades that followed the fall of the government of the socialist president Salvador Allende (12/70–9/73), all the banks and firms that had been acquired or expropriated by Allende's government were either privatized or liquidated. Farms that had been expropriated since the agrarian reform of 1965 were privatized, as well as a *majority* of the firms that were government owned before *December* 1970.

The military government also privatized the pension system and a part of the health insurance system. Government promoted vouchers for subsidized private schools and allowed free entry into tertiary education (university and other post-high school education). Finally, the private sector improved or built and operates most large infrastructure projects such as highways, seaports, airports, water reservoirs and even jails. In addition, in a bid to decentralize government, local governments (municipalities) became responsible for the lowest level of the public health care system as well as for public schooling.

The privatization is part of a much wider process of economic liberalization that Chile initiated in 1974, a major reversal of the policies followed by the country since the forties, which were characterized by an increasing *participation* of the state in the economy (see Galetovic (1998)). In the period pre-1974, the state played a role not only through the public firms, but also via regulations and other forms of intervention in the economy. The government would set the interest rate and the exchange rate, and regulate almost 3,000 prices. As part of its import substitution strategy, the government protected those sectors deemed essential. This meant that international trade was restricted by quantitative restrictions as well as by high, heterogeneous tariffs. All of this machinery started to disappear in 1974, with the country's turn towards a market economy,

where the price system is the main mechanism for resource allocation and the private sector is the centerpiece of the economy, Moreover, in an effort to reduce the size of the state, many traditional supervisory activities were surrendered to the private market: private custom agents relieved some of the duties of the customs office, private laboratories test new roads and the effluent from water treatment plants and industry, and the courts employ private individuals to run or liquidate bankrupt companies. Major overhauls of the tax system have simplified it and reduced tax rates.

It is possible to distinguish three main phases in the Chilean privatization process, even though any chronological division is arbitrary. In the first phase, which covers the period 1974-1980, 259 firms that were expropriated or illegally taken during the Allende's government were restored to their original owners. The government also sold or liquidated an additional 118 firms acquired in the same period (conserving 7 of in that category). In addition, 34 of the 65 firms pre-1970 government owned firms were also privatized or closed. Nevertheless, at the end of the decade the government still owned 40 firms, some of them because they were considered of strategic importance and some because there were no takers. In particular, government owned all of the major telecom and electric firms, and copper mining companies.

In the second phase, from 1980 to 1989, the state privatized the telecom and electric firms as well as most of the firms previously considered strategic: the CAP steel works, the flag carrier LAN, and other major firms. It also finished selling the last few firms that had been acquired by the socialist government. By 1989, only 16 of the 66 firms dating from the pre-December 1970 period were still in the hands of the government. During this period, specially in the first years of the decade, many activities which had been traditionally provided by the state, such as the pension system, health financing and the educational system were privatized, at least partially.

The privatization of SOEs slowed down in the period 1990-2001. However, the government sold the **three** main water and sewage companies and completed the privatization of the electric sector. The distinguishing feature of this period, however, is the privatization –through concession contracts– of infrastructure *management*. From 1993 onwards, the main highways, expressways and airports have been built, maintained and operated by private investors. The main state-owned ports were also franchised to private firms.

Most analysts ascribe the strong growth in the Chilean economy that begun in 1985 (after a severe crisis in the first half of the decade) to economic liberalization. If we accept this premise, we may still wonder about the specific contribution of privatization. The problem is that so many systemic changes occurred at the same time that it is difficult to evaluate the separate contribution of a particular policy.[1] Nevertheless, (Larraín and Vergara (1995)), suggest that the rest of the program would not have been credible in the absence of a privatization process. Moreover, privatization

[1]Some put the accent on the pension fund reform while others underscore the role of the 1984 tax reform.

was important in helping balance the budget and in developing the capital markets.[2] However, in this paper we focus on the direct effect privatization had on the efficiency of privatized sectors and therefore do not look at the global effects on the rest of the economy.

1.1 Privatization of SOE's

The Chilean privatization of SOEs has been a long-lasting and still unfinished process. There are still 38 firms –most of them of economic importance– that remain in public hands: ENAP, the monopoly oil refinery; CODELCO, a copper mining concern that is the largest company in Chile; ENAMI, a copper refinery; Banco del Estado, the fourth largest commercial bank; the post office; the subway; the Chilean Mint; the rail lines; the State lottery; ten ports, Zofri, the free trade zone; and other minor companies, representing in all, around 9% of total GDP in 1998.[3] The perception that Chile has advanced further along the privatization route than most other countries is probably due to the fact that most traditionally infrastructure and social services have been privatized rather than the extent to which the state has retired from the productive sector.

As can be seen from table 1.1, between 1974 and 2001, 125 firms have been privatized. However, most of these firms were owned by the State for only a short time and only 65 of these stayed long enough in public hand to count as real SOEs (see table 2.1). Most of the firms acquired during the socialist government (1970-1973) were privatized by 1978, and by 1983 only one of those firms was still state-owned. At least 55 other firms controlled by the government have been liquidated. Several of these were only viable while protected by large tariffs and other non-tariff barriers and became nonviable after the opening of the economy (Hachette and Luders (1994)). Note also that in the period 1979-1989 many state-owned firms were created by subdivision of larger firms, and were later sold.

As compared to later processes (in Mexico, for instance, see La Porta and López-de Silanes (1999)), privatization in Chile was not transparent in its early stages. This can be explained partially by the violent social convulsions that affected Chile in the period 1970-1982, which involved a socialist government, a coup leading to a dictatorship, three large economic crisis (1973, 1975 and 1982), major structural changes on the economy and by the fact that the policy makers were exploring untried policies in a context of no freedom of the press. There almost no records of privatizations that took place in the 1970's. Moreover, accounting books tell little about the value of a firm when inflation rates reached levels of more than 500% in some years, and bookkeeping regulations were loose and were only upgraded during the 1982 crisis. Therefore, most of the usable

[2] During the 80's, taxes were reduced and the government was able to finance the transition to a private pension system without going into deficit. Clearly, funds were not used to delay fiscal adjustment, as happened in Argentina.

[3] Shares of state related firms in GDP were obtained from Hachette (2000).

Table 1.1: Nationalization and Privatization of Firms

	70-73	74-78	79-83	84-89	90-2001
Beginning of period	65	179	82	45	44
Acquired	113	1	0	0	0
Created	1	0	10	29	12
Privatized	0	70	14	27	14
Liquidated	0	28	20	3	4
No information	0	0	13	0	0
End of period	179	82	45	44	38

Notes:
1. Does not include Pehuenche, which was privatized as a project (i.e., never operated as a public firm).
2. Includes Corporación del Cobre (Codelco)
3. Includes the 10 seaports originating in the subdivision of Emporchi.

data on privatization for Chile corresponds to the firms privatized since the early 1980's which have remained open-stock corporations (i.e., that trade shares in the bourse), since this means that that they were required to publish financial information. More than half of these firms provide public services and are regulated, so their data is contaminated by the effects of regulation, while the remaining firms are usually dominant in their markets, or have sizable market shares.

The most important conclusion we derive in this section is that, contrary to other documented cases (see La Porta and López-de Silanes (1999)), most SOE's were fairly efficient prior to being sold, except perhaps in the sense of overinvestment in the electric sector. As a matter of fact, employment increased after privatization in most firms. As a result, the behavior of privatized firms was not substantially improved by privatization and in fact, by many measures, investment was lower than average for their sectors after privatization. A second conclusion is that in the case of several variables of interest, the main divide is that between firms operating in a regulated or a competitive market. In particular, privatized firms that face competition have had lower profit rates, with profitabilities that are similar to those of their respective industries, while firms in the regulated sector have significantly higher profit rates than the average for their industries at the 2-digit SIU level. In the case of the regulated sectors, the effects of privatization can be due to differences in management efficiency or due to the introduction of new regulations on the sector, or even due to the interplay of these two factors. Thus, it is necessary to to evaluate the regulations in order to understand the impact of privatization it is necessary.

1.2 Privatization of regulated sectors

This section analyzes the Chilean experience with privatization of regulated sectors. It focusses on the privatization of utilities and social services that occurred in the 80's and on the private infrastructure franchises of the 90's. In these sectors, the government switched from a role of provider to the role of regulator.

Even though these two are different sectors, they share some important characteristics. First, these are imperfect markets, with failures such as non-convexities (leading to natural monopolies) and asymmetric information. Second, they produce "merit" goods or services, which require that the State guarantee access to all of the population. These privatizations are interesting not only by the fact that they represented a shift towards the private sector but also because of the policies that were introduced in order to deal with these market failures and guarantee universal access and by the results, successful or not, of these measures.

Despite the many market imperfections, the military government believed that there were benefits to be obtained from transferring property to a profit-maximizing private sector as compared to a public sector that followed procedures. Nevertheless, the government was aware that adequate incentives were required in order for private activity to increase welfare. This is the explanation for the fact that the regulations that were introduced prior to privatization tended to promote competition whenever possible and to simulate efficient behavior when competition was impossible. The government believed that market discipline played an essential role in economic policy, so much so that one of the first economic laws it introduced (in October 1973) was a thorough revamping of the antitrust legislation.

1.2.1 Privatization of utilities

In this section we analyze the post-privatization performance of regulated utilities, and relate it to regulatory legislation. We focus on the electric and telecom companies that were privatized between 1985 and 1989.[4] The gains in efficiency from privatization can derive both from the differential efficiency between the public and private management as well as from the effect of the rules and regulations that were imposed on the sector. During the 1980s Chile reformed and liberalized its electric and telecom sectors. The process started in the late 1970s with the establishment of new regulatory bodies and the introduction of new legislation in 1982, and culminated with the privatization of the major firms between 1985 and 1989. One trait that infrastructure-based sectors share is that competitive segments coexist with other segments that constitute a natural monopoly. Chile's policy has been to introduce competition wherever possible and to regulate

[4] We do not include the water sanitation companies, which were sold during the late 90's and for which there is little evidence about their performance, one way or another.

non-competitive segments of industry.

The cornerstone of the Chilean electric reform was the introduction of competition in the wholesale contract market for energy. The unbundling of transmission services was a prerequisite for wholesale competition to survive. Thus it was necessary to introduce the principle of open access to the transmission network. The second major change was that investment in generation was left to market forces. Existing firms or potential entrants will invest in generation capacity whenever a project has a return on capital that is commensurate with the sector's risk. The third major regulatory innovation was the introduction of incentive regulation to calculate the value added by the distribution sector. This implies that prices are set so that an efficient distribution company will attain a predetermined rate of return (Fischer and Serra (2000)). The laws regulating the telecommunication sector follows a similar pattern. They provide for free prices in all sectors deemed competitive, but regulates rates of basic phone services considered to be local monopolies. As the local network is considered an essential facility for competitors, the 1982 law has required local telephone service operators to provide access to their network to any other operator that requests the service.

On average, SOEs increased their profitability and efficiency after privatization, following the trend of the national economy, but the behavior of firms that provide regulated services can be singled out. Their productivity –and consequently their profitability– increased by more than in the case of the non-regulated firms. Hence, there is some evidence that the incentive mechanism have worked and provided incentives for efficiency. On the other hand, the high profits rates of these firms are also evidence of regulatory failure. In fact, the available evidence shows that a large fraction of the efficiency gains were not transferred to consumers as prescribed by the regulatory model. Nonetheless this situation has changed in the last five years as regulators have become more forceful and competition has made its mark even sectors previously considered to be natural monopolies.

1.2.2 The privatization of infrastructure

Even though there were some early plans to franchise infrastructure during the Pinochet government, it was the democratically elected Alwyin government that managed to pass a law allowing private franchises of highways and other infrastructure projects. There were delays at first as many practical problems had to be solved. Nevertheless, by the time of the Frei government (1994-2000), everything was ready and the franchising of infrastructure went into full swing. During the next six years, most of privately profitable projects were franchised to national and international firms. Projects worth more than US$4 billion are operational or are close to being operational. A further US$2.5 billion have been auctioned or will be auctioned during the year 2002, but have not

yet started construction; and a further US$650 million are under consideration, but have not been evaluated in detail.

By the mid-90's, the government discovered that it faced bottlenecks in seaports, a serious problem, since most Chilean international cargo is transported by shipping. There were multiple private cargo transfer and storage operators a each port, but there was little investment in equipment and activities were not well coordinated. The government decided to franchise port terminals ("frentes de atraque") to private operators.[5]. Given their scarcity in Chile due to geographical reasons, terminals can be considered essential facilities. In order to increase efficiency and investment in the ports, the main terminals were auctioned, under restrictions on horizontal and vertical integration that were supposed to limit their ability to command a bottleneck.

The program of infrastructure franchising has been successful overall. There have been few problems in the highway program, specially as compared to the experience of Mexico, which eventually cost taxpayers an estimated US$ 8 billion. By now the country can boast of a substantially upgraded road infrastructure and lower transport costs. Moreover, since franchise auctions were open and competitive, tolls (user prices) should be close to average cost, which is second best optimal in the presence of economies of scale. However, there are potential problems with the traffic guarantees the government has included in contracts in order to facilitate access to loans, since they represent unaccounted for liabilities to government that are pro-cyclical. Finally, there have been noticeable improvements in the efficiency of the privatized ports. The loading and unloading process has become twice as fast in just one year, and this has a multiplier effect on transport costs, since shorter stays in port mean that more efficient but also more capital intensive ships can afford to operate from Chile.

1.2.3 The privatization of social services

Social services were privatized starting in the early 1980's. In 1980, the government introduced legislation that created the private pension fund system. This system is based on compulsory contributions to individual pension accounts. Workers are required to contribute 10% of their gross wage income to the pension fund administrator of their choice.[6] In 1981 the private health insurance system was introduced. Again, workers were compelled to contribute 7% of their gross income to purchase health insurance, either through the public system or through the health insurance company of their choice.[7] In a bid for decentralization of government activities, municipalities became responsible for primary public health care. Public schools –previously managed by

[5] A terminal is an autonomous operational unit within a port that consists of adjoining berthing spaces and their associated support and service areas, thereby making it possible to auction the terminals at a port as separate items

[6] Pension fund administrators charge average commissions representing 2.5% of the income of contributors, but which represent less than 1% of accumulated funds.

[7] The compulsory health contribution was initially 4% but rose to 7% after a few years.

the state– were also transferred to municipalities and a voucher system that did not discriminate between municipal and private schools was introduced to finance basic and high schools.

The objective guiding these measures to promote private participation in social services was twofold. The first objective was to increase efficiency, specially through competition between the various participants in a sector. Second, to hand the responsibility for decisions concerning children's education or retirement pensions to families. This agenda was based on a deep-rooted distrust of the role of the State on both social and economic decisions. However, as these are complex decisions, where asymmetric information is rampant, the State remained a rule-setter and supervisor. The main problem has been the reluctance of private individuals to acquire the knowledge needed to make rational decisions.[8] As a result many individuals do not understand the main aspects that are involved in the choice of a provider of these services.

Lack of understanding on the part of consumers has led providers to focus their competitive efforts on marketing and sales effort rather than the variables that are relevant from the point of view of an enlightened policy-maker (extent of coverage of a health plan in the case of the private health insurance system, net rate of return on a pension fund in the case of the private pension system and quality of schooling in the case of the subsidized private schools). Nevertheless, there have been important benefits from the privatization of social services. In the case of the private pension system, the likelihood that politicians are able to misuse pension funds is far smaller, increasing the security of pensions. In the case of the health insurance and the private subsidized schools, competition from the private sector has increased the visibility of public sector inefficiencies, which is under pressure to improve its performance.

The rest of the paper is organized as follows. The next chapter analyzes the privatization of state owned firms, and the effect on their performance, efficiency and other parameters. The third chapter is devoted to a qualitative assessment of privatization of regulated sectors. First we analyze the privatized utilities and their sectors in more detail. Then we look at the private provision of infrastructure through franchises. The fourth chapter examines the privatization of the social sector, including health, pensions and education. The last chapter concludes.

[8] Of course, their decisions may be rational in a word where agents have limited rationality.

Chapter 2

The Performance of Privatized Firms

In this chapter we report the effects of privatization on 37 non-financial firms that were privatized between 1979 and 1999. During this period 13 additional non-financial firms were privatized, but we were unable the necessary information for this study. This is symptomatic of one of negative features of the Chilean privatization process: the lack of transparency (Hachette and Luders (1994)). There are no public records of privatizations during the 70's. Some of these firms went bankrupt subsequently or became private corporations (i.e., without openly traded shares) so that they do not publish accounting information. Therefore, most of the usable data on privatization for Chile corresponds to the open-stock firms privatized since the early 1980's which are required to publish financial information. Nineteen of the thirty seven firms in the sample belong to regulated sectors, so their data is contaminated by the effects of regulation, while the remainder are usually dominant firms in their markets, or have sizable market shares.[1] In this chapter we report both absolute and normalized (adjusted) changes in various performance ratios before and after privatization. The normalization allows us to compare the behavior of privatized firms to the performance of the sector to which they belong.

The next section describes the history of the nationalization and the privatization period. The third section describes the data and our treatment. The fourth section examines the effects of privatization.

[1]Of the 12 companies in the unregulated sector, four: CAP, ENAEX, LAN Chile and Soquimich are monopolies, while COLBUN, ENDESA and GENER represent almost all of the generating capacity in the Central interconnected electric system.

2.1 A brief history of the privatization of public enterprises

2.1.1 The era of state intervention

State participation in the economy has had a long history in Chile, even though it becomes really significant since 1940. After the crisis of the 1930's (according to Mamalakis (1976), Chile was one of the countries that suffered most in the crisis), the country chose an import substitution strategy and more state intervention. Thirty years later, the government owned or controlled more than 51% of 67 firms, 22 of which were created by law and 45 were under the control of the Corporación de Fomento (CORFO), a government organization created to promote industrial production, see table 2.1. These firms operated only in sectors that the State deemed too important to be left to the market, or which were originally private firms that had gone bankrupt, with government intervention in order to save them.[2]

Table 2.1: State owned and seized firms

Type of firm	1970	1973	1983	1990	2000
Enterprises	66	251	44	40	37
Banks	1	19	2	1	1
Seized	0	325	0	0	0

Source: Hachette and Luders (1994). The number of firms for 1973 includes 37 subsidiaries of subsidiaries of CORFO and 112 firms in which CORFO held minority stakes. Data for 2000 compiled by the authors.

Corfo had been set up in 1939 to help economic development through the promotion of investments. It operated through loans and loan guarantees to the private sector, through research and development of projects and eventually, through their implementation. In fact, Corfo established firms that were deemed vital to development.[3] Some of the main firms set up by Corfo were Empresa de Nacional de Electricidad (Endesa, 1944), Compañía de Acero del Pacífico (CAP, 1946) la Industria Azucarera Nacional (Iansa, 1953), la Empresa Nacional de Telecomunicaciones (Entel, 1964), Petroquímica Chilena (Petrox, 1967), Sociedad Química y Minera de Chile (Soquimich, 1968), Celulosa Constitución (Celco, 1969), Celulosa Arauco (1967) and Industrias Forestales SA (Inforsa, 1970). There were minority private shareholders in these firms (43% in the case of CAP). Corfo was also a minority shareholder in two other firms.

Among the firms created by law, there is Correo y Telégrafos, which has been public since

[2]For example, in 1965, value added in state related firms was just 14.5% of GDP.

[3]However, Corfo may have only displaced private investment in those sectors.

before independence, Ferrocarriles del Estado, founded in 1851, Línea Aérea Nacional, created in 1931, Empresa Nacional del Petróleo (Enap), established in 1950, the Empresa Marítima del Estado, separated from Ferrocarriles in 1953, the Banco del Estado, established in 1953 by the merger of state owned financial institutions established in the previous century, Empresa Nacional de Minería, created in 1960, and the Empresa Portuaria de Chile, separated from the Customs office in 1960.

Table 2.2: Number of state owned firms

	1973	1978	1983	1989	2001
State owned pre-1970	65	46	32	19	14
Acquired 70 -73	113	34	1	0	0
Created 70 -73	1	1	1	1	0
Acquired 74-78		1	1	0	0
Created 79-83			10	2	1
Created 84-89				22	13
Created 90-2001					10
SOEs	179	82	45	44	38

A change of policy occurred in the late 1960's when the government started timidly acquiring private firms. Previously, all SOES's have been created by the State itself, except for those troubled firms unable to repay the CORFO loans. Codelco, was established in 1968 to acquire 50% of the shares in the four largest copper mines, where copper was the main export, representing more than 80% of all exports. In 1970 Chilectra was acquired by Corfo, which meant that the State owned all of the electric sector. Moreover, in the period 1965-1970, 22% of the arable land (4.1 million hectares) was expropriated in a land reform process. Most of the land was not transferred to the peasants (except for six hundred and two thousand hectares), but was kept in public hands (Rosende and Reinsten (1986)).

The path of state intervention in the economy accelerated in December1970, when a socialist government took office with the professed aim of creating a vast state owned sector. The target was to acquire all firms whose equity exceeded US$500.000, in current dollars as well as all of the banking sector, the import-export sector and all utilities. A majority in congress opposed this plan, so the government resorted to administrative measures and legal loopholes. First, Corfo offered to buy shares in any bank or publicly traded firm. Given the uncertainty of the times, many investors decided to sell out (see table 2.2).

In the period 1971-1973, Corfo managed to buy a majority share in 113 industrial firms and 14 banks, as well as a minority sharehold in 68 other firms and 5 banks, while creating only one new firm (Transmarchilay). Therefore, in September 1973 the state was a majority controller in 179 firms and 15 banks, and was a minority shareholder in 70 firms and 4 banks. Another 259 firms were intervened or nationalized. In this case he government used pre-existing legislation that allowed intervention or expropriation of firms when there was a threat of shortages. The *modus operandi* was to have a strike in the firm, which was then taken over by workers. Since the firm had stopped operations, there was a risk of shortage, which allowed the intervention of the government.

To recapitulate, by September 1973, the government controlled 441 firms and 15 banks, and there were few important companies in private hands (the firms under control of the state represented almost 40% of GDP). In addition there were 66 agro-industrial plants and equipment built and/or operated by Socoagro, a subsidiary of Corfo. The state owned 8.979 thousand hectares, of which 5,873 had been expropriated in 1971-1973 (Larroulet (1984)) and the share of the State in the economy was growing apace.

2.1.2 The First Round of Privatization

After the coup of September 1973, the military government in power began to develop a strategy of economic liberalization. One of its aspects was the return to the original owners of the firms that had been intervened by government. During the year 1974, 202 firms were returned to their owners and 39 were given back the next year, leaving only 18 firms to be normalized in the next few years. Hence, most of these firms were returned to their original owners by 1975, so they stayed in the hands of the government for only a few years and hence are not representative of SOE's.[4] At the same time, the land that had been expropriated was privatized: 28% of the land, that had been expropriated illegally was returned to its original owners, another 52% was divided into small landholdings and sold to the peasants at subsidized prices (many of the peasants later resold the land), while the remainder was privatized through public auction or was transferred to the Corporación Nacional Forestal (Hachette and Luders (1994)).

Between 1975 and 1977 the government privatized most of the firms that had been acquired in 1971-1973. Most of the share holdings in banks were sold in 1976, leaving a few that were sold in 1976. In the period 1975-1977, 70 state controlled firms were privatized, while 28 other firms were closed and its assets sold in auction (see table 2.3). By 1980, the state had control over only 10 of the 115 firms acquired by the socialist government. On the other hand the military dictatorship decided to keep the largest electric and telecom companies. The same strategic reasons made

[4]See Sáez (1996), Meller (1996).

Table 2.3: Privatized SOEs

	74-78	79-83	84-89	90-2001
pre-1970 SOE's	10	7	10	3
Acquired 70 -73	60	7	1	0
Created 70 -73	0	0	0	1
Acquired 74-78	0	0	1	0
Created 79-83		0	8	1
Created 84-89			7	7
Created 90-2001				2
Privatized SOE's	70	14	27	14

the military government buy a controlling interest in the main telephone company in 1974 (thus obtaining control of 100% of the telecom sector).

Of those SOE's that dated to the period prior to 1970, only 35 were still owned by the State by the end of the seventies, so the government had either sold or liquidated 30 of them. The State kept the 22 companies that had been created by a special law, but the number of CORFO companies shrank from 44 to 11. Corfo sold all of the firms it had acquired through debt capitalization and kept only some of the companies it had created. Thus, by the end of the seventies the State owned the electric utilities, telecoms, the big mining companies, and a large fraction of the transport industry (railways, two shipping companies and the national airline) as well as the steel mill. There are 13 firms whose status is unclear, since they were either liquidated or were broke a short period after privatization.

The larger firms were sold in public auction, though there were post-auction negotiations with the auction winner (Hachette and Luders (1994)). The smaller firms were sold directly. Overall, the objective seems to have been to maximize revenue for the government, which explains why the government usually offered a controlling interest (generally all of the shares owned by Corfo), rather than selling small lots of shares in the open market. In the case of banks, the government tried to diversify ownership by setting a limit of 1.5% to the holdings, but this limit was raised after being easily evaded by buyers using shell companies. There were no serious attempts at attracting foreign investors.

The objective of maximizing revenue from sales led to a policy of lending money to the buyers. Thus only 10 to 20% of the bid was required immediately, and there was a one year grace period, plus seven years for full repayment, with a low (for those times) real interest rate of 8-12% per year. The government asked for a loan guarantee of 150% of the loan value, but the guarantee

could be in the form of the shares in the company. In the case of banks, the minimum payment was 20% (on average 23% was paid up front) and the loan had to be paid in full within two years at a real interest rate of 8%. The government offered easy conditions because the private sector was still very undercapitalized due to the effects of the policies of the early 70's.

2.1.3 The Crisis of the early 80s

Most financial firms, as well as several banks that had been privatized in the period 1975-79, were taken over by the State during the economic crisis of 1981-83. Beginning in 1981, several banks became effectively broke because they could not recover loans from troubled companies, many of them related firms, which were either broke or had suffered severe losses.[5] In November 1981, the government took over four banks and two more banks in 1982, all of which were later closed. In January 1983, the government had to take over 8 additional banks that had failed to repay international loans (three of these banks were later closed down). Ironically, most of the financial institutions that had been privatized during 1975 and 1976 representing 55% of all financial assets, were again being run by the State in the early 80's (Rosende and Reinsten (1986)).

By December 1984, the accumulated losses of the financial sector represented more than 200% of the sector's equity and reserves, and 18% of GDP (Valenzuela Silva (1989)). In order to continue to have access to international credit markets, the government had to guarantee all foreign loans of the banks that it had taken over while rescuing local depositors. The government also took over many non-financial companies, as well as the private pension funds (AFP) that were linked to the troubled banks, either because they had unpaid loans from the banks or because they were owned by the same economic conglomerates (Rosende and Reinsten (1986)). Between 40 and 90 firms were taken over by the State, giving rise to the so called "área rara" (the *weird sector*). Hence in the 1982 crisis, the state became once more the controller of many previously privatized firms. This new period of state control was fairly short and firms were not considered to be truly state owned.

The trigger of the crisis had an international origin (a large raise in the prime rate in 1981 plus a moderate fall in the terms of trade), but the impact was amplified by serious mistakes in economic policy, some of which were related to the privatization process. The Chilean financial system was fragile so the rise in interest rates, coupled to the stoppage in capital inflows, weakened the new conglomerates, most of which had high debt to asset ratios. The mechanism used for privatization in the 70's led to concentrated property holdings and gave rise to economic groups (conglomerates) that were highly leveraged (see Sanfuentes (1984)). In many cases, the buyers of banks used bank deposits to pay the loans incurred in buying the banks. When firms were

[5] Related firms are those that belong to the same conglomerate.

privatized in the period 1976-1977, the new owners of banks again used their client's deposits or loans from other financial institutions to buy the firms. As we have mentioned, the buyers were required to put up collateral for 150% of the loan used to buy state owned firms, but shares in the firm could be used as collateral. In this way, large and highly indebted conglomerates were formed.

The lack of regulation in the banking system made it easy to lend money to related firms and even when restrictions were imposed, they were easily eluded. In the case of the two main banks, 21% and 50% of all loans went to members of the conglomerate. The bank regulator did not keep track of the quality of the loan portfolio. Ideology played its part in the lack of regulation, since government economists argued that if the banks were receiving deposits, private investors must have decided that the projects to which the banks were loaning money were profitable, and regulation was unnecessary. However, the regulator failed to realize the effect of implicit deposit insurance on their assumptions. In 1976 depositors in a newly privatized failing bank were protected from losses and this created the perception among depositors of an implicit state insurance. Moreover, investors in the conglomerates believed that they were too large to fail (Vergara (1996)). Regulatory changes in order to monitor the quality and supervise the concentration of bank loans were only put in place in 1982, while a stringent new banking law was introduced in 1986.

In addition to the financial resources from their affiliated banks, the two largest conglomerates managed mutual funds (82%), insurance companies (53%) and pension funds (68%) that gave them even more control over the economy (Sanfuentes (1984)). These institutions would buy shares of firms in the conglomerate, thus raising share prices. The indebtedness of the conglomerates was due in part to the level of real interest rates in the period 1975-1981, which were high because of the excessive demands for credit of the conglomerates in order to buy even more privatized firms. The high real rates were compensated by capital gains in the stock market. In 1981 the government allowed banks to contract loans abroad which led to a rapid increase in indebtedness. Firms which had access to international loans obtained credit at much lower rates than smaller firms with no access. In less than two years foreign debt doubled, with the two largest groups holding 52% of the debt.

Starting in 1985, the banks that had been taken over began to be privatized once again. Preferred shares representing 70% of equity were sold to new buyers. The banks sold their bad loans to the central bank and were recapitalized. In return, the Central Bank became a claimant in future profits in the banks[6] When selling the two major banks, the government strove to create a broad based class of shareholders, for two reasons: to provide stability and to make it more difficult to revert the privatization process. The mechanism was the so called popular capitalism: buyers were only required to put 5% down, while Corfo gave them a 15 year loan for the remainder.

[6]In other words, the Central Bank exchanged fresh money for a claim on profits.

There was a one year grace period at zero real interest rate, there was a 30% discount for timely repayment of the loan and generous tax benefits. There was a limit to the number of shares per buyer (and limits were enforced). Three additional banks were sold to groups of investors.

The two main conglomerates had been the owners of the larger AFPs (Provida, Santa María, San Cristóbal y Alameda), which held 68% of worker's funds. The two largest (Provida and Santa María) were sold via the popular capitalism scheme (without the tax benefits). Aetna, which owned 49% of AFP Santa María, was sold enough shares to get control, while the rest went to small buyers. Banker' Trust bought 40% of the shares in Provida, with the remaining shares going to small buyers. The other two AFPs were merged and auctioned under the name of AFP Unión.

After their recapitalization, the government also auctioned the other firms it had taken over. In most cases, a controlling package was auctioned, but in contrast to the procedure of the 70's, the government required that payment be upfront. The major companies were bought by local conglomerates in association with foreign investors. In order to increase the attraction of the auctions to foreigners, they were allowed to pay with Chilean bonds that were selling in the market at 60% of par value. Unfortunately, there is little information about the detailed transactions of that period, as there seem to be no clear records.

2.1.4 The Privatization of the historic SOEs (1985-89)

During the period 1985-1989, the government privatized 27 firms and closed down three other companies, while creating 29 companies through subdivisions of larger SOEs. Only three of the new SOEs were entirely new (Zofri, Metro and Cotrisa). In particular, eleven water and sewage companies were created from the national water works. The firms that were sold in this period were pre-1970 SOEs or firms that were spin-offs of pre-1970's SOEs, created in order to be privatized. The State sold 12 pre-1970's SOEs and 14 firms that were spin-offs of SOEs as well as two other firms that were acquired in the 70's and had been kept for strategic reasons. Most of the firm sold in this period were utilities and included 13 electric and 3 telecommunications companies.

There were four different mechanisms for privatization in this period First, best price offers for the firm or for controlling packages in open international auctions. The second mechanism was the auction of non-controlling packages of shares on the stock market. A third mechanism was the direct sale of shares to the workers of privatized companies, public employees, and small investors, the so-called labor and popular capitalism. Workers and public employees financed the purchases of shares by using their severance benefits and loans from public institutions at subsidized interest rates. Private pension funds participated in the privatization process through the acquisition of packages of shares in the stock market. Finally, public utility users that needed to interconnect to the system or increase the capacity of their connection were required to pay for

Table 2.4: Revenues from privatization of Chilean Public Enterprises 1985-1989, (US$ MM)

	1985	1986	1987	1988	1989	Total
13 Electric Firms	16,4	124,3	393	632,5	77,9	1244,1
3 Telecom Firms	0,9	55,6	35,5	344	192,1	628,1
Soquimich	4,7	85,4	71,5	60,9	0,0	222,5
Cap	12,1	139,5	53,2	0,0	0,0	204,8
Ecom	3,2	0,2	0,0	0,0	2,8	6,2
Iansa	0,0	8,8	1,0	50,8	8,0	68,6
Labchile	0,0	2,8	3,8	18,1	3,1	27,8
Schwager	0,0	0,0	6,1	2,2	7,0	15,3
Enaex	0,0	13,4	0,0	0,0	0,0	13,4
Isegen	0,0	0,0	0,0	0,0	5,6	5,6
Lanchile	0,0	0,0	0,0	7,0	75,9	82,9
Chilefilms	0,0	0,0	0,0	4,5	0,0	4,5
Isevida	0,0	0,0	0,0	0,0	8,8	8,8
Total	37,3	430	564,1	1120	381,2	2532,6

Source: Corfo Annual reports. US$ of 31/12/1995.

the infrastructure, in return for shares in the company (Bitrán and Sáez, 1994).

2.1.5 Privatizations during the 90s

The first elected government after the military regime (1990-1994) stopped the privatization process almost completely, in contrast to the second elected government (1994-2000) which gave a new impulse to the privatization process. In the period 1994-2001 fourteen companies were privatized while four were closed down. During the same period twelve new firms were created, ten of them being subdivisions of Emporchi, the port authority. By late 2001, 38 firms remained in public hands, of which fourteen were pre-1970 SOEs and 24 had been created after 1980, mainly by splitting traditional SOEs. The current SOEs include the largest copper mining company, the oil refinery, nine regional water and sewage companies, the post office, the subway, a copper refinery, ten ports, the post office and a commercial bank.

Between 1994 and 2000 the government used public auctions to sell all the state owned transportation companies: two shipping companies (Empremar and Transmarchilay), a cargo railway company in the northern part of the country (Ferronor), the cargo railway company in the Central Zone (Fepasa), and sold the remaining 27% of the national airline in the stock exchange. Ferronor

bought the northern rail system, which consists of several lines that run from mines in the Andes to ports and carry minerals. It has been a successful company. Fepasa got the cargo concession in the rail system south of Santiago, but the lines were kept by the State (which also kept the money losing passenger rail system). Unfortunately for this second company, the rail lines were in worse shape than expected, as was the case with the rolling equipment. Moreover, its holding company had financial problems and initially Fepasa made some commercial mistakes. Hence, it is only after several years in private hands that it has been able to achieve positive operational flows.

During this period, the State also completed the privatization of the electric sector. Edelnor was privatized in the period 1991-1994. In 1995 Codelco, the State-owned copper mining company, hived off and then sold its thermal power plant (Tocopilla). A 37,5% stake in Colbún was sold in 1996. Before the sale just over 15% of Colbún was traded on the stock market. In December 1997 the government auctioned 4,65% of Colbún in the stock market, and repeated that performance in 2001, selling its remaining shares. The government also privatized a radio company.[7]

The two most important privatization of the 90s, were those of the three largest water and sewage companies. The military regime did not privatize sanitation services, unlike the case of other public services. The need to raise tariffs significantly before it became feasible to privatize these services was a hindrance to the sale of the water companies. The military government felt that privatization followed by a substantial price hike would have been politically unpopular. In fact, in the late 1980s, water rates were on average less than half of what was needed to finance provision of the service, with prices covering less than 20% of outlays in the desertic northern regions. Prior to privatization, however, charges had to be raised so that the water companies could cover their costs.

Sectoral modernization began in 1977, with the creation of the Servicio Nacional de Obras Sanitarias (Sendos). This service absorbed several agencies belonging to different ministries and made it possible to reduce the workforce from 10,000 to 3,000. Apart from regulatory responsibilities for the whole sector, Sendos charged with providing water services in the regions. In the same year, state-owned water companies were set up in the Santiago Metropolitan Region (Emos) and in the Vth Region (Esval), based on pre-existing small companies. In 1989 eleven regional joint-stock companies affiliated to the state development corporation (CORFO) were created out of Sendos.

In 1988, a new regulatory framework was set up for the sector, closely matching its electricity sector counterpart. The new rate system allows for the self-financing of efficient firms. Pricing zones with relatively homogeneous costs were also established. The new pricing system was introduced gradually in 1990, and charges rose by an average of 90% in real terms between 1990

[7]The only valuable asset in this company were the rights to the FM spectrum, which were sold separately under allegedly questionable circumstances. The remaining AM frequencies were not valuable and the company went bankrupt very shortly.

and 1994, although by this time the rate adjustment process was still not complete in all regions. The price rise was steeper in areas with higher costs, exceeding 500% in some cases, and by 1998 average regional water rates ranged from US$0.43 to US$ 1.21 per cubic meter. Arrears were cut from 7.9% in 1990 to 2.9% in 1994, as a result of a business oriented approach and by the possibility of cutting off service to customers in arrears. In 1994 the average rate of return on equity among public water companies was 6.3%.

The Frei government decided to privatize water companies. However, it wanted to strengthen the regulatory framework before selling the firms, since it was not totally satisfied with the way the regulation of privatized public utilities was working. In 1995 the government sent a bill to Congress improving the rate settlement process. Congress approved the bill in December 1997, after a prolonged and heated debate, since it was assumed that the bill was in preparation for privatization.

The privatization of the water sector begun in 1998. Since then the three mayor water and sewage companies have been sold. A scheduled rate revision took place in the two major sanitation companies after privatization. The tariff revision resulted in a 20% increase in the tariff rates of both firms. The increase is more or less in line with the 10% cost of capital estimated for the sector (the public firms had a 7% rate of return on equity), and the selling prices reflect these numbers. The privatized firms are investing in sewage treatment plants and this will lead to further tariff increases. Currently (2002), the government is in the process of franchising its remaining water and sewage companies.

2.2 Data on Privatized Chilean Firms

Given the history of the privatization process described above, the data are difficult to obtain in usable form. We excluded from our analysis privatizations that took place between 1975 and 1979. First, because most firms that were privatized during this period had been managed by the government for only a few years. Furthermore, the political and economic turbulence of the 70's renders available information highly idiosyncratic. In fact, economic data from 1971 to 1973 show significant distortions, and the economic recovery did not start until 1976. Moreover, accounting standards were laxer and were changed in 1982. Hence in this paper we focus on the 54 firms privatized in the period in the 1979-2001. Two of these are insurance companies and are thus excluded from the sample, which includes only non-financial firms. Two water companies that were privatized in 1999 have also been excluded, since there is only one year of post-privatization data. Of the remaining fifty firms, only thirty-four are publicly traded in the stock-exchange and thus are obliged to provide financial information to the public, while the other 16 have no public

Table 2.5: Status of privatized firms 1983-2000

Status	Type	Number
Privatized		54
Analyzed		37
	Publicly traded	34
	Privately held	3
Not Analyzed		
	Too recent	2
	Privately held (no data)	13
	Financial	2

Source: Authors' computations. One additional firm (Pehuenche), an hydro-electric project at the time of privatization, was merged with Endesa without ever operating independently.

disclosure requirements.[8] However, we were able to have access to the information of three of the firms in the latter group (Fepasa, Empremar, Ferronor) and they have been included in the sample.[9] This leaves 37 firms for which we have usable data (see table 2.5).

2.2.1 Data problems

The basic source of information are the standardized quarterly reports that companies with publicly traded shares (plus some other firms designated by law) must provide the Chilean Securities and Exchange Commission (SVS), the so-called FECUs. The FECU corresponding to December includes the annual financial report and other information, including the number of workers in the firm.[10] FECUs have been required for the last 20 years and are available in digital form.[11] Previous to important changes in the accounting standards introduced in 1982[12], the accounting information of firms was not standardized and is thus less *descriptive* of the true financial status of

[8]Some of these sixteen firms had never been publicly traded, while others were taken off the stock market (i.e., became private or "closed") after privatization.

[9]This is a very slow process, since the firms are not required to provide the information. Obtaining data for Empremar, Fepasa and Ferronor took almost three months, because it required obtaining information not only from the firms but also from the original state-owned firm.

[10]Another interesting source of information at the plant level is the INIA survey, which registers quarterly data on many of the variables of interest for this study. Unfortunately, secrecy considerations imply that the information provided by the National Institute of Statistics (INE), which owns the survey makes it impossible to use the data for our purposes. The INE refuses to provide information on whether a particular plant was ever privatized, so we were unable to use this rich data source for this study.

[11]The digital form does not include the number of workers, which must be reconstructed from the FECUs in paper form.

[12]Circular 239, Superintendencia de Valores y Seguros (1982).

firms. An additional source of information were the annual company reports. However, the data in the annual reports is not standardized, and is therefore less useful.

There is no source for the following data at the firm level: number of white and blue collar workers, average wages, salary differentials and output price indexes. Another important data limitation is that there are no readily available physical data, since only output of some products are described in the annual reports, and the products themselves change between annual reports and, finally, we have no price index of these products. As an example, a steel company might produce steel in ingots and liquid form, iron ore and other products. Should we assume that physical productivity has gone down because steel ingots per worker have fallen, or is it due to a change in the demand for ingots as compared to liquid steel, for instance?

In principle, one might look at sales per worker as an index of productivity, and we do this in the paper. However, most of the firms we analyze are either regulated or face very few competitors, so that prices are not competitively based and more sales per employee after privatization could be due either to higher prices or to higher productivity, or to a combination of both factors. In our analysis, in addition to working with the whole sample of firms, we analyze the performance of the group of regulated and unregulated firms. Our definition of a regulated firm is slightly ad-hoc: if the government, through interventions in the market or though tariff regulation, has the ability to change the profitability of a company.[13] This implies that all electric distribution companies are regulated for our purposes, as are local and long distance telephone companies.[14] IANSA, the monopoly sugar refinery, is a doubtful case, since the government, sets the price it can charge for sugar through a price stabilization mechanism known as "bandas".[15] We have compared the results obtained by assigning IANSA to either group (regulated or unregulated) and there are no major difference between the two cases.

In order to measure the impact of privatization on firms we exclude the two years immediately prior to and post privatization. There is a potential cleansing effect in the accounts before the sale of the company, while the years following privatization could not be representative of the post-privatization performance if the firm is still undergoing a reorganization process. Hence we compare years three to five prior to privatization with years three to five post privatization. Nevertheless, we have examined the data in the three years prior to privatization, in order to get a feeling for the cleansing effect described in La Porta and López-de Silanes (1999).

[13] We have included the electric generating companies among unregulated firms because they sell a large fraction of their energy in unregulated long term contracts.

[14] Telex, a long distance operator, was not regulated during the period under consideration.

[15] IANSA has a powerful lobby among southern landholders.

2.2.2 Treatment of Mergers and demergers

Using data three to five years prior to and post privatization creates a set of problems. Some firms were spun just a short period before being privatized. For instance, Chilectra was divided into three firms prior to privatization. Six regional distribution companies, Colbún and smaller generating companies were spun off ENDESA. The problem is that pre-privatization FECU's for the newly independent firms do not exist and therefore it is not straightforward to determine the change in performance due to privatization. Similarly, in the case of mergers, we do not have post-privatization independent FECU's. In these cases we have to rework the data in order to assign the assets of the original firms to each daughter firm. Conversely, when the firms are merged we have to "disassemble" the merged firm into its original constituents.

The procedure we follow is to assign the different variables in proportion to their fraction of the merged firm at the time of privatization. For example, suppose that Firms A demerges from firm Z and both are privatized. In order to obtain data on a variable prior to privatization, take the data at privatization, and consider the proportions of that variable for the combined firm. Then assign the data in the combined FECU or variables not in the FECU (prior to privatization), in those proportions. A similar procedure is used in order to analyze data for merged firms.

2.2.3 Data adjustments

In order to eliminate the effect of economic conditions on the performance of firms, we also present normalized comparisons. Firm performance ratios are normalized by subtracting the average values of the two-digit SIC group to which it belongs. Although the two-digit decomposition encompasses widely differing industries, going to more digits in the decomposition would not have been useful, since the firms in question represent most if not all of the industry at more detailed SIC levels. We have subtracted the two-digit averages rather than used ratios because of the extreme variations in these ratios, which would have given excessive weight to some observations. Moreover, the interpretation is simple: if an adjusted ratio for a privatized firm is negative, the ratio is worse than the average of that variable in its (two-digit) sector. Some two-digit average ratios have been treated differently because of the extreme variation in the data. For example, consider the ratio Net Income/Sales (or PPE) for a small timber company in the control group that sells a forest. This is a non-operational income, there are very few sales, and the ratio of net income to sales is astronomical. In these cases we have taken the sum of net income for firms in the control group and divided it by total sales of the firms in the control group to obtain a more reasonable result.

Table 2.6: Net income to equity, privatized SOEs

Firm	1970	1974	1979	1983	1986	Year Privat.
CAP	10.9	0.5	0.2	0.7	2.3	1986
Chilectra	0.5	-3.2	2.6	4.6	–	1986
CTC	0.7	-4.1	1.7	11.9	10.9	1987
ENDESA	0.3	-4.3	2.4	6.4	4.9	1988
ENTEL	-0.7	-3.4	12.3	13.0	35.4	1988
IANSA	-9.3	12.1	-9.8	-24.0	5.5	1988
Lab. Chile	4.1	7.9	0.5	-196.4	12.8	1989
Soquimich	-65.3	11.9	-7.9	10.1	30.8	1986

Source: Sáez (1996).

2.3 Effects of privatization on Chilean firms

We analyze the firms before and after privatization both in terms of absolute performance and by comparing them to a benchmark given by the average behavior of their sector at the two-digit level, as we have mentioned before. The first part of the analysis in each subsection is devoted to unadjusted data. Perhaps the most interesting result we obtain is the difference between the performance of regulated and unregulated firms. The detailed tables and graphs with the pre- and post-privatization performance appear in the appendix.

2.3.1 Profitability

Prior to privatization, in contrast to Mexico (see La Porta and López-de Silanes (1999)), SOE's were fairly profitable. Most of the large SOE's that were privatized were profitable, as shown in table 2.6, so the firms did not have to go through the large changes that were required in other countries. Even though on average privatized firms were profitable, several smaller firms (and a few large ones such as ENDESA in 1985) did have losses prior to privatization. If anything, at the time there were complaints that the government was selling the crown jewels. Hence, the scope for efficiency benefits from privatization was relatively small.

Using table 6.1, which is analogous to the first part of table IV in La Porta and López-de Silanes (1999), we can analyze profitability before and after privatization. If we consider the profitability variables: Operating income to sales (OI/S), Operating income to physical assets (OI/PPE), Net income to sales (NI/S) and Net income to physical assets (NI/PPE), we observe that there seems to be a significant change in the profitability ratios before and after privatization. In particular, we

observe that NI/S rose from less than 2% to 13% on average and that NI/PPE rose from less than four percent to more than 16%. Moreover, the profitability measures are strongly positive.

However, this change in profitability is mainly due to the change in the results of regulated firms.[16] While the profitability ratios improve for the group of unregulated firms, there is enough variation in the results that we cannot show that the change is significant. The important ratio NI/PPE increases from a low 4% to a fairly reasonable rate slightly above 12%. By contrast, in the case of regulated firms the change in profitability ratios is far more important. The ratio NI/PPE rises from 3.5% to 20.5% and the same pattern of large increases in profitability of regulated firms occurs for the other profitability ratios.

When we consider adjusted variables (see Table 6.4), obtained by normalizing the profitability ratios by subtracting the ratio of their sector, we find that the improvement is less significant. This implies that part of the improvement observed in the previous paragraph can be largely explained by a simultaneous improvement in the profitability of the sector. Nevertheless, the net income ratio NI/PPE for the sample of firms rises from 1.5% above the average in the sector to almost 10% above average for the sector. What is interesting is that the profitability ratios with respect to sales are not significantly different from that of the industry as a whole, which seems to indicate that the increased profitability is related to a better use of physical assets, or alternatively, to overinvestment prior to privatization.

As in the case of non-adjusted variables, most of the change in profitability is due to the increase in the profitability ratios of the regulated firms. While there is an increase in adjusted profitability of non-regulated firms after privatization, the increase is non-significant. Moreover, the profitability of these firms is not significantly different from that of the other firms in their sector. By contrast, all adjusted profitability ratios except for NI/S increase significantly after privatization in the group of regulated firms. Moreover, these firms, which had average profitability similar to that of their sectors, became much more profitable afterwards, which seem to indicate that the regulators were unable to pass the gains in efficiency to consumers.

2.3.2 Efficiency

Efficiency is described by the cost per unit (Cost/Sales) and by the sales to physical assets (S/PPE) ratio shown in Table 6.2. The cost per unit ratio falls by a small but significant amount at the 10% level for the sample of privatized firms. The S/PPE ratio falls slightly but non-significantly. Once again, there is a large difference in the behavior of regulated and non-regulated firms. Cost per unit falls significantly for regulated firms, while it barely changes for non-regulated firms.

[16] As we have mentioned before, IANSA is assumed to be non-regulated, but results do not change if we group it among the regulated firms.

Similarly, S/PPE ratio increases significantly (at 10%) for the regulated firms, whereas it falls for non-regulated firms.[17]

When we examine adjusted efficiency ratios, see Table 6.5, we observe that there is no difference between the privatized firms and the cost per unit in their sectors and there is no change post-privatization. Moreover, for this ratio there is no difference between regulated and unregulated firms. Things are different for the S/PPE ratio, since the firms in the group of privatized firms seem to have much higher ratios than the average for their sector.

2.3.3 Assets and investment

Table 6.3 shows variables related to assets and investment. The average value of the logarithm of physical assets (the log of the geometric mean of PPE) shows an increase that is non-significant after privatization. In fact the change is concentrated in the regulated sector, where the increase in physical assets is significant. The investment to sales ratio (I/S) fell significantly (at 10%) after privatization, which seems to imply that firms invested more productively. Again, the big change lies in the regulated sector, where this variable fell from a value of 1.92 to 1.43 on average (compare to 1.84 to 1.79 in the non-regulated sector). An alternative explanation is that SOEs that operated in a competitive setting were investing efficiently before privatization so there was not that much scope for improvement.

The ratio of investment to physical assets (I/PPE) for the whole set of firms remained constant, but again there is a difference between regulated and non-regulated firms. There was a non-significant fall in this ratio for the non-regulated firms and an increase for regulated firms (again, non-significant). The ratios of investment and physical assets per employee increased substantially after privatization: workers had access to better equipment. What is interesting here is that it is in the non-regulated firms that the increase is significant.

When we consider adjusted ratios (see Table 6.6, there are no significant changes in the behavior before and after privatization. The only important difference is that first, the privatized firms are much larger than the average for their sectors and the I/PPE ratios is also significantly higher. However, in the case of this last variable, this holds only for regulated firms.

2.3.4 Productivity

In Table 6.2 we have the productivity ratios of sales to employees and operating income to employees. Both these ratios show that productivity increased significantly as firms became private,

[17] In a personal communication, R. Luders observed that he had not been able to detect improved performance in privatized firms in Hachette and Luders (1994). His explanation was that managers of state owned firms were ideologically committed to efficiency during the 80's. For further evidence of this, see table 6.1.

as expected. However, once again, most of the change was due to the behavior of regulated firms, whose sales to employment ratios increased by 88% and whose operating income to employment ratios rose by 325%. We were unable to obtain employment data for all firms in a sector at the two-digit level, so we have not compared the growth in productivity of privatized firms with the firms in their sectors.

We have also examined physical productivity for firms for which we could obtain measures of physical product (tons, passenger/km, GWh, etc) in table 6.8. We have used these variables to construct productivity ratios and then we have taken the percentage difference before and after privatization. The results show that firms increased their productivity by about 25% on average after privatization, but there is enough variation in the data that this is not significant for the whole sample nor for regulated or unregulated firms separately. However, some caution is required in the use of this data: most firms have more than one line of production, and therefore a fall in physical productivity on the basis of one product may mean nothing. As an example, Lan Chile seems to have decreased its productivity in terms of passenger/km after privatization. However, after privatization, the firm began a successful cargo branch, whose revenues are about the same as as those in the passenger segment of the company. Therefore, the data in this section may show that productivity has increased in physical terms, but unless we have the prices of these different products and their production, this comparison is not very informative.

2.3.5 Employment

As can be seen from table 2.7, there is no evidence that firms fired workers during the period in the period 1983-1992, which includes the year that the firm was privatized. In fact it appears that firms increased the number of workers on aggregate. Moreover, it is clear that SOEs reduced their employment levels years before they were privatized (more than three years in most cases). However, different firms were privatized at different times, and therefore it is interesting to see if this continues to hold for the complete sample of privatized firms, considering the time in which they were privatized. To examine this issue, we use table 6.7. Again, there is no evidence that firms fired workers after privatization. Employment increased slightly but non-significantly after privatization: the average firm grew from 1193 to 1381 employees. Both regulated and unregulated firms grew in size. Note that on average, non-regulated firms are larger.

Table 2.7: Employment changes in privatized firms

Firm	1970	1973	1979	1983	1986	1992	Privatized
CAP	7025	11637	9321	6519	6667	9643	1986
Chilectra*	NA	4250	4196	3846	4133	4712	1986
CTC	5887	7252	7206	6338	6938	8504	1987
ECOM[a]	188	341	333	165	149	NA	1986
ENAEX	344	340	394	388	470	NA	1987
ENDESA*	6512	8504	4270	2705	2905	2980	1988
ENTEL	1161	1458	1236	1338	1402	1748	1988
IANSA	2827	2881	1597	1079	2027	1561	1988
Lab. Chile	3608	4546	2059	1372	883	797	1989
Soquimich	10814	10684	7109	4096	4704	3242	1986

Source: From Sáez (1996). Data for 1992 from FECU's. Data for Endesa (apart from 1970) from Hachette and Luders (1994) (for the principal office, and the last year is 1989). Data for Chilectra from Sáez (1996) except for 1986 and 1992. Those years obtained by aggregation of all the firms that were originally part of the firms in 1980 using data on Hachette and Luders (1994) for 1986. [a]: ECOM went bankrupt before 1992.

Chapter 3

Privatization of Regulated Sectors

3.1 The Efficiency of Privatized Utilities

In this section we provide an assessment of the privatization-cum-regulation process carried out at electricity and telecommunications companies between 1985 and 1989. The evaluation considers the aims of the privatization, namely to provide capital for expansion of utilities that the State was not able to fund at the necessary level, to enhance the efficiency of enterprises, and to transfer those efficiency gains to consumers. In the previous section we saw that SOEs increased their profitability and efficiency after privatization. These changes, however, are in line with those of the rest of the economy. But firms that provide regulated services stand apart. Their profitability increased more than those of non-regulated firms. This difference has to be attributed to the interplay between privatization and regulation.

3.1.1 The Privatization Process

The government privatized most of the telecom and electricity industries between 1985 and 1989. Some of the smallest companies were sold through public auctions. Larger firms were privatized through different mechanisms: sale of shares in the stock market; the periodic auction of packages of shares on the stock market, and the direct sale of shares to employees of privatized firms (labor capitalism), public employees and small investors (popular capitalism). Pension funds, company's employees and foreign investors acquired most of the shares.

In the late 1970s, the telecommunications industry was dominated by two public enterprises: CTC, which provided basic telephone service throughout almost the entire country, and Entel, the only international long-distance provider. [1] The State also owned two regional local telephone

[1] These two companies shared the domestic long-distance market.

Table 3.1: Privatization of Chilean Telecom Companies 1984-1989 (UU$ Millions December 95)

Company	1985	1986	1987	1988	1989	Total
Entel	0.2	36.7	8.4	81.8	105.0	232.2
CTC	0.7	4.7	27.1	262.2	87.1	381.7
Telex	0.0	14.2	0.0	0.0	0.0	14.2
Total	0.9	55.6	35.5	344.0	192.1	628.1

Source: CORFO Annual reports

companies (CNT and Telcoy) and Correos y Tel'egrafos, which provided telegraph service. In 1982, the Government sold Telcoy and CNT in public bidding, and both were acquired by VTR, a local telegraph operator. However, the privatization of the large telecom firms only started in 1995. By the end of 1987 25% of the equity of CTC was in private hands. In 1988 the government sold 45% of the ownership of the company to a foreign investor. In the case of ENTEL, in 1995 and 1996 the government sold 30% and 3%, respectively, of its shares, most of which was acquired by pension funds. In 1988, the State further reduced its stake in Entel to 37.7%. This time, company workers were the main purchasers(12.5%). The revenues from the privatization process of the main telecom firms appear in table 3.1.

The privatization of the two largest electricity companies (Endesa and Chilectra) also started in 1986. In order to create competition in the wholesale electricity market they were restructured prior to privatization. The restructuring involved separating distribution from generation. Endesa, the largest company, was divided into 14 companies: six generating companies, six distribution companies, and two small isolated companies combining generation and distribution in the southern part of the country. Chilectra was divided into three firms: a generating company, and two distribution companies. Most of the firms were under private control by 1989. The revenues from the privatization process of the main telecom firms appear in table 3.2.

3.1.2 The Regulatory framework

Some services provided by utilities were considered to be natural monopolies and therefore the development of regulatory institutions preceded their privatization. Regulatory bodies were created in the late 1970s for each sector: the National Energy Commission (CNE) and the Undersecretariat of Telecommunications, respectively. They are responsible for granting operating licenses, monitoring technical standards, and setting rates for services where competition is insufficient. Regulation, operation, and, to some extent, policy-making had previously been in the hands of

Table 3.2: Privatization of Electric Companies 1984-1989 (US$ Millions December 95)

Sector	Company	1985	1986	1987	1988	1989	**Total**
Distribution							
	Chilmetro	10	36	83,3	0	0	129,3
	Chilquinta	2,4	11,1	18,7	0	0	32,2
	Emec	0	6	7,5	0	0	13,5
	Emel	0	7,9	0	0	0	7,9
	Emelat	0	0	9,7	0,9	0	10,6
	Emelari	0	0	0	0	3,1	3,1
	Eliqsa	0	0	0	0	4,8	4,8
	Elecda	0	0	0	0	6,1	6,1
Generation*							
	Endesa	0	0	180,0	585,4	63,8	829,2
	Pullinque	0	0	62	0	0	62
	Chilgener	4	22,2	31,8	33,8	0	91,8
	Pilmaiquen	0	41,1	0	0	0	41,1
Integrated							
	Edelmag	0	0	0	4,8	0,1	4,9
Total		16,4	124,3	393,0	624,9	77,9	1236,5

Source: CORFO annual memories.
Note: * Excludes Pehuenche, which was sold as a project for US$7,6 millions

the SOEs themselves. Moreover, new regulatory legislation was introduced in 1982. The aims of these laws were to create the conditions for competition to arise whenever possible, and to guarantee, in cases where there was insufficient competition, that the efficiency gains expected from privatization would be transferred to consumers.

Under these rules, concessions to operate utility services are not exclusive, and objective, non-discriminatory criteria govern the granting of licenses. Only technical reasons, as in the case of mobile telephony, may limit the number of operators. On the other hand, legislation mandates that service be provided within the area of the concession, defines continuity and quality standards, and requires interconnection with other firms when regulators deem this to be necessary. Tariffs of regulated services are based on the long-term marginal cost of a hypothetical efficient firm. Prices are set every four (electricity distribution) or five years (basic telephony), and within the price setting periods they are indexed to the prices of the main inputs used to provide the service. The separation of rates from current costs is intended to create an incentive for firms to be efficient.

Chile's regulations did provide for open access to essential facilities, but did not regulate access charges at first. Moreover, Chilean legislation does not preclude vertical integration. Thus, in 1992, Enersis, a holding company that owned distribution companies which supply 44.4% of the market in the Central Interconnected System (SIC), took control of the largest power generation company (Endesa), which in turn owned the main transmission system. It is fairly well known that monopolies that are vertically integrated into non-regulated segments may have an incentive to sabotage its down-stream competitors (Beard *et al.* (2001)). Accusations by their competitors that integrated monopolies had discriminated led to regulatory changes. In 1994 the telecommunications law was amended to mandate the regulation of access charges to the local telephone network. In 1997 the Antitrust Commission instructed Endesa to re-charter its subsidiary as a public stock corporation and open its ownership to participation of other shareholders. Finally, Endesa sold its transmission subsidiary in 1999.

The electricity sector.

Electrical sector legislation distinguishes among three distinct activities: generation, transmission and distribution. Only distribution firms need a concession. Distribution licenses are granted for indefinite periods, but may be cancelled if the quality of service falls below the legal standard. Power-generating firms and transmission companies within the same area must interconnect, and they must co-ordinate their operations through an economic load dispatch center (CDEC). The aims of CDEC are to guarantee the most economical operation of all generating facilities, to guarantee the right of power-generation companies to sell energy at any point in the system, and to safeguard the security of the system. The specific tasks of a CDEC are to plan he short-term opera-

tion of the system, to handle the dispatch of electric energy, to calculate the spot price of electricity and to co-ordinate major preventive maintenance of generation units. All plants must be available for dispatch (refusal to provide energy when requested can lead to severe penalties), unless maintenance has been scheduled. The optimal operation of the various facilities, independently of existing supply contracts, calls for transfers of energy to be made between power generators, at the so called *spot price*, which is the operational (or marginal) cost of the most expensive plant in operation at a given time.

The Chilean regulatory system distinguishes between large and small customers. The former, with maximum power demands above 2MW, are free to negotiate the terms of their supply with the various generating firms. Small customers, on the other hand, purchase energy from distribution companies at regulated prices, which are made up of two components: the node price, at which the distribution firms buy energy from power-generation firms, and the value added of distribution, which pays for distribution services. Distribution charges are computed for different urban or rural areas in such a way that an efficient firm operating in an area with those characteristics would make a 10% return the replacement value (NRV) of its assets. This charge is calculated as a weighted average of the findings of outside studies contracted for by the industry and CNE, respectively, with the CNE study accounting for two thirds of the final figure. These figures are applied to the real firms to calculate average profit levels for the industry over the NRV of assets. If average profits are more than 14% or less than 6%, distribution costs are adjusted to the nearest quantum.

The node price, in turn, has two components: the price of energy and the price of peak power. In order to guarantee stable rates for small consumers, the price of energy is computed every six months as an average of the marginal costs expected over the next 48 months, using projections of demand, fuel prices, water-reserve levels, generating plants under construction and the indicative plan drawn up by CNE. The price of peak power is defined as the annual cost of increasing power during peak hours with the least expensive plant. This cost is increased to take into account the reserve margin (or security level) of the system.

Large customers (including distribution companies) are required to have contracts with generating companies. In turn, every power-generation company must have the capacity to meet the yearly energy contracts, bearing in mind potential dry spells that would affect the hydroelectric plants and average capacity of thermal generation units. Power-generation firms must also be able to satisfy peak demand; measured as the average gross hourly demand they have undertaken to supply their customers at the system's peak times. A yearly determination is made of power and energy deficits/superavits incurred by the generation companies in respect of their supply contracts that would give rise to transfers between producers. The terms of energy-transfer arrangements are negotiated between the firms, while transfers of peak power are made at the price

set by CNE.

Finally, power-generating firms pay marginal cost plus a basic fee for use of the transmission lines. Given that there are significant economies of scale in building lines, marginal-cost pricing does not allow for recovery of all transmission costs. The difference between the total cost of a line and the revenue collected through marginal costs is designated as the basic fee. Then, for each line, the basic fee has to be distributed among the various power-generating firms. The basic charge is negotiated between the transmission company and the generating company, and disagreements must be settled by arbitration. The assignment of basic cost for a line among the various generating firms is based on maximum demand at peak times. The foregoing criteria have no solid conceptual basis, particularly as regards the assigning of the entire transmission cost to the generating firms.

Telecommunications.

The legislation governing telecommunications provides for free pricing of telecommunications. However, rates are set for those services the Antitrust Commission considers to be provided under conditions of inadequate competition.[2] The telephone companies themselves, on the basis of guidelines set by Subtel, carry out the studies that are used to set rates. The companies hand in these studies to Subtel, which has 120 days to present its objections and counterproposals. A committee of three experts arbitrates disagreements between the companies and Subtel, both in regard to guidelines and to objections. The company appoints one member of the committee, the regulator a second one, and the two parties agree the third on. Although the regulators make the final decision, they tend to follow the recommendations of the experts, since the companies are likely otherwise to go to court.

The ambiguities of the 1982 law had created a legal monopoly in long-distance service. In 1989, a number of companies applied to Subtel for licenses to operate long-distance services. The final decision was not handed down for several years, because of the indecisiveness of the courts as to whether or not vertical integration of local and long-distance service should be allowed. Finally, in 1993, the Antitrust Commission authorized the participation of local telephone companies in the long-distance market. In 1994 the law was modified in order to introduce the competition in long distance though the multi-carrier system, and following the ruling of the Commission, it imposed restrictions on local telephone concessionaires that wished to operate in the long-distance market. In the first place, they had to do so through subsidiaries organized as independent joint-stock companies, subject to supervision by the Superintendence of Securities and Insurance (the Chilean Securities an Exchange Commission). The law also required local telephone service providers not

[2]Congress excluded mobile telephony (except for access charges) from this requirement, so user prices are free, independent of the competitive conditions.

to discriminate among long-distance carriers with respect to quality of service and information on long-distance traffic. Moreover, the access charges to the local network were regulated.

In 1988, the Government set standards for mobile telephone service, though an early entrant had had a concession since 1981. The regulations created two concession areas for mobile service, with two licenses in each area, to be granted on a first-come, first-served basis. In November 1996, Subtel granted three nation-wide PCS licenses, using a "beauty contest" where geographic coverage and speed of implementation were the key bidding variables. Until 1999, subscribers had to pay the same fee both for the calls they made as for the calls they received, which was a disincentive to the use of mobile phones. In February 1999, the regulator introduced a "calling party pays" principle, in which callers are forced to pay for all charges (including the regulated access charges) when calling mobile phones.[3]

3.1.3 Evaluation of privatization in the regulated sectors

An assessment of the privatization process carried out at electricity and telecommunications companies between 1985 and 1989 should consider the objectives of the process. As we have mentioned before, the objectives were to increase the efficiency of these firms, and to provide resources for investment in new capacity. Therefore, a complete evaluation of the privatization-cum-regulation process would require, as a counterfactual, a prediction on how the privatized firms would have developed if they had remained in the public sector. Here we take a more modest approach. We analyze, for each sector, the post-privatization evolution of a set of variables, and relate their behavior to the regulatory changes. In particular, the comparison between regulated utilities and those that operate in competitive markets makes it possible to draw inferences regarding the effectiveness of the regulatory system. In some cases, the differences are so significant that inferences can be drawn despite the obvious limitations of this approach.

The electric sector.

Between 1988 and 2000 electricity generation grew from 16,914 GWh to 39,142 GWh, and installed capacity rose from 4,016 MW to 10,045 MW. In the Central Interconnected System, capacity grew less than electric generation, and this can be explained by the fact that peak demand grew at a lower rate during those years, owing to the use of peak-demand pricing.[4] Moreover, power-generating firms have generally invested earlier than required under the Government's indicative

[3]The high value of the mobile access charge has played a prominent role in the accusations by the local telephone company that its competition is being subsidized.

[4]Initially, the creation in the early 1990s, of an interconnected system in the northern part of the country helped increase the use of existing capacity in that area. However, commercial mistakes in the late 90's led to overcapacity and large losses.

investment plan. Despite the installation of new capacity ahead of the plan, there have been periods of energy shortages in the Central Interconnected System (SIC) due to the system's heavy dependence on hydroelectric power (in some years, such as 1992, 97% of generation is provided by hydroelectric power). These outages, however, seem to have been caused by regulatory failures.

Outages are caused by excessive demand in relation to supply in specially dry years, because the inflexibility of the (forward looking) regulated energy prices for small customers makes them unresponsive to supply constraints. When those hydrological conditions are expected, the regulated price is set as the outage cost (i.e. the cost to users of long run supply failures).[5] On the other hand, generating companies must compensate users in these conditions by future energy bills by an amount equal to the outage cost times the amount of non-delivered energy. Hence, during a severe drought, the actual price faced by customers is the outage cost, making users indifferent between reducing their energy consumption and not having energy, so in theory, the supply deficit will be eliminated.

Unfortunately, this compensation mechanism has never been used. Regulations (introduced at the suggestion of the largest hydroelectric operator) eliminated these compensations when the drought is drier than the driest year that is used in computing the node price. Moreover, no procedures were introduced to deal with that case. After the 1998 blackouts the law was modified and now imposes compensations under all circumstances. In response, generators have not renewed their contracts with distributors t supply energy at the node price, leading to an impasse.

Labor productivity in the privatized companies has improved considerably. In Endesa, the largest generator, power generated per worker rose from 2.2 GWh in in 1989 to 18.1 GWh in 2001 (see table 3.3). If we only consider employees working in the holding company and in the generation subsidiaries, the power generated per worker rises from 6.3 GWh in 1991 to 28.7 GWh in 2000. Labor productivity in electricity distribution has also grown substantially after privatization. For example, Chilectra, the largest distributor, more than doubled its annual sales of electricity since privatization, from 3,612 GWh in 1987 to 9,253 GWh in 2001 and its customer base grew from 973 thousands to 1,289 thousands. The number of workers, meanwhile, fell from 2,587 to 722, and the number of clients per worker grew from 376 in 1987 to 1,785 in 2001. In addition, energy losses fell from 19% to 5.4% in the same period (see table 3.4).

[5] In fact there are several such costs, depending on the amount of the energy deficit.

Table 3.3: Endesa: Investment, Power Generation and Productivity of Labour

Year	Dom. invest.	Invest. abroad	Dom. gener.	Local workers		Labor Prod.[a]	
	US$ MM	US$ MM	GWh	All	Generation[b]	All	Generation
1988	–	–	7,420	–	–	–	–
1989	110	–	6,649	2,980	–	2.2	–
1990	–	–	6,608	2,883	–	2.3	–
1991	131	–	8,521	2,445	1,357	3.5	6.3
1992	47	102	10,022	2,347	1,302	4.3	7.7
1993	107	165	10,627	2,088	1,058	5.1	10.0
1994	94	51	11,277	1,970	1,970	5.7	5.7
1995	180	119	11,783	2,255	1,038	5.2	11.4
1996	235	391	12,898	1,692	879	7.6	14.7
1997	415	1,023	13,247	1,674	929	7.9	14.3
1998	579	462.6	12,188	1,763	980	6.9	12.4
1999	301	362.4	13,672	1,383	711	9.9	19.2
2000	145	78	15,346	888[c]	574	17.3	26.7
2001	–	–	15,741	–	–	–	–

Source: Company's annual reports.
Notes: [a]: In GWh/worker. [b]: Assumes that 30,5% of employees work in transmission in 1991 and 1992 (the 1993 figure). [c]: The reduction in the labor force is partially explained by the sale of the transmission subsidiary.

Table 3.4: Chilectra: Sales, Employees, Productivity of Labor, and Energy Loss

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Sales (GWh)	3,612	3,844	4,070	4,230	4,568	5,338	6,476	6,359	6,676	7,256	7,647	8,175	8,425	8,854	9,523
Customers	973	1,008	938	935	960	988	1,018	1,064	1,100	1,133	1,169	1,212	1,239	1,262	1,289
Employees	2,587	2,565	2,144	2,159	2,125	2,086	1,856	1,823	1,801	1,643	1,662	1,383	1,383	867, 722	
Labor Prod.[a]	376	393	437	433	452	473	549	587	610	689	703	724	896	1,455	1,785
Sales/worker[b]	1.4	1.5	1.9	2.0	2.1	2.6	3.5	3.5	3.7	4.4	4.6	5.9	6.1	10.2	12,8
Energy Losses (%)	19.8	18.8	16.1	13.6	13.3	12.0	10.6	9.3	9.0	8.6	7.6	6.0	5.3	5.2	5,4

Source: Chilectra's annual reports. Notes: [a]: Customers per worker. [b]: GWh.

Table 3.5 shows the node prices in the two main interconnected systems (SIC and SING), in current dollars and pesos. There has been a clear downward trend in energy prices since generating firms were privatized. In constant pesos, the drop is approximately 33% in SIC and 73% in SING. This is explained primarily by the decline in prices of fuels used at the thermoelectric plants (partly explained by the appreciation of the peso), which play a part in determining marginal prices. In the SIC, the fall has been particularly sharp from 1997 onwards, owing to the anticipation of the arrival of natural gas supplies from Argentina (recall that the regulated price of energy is forward looking). A greater load factor (use) as a fraction of installed capacity and the transfer to consumers of these gains in productivity also help explain the lower prices. The profits of the main power-generating company have increased moderately since privatization, reaching a peak of 15.7% return on equity (ROE) in 1995 (see table 13) and declining in the following years, as a result of unfavorable hydrological conditions and the fact that the installation of more efficient combined-cycle gas turbines and the arrival of natural gas from Argentina reduced the economic value of existing plants.[6] Note that the fall in profitability in the generating industry led to further labor-productivity gains in the late 90s.

Regulation of distribution firms has been less successful. According to data from the Ministry of Economics, the value added (i.e. the charge to consumers) by distribution for Chilectra fell by 18% in the rate-setting process of 1992 and by an additional 5% in the rate-setting process of 1996. However, this price reduction in the VAD does not match the efficiency gains achieved after privatization. This situation led to increases in the profits of distribution companies. The return on equity obtained by Chilectra increased from 8% in 1988 to 32% in 1996-98. In the 2000 rate-setting process, rates were reduced by a further 18%, which led to lower profit rates at first. In response, Chilectra increased labor productivity substantially. The rest of the industry has gone through a similar process. The profit levels in distribution are much higher than those of the generating companies, which in any event are subject to greater risks, both for lack of a secure market (they operate under competition) and because of the potential for droughts (see Table 3.6). Some of the distribution industry profits come from unregulated services which are unlikely to become competitive, because they are closely related to regulated services, as in the case of the renting of meters. Distribution companies also obtain significant returns from allowing phone and cableTV companies to hang cables in their poles. However, these returns are not considered when estimating the income of the efficient firm, so in effect, consumers can pay more than twice for the same infrastructure.

[6]Chile has no stranded cost principle, so the introduction of a new technology may reduce to zero the value of existing power plants.

Table 3.5: Change in Node Prices and in Residential Rates

Year	Node price				Residential
	SIC[a]	SING[a]	SIC[b]	SING[b]	SIC[b]
1987	22.2	53.4	2.4	5.9	14.73
1988	26.1	49.7	2.9	5.6	15.87
1989	26.8	51.7	3.3	6.4	16.97
1990	22.6	59.5	3.0	7.9	18.15
1991	19.3	47.8	2.6	6.5	15.83
1992	18.9	36.9	2.9	5.6	15.72
1993	20.4	37.8	3.1	5.7	15.08
1994	21.1	34.7	3.7	6.1	15.31
1995	18.4	23.1	3.7	4.6	15.44
1996	15.4	23.5	3.1	4.8	14.65
1997	12.7	18.8	2.7	4.0	13.77
1998	10.7	14.0	2.1	2.8	12.16
1999	11.4	11.4	2.1	2.1	12.16
2000	14.9	13.7	2.6	2.4	–

Source: CNE.
Notes:
[a]: October 2000 pesos per KWh.
[b]: Current US¢ per KWh.

Table 3.6: Profits of Main the Electric Sector Companies: 1987-2000

Year	Distribution (%)				Generation (%)			
	Chilectra	CGE	Chilquinta	Saesa	Endesa	Gener	ElectroAndina	Edelnor
1987	–	18.5	8.8	17.6	5.2	3.1	–	-7.7
1988	7.4	19.7	12.4	19.9	13.7	7.8	–	-2.8
1989	21.3	17.8	19.5	25.9	7.7	8.4	–	-0.7
1990	22.9	17.5	19.5	25.2	6.4	9.4	–	3.3
1991	19.4	16.5	21.7	26.6	10.4	7.4	–	3.0
1992	17.3	16.7	42.3	24.9	13.5	7.3	–	3.4
1993	14.5	18.3	15.7	27.1	11.0	8.6	–	3.4
1994	17.9	17.1	7.9	22.5	15.7	8.4	–	7.2
1995	27.6	21.1	9.5	24.8	14.5	11.6	–	2.3
1996	32.1	22.0	19.8	26.3	12.7	9.5	–	0.1
1997	31.8	20.0	11.8	22.2	9.9	10.3	5.6	2.5
1998	31.6	20.2	9.3	18.6	3.6	5.9	8.2	2.6
1999	20.6	16.9	111.3[a]	16.4	-13.5	0.8	6.2	-0.9
2000	16.0	15.3	8.9	29.2	9.1	0.3	8.8	-3,9

Source: Authors computations from FECU'.
Notes: [a]: Profits of Chilquinta in 1999 include non-recurring profits from sales of shares.

Table 3.7: Telecom Statistics (1987-2000)

Year	Lines in service[a]	Density[b]	Mobile Phones[a]	Int. Traffic[c]
1980	363	–	–	8.0
1985	537	–	–	13.4
1986	558	–	–	16.2
1987	581	4.7	–	21.2
1988	631	4.9	–	27.5
1989	689	5.4	4.9	29.9
1990	864	6.5	13.9	38.8
1991	1,957	7.8	36.1	47.0
1992	1,283	9.6	64.4	53.1
1993	1,521	10.9	85.2	59.5
1994	1,634	11.6	115.7	63.5
1995	1,891	13.2	197.3	113.6
1996	2,264	15.6	319.5	144.2
1997	2,693	18.3	409.7	198.8
1998	2,947	20.4	964.2	215.0
1999	3,109	20.6	2260.7	210.2
2000	3,365	22.0	3401.5	222.5
2001[d]	3,581	23.1	5271.5	241.0

Source: Subtel.
Notes: [a]: Thousands. [b]: Lines /100 inhabitants. [c]: Million minutes. [d]: December 2001 (estimated).

Telecommunications.

Since privatization, the telecommunications sector has experienced rapid growth, as shown by all indicators. Between 1987 and 2001, the number of lines in service rose by a factor of almost six, so the line density rose from 4.7 to 23.1 lines per 100 inhabitants (Table 3.7). In the main local phone company (Telefónica), which accounts for 76% of all subscribers, average installation time was reduced from 416 days in 1993 to 6 days in 2001, and the waiting list, which in 1987 included 237 thousand people, had been reduced to 32 thousand by 2001, having reached a peak of 314 thousand in 1992. Digital commutation rose from the 36% in 1987, to 100% in 1993. Long-distance traffic also grew significantly. Outgoing international traffic rose by a factor of 10, from 21.2 million minutes in 1987 to 241.0 million minutes in 2001. Growth was especially rapid after the introduction of competition in long distance services (see table 3.7). The number of lines per worker in the largest telecommunications firm grew from 74 in 1987 to 845 in 2001 (see table 3.8).

This period has also seen the emergence of new services, such as beepers, data transmission,

Table 3.8: Teléfonica-CTC: basic fixed phone statistics

Year	Lines[a]	Share	Workers[b]	Lines/Worker[b]	Install. Time	Waiting list[a]
1980	360	99.3	6.911	52	–	150
1985	505	94.1	6.894	73	–	181
1986	528	94.6	7.219	73	–	228
1987	548	94.3	7.414	74	–	232
1988	592	93.7	7,518	79	–	236
1989	646	93.8	7,366	88	–	284
1990	812	94.0	7,530	108	–	308
1991	997	94.3	7,994	125	–	241
1992	1,213	94.5	7,991	152	–	314
1993	1,437	94.5	8,133	177	416.0	198
1994	1,545	94.6	7,424	208	208.9	117
1995	1,754	92.8	7,449	235	169.8	52
1996	2,056	90.8	7,073	291	55.4	72
1997	2,394	88.9	6,898	347	38.6	97
1998	2,650	89.9	6,917	383	35.4	58
1999	2,592	83.4	5,649	459	15.4	27
2000	2,701	80.3	4,639	582	4.3	10
2001	2,723	76.1	3,223	845	5.7	32

Source: Subtel and CTC annual reports.
Notes: [a]: Thousands. [b]:Excludes employees working in subsidiaries.

Table 3.9: Monthly Bills: Local Telephone Service for the Average Family (Fixed charge plus variable consumption, including VAT)

Year (May)	US$	Ch$ May 1987
1987	11.62	9,853
1988	11.00	9,151
1989	11.24	8,347
1990	13.44	9,475
1991	15.69	10,213
1992	17.75	10,156
1993	18.91	10,817
1994	19.96	11,742
1995	24.36	11,584
1996	25.33	11,489
1997	25.65	11,932
1998	25.11	11,395
1999	23.57	11,432
2000	19.43	10,137
2001	17.11	10,340

Source: National Institute of Statistics (1987-1998), own estimations for 1999-2001.

private networks and the internet. However, the new service that has had the greatest impact is mobile services. At the end of 1997, 16 years after the entry of the first operator, there were only 410,000 subscribers. This number rose sharply with the fall in prices brought about by the entry of new PCS concessionaires. In mid-1998, the number of subscribers had risen to 650,000. With the introduction of the "calling party pays" system in February 1999, there was an additional jump in the number of subscribers. By the end of year 2001 the number of subscribers reached 5.3 million.[7] This explosion in the number of mobile phones is partially explained by the level of the access charge to mobile companies set by the regulator. This charge was set too high, so mobile phone companies are willing to give away the phones, in order to benefit from the access charge paid on incoming calls.

Real residential local telephone charges have increased by about 5% since privatization (see Table 3.9). However, there was a simultaneous rebalancing of tariffs which makes it difficult to reach definite conclusions about the evolution of rates. Before 1993 phones rates were much higher for commercial subscribers than for residential clients. Moreover, clients have benefitted with the extension of basic phone zones. In fact, many calls that were previously considered long-distance

[7]The majority of the mobile phones are sold as calling-card phones and do not have a fixed monthly contract.

calls are now considered local calls. In 1993 rates were 8,6% higher than in 1987, as a result of the 1988 tariff-setting process. In the 1993 tariff-setting process residential rates were further increased by 9,8%. This tariff rise was explained by the need to compensate the partial elimination of subsidies from long-distance service to local service and the unification of residential and commercial rates. Starting in 1994, access charges for long-distance calls were substantially reduced.

The 1999 rate-setting process can be considered a turning point. Basic phone rates were reduced by 11%, at the same time that access charges to the local network were reduced by an average of 72%. As a result, in 2001 basic phone rates for an average family were still 5% higher than in 1987, but access charges for long distance calls were much lower. The deregulation of long-distance service in 1994 eliminated the need for rate setting in that market. Deregulation coupled to the reduction in access charges to the local network, led to a dramatic fall in long-distance rates. This is illustrated by the value of a one-minute call to the United States, a route that represents 42% of international traffic. In 1987 the average per minute cost of a call to the US was US$1,51. If the regulated rate setting process had remained in place, the price today during normal hours would be 2.40 dollars, which can be compared to the current price of call of about US$ 0,10.[8]

Since long-distance companies, as well as other telecom operators, require access to local networks in order to provide service, it became very important to regulate fees for access to the public network. In the 1994 rate-setting process, the regulator established the rule that the access charge for incoming and outgoing domestic long-distance calls and outgoing international calls would be 0.63 times the charge for a local call, which is higher than the real cost of providing the service. Even worse, the per-minute access charge for incoming international calls was set at a rate that was 14 times the local rate during normal hours and 84 times the local rate during reduced-rate hours. High access charges to local networks, coupled with strong competition in the industry on the part of the market leader, Teléfonica-CTC, meant that many long-distance operators had serious financial difficulties in the period 1994-1999. The local telephony companies, which were allowed to operate in the long-distance market through subsidiaries, had incentives to charge below cost on long-distance calls, since by lowering rates long-distance traffic would increase and the companies would benefit from the higher revenue arising from access charges to the local network, a reward that the other long-distance companies did not have. In response, the 1999 rate-setting process reduced access rates by an additional 62.7% on national and international outgoing calls. In the case of incoming international traffic, the charge was reduced by 97.5% in normal hours and by 99.6% in off-peak periods (from the previous high levels). The average reduction in regulated access charges was about 72%.

[8]The price drop has not been so great on other routes. Carriers pay so-called accountancy rates to their foreign counterparts for traffic imbalances on international routes. On those routes where outgoing traffic exceeds incoming calls, the marginal cost of providing service should include the accountancy rate.

Prices of mobile telephony have also declined sharply with increased competition. At the end of 1997, subscribers paid a fixed charge of 15,000 pesos plus 130 pesos per minute for calls made as well as calls received. The entry of Entel PCS in March 1998 led to a marketing war among operators that entailed heavy spending on advertising and brought about a significant decline in prices. In early 1998, Teléfonica-CTC offered 60 free calling minutes for a fixed monthly charge of 7,080 pesos and billed additional outgoing minutes at 124 pesos during normal hours and 80 pesos during reduced-rate hours.[9] In addition, customers who signed a two-year contract received the mobile phone for free. Other plans offered 200 free calling minutes for 16,000 pesos. Clearly, increased competition significantly reduced rates.

The profitability of Teléfonica-CTC increased after privatization and remained high until 1997, as shown in table 3.10, as regulators were unsuccessful in passing Teléfonica-CTC's efficiency gains to customers. This state of affairs changed in 1998, as Teléfonica-CTC began to shift investment towards competitive sectors such as mobile telephony and long distance. Teléfonica-CTC was also affected by the rate setting process of 1999 that lowered local rates and access charges to the local network. Moreover, Teléfonica-CTC suffered from the devaluation of the peso (20-30%) that began in 1998, since it had not hedged its dollar denominated debt. Another negative effect was the decline in demand growth and the increase in non-paying clients due to the slowdown in the economy that began in late 1998. Finally, Teléfonica-CTC is responsible for the access charges to mobile phone companies of its non-paying clients, and these access charges are twenty times higher than those that Teléfonica-CTC can charge.

Teléfonica-CTC has implemented a strict cost reduction plan, which has included a drastic reduction in the number of workers. The decline in employment is due to the elimination of inefficiencies in the firma as well as by the reduction in planned investment due to the decline in profitability caused by the new rates and slower economic growth. This increase in efficiency has allowed the company to achieve small profits in 2001 after two years of large losses. Since severance payments are large, part of the explanation for the losses is the cost of reducing employment in the company. It is probable that the company will have higher profits in 2002 as employment in Teléfonica-CTC seems to have stabilized.

The two regional basic telephone companies that are dominant in their respective areas (Telcoy and CNT) were less affected by the tariff-setting process and have maintained their profit levels. Entel, is in the opposite situation. While it was a regulated monopoly provider of long-distance services, its rates were much higher than the cost of providing service, and this allowed it to have profit levels above 50% for several years. Deregulation led to dramatic falls in long-distance rates and profits (see table 3.10). In 1998 the company had losses due to the strong competition in long distance, its restructuring costs and the cost of entry into mobile telephony, where it has become

[9]The calling party pays principle means that incoming calls are not charged.

Table 3.10: Profits of Telecommunications Enterprises (Return on equity %)

Year	CTC	CNT	Telcoy	Entel	Telex	Bellsouth
1987	11.5	20.1	20.5	56.4	–	–
1988	12.7	26.7	23.9	73.6	–	–
1989	17.8	18.7	26.2	73.8	57.4	–
1990	12.9	20.2	15.6	52.7	21.9	–
1991	16.2	22.7	16.7	50.5	14.5	–
1992	19.4	29.2	22.8	49.7	28.3	–
1993	23.0	30.2	30.4	37.4	58.9	–
1994	18.7	24.9	32.2	17.2	16.5	0.0
1995	17.3	13.7	29.2	8.4	10.2	-70.4
1996	20.9	21.0	37.3	2.4	5.6	-250.3
1997	18.7	18.6	39.0	5.1	-29.9	-1.0
1998	10.8	24.1	47.8	-3.8	-41.5	62.6
1999	-3.8	24.6	36.3	7.0	-30.1	-3.0
2000	-8.5	15.7	20.0	6.3	-45.1	1.1

Source: Author's figures, based on companies' annual reports.

one of the main participants. In 1999 and 2000 the firm has had profits once again, which is in part explained by the asymmetric access rates between the fixed and mobile networks and also because it has used a successful marketing approach in mobile telephony.

In short, the telecom sector has been one of the most active in the last few years and it is only since 2001 that a slowdown has become noticeable. The increased competition in the sector has had a favorable effect on consumers, who are spoiled for choice. Even in local calls, a market that is monopolized in most countries, the market share of Teléfonica-CTC has declined from 94% in 1987 to 76% in the year 2001. There are important unresolved regulatory problems, however. The most important revolve around the principles that should guide the regulation of access charges. The problem arises because high access rates act as a negative externality on competitors, apart from the direct effect on the profitability of the company. One important point is whether access charges should be based on costs adjusted to the demand facing a company (since the local monopoly has a higher phone density, costs are lower) a principle which Teléfonica-CTC claims represents a subsidy to the competition and the competition deems essential for survival, or if rates should be symmetric for identical services. The inclusion of fixed costs is also an issue in this regard: should they be included in the cost calculations? Finally, a further issue is that time metering of calls or access may be inappropriate when capacity is not a constraint (at least for standard telephone calls) due to technological change.

The problem is that in the case of access charges, price competition can break down. Consider a situation where users value outgoing calls more than incoming calls and Teléfonica-CTC's access rates are set low, while its smaller rivals have high regulated rates due to their higher costs. A Teléfonica-CTC client would pay the regulated rate for calls within the Teléfonica-CTC network, but a higher rate for calls to Teléfonica-CTC's rivals. Conversely, a rival's client faces a cheaper rate to call a Teléfonica-CTC phone. Since Teléfonica-CTC is by far the largest company, with 76% of all telephone lines, most of rival's calls end up in Teléfonica-CTC's network in any case. Since the rivals pay a low access rate for these calls, they might be able to charge a low rate for phone service even though their own networks are more expensive. Thus the rivals can gain market share at the expense of Teléfonica-CTC by having high access charges. Of course, if users also value incoming calls, this incentive to raise access charges is smaller since clients will not appreciate the fact that nobody calls them because it is expensive. Nevertheless, on balance, heavy users of outgoing calls are more attractive to firms than clients who put more weight on incoming calls.

On the other hand, the last mile is an essential facility in telecoms. Cable companies usually have access to the last mile, but other operators (long distance, mobile telephony, internet access providers) require access to the local telephone network (or to the cable network) in order to reach consumers.[10] Since Teléfonica-CTC faces regulated rates, it has incentives to become a monopoly in the competitive sectors.[11] It can achieve a monopoly by non-price discrimination against the other operators. In order to reduce this risk and preserve competition in the other markets, the regulator may prefer to incur in the social cost of having more than one last mile service provider. Which option is better depends on the extent of economies of phone line density.

3.2 Infrastructure franchises

By the early 1980s, continuous high growth rates for the last years had led to congestion and severe quality problems in highways, seaports and airports. Even though the government had increased the expenditure in infrastructure several times over the minuscule amounts spent during the 1980s, they were insufficient. Therefore franchising became the hope for rehabilitating and expanding public infrastructure. In 1992 a franchise law was passed allowing the private sector to finance and operate highways, airports and other infrastructure.

Franchises have other advantages in addition to solving the problem of governments that do not have the resources (financial, managerial and supervisory) to provide for infrastructure needs. In fact, there are several economic arguments in favor of highway franchising, whenever possi-

[10] A wireless fixed system, WLL, has not been as successful as expected in breaking down the local telephone monopoly in the last mile.

[11] See Beard *et al.* (2001).

ble:[12] first, the fact that when the same firms is in charge of construction and maintenance there are better incentives to invest in non-verifiable quality; second, private projects are managed better and are usually more efficient than state-owned companies; third, it is politically easier to justify cost-based tolls when the project is a private concession; fourth, the cost of the project is imposed on users and not on the rest of society; and sixth, there is built-in screening mechanism against socially wasteful projects, since a project with a negative private return will most likely also have a negative social return (i.e., be a white elephant). Moreover, when franchise auctions are open and competitive, tolls or user prices should be close to average cost, which is second best optimal in the presence of economies of scale.

From 1994 to the present, 32 projects have been auctioned for a total amount of about US$ 5.0 billion, of which 18 are already operational. In addition, in 1997, a law was passed allowing franchises of the infrastructure of public ports. Currently, over 2,000 km of interurban highways together with the main airports and seaports are privately managed. Even though the system has been remarkably successful, there are several challenges for the future. One of the challenges is how to incorporate flexibility in order to react to changed conditions (for instance, unexpected permanent increases in traffic that require widening a road or raising the toll) while at the same time keeping a reputation of not renegotiating contracts when the franchise is loosing money or of expropriating money-making franchises. Another problem is that most of the privately profitable projects have been franchised, and the projects that remain require government subsidies in order to have interested bidders. But the existence of government subsidies negates many of the advantages of infrastructure franchises and the optimal approach to franchising in this case is equivalent to the traditional approach of franchising the building of the road to the lowest bidder and financing it upfront from public funds.[13]

3.3 Highways and airports

The private sector has financed the construction of new highways and airports through build-operate-and-transfer (BOT) concessions (see table 3.11). More recently the government has extended the range of concessions contracts to the building of water reservoirs for irrigation and of penal complexes (see tables 3.12 and 3.13).[14] In general the auction process for concessions has operated as follows. The government sets the minimum technical specifications of the project and grants a concession for 20 or 30 years to the bidder offering to charge the lowest user price for

[12] For more details on these arguments, see Engel *et al.* (To be published). For a different perspective, see Gómez-Lobo and Hinojosa (2000).

[13] Engel Fischer and Galetovic (2002): *Highway Franchising with Subsidies*, unpublished.

[14] There are some doubts about the rationale for this last type of concession contract, since it appears to be a means of evading the standard budgetary process.

building, operating and maintaining the project. Bidders must first pass through a technical vetting process that qualifies them to make an economic bid. A ceiling and a floor price are imposed. If the ceiling is reached, the bidders compete on the minimum subsidy they request. On the other hand, if the floor price is reached, the firm that offers the largest payment to the State wins the concession.

The first project, a 42 million-dollar tunnel, was put out to tender at the end of 1992, completed in time at very close to the budgeted cost, and inaugurated in 1995. The most important franchised highway project has been the improvement of the Pan-American Highway, with a total investment estimated at US$ 2.4 billion, and total length of 1,511 km. The project was put out to tender divided in 8 segments, and concessions awarded over a two-year period. The final stretch, adjudicated in May 1998, runs from Santiago to Talca, with an estimated cost of US$750MM. The concession will last 25 years. Starting in 1995, the cargo and passenger terminals of the eight main airports were awarded in a public bidding. Airport concession-holders have invested about US$ 271 million, of which 200 million were spent in Santiago.

Table 3.11: Concessions that are operational

Project Name	Project origin	Investment (MMUS$)	Franchise length (yrs)
Northern access to Concepción	Public	214	28
Access to Santiago's Airport	Public	9	12
La Serena Airport	Public	4	10
Route 78, Santiago - San Antonio	Public	172	23,67
Road of La Madera	Public	31	25
Road Nogales - Puchuncaví	Public	12	22
Road Santiago - Los Andes	Private	131	28
Route 5, Chillán - Collipulli	Public	192	21
Route 5, Los Vilos - La Serena	Public	244	25
Route 5, Santiago - Los Vilos	Public	251	23
Route 5, Talca - Chillán	Public	171	12,5
Route 5, Temuco - Río Bueno	Public	211	25
Carriel Sur Airport, Concepción	Private	25	16,5
El Loa Airport, Calama	Private	4	12
El Tepual Airport, Puerto Montt	Public	6	12
Iquique Airport	Public	6	12
El Melón tunnel	Public	50	23

Source: MOP

Table 3.12: Projects under construction

Name	% built (december 2001)	Project Origin	Bidder's budgeted expense (MMUS$)	Franchise length (yrs)
Cerro Moreno Airport, Antofagasta	100	Private	8	10
Internacional Airport, Santiago	100	Public	170	15
Punta Arenas Airport	98.95	Public	10	9
Santiago-Valpara'iso-Vi na del Mar highway	77,96	Public	383	25
Litoral Central Road	0.00	Public	67	30
Route 5, Collipulli-Temuco	91.79	Public	256	25
Route 5, R'io Bueno-Puerto Montt	99.30	Public	236	25
Route 5, Santiago-Talca y Acceso Sur a Santiago	33.78	Public	698	25
North - South urban highway, Santiago	1.08	Public	517	30
Costanera Norte urban highway	33.40	Public	405	30
El Bato reservoir, Illapel	Auctioned 2001	NA	37	25
Alternate Melipilla road	Auctioned	NA	19	25
Américo Vespucio South urban highway	Auctioned 2001	NA	28	30
Américo Vespucio North urban highway, Santiago	Auctioned 2001	NA	250	30
International road 60	Auctioned enero 2002	NA	165	30
Route Talcahuano-Penco	Auctioned 2001	NA	19	25
Group 1 jails (Iquique-La Serena-Rancagua)	Auctioned 2001		75	15 a 20

Source: MOP.

Table 3.13: Projects in process

Project Name	Status Dec. 2001	Project cost (MMUS$)	Franchise length (yrs)	Auction date	Bidding date
New Regional Airport, Atacama	Call for bids	25	20	October 2001	April 2002
Jails, Group 2 (Concepci'on, Valdivia)	Call for bids	50	22	October 2001	May 2002
Commuter rail Melipilla-Santiago-Batuco	Call for bids	300	18		July 2002
Chiloé Bridge	Call for bids	350	Approx 30		August 2002
Airport, Arica	NYA[a]	10	10	June 2002	September 2002
Jails, Group 3 (Santiago1, 2, V Region Interior)	NYA	80	20	June 2002	October 2002
International Airport IV Region	NYA	45	20		November 2002
Intermediate tech., Recoleta - Independencia	NYA	171	20	June 2002	December 2002
Ecological complex, Santiago	NYA	50	30		2nd sem., 2002
North-West access Santiago	NYA	160	30	1st sem., 2002	2nd sem., 2002
Exchange stations Quinta Normal, Gran Avenida	NYA	60	30	2nd sem. 2002	1st sem., 2003
Land port, Los Andes	NYA	16	25	2nd sem. 2002	1st sem. 2003
Intermediate highway ring, El Salto-Kennedy	NYA	32	30	2nd sem. 2002	1st sem. 2003
Convento Viejo reservoir	NYA	210	20 a 25	2nd sem. 2002	1st sem. 2003
Improvement Route 5: La Serena-Caldera	NYA	105	17 aprox.	2nd sem. 2002	1st sem. 2003
Exchange stations Pajaritos, Santos Dumont	NYA	60	-	1st sem. 2003	2nd sem. 2003
Jails, Group 4 (Santiago 2, V region)	NYA	50	15 to 20	1st sem. 2003	2nd sem. 2003
New Airport IX Region	NYA	48	20 to 25	1st sem. 2003	2nd sem. 2003
Maintenance Route 66	NYA	64	18	1st sem. 2003	2nd sem. 2003

Source: MOP

Notes: [a]: Not yet auctioned.

Concessions raise important regulatory issues. There are end-point problems, especially as regards maintenance close to the end of the concession period. One major problem is caused by the length of infrastructure concessions, coupled to the rigidity of the contract rules. For instance, in cases of congestion, welfare maximization may require increases in the user fee set in the original contract. The question is how to share the increased income, since the firm bid on a lower price and unless it gets a fraction of the increased revenue, prefers to keep the lower price. However, when contracts are expected to be renegotiated, the benefits of competitive bidding are largely lost, since the firm's ability to negotiate, or its lobbying capacity counts as much or more than its efficiency (Williamson (1976)). Shortening the concession period is not a solution, since there would be not enough time for concessionaires to recoup their investments, requiring government subsidies.

The first infrastructure concession, the Melón Tunnel, illustrates these problems. Though it had no cost overruns and was built on time, it has not been successful and is unlikely to recoup the original investment (the firm has been making annual losses of about US$ 1.5 million). The winner's curse (fairly common in a newly developed system, such as infrastructure concessions) meant that the winner offered to pay substantially more than the runner-up. They overestimated the demand for the road at the toll ceiling, since a significant percentage of drivers choose the old alternative road.[15] The winner has claimed that the lower-than-estimated demand is due to the construction of new alternative roads and are offering to reduce the toll if the government lowers the annual payment. Such an agreement would almost certainly be socially beneficial in the short run, but the Government has refused to renegotiate, on the grounds that it would set a reputation for renegotiation of agreements.

Franchise-holders have discovered that willingness to pay is less than anticipated when an alternative free route is available, even if an economic computation implies that the savings in time and wear and tear on the vehicle compensate the toll. Even in cases where alternatives are not competitive at all, demand can be highly variable and depend on macroeconomic and regional effects. Moreover, the traffic over a specific road depends on the other links in the highway network. Thus, Government may affect the demand on a particular route when it alters the rest of the network, and government flexibility in this respect is obviously required.[16] The Government dealt with this problem by introducing minimum traffic guarantees, which promise that if traffic

[15]The franchise was awarded to the firm that had the highest score in an index that weighed (mainly) the toll and the payment to the government. Due to poor auction design weights were set such that payments to the government has a higher relative weight, so the bidders set tolls at the ceiling and bid positive payments.

[16]If government promised to compensate the franchise holders for each change in the network that was claimed to affect their traffic flows, there would be endless and expensive negotiation of the impact of the changes. An example of the effects of these restrictions is Orange County's Riverside Freeway, which is terminally congested because its contract with the private 91 Express Lanes does not allow expansion without permission from the owner of the private franchise. See Engel *et al.* (To be published).

flows fall below predetermined levels (usually equivalent the toll revenues that would pay 70% of estimated construction costs), the government will make up the shortfall.

Giving guarantees to concession-holders makes it easier for bidders to obtain loans in the financial system, which translates into a larger number of bidders and therefore greater competition. On the other hand, State guarantees have some disadvantages. First, they increase the chances that projects which are neither privately nor socially profitable will be undertaken. Private investors might push for higher estimated construction costs, so that the guarantee covers all of their actual construction costs, even though they know that that actual traffic would probably be much lower (given that the guarantee covers 70% of estimated construction costs). Second, it is inconvenient to eliminate all risks from the concession-holder during the highway operation period, because it would mean the benefits of private management being lost. Third, guarantees create contingent liabilities for the Government, but are seldom valued and are excluded in the year-to-year budget or counted as government debt. However, there is a seldom observed political economy advantage to guarantees: if traffic falls far below expectations, government can always point to the guarantees as a way to reduce the pressures to renegotiate the franchise contract.

In order to avoid some of the problems associated to standard auctions, the government has been experimenting with a new mechanism to auction infrastructure concessions advocated by Engel *et al.* (To be published).[17] In their proposal, the regulator sets the maximum toll that the concession-holder can charge, and then awards the concession to the firm demanding the least present-value of revenue (PVR) for building and then operating the highway, until the required revenue is collected through toll payments. Hence the duration of the concession is endogenous. This auction mechanism reduces the risk faced by the franchise holder, because the present value of the total income the concession-holder will receive is known in advance. There remains a lesser risk associated with the time the franchise-holder takes to collect the required sum. The longer the time taken to collect the desired income, the greater will be the operating and maintenance costs incurred by the concession-holder. [18]

An additional advantage of PVR auctions is that they are inherently flexible. Early termination of a concession is not a problem, for instance if required in order to widen the highway. If the government compensates the operator with the amount remaining to be collected, minus estimated savings on maintenance and operation costs, this is a fair compensation to the franchise

[17] A similar approach had already been used in the UK when awarding the franchises of the Second Severn Bridge and the Queen Elizabeth II bridge over the Thames. The main difference with the UK approach is that there was no auction for the bridges.

[18] Since maintenance cost is directly related to traffic flow (and its composition), it is possible to reduce this risk substantially by bidding for a modified PVR which is computed net of an estimate of the road deterioration caused by vehicles. In that case, the only remaining risk is related to operational expenses, which are minor and can also be accommodated through cost estimates.

holder. Hence PVR greatly reduces the scope for disagreement. The authority could also change the toll charged by the franchise holder in order to be closer to the optimal toll given the level of congestion without affecting the franchise holder.[19]

The highway linking Santiago and Valparaíso was auctioned using the PVR method. In February 1998 a Spanish consortium won the concession. It sought a present value revenue of UF 11,938,207 (approximately US$ 400 million), an amount it expects to collect in 15 years. The price-cap for the toll is Ch$ 1,800 (about US$ 3). In this instance, the rules required that bidders seeking a minimum guaranteed income would have had to pay the government for this guarantee. Remarkably, two out of four bidders, including the winner, did not seek the guarantee. Thus, in principle, the State did not assume any risk.

Starting in year 1999 the government has awarded four urban highway concessions in Santiago that represent a total investment of about 1,370 million dollars (two franchises for the improvement of a road that rings around Santiago and two that cross Santiago in the North-South and East-West directions). Auctioning urban highways has proven more difficult than expected. First, in urban highways the range of government decisions influencing traffic is much broader than in inter-urban highways. For example the construction of access roads, complementary or substitute routes, the expansion of the subway system, or the introduction of tolls on congested streets can affect traffic patterns. Moreover, the construction of highways generates urban problems. For example, the construction of a large-capacity urban expressways can cause the deterioration of the surrounding area. In Santiago, people living in a well-to-do residential area adjacent to a proposed highway mounted a strong campaign against its construction. While they could not prevent its construction, they forced major changes that increased the cost substantially. Ecologists have opposed urban highways because they believe highways will encourage car use and so increase pollution; instead they favor investing in public transport. While the argument is correct when the highways are free, this is no longer the case when these highways have tolls that depend on the level of congestion. The four highways that have been adjudicated, will reduce congestion substantially and the fact that users pay for them implies that the standard relocation effects of free highways will be dampened.

3.4 Concessions for Port Management and Operation

There are 10 state-owned ports and 22 private ports in Chile. The state-owned seaports have natural advantages due to their better geographic localization. In general the private ports are used for bulk cargo, so they need less infrastructure than the state owned ports, which are normally

[19] This requires that the contract specify a minimum toll in order to avoid the threat of expropriation of the franchise holder.

specialized to general cargo (normally in containers). This type of cargo requires calm waters for loading and unloading, so the state owned ports are usually protected by extensive works.

Private participation on state-owned ports started in 1981 when private firms were allowed to perform the duties of loading and unloading ships at the docks, as well as on-port storage services. This change greatly increased efficiency in cargo handling, making it unnecessary to invest in expanding these ports, even though previously, under public operation, the ports were terminally congested. The port authority (Empresa Portuaria de Chile- Emporchi), however, kept the management of all state-owned port infrastructure, that is to say, docking sites and storage facilities.

In the middle of the 1990's, it became evident that rapid growth in foreign trade would, in the short term, render inadequate the cargo transfer capacity in state-owned ports. This was particularly true of ports located in the central zone of the country where, for geographic reasons, there is little potential for development of new ports. Chile has few well protected bays and inlets and most of these lie in the middle of urban centers. Expanding the number of docking sites at existing ports is possible, at least in the case of the port of San Antonio, but at a high cost. In addition to these stumbling blocks, a dearth of stacking and storage space within the ports themselves further compounds problems, since urban growth and sprawl has severely limited the ability of these port service areas to expand.[20] Finally, having multiple private operators conspired against the coordination of activities and investment in specialized gantry cranes for containers.

The government feared that inefficient port operations would have a multiplier effect on the costs of the transportation chain. Ships range from large, fast and expensive types to slower and depreciated hulls. Since an efficient ship costs tens of millions of dollars, from the point of view of a shipping company the main cost of an inefficient port is not the tariffs for docking and loading/unloading but rather the capital cost of the ship. Inefficient ports tend to receive slower, older and smaller ships with higher operational costs. Hence, even in addition to having high docking and loading/unloading costs, inefficient ports raise the total transport cost of traded goods by much more and render a country non-competitive in international markets for its goods. This was one of the fears of the Chilean government, since Chile is an open economy that depends on remaining competitive for its future growth.

The government believed that it was possible to increase the transfer capacity of the state-owned ports by increasing private participation in port administration and operation. Moreover, the government began to think of ports as consisting of terminals known as "frentes de atraque", which combine groups of docking sites and storage space that could function as independent units and believed that these terminals would be operated best by a single private firm, that would coordinate its activities and internalize all the benefits of investment in new equipment. Based on

[20]San Antonio is an exception and has been able to expand these support areas.

this assessment, a bill was introduced in Congress for modernization of the state-owned port sector, which was enacted on December 1997. The law split Emporchi into 10 different SOE's or port authorities, one for each state-owned port, which were granted the power to award concessions to multiple or single private companies for the administration and operation of port infrastructure.

Granting concessions for state-owned port administration and operations posed certain risks to competition in the sector. There are only three ports in the central zone of Chile (Region V), which is where the most of the general cargo enters and leaves the country. Two of these ports are state-owned (Valparaíso and San Antonio) while the remaining port is privately owned (Ventanas). Altogether, these three ports are endowed with seven "frentes de atraque", but not all of these are able to berth large vessels. Additionally, it is necessary to consider that some terminals are especially built for transfer of containers, others for bulk cargo (where there is no lack of competition), and still others, for standard cargo.

In other countries, large-scale port users, mainly shipping companies, own their cargo terminals, because such an arrangement provides operational advantages. In Chile, however, since so few "frentes de atraque" are available, only a small number of users of significant size would be able to own their terminal and this would, of course, place other users at a great disadvantage. Even though regulations make it mandatory for prices to be made public and set on a non-discriminatory basis, concessionaires can use subtle methods to discriminate against non-integrated shippers, which are difficult to prove and, therefore, to penalize. These methods include assigning the choice spaces in the holding areas to one company over another, providing better quality service to one company as compared to others, using insider information, and manipulating docking reservations.

In drafting the port modernization law (Law 19.542), legislators took into account the above-mentioned problems and included several clauses into the law for the purpose of safeguarding competition in the sector. Firstly, the law requires that concessions be awarded through public auctions and only for up to 30 years. Secondly, concessionaires must be incorporated as publicly owned stock companies, which are engaged in a single line of business. Thirdly, the rates set by concessionaires must be made public and established on a non-discriminatory basis. Fourthly, proposed by-laws and internal regulations for concessions are required as an integral part of the rules of bidding. These rules must conform to objective technical and non-discriminatory standards, especially with regard to assignment of spaces and reserve capacity.

The two port authorities in Region V put up for simultaneous public bidding three out of the six docking areas they owned. Two of these were the "frentes de atraque" capable of berthing the largest vessels at each port, while the third was the bulk terminal of San Antonio. The port authorities, in consultation with the Antitrust Prevention Commission, imposed additional conditions to concession-holders to prevent risks of abuse of a dominant position, as provided for by the law.

Their conditions included ceilings on horizontal integration, restrictions on vertical integration, additional rules of transparency, reserving the right to set maximum prices in order to prevent low bidder turnout, and quality standards.

The rules specified, for instance, that significant users (defined as those that shipped more than 15% of the cargo in the region) should not own more than 40% of the stock and/or voting shares in the firms that operated the port franchises. According to the port authorities, it was necessary to limit significant users to a minority position in the company in order to reduce the possibility of discrimination. Concessionaires are required to grant any interested party expeditious access to information such as cargo contracts, service priorities, and type of cargo and consignees, so that all of the interested parties will have the same information. Finally, the port authorities can impose penalties for low quality of service. Minimum transfer speeds and maximum waiting times for ships are specified in the concession contracts.

The concessions were awarded in July 1999. In principle, each one was to be awarded to the bidder that offered the lowest maximum port transfer rate index, which was an average of 4 transfer charges. Nonetheless, in fairness to private port competitors, the rules of bidding for each docking front specified a minimum rate floor index. Moreover, the minimum rate floor has the beneficial effect of creating ex-post rents for the non-integrated port, which implies that the incentives for underhand integration with a shipper and then discriminating against its competition are reduced. In the event that more than one bidder offered the minimum rate index established in the rules, a tie-breaking payment was to be offered in addition.[21] This payment was over and above the leasing payment that was established in the rules of bidding for the port infrastructure, and was calculated on the basis of the economic value of the property.

The bidding attracted a great deal of interest, and a total of 21 bids were tendered by consortiums made up of leading domestic and foreign companies, of which 19 included the minimum rate index, plus the additional tie-breaking payment. All terminals were awarded in the end on the basis of the tie-breaking payment amount. Consequently, the average rates for port services were reduced by over 10% in the "frentes de atraque" that were awarded in concession and the government was also able to take in revenues that tripled its expectations and added up to 267 million U.S. dollars.

The results of the first years of operation have also satisfied the government's expectations, as can be seen with data for the Port of Valparaíso (Table 3.14). The efficiency in port services increased substantially. Similarly, the transfer speed at the port of Iquique increased by 41% in just half a year.[22] Finally, in the franchised terminal at San Antonio, the main port, the transfer

[21] Ex-ante rents are dissipated via this cash payment. See Engel *et al.* (2001) for a detailed analysis.

[22] Report of the President of Empresa Portuaria de Iquique, 2000.

velocity rose from 475 ton/hr to 635 ton/hr, an increase of 34%.[23] In the Valparaíso concession, investment in new cranes, computer software and other equipment during 2001 topped US$8MM, with another US$27.5 expected until 2006.

Table 3.14: Valparaíso: Time spent in loading and unloading (U/L) and transfer velocity

	1999	2001	2002 (est.)
U/L Time (hrs)	45.0	26.3	21.0
Productivity (containers/hr)	25.5	43.7	54.8

Source: Empresa Puerto Valparaíso. Loading and Unloading time refers to a Eurosal vessel with 1150 cargo movements.

[23]Source: Empresa Portuaria San Antonio.

Chapter 4

Privatization of social services

In 1980, the military government introduced reforms that transferred a major fraction of social security to the private sector. That same year, another set of reforms began to transfer public education to the private sector through a system of implicit vouchers. The prime objective was to improve efficiency (though there was an ideological component independent of the efficiency objective), specially through competition in the provision of social services. When the government handed the administration of these sectors to the private sector, it also gave citizens the responsibility for their decisions regarding social security and the education of their children. Since these are complex services with asymmetrical information and strong externalities, the State kept a supervisory role.

4.1 The privatization of the pension system[1]

One of the more radical reforms was the privatization of the pension system. In 1980 the government approved a law that created the private pension fund administrators (AFPs), which began operating in July 1981. This new system introduced compulsory savings accounts for retirement. Workers are required to deposit 10% of their gross wages (with a maximum amount of 6 UF - around US$150/month) in the AFP of his choice. They can add voluntary amounts in order to increase their savings. The AFP's receive a commission that is charged in addition to the amount that goes to the pension fund. In December 2000, the commissions varied between 3,55% and 2,24% of the monthly income of a worker, and depended on the income of the worker and the specific policies of the AFP. The State remained responsible for three specific aspects of social security. First, it regulates and supervises the AFP's and created a specialized supervisory agency (Superintendencia) for this task. Second, it pays the pensions of workers that had retired and the

[1] For a detailed account of the pension reform see Acuña and Iglesias (2000).

old pay-as-you-go system, and also receives the contributions of the workers that chose to remain in the old pension system, which required the creation of a new institution, the Instituto de Normalizaci'on Previsional (INP). The third obligation is the financing of pensions for those workers whose savings are not sufficient to finance a minimum monthly pension, as well as even smaller pensions for those who do not have any resources.

The change from a pay-as-you-go system to a fully funded, personal system represented a huge cost to the State during the transition, as it had to continue to pay the pensions under the old system as well as bonuses representing contributions to the old pension system for those workers who switched to the new system. At the same time, the number of active contributors to the pay-as-you-go system fell by 70% as workers switched. The operational deficit of the pay-as-you-go system reached its maximum value of 8,1% of GDP in 1992, and has been falling ever since. Reaching a value of 3,7% in 2001. The State was able to finance this deficit by reducing expenditures, with the income received by the sale of state owned enterprises and by indebtedness, partly to the private pension system. For example, in November 1984, 43.3% of the assets administered by the AFP's were government debt. This percentage has been falling and by February 2000, only 34.4% of the funds administered by AFP's were government debt.

4.1.1 Evaluation of the private pension fund system.

In order to analyze the effects of the private pension fund system, there are two aspects that need to be considered. First, there are benefits to the agents that are directly involved: AFPs and workers. A second possible aspect is the effect of the system on the economy as a whole. We will concentrate on the first aspect, even though we briefly mention the global effects of the reform. There is no question that the existence of AFP's, which were fairly sophisticated investors (buying public debt, bonds and shares) as compared to average workers or the State, gave a big impetus to the development of a local capital market. Moreover, their existence made it easier to privatize firms during the second half of the 80's, and their participation in the privatization process had the effect of distributing the property of these firms among workers.

It is often mentioned that the private pension system raised the Chilean savings rate, but the evidence is not conclusive regarding this issue.[2] Clearly, the government's decision to reduce spending in order to help finance the transition to the new system did have a positive impact on the national savings rate. However, the reduction in public spending meant less investment in infrastructure, health and education (see table 4.5 for spending in education).

The owners of the pension funds administrators have clearly benefitted, with high rates of return on assets, as can be seen in table 4.1. By the mid 90's, the AFP's became less profitable, but

[2]Other authors attribute the increase in the savings rate to the the 1984 tax reform that reduced to 10% the income tax on retained profits on firms.

Table 4.1: Profitability of the private social security funds administrators and of the funds.

Year	Administrators	Funds
1985	17.9	13.4
1990	56.7	15.6
1995	21.7	-2.5
1997	17.5	4.7
2000	50.2	4.4
2001	33.8	6.7

this is partly explained by rent dissipation, i.e., an increase in the competition between AFP's for clients. Sales effort represented 36% of operational costs of AFP's in 1997 (46% of operational costs if the life insurance premium is excluded). The competition was so intense that every month 5% of affiliates switched AFP's. In 1999, in a misguided attempt to reduce the sales effort and hence lead to lower commissions to affiliates, the government introduced rules that made it more difficult to switch AFP's. AFP's benefitted most from the change as the reduced competitive effort led to an increase in their profitability, given the levels of concentration in the industry. The government is attempting to reintroduce more competition by opening the system to other financial institutions.

The biggest advantage for workers is that they have more security about the destiny of their pension contributions. Under the pay-as-you-go system, politicians used the pension contributions as a piggy-bank to be raided for political purposes. Pensions depended in many cases on the ability to exert political pressure of the 32 different pension systems. Even within one of these systems, there was a lot of discretion in the amounts a worker could receive in pensions. Hence, it was not uncommon for two workers who had contributed exactly the same amount to receive vastly different amounts in pensions. As a consequence of these problems, the system was bankrupt, so there was no guarantee that the promised pensions could ever be delivered, and in fact the military government reduced pensions discretionally in order to finance a budget deficit after the 1982 crisis.

An often touted advantage of the AFP system is that it allows for freedom of choice among administrators. However, workers seem not to respond to the most important variable in the system: the profitability of their pension savings, which depends, to a large measure, on the commissions charged. After more than 20 years of the system, a survey showed that only 3% of the workers knew the commissions charged by the AFP's (Cerc, noviembre 2001). Among the people that had switched in the previous year, only 12% answered that they had done because of the better performance of the new AFP and only 17% said it was due to the level of commissions. This lack of

knowledge is the reason that AFP's compete mainly by rent dissipation through sales effort.

The affiliates have also benefitted from the high rates of return of their savings. On average, since inception in July 1981 up to December 2001, the average real return on pension funds has been 10.68%. This high returns are explained in large part by the huge increase in the value of shares after the AFP's were allowed to invest significant amounts in the stock market in the early 90's. The returns have been smaller more recently. From January 1996 to December 2001, the return fell to 5,65%. Given that the AFP's are constrained in the types and the amounts of instruments they can invest, it is difficult to judge the quality of the AFPs' investment decisions. Moreover, since the law sets penalties for AFP's whose fund returns fall by more than 2% below the average of the industry, while there is no compensating benefit when the returns are higher than average (except for marketing possibilities), the AFP's tend to invest with herd-like behavior. This explains the fact that the returns of all AFP's funds show very little dispersion. The average returns vary from 10.43% to 11.00% annually since inception. In any case, the system has allowed workers to benefit from the increased values of shares. The limits on investment have been relaxed gradually and hopefully the ability to invest well will become more important in the future.

The system is costly. As can be seen in table 4.2, workers have to pay net commissions (excluding the life insurance premium) in addition to the pension contribution, which in March 1985 fluctuated between 31.4 and 53.6% of the pension contribution, a fraction that depended on the income of the worker and the specific AFP. By December 2001, commissions had fallen to between 15.1 and 27.2% of the worker's pension contribution. These numbers are very high when compared to the administrative costs of the public pension fund, which represent 1.4% of the income of the system and 7% of worker's contributions. On the other hand, when the commissions in AFP's are measured in terms of accumulation, they represented 9.1% of the accumulated fund in 1984 and had fallen to 1% by December 2000. This price is still higher, but getting close to the cost of similar funds in the US.

In order to know the effective rate of return of workers, it is necessary to subtract the commissions (net of insurance premiums) from the return of the AFP's funds. For the period between July 1981 and December 2001 the effective return was 7.17% for an individual who earned $105.500. For an individual earning the top rate for compulsory contributions ($975,760), the effective return was 7.43%. To sum up, almost thirty percent of the return of the AFP's funds went to pay their services. Moreover, the average rate hides differences between AFP's, since for a low income worker, the effective rate of return for the period between July 1981 and December 2001 varied from 6.61% to 7.71%, that is by more than one percentage point over more than twenty years. Over time these numbers have become less striking: from January 1996 to December 2001 the average effective return was 4.51% for the lowest income workers and 4.66% for those with salaries of 60UF, which is about 1% lower than the average return for the fund: 5.65%. This numbers show that the system

Table 4.2: Commissions of Private Social Security Administrators

Year	% of contributions to the fund				% of fund accum.	
	Maximum		Minimum		Average	
	Gross	Net*	Gross	Net*	Gross	Net*
1985	63.8	38.6	41.7	16.5	11.6	9.1
1990	62.3	52.0	31.9	21.6	4.2	2.4
1995	42.6	34.8	28.4	20.6	1.9	1.2
2000	36.6	30.2	22.5	16.1	1.5	1.0
2001	33.8	27.2	21.7	15.1	–	–

Source: Superintendencia de AFP.
Notes: *: Excludes the life insurance premium, estimated as 2,52% of gross income for 1985, and 1,03%, 0,78%, 0,64 y 0,67% for the years 1990, 1995, 2000 and 2002, respectively.

is becoming less expensive for workers, probably due to scale economies.

A further problem with the system concerns the options at retirement. There are severe restrictions on how the fund can be disposed, the main choice being an annuity lasting for the life of the pensioner (plus a smaller fraction to a widow), or a system by which the pensioner receives a set annual fraction of the remaining funds (which can still earn returns). The second option represents no additional costs for the retired workers, but the first option, chosen by most pensioners as it eliminates investment risk, could be very expensive, at times reaching more than 5% of total funds.[3] These high commissions led to intense sales efforts which led to higher costs. The government has introduced legislation that promises to provide better information on the costs of these annuities to retiring workers and this has led to a decline in the commissions, which have fallen by almost half.

4.2 The health insurance system[4]

Another innovation of 1981 was the partial privatization of the health insurance system. The military government introduced a law-decree that created the private health insurance firms, the Isapres. All active and retired workers must contribute a fraction of their income to a health insurance system, but they can choose between one of the 15 open Isapres (four of them have 67.2% of all affiliates) or the public health insurance system (Fonasa). At present, the compulsory contri-

[3] Part of the commission was used to illegally provide cash to the pensioners

[4] A complete, though slightly dated analysis of the private health care system can be found in Fischer and Serra (1996)

Table 4.3: Statistics of the private health insurance system

Year	Beneficiaries		ISAPRES			Exp. per benef.[2]	
	Number	% of pop.	Admin. costs	Profit rate[1]	Health visits	Isapres	Fonasa
1985	545,587	4.5	29.0	66.2	8.36	118.9	–
1990	2,108,308	16.0	21.4	40.0	9.04	104.9	37.6
1995	3,763,649	26.5	20.0	30.9	9.41	147.4	88.3
1997	3,882,572	26.6	19.0	18.2	10.18	162.7	103.6
2000	3,092,195	20.3	17.5	12.2	13.12	212.5	118.33[3]

Notes: [1]. Profits on equity. [2]. In thousands of Ch$ of December 2000. Excludes the subsidy of medically absence from work (on average 18% of total costs). Co-payments included, using data for the year 2000. The expenditure in the Program for Complementary food is excluded from Fonasa. [3]. Corresponds to 1999.
Source: Series Estadísticas, Superintendencia de Isapres. Rodríguez and Tokman (2000).

bution corresponds to 7% of a worker's salary, with a maximum of 4.2UF (i.e. corresponding to a salary of 60UF or Ch$975.000). Before 1981, all workers had to contribute compulsorily to Fonasa even when they did not use its services due to their low quality or long waiting times. People that are self-employed can also pay into either system (Isapres or Fonasa) and they represent 5% of affiliates to Isapres.

The biggest difference between the two systems is that Fonasa provides (virtually) the same benefits to all affiliates, independently of the contribution and the number of dependants of the affiliate. The affiliates can choose two different forms of health provision: free choice or institutional. Under the first type of provision, the affiliate and its dependents can choose a private health provider (with a contract with Fonasa), while paying a co-payment. In the institutional form, the beneficiaries get health under the public system. In this case, there are co-payments that increase with the income level and the system is free for individuals with very low incomes. Since Fonasa serves the very poor without contributions or co-payments, as well as providing public goods (vaccination programs and health campaigns, etc.), it receives funding from the State representing 44% of its expenses. Fonasa also finances the primary health clinics, which have been under the supervision of the municipalities since 1981.

The private system is run on a totally different basis: the affiliate signs a contract with an Isapre that specifies the benefits he/she will receive, and which depend on the age, sex, health related risk and the number of dependants and their age, sex, etc. Affiliates can improve on their plan by paying additional, voluntary contributions. In 2000, this voluntary contribution

represented 26% of the compulsory contributions. The clients of Isapres must use private health providers. To obtain the benefits they can either buy a voucher previous to going to a doctor that has a contract with the Isapre or pay any doctor and then get a reimbursement from the Isapre. In general, the reimbursement is not total and when using a voucher the beneficiary normally has a co-payment. The amount of the co-payment or reimbursement depends the specific plan that the affiliate has contracted with the Isapre. On average, the co-payments represent 14.3% of the compulsory contribution in the private system. There is no information regarding the non-reimbursed fraction of user's expenditure of users that do not buy vouchers, but go directly to their health providers and ask for reimbursement afterwards.

The private system is too expensive for most people. The beneficiaries of the private system are employed, with middle or high incomes and have a low health risk. The 7% of compulsory contribution is not sufficient to buy into a good plan for lower income individuals or for potential affiliates with high health risks. In these cases, the voluntary contribution in order to get an appropriate program would be too expensive. For example, only 7.2% of beneficiaries are older than 65 years (this is an improvement on the 4% of 1990). The CASEN socioeconomic survey of 1988 showed that only 6.7% of the population older than 65 years is affiliated to Isapres and that only 3.1% of the members of the lowest income quintile are affiliated to Isapres (while 54.2% of the households in the highest income quintile was a beneficiary of the Isapre system).

The number of beneficiaries of the Isapre system grew constantly until 1997, when it represented 26.5% of the population. Since then, the percentage of the population affiliated to the system has been decreasing, slowly, until it reached 20.3% of the population in 2000. There are several reasons for the decrease in the number of beneficiaries: i) There has been an increase in the unemployment rate since 1998, ii) the increased funding for Fonasa (expenditure per affiliate has increase 300%), has meant that it has become a relatively more attractive system, iii) the removal in the year 2000 of a subsidy to employers that reduced corporate taxes by up to 2% of the salaries of employees if the employer applied it to collective plans in an Isapre.[5] (iv) the increased supervision by Fonasa to bar clients of Isapres from getting free services (as indigents) from the public system (a survey showed that 24% of beneficiaries of the Isapre system had used the public system).

Another reason for families to move back to the public health system is that Isapre health plans have become more expensive. The increase in regulation of the private health system has increased its costs, but there are additional reasons for the increase in the cost of the private (and also of the public health system, see Table 4.3). There has been an increase in both the number of health visits

[5]In a collective plan, the Isapre establishes a contract with a substantial number of workers in the company. The reduction in adverse selection and other expenses implies that the individual price of a plan can be up to 30% less than when plans are contracted individually. Employer's contribution under this subsidy amounted to 3.3% of the revenue of the Isapre system.

by beneficiary and in the cost of these visits. Rodríguez and Tokman (2000) have constructed an index of the numbers of all forms of health provision, valued by the prices paid by Fonasa to private providers of medical services in the free choice system. The authors have estimated that this index has increased by 104% in the period 1990-1999, while total cost (excluding the subsidy for medical absences from work) increased by 165%, showing that there has been an increase in the unit costs of medical services of 30%. In the public sector this increase in unit costs has been much larger, since the unit costs have increased by 141%. Total expenditure in Fonasa has increased by 290% in the period 1990-1999, while the number of individual forms of health provision has increased by only 22%. The large increase in unit costs can be interpreted as a loss of efficiency, but it may also have a component of better quality of service.

4.2.1 An evaluation of the private health insurance system

The Isapre system was, until the late 90's, a very profitable system. While the profit on equity plus reserves was only 12.2% in the year 2000, it had been significantly higher in the past, reaching 66.2% in 1985. Higher income households benefitted by receiving better health care in exchange for their compulsory contributions. An overall assessment is difficult, since there is also the cost to the public health system, which lost the compulsory contributions of these same households.

The expense per beneficiary in the Isapre system is almost twice as high as in the public system, even though this difference has decreased over time. This comparison underestimates the cost of the private health system, because it omits the direct payments of ISAPRE affiliates for the part of their treatment that is not covered by their plan (the data on expenditure in public health does not include the transfers from municipalities to the primary health care centers, but this is a relatively small amount). Notice, however, that the number of health visits does not differ between the two systems. Table 4.4 shows that, except for the image tests (X-rays, NMR, CAT-scans, etc) the number of health services does not differ by much between the two systems. In fact, the public system has more surgeries, which are expensive.

A cursory analysis might suggest that the public system is more efficient. The problem with that interpretation is that there is a significant difference in the quality of the care in the two systems.[6] There are some economic principles that suggest that private, individual health care insurance with free choice of services and providers is more expensive than public insurance without free choice.[7] First, because there is a tendency to overprovide services: the classical example is the fact that 63.4% of all pregnancies in the private sector end in a caesarean section, while the

[6] Another difference may be due to the fact that the aggregates in table 4.4 may hide differences in the composition of services.

[7] On the other hand, another set of economic principles indicates that public systems are less efficient due to lack of competition.

Table 4.4: Health services provision per beneficiary, 1999

Type of service	Fonasa	Isapres	Difference (%)
Doctor visits	3.85	3.89	1.0
Lab. Exams	4.84	3.59	-25.8
Image exams	0.54	0.80	48.1
Pathologic Anatomy	0.13	0.14	7.7
Surgery	0.12	0.10	-16.7
Average cost*	61,352	59,474	-3.1

Sources: Anuarios Estadísticos Ministerio de Salud, Series Estadísticas, Superintendencia de Isapres.
*: Ch$ of 1999. The prices of Fonasa free choice are used in the valuation of services.

average for the public sector with no free choice is about half that rate.[8] Second, the administrative cost of individual insurance contracts is higher, among other things, because Isapres evaluate the health risks of each new affiliate and must ensure that the level of reimbursement and the coverage are appropriate for their particular plans.[9] In the year 2000, the administrative and marketing expense were 17.5% of total revenues, while profits were equivalent to 2.2% of revenues. On the other hand, the administrative expense in Fonasa is only 1.5% of total expense. Third, a centralized system may be able to contract services at monopsony prices.

One of the main problems of the Isapre system is that plans tend to offer good coverage for routine health care, while they offer poor coverage of catastrophic illness, which is the main object of compulsory health insurance. In the last two years, strong criticism on this basis has forced the Isapres to offer catastrophic illness insurance. The catastrophic illness insurance operates a system without free choice that takes over all expenses after a specified yearly expenditure by the beneficiary. This approach seems interesting, but as there is little experience there are no serious evaluations of how it works. In any case, it is interesting to speculate as to the reasons why clients would choose plans which lack good coverage for catastrophic illness. One explanation might be that affiliates are myopic and do not evaluate the cost of illnesses that are rare though costly. Second, affiliates may move to the public sector if they require cover for an illness which has little coverage under their private plan. Third, the system is not transparent, since plans will claim to pay up to up to X% of a standard defined by the Isapre for a given treatment. Often the standard

[8] Interestingly enough, in the section of the public sector with free choice, the caesarean section rate is the same as in the private sector. This suggests that free choice by itself leads to overprovision.

[9] The Isapres must also ensure against fraud, which occurs when affiliates lend their personal identification cards to non-beneficiaries.

is not publicly available.

Another problem is that Isapres try to exclude beneficiaries who develop expensive illnesses. In an attempt to end this problem, since 1991 the Isapres are required to renew their contracts to any affiliate who desires renewal. However, the Isapres have found a way around this obligation by raising the price of these plans and offering new plans with similar benefits but at the original price to affiliates that do not represent a high risk. The Superintendencia that supervises Isapres has instituted rules that try to reduce this type of risk selection, but it runs into the inherent instability of the private health insurance system. Since low cost affiliates in a given plan are attractive to other ISAPRES, there is a tendency to attract them to a plan with similar characteristics (in another Isapre) but without the expensive individuals. Even if this last problem might be solved, affiliates who acquire or whose dependants acquire an expensive illness have lost their ability to switch Isapres, thus losing one of the main advantages of the system: the freedom of choice between Isapres. Most of these problems arise from the serious information asymmetries in private health systems (see Fischer and Serra (1996)). There are ways of reducing these problems, but they are intrinsic to private health insurance systems so they cannot be eliminated from a system which simultaneously has free choice of providers and asymmetric information.

4.3 Public education and school vouchers

The country has gone a long way to decentralize its publicly funded education system. In 1980, just before the policy reform that initiated the decentralization process, the Economics Ministry spent 45% of its budget directly. At present, more than 93% of the budget of the Education Ministry is transferred to local governments or to private or other autonomous education organizations, as shown in table 4.5. The main object of the reform of the educational system was to improve the quality of the state financed education by having competition between education providers. These institutions would compete for students, as the transfers would be linked to the number of students attending classes in the institution. The government hoped that competition would be based on que academic quality of the educational establishments.

The two main elements of the reform of primary and secondary education were i) the transfer of state-owned schools from the central government to the local municipalities, ii) the establishment of a common subsidy (an implicit voucher) per enrolled student both at public, and private nonprofit and for-profit schools. The only requirement for a school to receive the implicit voucher is that the student be enrolled and attending classes at the school. In the year 2000 the amount transferred to primary and secondary schools amounted to Ch$809,006MM. Of this amount, Ch$ 322,377 MM went to the private schools and CH$ 486,628 was assigned to the municipal schools. The municipal schools received additional funding for infrastructure amounting to Ch$62,319 MM

Table 4.5: Budget of the Education Ministry

Year	Total	Subsidies		Other transfers		Tertiary education	
		Amounts	%	Amounts	%	Amounts	%
1980	657317	47729	7.3	2582	0.4	246214	37.5
1981	739359	177892	24.1	4184	0.6	181137	24.5
1985	667028	301531	45.2	82596	12.4	183979	27.6
1990	537247	342802	63.8	56602	10.5	101240	18.8
1994	803076	484509	60.3	117722	14.7	132230	16.5
2000	1516003	954739	63.0	275893	18.2	191860	12.7

Source:
1. Amounts in millions of Ch$ of 2000.

from the municipalities and Ch$56,898 MM from the central government. Since 1993 the private subsidized schools have been allowed to receive additional payments paid by the families of students, subject to a series of restrictions including a tax to the Education Ministry and a fund for scholarships of families that cannot afford to pay these amounts.[10]. Even though the municipal schools can also charge additional amounts, these monthly fees are much smaller. The local and central government funds received directly by the municipal schools are slightly larger than the amounts received by the private subsidized schools from these additional fees. González (2002), shows that the private subsidized schools received Ch$ 68,600 MM from these additional fees, while the municipal schools received only Ch$1,400MM.

The reform has led to a large increase in the number of private subsidized schools.[11] The number of private subsidized schools rose from 1,627 in 1980 to 3,287 in 2000, while the number of municipal schools fell slightly from 6,370 a 6,250 in the same period. In 1981, only 15,1% of all primary and secondary students attended the private subsidized system (mainly religious schools) while 37.3% are enrolled in these schools in 2000. One unintended consequence of the reform is the decrease in the rates of truancy, which is easily explained by the inherent characteristics of the voucher scheme, though it is possible that the system has led to a loosening of the standards for promotion of students.

The growth in the public, subsidized sector might have been greater if the value of the subsidy per student had not been reduced substantially in the mid-80's. If we set the real value of the

[10]The possibility existed since 1980, but was scarcely used because 40% of contributions had to go to the Education Ministry

[11]Around 10% of the students belonging to the higher income groups attend purely private schools, which receive no subsidy.

Table 4.6: Types of primary and secondary schools

Type of school	1980	1985	1994	2000
Public, Centralized	6370	808	0	0
(%)	72.4	8.2	0.0	0.0
Municipal	0	5668	6221	6250
(%)	0.0	57.8	63.6	58.9
Private, subsidized	1627	2667	2707	3287
(%)	18.5	27.2	27.7	31.0
Private, no subsidy	802	668	860	1068
(%)	9.1	6.8	8.8	10.1
Total	8799	9811	9788	10605

subsidy per student at 100 in 1982, by 1985 the the value in real terms had fallen to 75, and even by 1990, it stood at 76 (see González (2002)). During the 90's this fall was reversed, and the real value of the subsidy index reached value of 104 by 1994. By 1999, the value was 169, implying that in real terms, there had been an increase of almost 70% in the resources per student in one decade. This implies that after the rapid increase in the number of subsidized, private schools of the early eighties, and the stagnation of the late eighties, by 1995, the number of these schools started increasing once again. In order to survive the decline in the value of the voucher in the period 1985–1994, the private, subsidized schools increased enrollment by 25%.

4.3.1 An evaluation of the reform

There is no question that parents like the possibility of choice, and this is one of the reasons for the popularity of the new schools. A more complex question is to determine whether they add value to education. One important element is provided for by the SIMCE tests, which are standardized national tests which measure achievement of educational standards. On average, private, non-subsidized schools do best, private, subsidized schools come next (much farther down) and the municipal schools have the worst performance on these tests. However, a large fraction of the difference between the schools can be attributed to differences on socioeconomic (including education) of the parents. In one recent study, Mizala and Romaguera (2000), show that these variables explain the difference between the performance of municipal and private subsidized schools for the SIMCE of fourth grade in 1996. In the same study, the unexplained difference between private non-subsidized and private subsidized schools falls to only five points. The explanation for this residual difference is probably the enormous difference in expenditure between subsidized and

Table 4.7: Simce Test Results, fourth grade.

Type of school	1988	1990	1992	1994	1996	1998
Municipal	49.25	56.70	63.85	64.43	68.00	–
Private subsidized	56.35	58.8	70.15	70.66	73.65	–
Private, non-subsidized	76.15	80.05	86.05	85.07	85.85	–

non-subsidized private schools.

However, these results are not robust, since in an analysis of the SIMCE of 1998 for the tenth grade, Mizala and Romaguera (2001) find that the private subsidized schools have better results than the municipal schools, even after controlling for socioeconomic variables. In short it appears that the private subsidized schools have obtained results that are equal or better than those of municipal schools, even after normalizing by socioeconomic variables, at a lower government expense. In fact, the subsidized schools have invest in infrastructure, while the municipal schools have used the previously existing infrastructure of the state schools, and improvements have been financed by the government. There are various possible explanations of this result. One is that private schools have managed to do this because they are more flexible, they have more students per class and because they apparently are more efficient.[12]

Some facts point to a more rigid and less efficient municipal school system. The idea behind the implicit vouchers is that the income of a school would depend primarily on the number of students, and not on historical criteria of budget assignment. However, mayors manage the income from vouchers corresponding to all students enrolled in their municipal school system, and for political reasons the mayors have refused to lower the revenue of those schools with fewer students. A second factor is the Estatuto Docente (Teachers Statute) of 1991, which made it almost impossible to fire teachers no matter how bad their performance and set a fixed pay scale that depends on seniority and not on performance (see Beyer (2000)). For the last ten years, the teacher's association has managed to stop any attempts at grading teachers based on the quality of their performance. Even though the minimum wage established in the Estatuto applies to the private, subsidized schools, other conditions do not apply, and it is possible to fire teachers at the end of the school year, under the standard rules for labor contracts in Chile.

A different explanation for the better results obtained in standardized tests by subsidized private schools compared to municipal schools, is that the former can be selective, whereas the latter

[12]Since this is an area where ideology plays an important role, it is important to read the evaluations with a pinch of salt.

cannot reject students unless they do not have openings.[13] However, there might be a selection bias, since parents that care more about their children may prefer private subsidized schools. Since there are so many alternative explanations, perhaps the comparison between municipal and private subsidized schools is besides the point since one of the main beneficial effects of the voucher system has been to increase the awareness of school quality and to make schools behave more competitively.

The fact that school level Simce results are published has increased the incentives for school owners to compete for the best students, though not necessarily through improvements in the quality of education. Moreover, prestigious schools can choose their students and they select for academic quality, so that standardized tests magnify the contribution of the highly selective schools to the results.[14]

The overall results of the reform of 1981 are still not clear. For instance, Hsie and Urquiola (2001) believe that the effects of the reform have been negative or at most non-significant. They argue that the median quality of students at municipal schools decreased, as the best students emigrated to the private subsidized schools. Since they believe that students get better results depending on the quality of their classmates, this migration was bad for the students that remained (and, by the same token, it was good for those that migrated). These authors claim that the loss to the first group is larger than the gain to those that migrated, based on their finding that in those municipalities in which there is a higher proportion of private schools, the average results in standardized tests are worse than the national average. This finding is consistent with an educational production function which shows better average results from aggregation rather than segregation of students by ability. However, the inherent weaknesses of their claim is that it cannot separate clearly cause and effect, since one among many competing interpretations might be that there more students in private schools in a particular municipality because the municipal schools are worse than average.

Any analysis, moreover, must consider that there are several reasons why competition between schools – the mechanism through which the quality of schooling was to improve under the reform – was damped. First, parents did not have objective measures of school quality: tests equivalent to the Simce have been used since the 80's, but only in 1995 were these results published at the school level. Second, the Teachers Statute has reduced flexibility in the hiring and discharging of teachers. Third, municipal schools have been shielded from competition.

[13] See Gauri (1998) and Parry (1996). In a recent survey that examined the 100 schools of each type with the best educational results, admissions testing occurred in 88% of private non-ubsidized schools, 68% of subsidized and 22% of public schools.

[14] In order to reduce any perverse incentives, the Education Ministry introduced in 1996 the National Performance Evaluation System (SNED), which evaluates a school with respect to its own past history and which penalizes schools that expel students.

Table 4.8: Enrollment in tertiary education

Type	1983	1987	1991	1993	1995	1997	1999	2000
Universities	108.049	121.219	143.526	188.253	223.889	259.790	286.357	302.572
Traditional	105.341	113.567	114.698	138.267	154.885	175.641	195.372	201.186
Private	2.708	7.652	28.828	49.986	69.004	84.149	90.985	101.386
IP[a]	25.244	29.595	37.376	38.076	40.980	56.972	74.456	79.904
Subsidized	17.720	10.548	6.802	0	0	0	0	0
Private	7.524	19.047	30.574	38.076	40.980	56.972	74.456	79.431
CFT[b]	39.702	67.583	65.987	83.245	72.735	54.036	50.821	53.354
TOTAL	172.995	218.397	246.889	309.574	337.604	370.798	411.634	435.830

Source: Ministerio de Educación.
Notes: [a]: Professional institutes. [b]: Centros de formación técnica.

4.3.2 Tertiary Education

There have been important changes in tertiary education, which involves universities, technical institutes and other centers of post-secondary education. The changes involve both financing, management and the opening of the system to new, private entrants. The object, once again, was to improve the quality and efficiency of the system via the introduction of competition. Once they were allowed, a large number of new, private universities were created. Until 1980 there were only two public universities, plus five private universities that were financed by the State. In 1981 the regional centers of the two state universities were set up as 17 independent universities (three more regional centers became universities later on). Simultaneously, the government introduced nondiscriminatory rules for creating new private universities without direct state financial support. There are now 39 new private universities, which enroll 32% of all university students in the year 2000.

The financing of the university system also was radically changed. The education authorities have directed more and more resources to primary and secondary education, as can be seen in table 4.5. The main reason is that spending in universities is considered regressive, since the majority of students belong to middle and upper income households. Moreover, there was evidence for a wider divergence between private and social returns in primary and secondary education, which meant that there was less need to subsidize a college education since the benefits are well internalized. As a result of this change, the State financing of the university system was cut from almost 100% in 1980 to around 30% by 2000. Universities were allowed to raise fees to compensate for the reduction in direct transfers from government. Up to 1981 university fees had been nominal. Lower income students benefitted from a system of student loans at subsidized rates (2% in

real terms). These loans enabled students to pay their fees totally or partially, and in the case of very poor students included small amounts for living expenses.

The system through which the state finances the university system was also reformed in order to introduce competition. Until 1981, the government made direct transfers to universities to cover their expenditures. By the year 2000, only 41% of all state financing of universities was a direct transfer. Another 10% went to the universities via competitive improvement projects, 24% went to students (16% as a student loans and 8% in grants), 7% went to the universities that attracted the best students (according to the Prueba de Aptitud Académica, a Chilean version of the SAT), 13% through competitive research funds and finally 4% as the State contribution for private donations. The new, private universities can only compete for the last three sources of funds, though they have argued that this is not a level playing field (though they are the main recipients of private donations). In the future, state guaranteed student loans will probably be provided to students in the new private universities.

Our evaluation of these changes is positive. First, the total enrollment in the university system grew from 108,049 students in 1983 to 302,572 in the year 2000, vastly increasing access to the university system, even though students pay substantial fees as compared to the almost free universities of 1980. Private individuals have dedicated large resources to university education, and these have compensated for the decline in government support. Second, the increased competition for public funds and, more recently, for students, has had a salutary effect on the system. The concern for the needs of students and for the quality of teaching has increased, as the main universities face an increasing challenge from private universities.

An important problem is that there are few objective indicators of the quality of the different universities that can be used by students when selecting a university. Most of the research is still carried out in the traditional universities, due to their longer tradition and the fact they receive direct funding from the state. However, the traditional public universities (except those that are linked to the Catholic Church, which face another threat: many of the new private universities are competing for conservative, catholic students) suffer from management problems that may threaten their future. For instance, the presidents are selected by the professors, so they have to respond to corporate interests which may conflict with efficient management. Finally, the public universities labor under an inflexible civil service system, which is another obstacle to good management.

Chapter 5

Conclusions

This chapter collects our results and presents some hypothesis that represent consistent explanations for these results. Unfortunately, the lack of information limits the verifiability of these hypothesis. First, we found that privatized firms experienced significant improvements in efficiency, but this improvement is no different from the change experienced by other private firms in their respective economic sectors. This allows us to conclude that Chilean SOE's were efficient before privatization, at least if we compare them to private firms in their respective sectors. This has been noted before by other researchers, including Hachette and Luders (1994). This conclusion is consistent with the fact that employment levels in privatized firms were stable for several years before privatization, and rose afterwards. This is not surprising, given that several years prior to privatization, State Owned Enterprises (SOEs) had suffered reorganizations, specially in terms of reducing the number of workers (see table 2.7).

Second, we found that there are significant differences in the post-privatization performance of regulated and non-regulated firms. Hence we have reported separate results for each group of firms. In what follows we give an account of adjusted results, i.e. where we have normalized the performance of firms with respect to the performance of their economic sectors at the 2-digit SIU levels. We focus first on the behavior of firms that era not regulated. Results for this group show no major changes in efficiency measured as unit costs and sales over PPE after privatization. Since these firms operated in competitive sectors, and their efficiency did not grew compared to other firms in their sectors, adjusted profitability should not show major changes after privatization, and this is the case.

The post-privatization performance of regulated firms is quite different. The profitability of regulated firms grew after privatization. In fact, the ratio of net income over PPE (physical assets) rose substantially, while the ratio of income to sales also increased, but at a smaller rate. These firms had efficiency gains after privatization, but these gains are not statistically significant. Sim-

ilarly, the cost per unit indicator shows a slight decrease, while the ratio of sales to PPE shows a timid increase. These results are consistent with efficiency gains due primarily to a more efficient use of capital (and probably a minor increase in regulated prices). There is some evidence that prior to privatization, regulated SOEs had overinvested in physical assets. This implies that privatization should result in higher profits rates, as observed.

The implication is that Chile's approach to incentive regulation has proven its worth, promoting efficiency in regulated firms. As we have shown, the efficiency improvements in the regulated sectors that were privatized do not lag behind those of the non-regulated privatized sectors. On the other hand, regulators have been unable to shift these efficiency gains to consumers. This should not come as a complete surprise. It is well known that regulation is an imperfect substitute for competition, and Chile is not an exception.[1] Moreover, more recently the ability of regulation to transfers gains to consumers has improved substantially. However, there remain aspects of the Chilean regulatory legislation and practice that should be improved.

In particular, the transparency of the tariff-setting process should increase. Currently, regulators in the electricity and telecommunications sectors can exchange the information used to set rates with the regulated companies; this prevents consumer organizations from countering the lobbying pressures of the regulated enterprises. The recent law for the water and waste treatment sector takes the opposite approach: all the information used in setting rates must be made public. However, it is not clear that this new law has been effective in restraining lobbying while at the same time limiting the possibility of regulatory takings.

The regulatory process requires improvement in access to information on the regulated firm. The regulatory process requires modelling an efficient firm, but this requires information that is uniquely available to the real firm, since costs depend, among other factors, on topography, geographic density of customers, and demand. Regulators have had major problems in gaining access to company data, because legislation does not provide specific penalties for failure to deliver or for delivering false information. Currently, when a company refuses to hand over information, the regulator must go to the courts, where the process is lengthy and penalties are low.

Another lesson that may be learned from the Chilean experience is the importance of properly regulating essential facilities. The 1982 law had required the dominant local telephone operators to provide interconnection access for other operators requesting it, with the cost of access to be negotiated by the parties. However, the negotiation of these charges led to prolonged lawsuits that made it difficult for new companies to enter the market. The 1994 law solved the problem by regulating all interconnection charges. Similarly, Chilean legislation guarantees power-generating firms' access to the transmission system, but the fact that the largest power-generating company owned the transmission system, combined with the fact that transmission tolls are negotiated,

[1] See also the results in section 2.3.1.

created some problems. In June 1997, the Anti-trust Commission ruled that the power generating company should divest its transmission assets to an independent company.

Another type of natural monopolies was also privatized: those related to infrastructure. In these cases, the rate setting problem was solved by *competition for the field* (see Demsetz (1968)), auctioning the franchise to the firms that asked for the lowest user fee. It has been a successful system. The main highways have been completely overhauled and their capacity has increased substantially, reducing internal transportation costs and making the country as a whole more efficient. There are only a few potential problems. First, we have unaccounted liabilities due to the traffic guarantees offered by the government to successful bidders, and second, the possibility that the franchise holders are successful in lobbying the government for changes in the terms of their contracts. In fact, many contracts have already been renegotiated because the highway projects were awarded omitting important details and had to be changed through negotiation. This has meant a substantial (but not overwhelming) increase in the cost of the projects. On the other hand, the government was able to remain firm when Tribasa (A company that had received three important highway concessions) failed to complete one of its projects in time, and this is an encouraging sign.

Seaport franchises have also been successful so far: investment has increased, port efficiency is higher and ships require much shorter periods for loading and unloading. There have been no complaints from shipping companies that they are discriminated in the franchised ports, so it appears that the horizontal and vertical integration restrictions on the port operators have served their purpose. It is too soon to have a fair evaluation of the port franchises despite these favorable results.

Finally, we consider social services, where there is competition between providers, but State regulation is required due to information asymmetries. These sectors are also characterized by the fact that the government either requires workers to buy their services, or finances them out of public funds, as is the case of education. There have been important benefits from the privatization of social services. In the case of the private pension system, the likelihood that politicians being able to misuse pension funds is far smaller, increasing the security of pensions. In the case of the health insurance and the private subsidized schools, competition from the private sector has increased the visibility of public sector inefficiencies, which is under pressure to improve its performance. This does not mean that privatization has been free of troubles. The main problem has been the reluctance of private individuals to acquire the knowledge needed to make rational decisions.[2] As a result many individuals do not understand some of the main aspects that are involved in the rational choice of a provider of these services,

Limited understanding in the part of consumers has led providers to focus more resources

[2]Of course, their decisions may be rational in a world where agents have limited rationality.

on marketing and sales efforts than on variables that are relevant from the point of view of an enlightened policy-maker (extent of coverage of a health plan in the case of the private health insurance system, net rate of return on a pension fund in the case of the private pension system and quality of schooling in the case of the subsidized private schools). On the other hand, regulation has prevented full competition. In private pension funds, restrictions on portfolio investment and rules that penalize administrators whose funds perform poorly (apart from the market punishment due to the defection of affiliates from such a fund), imply that all administrators obtain similar performances from their fund investments. As a result, competition between administrators has focused in variables that are not relevant from the point of view of the objectives of the State. Similarly, beneficiaries of the private health insurance system may prefer plans with little coverage for expensive but infrequent diseases because they can always switch to the public system. In education, parents did not have objective measures of school quality until recently; only since 1995 were these results published at the school level, and individual student results are still not provided to the parents. The Teachers Statute has reduced flexibility in the public system. On the other hand, municipal schools have been shielded from competition. Hence the full gains from privatization have yet to be achieved.

To summarize, privatization has benefited the country, even in the case of regulated sectors. Due to market imperfections, it is not always easy to align the interests of private providers and society. However, regulation has partially succeeded in this intent. This achievement has required a permanent fine-tuning of regulation. The full benefits of privatization in regulated sectors, however, will be attained when citizens become more informed consumers.

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Chapter 6

Appendix

Table 6.1: Changes in profitability of privatized firms[1]

	Variable	N	Mean before Median before	Mean after Median after	T-stat for change in mean		Z-stat for change in median		Mean before = 0 Median before = 0		Mean after = 0 Median after = 0	
All firms	Oper. income / sales	37	0.1182	0.2051	3.6298	*	-2.5459	*	3.6213	*	7.62117033	*
			0.0835	0.1512					0.0000	*	5.1223E-09	*
	Oper. income / PPE	37	0.0969	0.2000	2.5620	*	-2.9784	*	3.7906	*	4.71294353	*
			0.0624	0.1269					0.0000	*	5.1223E-09	*
	Net income / sales	37	0.0172	0.1303	3.2708	*	-3.2811	*	0.6074		3.86796676	*
			0.0192	0.1459					0.1620		5.422E-07	*
	Net income / PPE	37	0.0386	0.1636	3.3633	*	-3.5189	*	2.8923	*	4.75558994	*
			0.0214	0.0968					0.0494	*	6.1656E-08	*
Non-Regulated	Oper. income / sales	18	0.1113	0.1797	1.2527		-0.9808		1.8682		3.87255987	*
			0.0763	0.1294					0.0038	*	0.00065613	*
	Oper. income / PPE	18	0.1206	0.2139	0.9345		-0.7277		2.4296	*	2.51257924	*
			0.0711	0.0788					0.0038	*	0.00065613	*
	Net income / sales	18	-0.0331	0.0461	0.9706		-1.0124		-0.7044		0.76878742	
			0.0299	0.0456					0.2403		0.01544189	*
	Net income / PPE	18	0.0510	0.1273	0.9072		-0.5379		2.1953	*	2.00116015	
			0.0402	0.0476					0.0481	*	0.00376892	*
Regulated	Oper. income / sales	19	0.1247	0.2291	4.7276	*	-2.8465	*	4.0062	*	7.96572251	*
			0.0872	0.1726					0.0004	*	1.9073E-06	*
	Oper. income / PPE	19	0.0744	0.1868	5.8026	*	-3.6347	*	4.4425	*	8.29444141	*
			0.0549	0.1649					0.0004	*	1.9073E-06	*
	Net income / sales	19	0.0649	0.2101	5.1091	*	-3.3720	*	2.1687	*	9.66191041	*
			0.0143	0.2030					0.3238		1.9073E-06	*
	Net income / PPE	19	0.0268	0.1981	4.5417	*	-4.2478	*	1.9231		6.76730152	*
			0.0019	0.1607					0.3238		1.9073E-06	*

[9]: In this and the following tables, a star (*) indicates a statistically significant value.

Table 6.2: Changes in operating efficiency of privatized firms

	Variable	N	Mean before Median before	Mean after Median after	T-stat for change in mean		Z-stat for change in median		Mean before = 0 Median before = 0		Mean after = 0 Median after = 0	
All firms	Cost per unit	37	0.7049	0.6606	-1.8235		1.2595		22.8569	*	21.9694	*
			0.7769	0.7149					0.0000	*	0.0000	*
	Sales / PPE	37	1.1686	1.1157	-0.2074		-1.1838		4.3087	*	7.2498	*
			0.5787	0.7487					0.0000	*	0.0000	*
	Sales / Employees	30	69284.4870	102795.0097	3.9218	*	-2.1290	*	5.4755	*	6.5359	*
			42013.6095	82924.2615					0.0000	*	0.0000	*
	Oper. Income /Employees	30	14705.0275	25088.0736	2.8042	*	-2.7795	*	2.9264	*	4.2550	*
			4087.5993	13788.9867					0.0000	*	0.0000	*
Non-regulated	Cost per unit	18	0.6979	0.6747	-0.4239		0.3797		17.4061	*	14.3750	*
			0.7234	0.6978					0.0000	*	0.0000	*
	Sales/PPE	18	1.7011	1.0906	-1.0359		-5.7266	*	3.2401	*	4.2907	*
			0.6083	0.6532					0.0000	*	0.0000	*
	Sales/Employees	12	107647.9371	134806.9036	1.3016		-0.4041		4.0110	*	3.7855	*
			85164.2136	107110.7778					0.0002	*	0.0032	*
	Oper. Income/Employees	12	29483.4651	39012.3794	0.8572		-6.2354	*	2.5880	*	2.8487	*
			6807.3028	22053.4960					0.0002	*	0.0193	*
Regulated	Cost per unit	19	0.7116	0.6473	-2.7041	*	1.4159		14.9651	*	16.5470	*
			0.8083	0.7257					0.0000	*	0.0000	*
	Sales / PPE	19	0.6641	1.1394	1.6805		-1.8539		6.3889	*	6.1465	*
			0.5589	0.8323					0.0000	*	0.0000	*
	Sales/Employees	18	43708.8536	81453.7471	4.0624	*	-2.9108	*	6.2884	*	8.6217	*
			34940.3242	82345.8544					0.0000	*	0.0000	*
	Oper. income/Employees	18	4852.7357	15805.2031	5.8470	*	-3.8915	*	3.9250	*	6.8893	*
			3448.3215	13788.9867					0.0007	*	0.0000	*

Table 6.3: Changes in investment and assets in privatized firms

	Variable	N	Mean before Median before	Mean after Median after	T-statistic for change in mean		Z-stat for change in median	Mean before = 0 Median before = 0		Mean after = 0 Median after = 0	
All firms	Log (PPE)	36	16.45	16.76	1.16		-0.77	41.40	*	38.20	*
			16.33	16.69				0.00	*	0.00	*
	Invest / sales	27	1.89	1.58	-1.79		1.60	6.52	*	6.81	*
			1.57	1.29				0.00	*	0.00	*
	Invest / employees	24	133603.72	218207.47	2.54	*	-1.51	3.86	*	3.79	*
			61850.21	81526.35				0.00	*	0.00	*
	Invest / PPE	27	0.87	0.86	-0.07		0.94	8.89	*	9.45	*
			0.77	0.80				0.00	*	0.00	*
	PPE / Employees	30	233653.76	330056.51	2.34	*	-0.71	2.25	*	2.55	*
			60346.70	70591.59				0.00	*	0.00	*
Non-regulated	Log (PPE)	17	16.06	16.21	0.23		-0.33	21.99	*	19.98	*
			16.03	16.58				0.00	*	0.00	*
	Invest/sales	11	1.84	1.79	-0.11		0.89	3.21	*	4.64	*
			1.54	1.42				0.00	*	0.00	*
	Invest/employees	6	338457.90	600132.98	2.04		-1.28	3.60	*	3.98	*
			304095.08	527720.58				0.02	*	0.02	*
	Invest/PPE	11	0.84	0.59	-0.79		1.74	3.99	*	7.82	*
			0.59	0.61				0.00	*	0.00	*
	PPE/employees	12	470839.75	670100.97	1.70		-0.75	1.89		2.21	*
			173215.30	283717.74				0.00	*	0.00	*
Regulated firms	Log (PPE)	19	16.81	17.24	3.52	*	-0.83	44.46	*	43.50	*
			16.57	17.19				0.00	*	0.00	*
	Invest/sales	16	1.92	1.43	-2.40	*	1.47	6.26	*	4.91	*
			1.61	1.14				0.00	*	0.00	*
	Invest/employees	15	73002.07	103441.46	0.48		-1.68	6.77	*	5.15	*
			52612.12	78829.13				0.00	*	0.00	*
	Invest/PPE	16	0.89	1.05	1.14		-0.83	10.16	*	8.35	*
			0.88	0.97				0.00	*	0.00	*
	PPE/employees	18	75529.76	103360.21	0.64		-0.85	5.77	*	4.62	*
			57560.86	70591.59				0.00	*	0.00	*

Table 6.4: Changes in profitability of privatized firms (adj.)

	Variable	N	Mean before Median before	Mean after Median after	T-stat for change in mean		Z-stat for change in median		Mean before = 0 Median before = 0		Mean after = 0 Median after = 0	
All firms	Oper. income/sales	36	-0.05703177	-0.0128924	2.02030182		-1.13749125		-2.09258494	*	-0.58857055	
			-0.05761266	-0.03138287					0.00059662	*	0.12149248	
	Oper. income/PPE	36	0.02232722	0.1093312	2.11989456	*	-1.99342527	*	1.13846309		2.62978203	*
			-0.00307806	0.02960545					0.20251612		0.06624908	
	Net income/sales	36	-0.06218277	-0.03550831	0.84809775		-0.39418014		-2.64896279	*	-1.35865814	
			-0.04055416	-0.03288875					0.03262267	*	0.03262267	*
	Net income/PPE	36	0.01494155	0.09646355	2.28581207	*	-1.65555658		1.06828335		3.01145229	*
			-0.011098	0.01416823					0.30885966		0.12149248	
Non-regulated	Oper. income/sales	18	-0.01700443	0.03011643	1.00790419		-0.4113018		-0.34707857		0.80910461	
			-0.00721252	0.0005208					0.11894226		0.59273529	
	Oper. income/PPE	18	0.04085776	0.1410457	1.01449257		-1.0124352		1.12437947		1.77213505	
			-0.00307806	0.00943712					0.40726471		0.24034119	
	Net income / sales	18	-0.08798321	-0.04873002	0.56705274		-0.1898316		-2.04944212		-1.01502648	
			-0.01504578	-0.02428621					0.24034119		0.11894226	
	Net income / PPE	18	0.02116692	0.08047098	0.76127044		-0.2214702		0.87463926		1.41819608	
			0.01508835	-2.3359E-05					0.40726471		0.59273529	
Regulated	Oper. income/sales	18	-0.09705911	-0.05590124	1.82357058		-1.45537559		4.47820215	*	2.89599416	*
			-0.10852237	-0.07140012					0.00065613	*	0.04812622	*
	Oper. income/PPE	18	0.00379669	0.0776167	3.4631732	*	-1.92995459		0.25431563		3.01215002	*
			-0.00316603	0.0756016					0.24034119		0.11894226	
	Net income / sales	18	-0.03638234	-0.02228659	0.47054554		-0.2847474		1.9511658		1.00981806	
			-0.04427092	-0.03686474					0.04812622	*	0.11894226	
	Net income / PPE	18	0.00871619	0.11245612	2.93451037	*	-1.99323179	*	0.59406803		3.60101665	*
			-0.01402265	0.07831472					0.11894226		0.04812622	*

Table 6.5: Changes in operating efficiency of privatized firms (adj)

	Variable	N	Mean before Median before	Mean after Median after	T-stat for change in mean	Z-stat for change in median	Mean before = 0 Median before = 0		Mean after = 0 Median after = 0	
All firms	Cost per unit	36	-0.0017	0.0055	0.2858	-0.1126	-0.0679		0.2343	
			0.0275	0.0322			0.4340		0.1215	
	Sales/PPE	36	0.6096	0.6121	0.0093	-1.0812	2.3561	*	4.0088	*
			0.1922	0.2864			0.3089		0.0662	
Non-regulated	Cost per unit	18	-0.0652	-0.0419	0.4396	-0.6328	-1.7328		-1.0239	
			-0.0441	-0.0093			0.1189		0.2403	
	Sales/PPE	18	0.8943	0.4995	-0.6096	-0.3797	1.7690		2.0071	
			-0.0600	0.1074			0.4073		0.4073	
Regulated	Cost per unit	18	0.0617	0.0529	-0.3107	0.8226	2.2441	*	2.8640	*
			0.1164	0.0548			0.0481	*	0.0038	*
	Sales / PPE	18	0.3248	0.7248	1.7461	-1.4237	3.1721	*	4.0149	*
			0.2820	0.4787			0.1189		0.0481	*

Table 6.6: Changes in investment and assets in privatized firms (adj)

	Variable	N	Mean before Median before	Mean after Median after	T-stat for change in mean	Z-stat for change in median	Mean before = 0 Median before = 0		Mean after = 0 Median after = 0	
All firms	Log (PPE)	35	0.7909	0.7846	-0.4744	0.3230	39.4821	*	39.0845	*
			0.7845	0.7779			0.0000	*	0.0000	*
	Invest / sales	27	-0.2398	-0.1365	0.5730	0.2854	-0.8588		-0.6548	
			-0.6187	-0.3016			0.2210		0.1239	
	Invest / PPE	27	0.1694	0.2073	0.3590	0.9428	1.8460		2.1663	*
			0.1440	0.0430			0.0610		0.2210	
Non-regulated	Log (PPE)	17	0.7785	0.7628	-0.4644	0.4650	23.5227	*	22.6188	*
			0.7845	0.7779			0.0000	*	0.0000	*
	Invest / sales	11	0.0615	0.2138	0.3188	0.9521	0.1159		0.6322	
			0.0304	0.3522			0.5000		0.5000	
	Invest / PPE	11	0.1390	-0.0889	-0.7953	2.0684 *	0.7372		-1.1575	
			0.1340	-0.1016			0.5000		0.2744	
Regulated	Log (PPE)	18	0.8026	0.8052	0.3869	-0.1898	33.6094	*	35.8317	*
			0.7866	0.7699			0.0000	*	0.0000	*
	Invest / sales	16	-0.4470	-0.3773	0.3557	-0.4900	1.4753		1.4781	
			-0.8391	-0.5925			0.1051		0.0384	*
	Invest / PPE	16	0.1903	0.4110	1.5583	-0.9045	2.0935		3.1251	*
			0.2159	0.2870			0.0384	*	0.0384	*

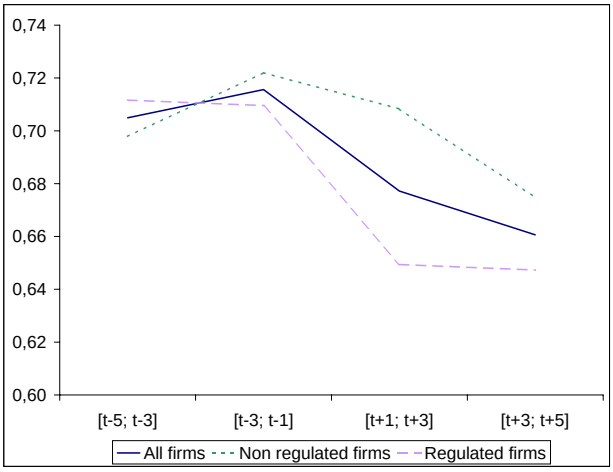
Table 6.7: Employment in privatized firms

	N	Mean before Median before	Mean after Median after	T-statistic for change in mean	Z-stat for change in median	Mean before = 0 Median before = 0		Mean after = 0 Median after = 0	
All firms	32	1193	1381	1.3374	-0.1880	3.8391	*	3.4071	*
		380	360			0.0000	*	0.0000	*
Non-regulated	15	1557	1764	0.6502	-0.1867	3.1965	*	2.7635	*
		754	874			0.0000	*	0.0000	*
Regulated	17	871	1044	1.2049	-0.3272	2.2127	*	2.0096	
		179	236			0.0001	*	0.0001	*

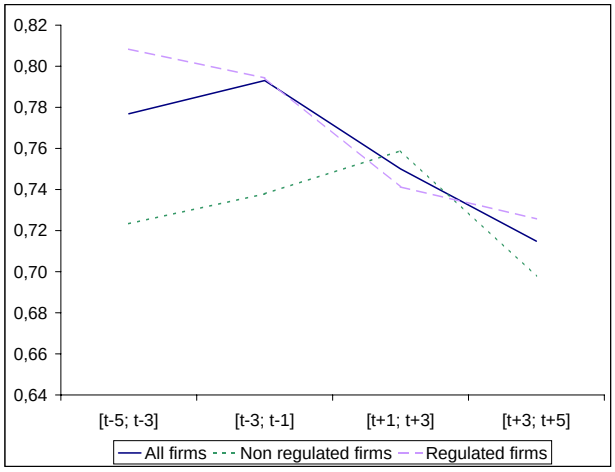
Table 6.8: Physical productivity

		Before	After	Percent variation	
NR	CAP	0.0718	0.0629	-0.1233	Toneladas de acero terminadas [MTM/worker]
NR	Colbún	17.0733			
NR	Electroandina		12.4271		
NR	Endesa	2.6206	3.6677	0.3995	Energ'ia generada [GWh/trabajadores]
NR	Fepasa	0.4554	0.4123	-0.0947	[Millones de toneladas km/trabajadores]
NR	Ferronor	0.2891	0.5084	0.7584	[Millones de toneladas km/trabajadores]
NR	Gener	5.7859	4.7388	-0.1810	Energ'ia generada [GWh/trabajadores]
NR	Laboratorios Chile		1394.5421		
NR	LAN Chile	1.7089	1.0008	-0.4144	[Pasajeros por kil'ometro/trabajadores]
NR	Pilmaiquén	7.1905	8.6277	0.1999	Energ'ia generada [GWh/trabajadores]
NR	Telex	39.0387			
NR	Mean			0.0778	
	Median			-0.0947	
	SD			0.4002	
	N			7	
R	Chilectra	1.3412	1.7036	0.2702	Energ'ia comprada [GWh/trabajadores]
R	Chilquinta	0.8038	1.6152	1.0093	Energ'ia comprada [GWh/trabajadores]
R	CTC	69.3534	151.1731	1.1797	N'umero de lineas operativas [unidades/trabajadores]
R	Edelaysén	0.3208			
R	Edelmag	0.6296	0.8611	0.3676	Energ'ia comprada [GWh/trabajadores]
R	Elecda	0.9252	1.4479	0.5649	Energ'ia comprada [GWh/trabajadores]
R	Eliqsa	1.6372	2.0288	0.2391	Energ'ia comprada [GWh/trabajadores]
R	Emec	1.7957	1.4135	-0.2128	Energ'ia comprada [GWh/trabajadores]
R	Emel	1.2992	0.8345	-0.3577	Energ'ia comprada [GWh/trabajadores]
R	Emelari	1.0657	1.6876	0.5836	Energ'ia comprada [GWh/trabajadores]
R	Emelat	1.5176	1.5749	0.0377	Energ'ia comprada [GWh/trabajadores]
R	Emos	0.1911			
R	IANSA	278.0696	266.4219	-0.0419	Prod. ázucar por trabajador [toneladas m'etricas/trabajadores]
R	Saesa	0.6055	0.9196	0.5188	Energía generada [GWh/trabajadores]
R	Telefónica del Sur		39.0387		
R	Mean			0.3466	
	Median			0.3189	
	SD			0.4612	
	N			12	
All firms	Mean			0.2475	
	Median			0.2391	
	SD			0.4485	
	N			19	

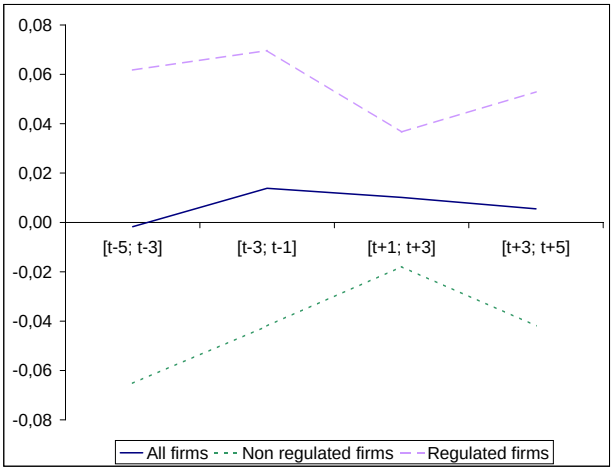
Figure 6.1: Cost per unit before and after privatization, adjusted and unadjusted



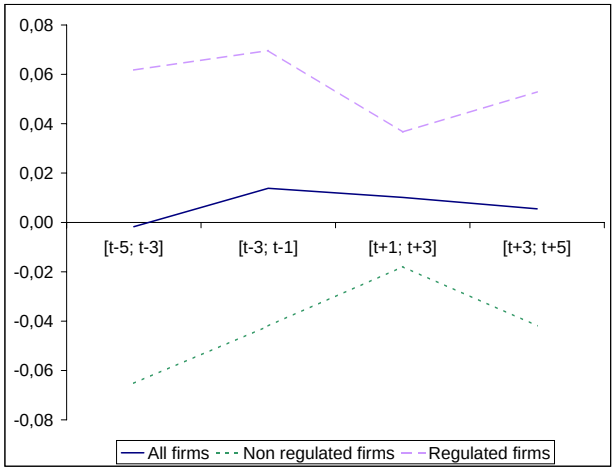
(a) Cost per unit (mean)



(b) Cost per unit (median)

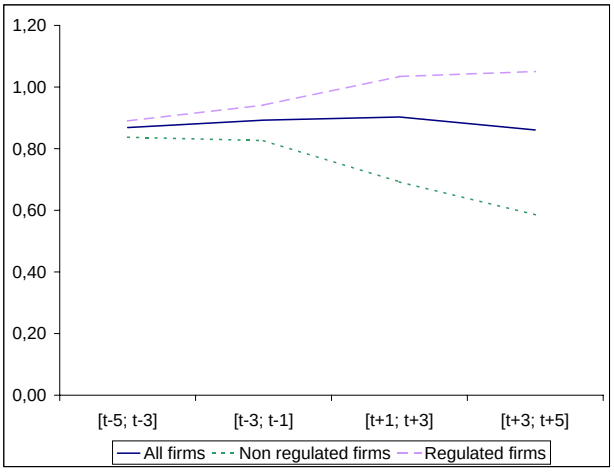


(c) Cost per unit adjusted (mean)

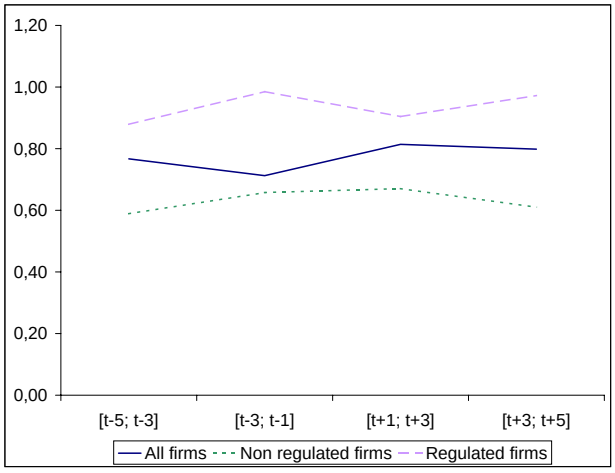


(d) Cost per unit adjusted (median)

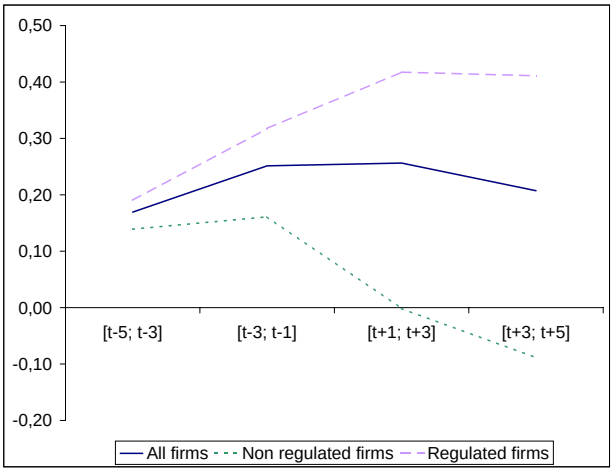
Figure 6.2: Investment as a fraction of physical assets (PPE) before and after privatization, adjusted and unadjusted



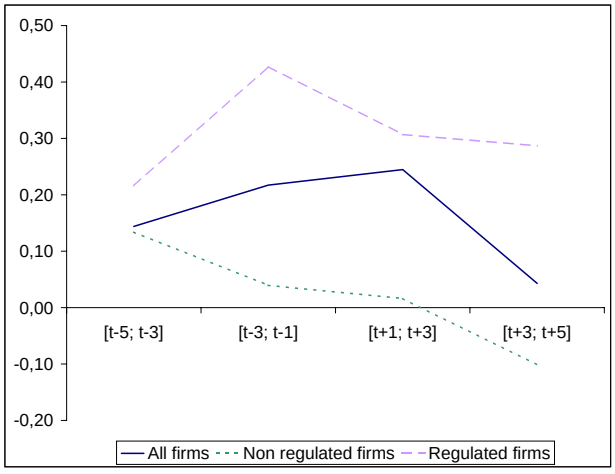
(a) Investment over PPE (mean)



(b) Investment over PPE (median)

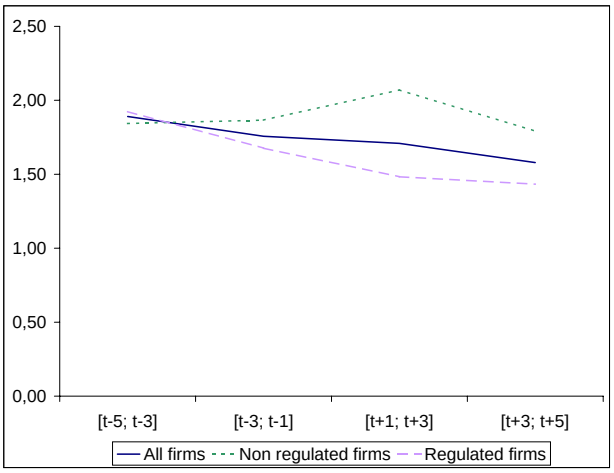


(c) Investment over PPE adjusted (mean)

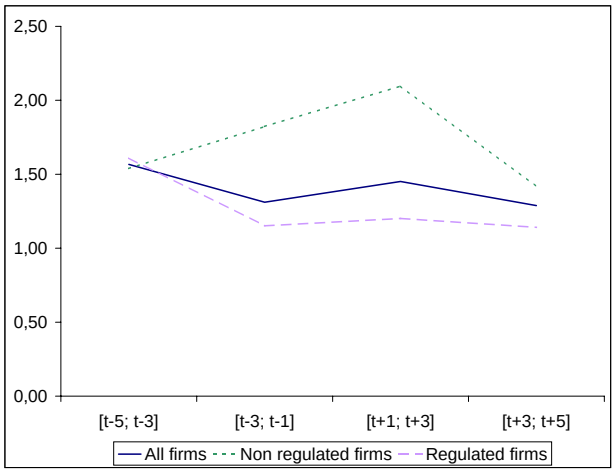


(d) Investment over PPE adjusted (median)

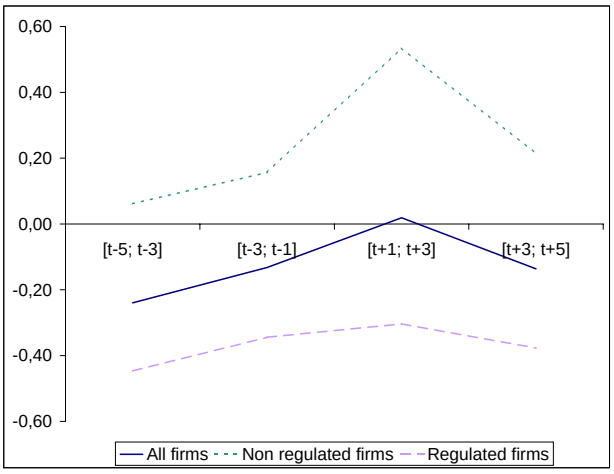
Figure 6.3: Investment as a fraction of sales before and after privatization, adjusted and unadjusted



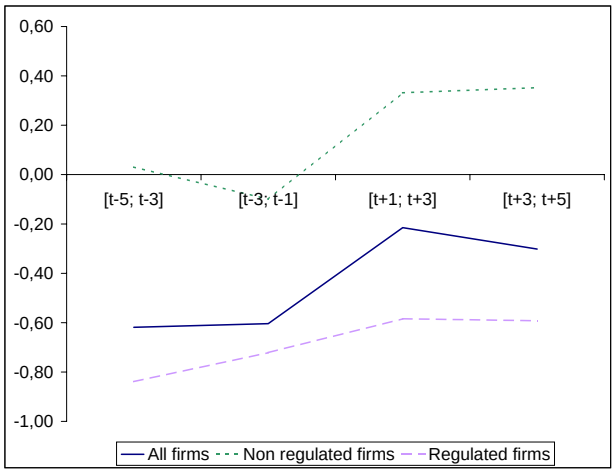
(a) Investment over Sales (mean)



(b) Investment over Sales (median)

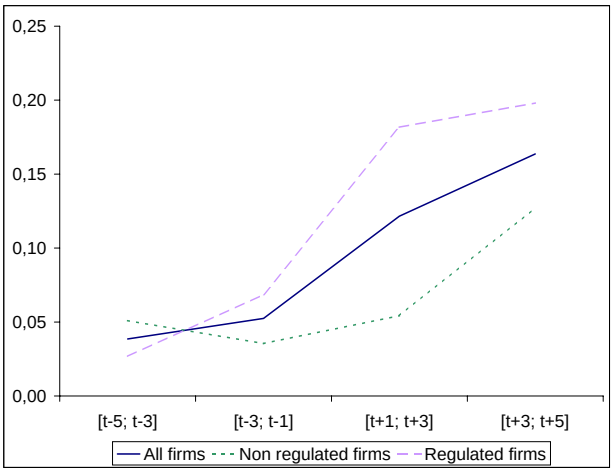


(c) Investment over Sales adjusted (mean)

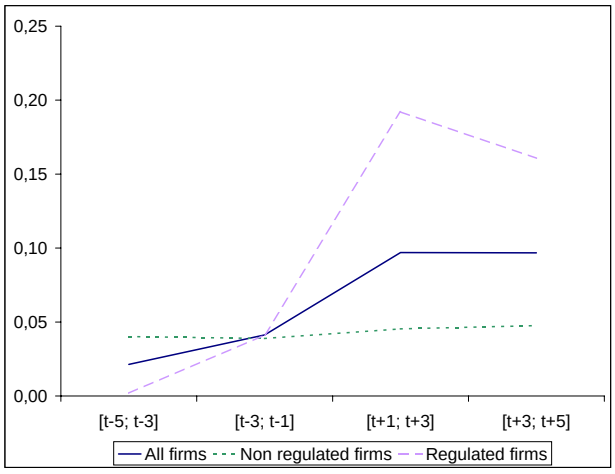


(d) Investment over Sales adjusted (median)

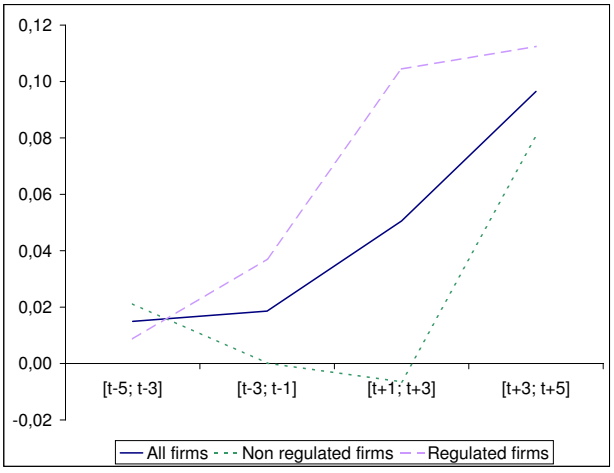
Figure 6.4: Net income as a fraction of physical assets before and after privatization, adjusted and unadjusted



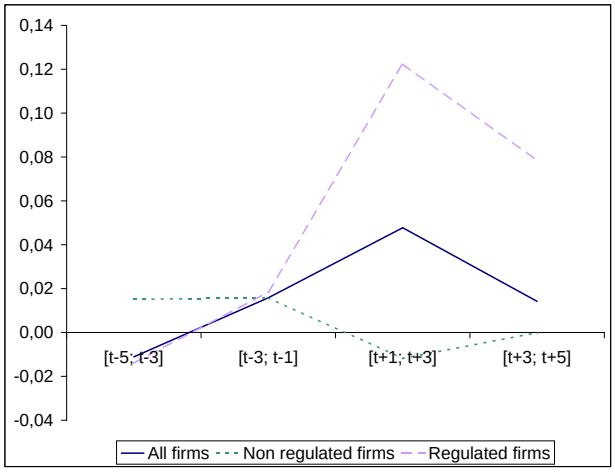
(a) Net income over PPE (mean)



(b) Net income over PPE (median)

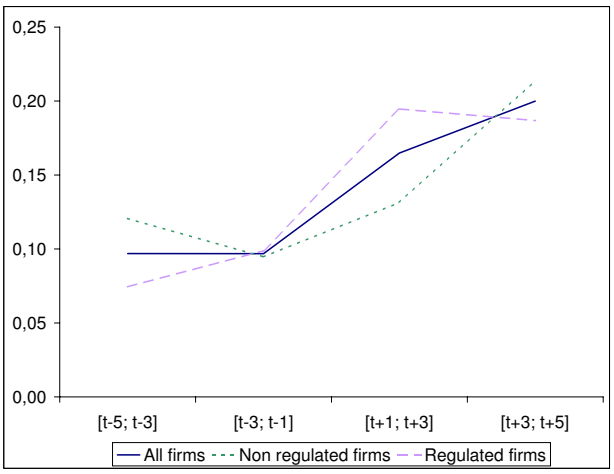


(c) Net income over PPE adjusted (mean)

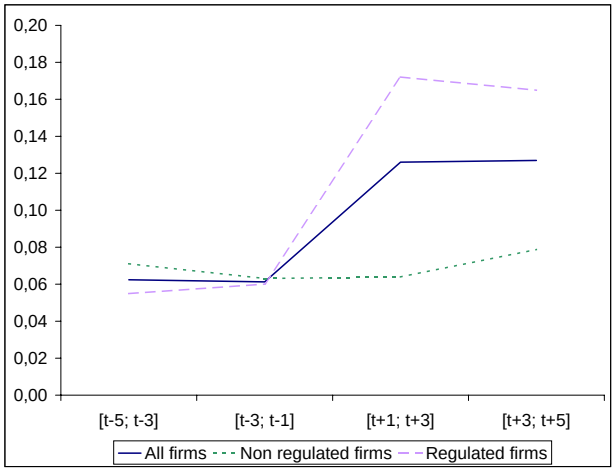


(d) Net income over PPE adjusted (median)

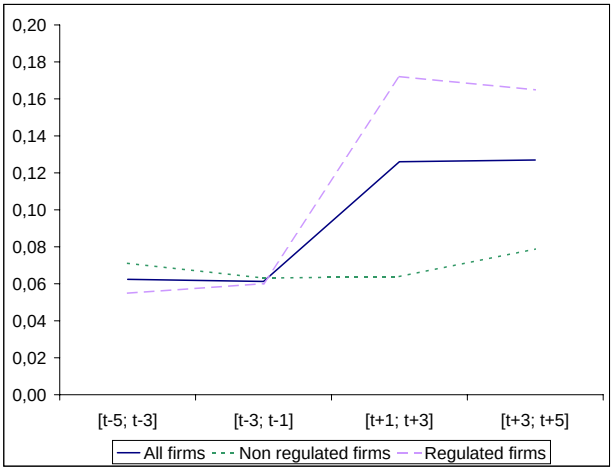
Figure 6.5: Operating income as a fraction of physical assets before and after privatization, adjusted and unadjusted



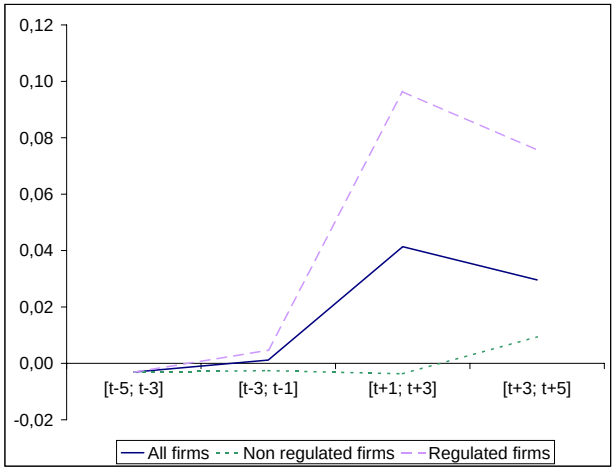
(a) Operating income over PPE (mean)



(b) Operating income over PPE (median)

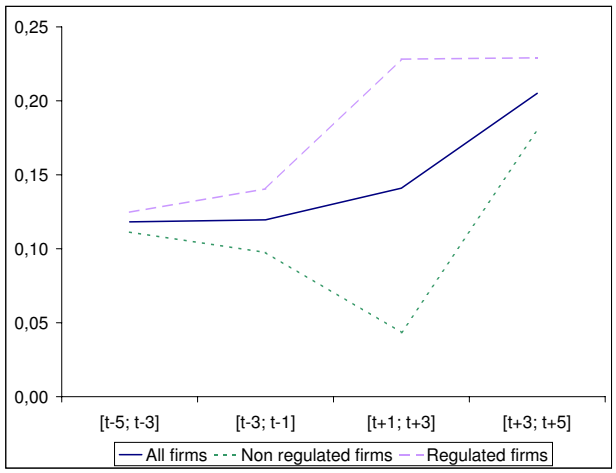


(c) Operating income over PPE adjusted (mean)

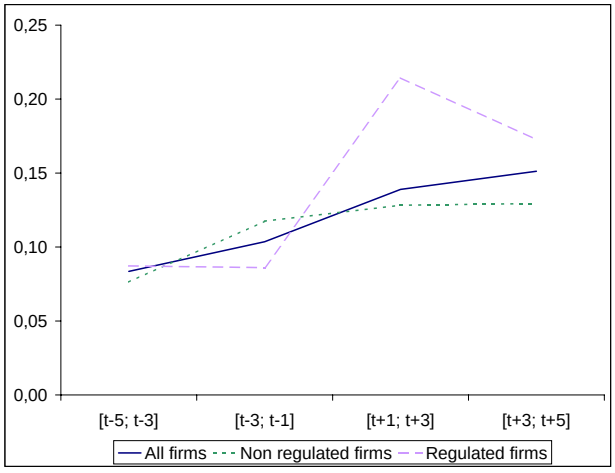


(d) Operating income over PPE adjusted (median)

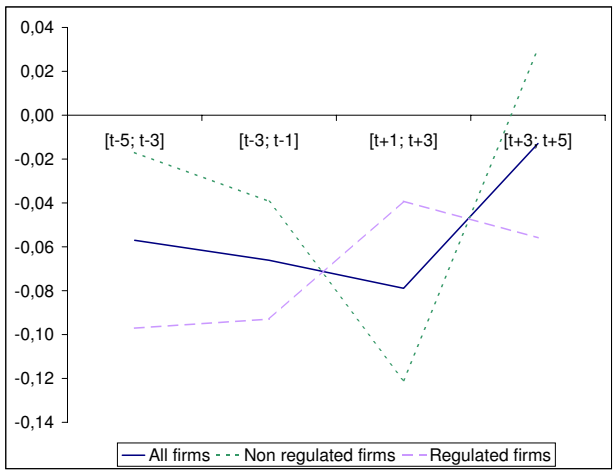
Figure 6.6: Operating income as a fraction of sales before and after privatization, adjusted and unadjusted



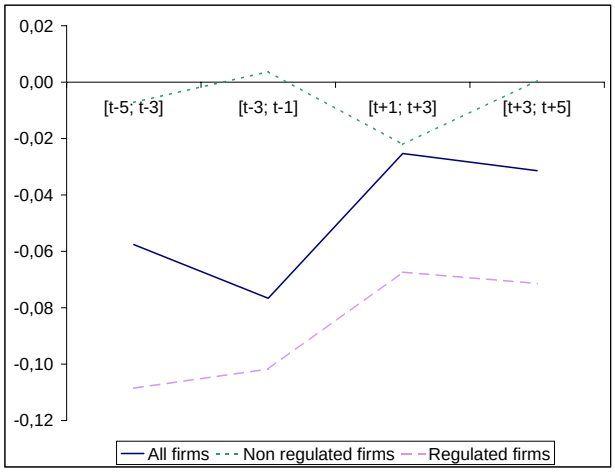
(a) Operating income over sales (mean)



(b) Operating income over sales (median)



(c) Operating income over sales adjusted (mean)



(d) Operating income over sales adjusted (median)