

## THE FISCAL IMPACT OF PRIVATIZATION IN CHILE: 1985-1990

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This paper provides a qualitative and quantitative analysis of the public-finance effects caused by the privatization of state-owned firms in Chile between 1985 and 1990. In that period, important state-owned firms were transferred to the private sector (from the electricity and telecommunications sectors, among others), and the Treasury collected an sum amounting to nearly US\$1,700 million.

This study—which considers the ten largest firms covering more than 80% of revenues received by the Treasury in that period— shows that, contrary to what has been argued, from the fiscal point of view the firms were not “given away”. The author points out that the Treasury would have suffered a capital loss only if there were no efficiency increases in the privatized firms. This is because efficiency improvements redound in gains for the Treasury through taxation, thereby compensating the possible subsidy which might have been obtained by the private sector in the purchase.

The author also concludes that at the outset of the process (1985-1986) the Treasury made asset losses, which were nonetheless offset by subsequent sales. In the author's opinion, this loss was probably due to the strong opposition that existed at the start of the privatization process, which brought the price of the shares down, and consequently made for a reduction in the revenue flow received by the Treasury. In the following period (1987-1990), on the other hand, divestiture had a positive affect on public finances. Furthermore, when significant efficiency advances are taken into account, the author concludes that the initial fiscal losses were more than offset.

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## I. INTRODUCTION

The privatization of state-owned firms has short- and long-run effects on public finances. It can also have an impact on the behavior of the private productive sector, which in turn will have fiscal consequences. For all of these reasons, to analyze the fiscal impact of privatization in a comprehensive way, a general equilibrium-type model is needed. However, the quantitatively most important impacts are clear and potentially measurable.

The sale of an asset has effects on the “permanent income” of both seller and buyer. It is not sufficient to look at the current deficit of the public sector to determine whether privatization is appropriate or not. At the moment of sale, public sector revenues will rise as a result, but if the asset was generating positive cash flows, in subsequent years there will be a negative effect on fiscal income due to the loss of these cash flows. Consequently, there is a similarity between privatization and an increase in fiscal borrowing, because a flow is received in the present in exchange for reduced flows in the future. For that reason, income from privatization should be seen as a way of financing a deficit rather than a determinant of the deficit.<sup>1</sup> The aim of this study is to analyze the fiscal impact of the divestiture of firms by the public sector, and then to make a measurement for the Chilean case between 1985 and 1990.

## II. PRIVATIZATION AND PUBLIC FINANCES: THEORETICAL ANALYSIS

The immediate impact of the divestiture of an asset by the public sector is a reduction in the conventional deficit in the year of sale, thereby easing liquidity constraints. However, as has been said already, this is not the only impact that is produced: there are also effects on the public sector's permanent income, through a reduction (or disappearance) of the future flows the asset would have generated, implying a positive effect at the moment of sale followed by negative (or positive) effects in subsequent periods. The problem can be even more serious if as a result of the revenue

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<sup>1</sup> It is not only asset sales that can lead to false conclusions regarding the conventional measurement of fiscal deficits. The same occurs with public-sector investment, which traditionally is considered as an expense in the current period, without taking into account that it will probably give rise to future benefits.

from the sale, the government reduces taxes or increases current spending.

If the public sector sells a firm to the private sector, it will obtain revenues as a result of the sale, but will also cease to receive the dividends that firm was generating. On the other hand, it will receive the tax revenue that the firm and its shareholders pay in future periods.

In general terms, the fiscal impact of the sale can be expressed as.

$$(1) \quad IFP = PV - \sum \frac{DVP_i}{\pi (1 + r_i)} + \sum \frac{T_i}{\pi (1 + r_i)}$$

where:

$IFP$	=	fiscal impact of the privatization
$PV$	=	sale price of the firm
$DVP_i$	=	flow of dividends lost to the Treasury in period i, net of reinvestment of profits.
$T_i$	=	flow of taxes paid by the private sector in period i
$r_i$	=	discount rate in period i

In what follows, the value of these variables is analyzed under different scenarios.

#### a) Perfect competition, certainty and equal behavior

With no changes in the firm's behavior, i.e. with identical administration under both the private and public sector, the analysis is limited to studying the budgetary impact of a change in the firm's ownership. If the capital market is perfect, the firm will be sold at the competitive price, equivalent to the discounted present value of after-tax income flows. An exception to this would be if the Treasury decides to make a gift to specific group (e.g. workers) by selling them the firm, or part of it, at a price below the present value of future cash flows. If, on the other hand, the offer for sale is open and public, competition between buyers will lead to a situation where, at the limit, the maximum willingness to pay will correspond to the present value of future flows.

If the public sector invests the proceeds of asset sales at the discount rate (the alternative cost of the proceeds), the future higher deficits in this sector will be exactly offset by the returns on the investment made with the proceeds from the sale. This would be the case if the government uses the resources to buy other assets or to repay debt; i.e. if it invests in projects with a yield equal to the discount rate. In these circumstances, the

government and the private sector simply exchange financial assets and liabilities, with no effect on real resource demand, either present or future: the fiscal situation will not be affected. In the context of a closed capital market, the discount rate will not change, because, as it is equal to the marginal return on investment, the only effect will be to alter the composition of investment portfolios belonging to the Treasury and to the private sector.

The same happens if the capital market is open to the outside world, and firms are sold to foreign investors. If the market is efficient, the Treasury will receive the present value of the firm's future income flows.

On the other hand, if the proceeds from the sale are used to finance current expenditure or to reduce taxes, future deficits could be greater,<sup>2</sup> and the conventional measurement of the deficit in the year of sale would not reflect the medium-term macroeconomic consequences resulting from the divestiture.

Formally, the analysis is as follows:

The sale price of the company will correspond to the present value of the cash flows it generates, net of taxes, i.e.:

$$(2) \quad PV = \sum \frac{F_i - T_i}{\pi (1 + r_{ip})}$$

where:

$$\begin{aligned} F_i &= \text{pre-tax cash flow generated by the firm in period } i \\ r_{ip} &= \text{private discount rate in period } i \end{aligned}$$

In addition, if there are no behavioral changes<sup>3</sup> in the firm after privatization, the flow of dividends lost to the Treasury is given by:

$$(3) \quad VP(DVp) = \sum \frac{F_i}{\pi (1 + r_{is})}$$

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<sup>2</sup> It should be kept in mind that part of current expenditure, social spending, represents investment in human capital, which may socially be highly profitable. In addition, reductions in tax rates, through their impact on economic growth, can lead to increases in the tax base, so the effect on tax revenue will not necessarily be negative.

<sup>3</sup> Changes in the firm's economic goals and results.

where:

$$\begin{aligned} VP(DVp) &= \text{present value of dividends lost to the Treasury} \\ r_{is} &= \text{social discount rate} \end{aligned}$$

However, the Treasury will receive the taxes paid by the private sector:

$$(4) \quad VP(T) = \sum \frac{T_i}{\pi (1 + r_{is})}$$

where:

$$VP(T) = \text{present value of tax revenue received by the Treasury.}$$

The fiscal impact of privatization can be expressed as:

$$(5) \quad IFP = \sum \frac{F_i - T_i}{\pi (1 + r_{ip})} - \sum \frac{F_i}{\pi (1 + r_{is})} + \sum \frac{T_i}{\pi (1 + r_{is})}$$

Under the assumption of perfect competition, i.e. with no distorted markets, the social and private discount rates coincide ( $r_{ip} = r_{is}$ ), and so the sum of the terms of equation (5) gives a resulting fiscal impact equal to zero. However, it is important to note that the present-value calculation implicitly assumes that cash flows obtained from the sale of the firm are reinvested at a yield equal to the discount rate. So, if the sale proceeds are invested in projects yielding less than that rate, the fiscal impact will be negative.

However, the practical utility of this analysis is only as a benchmark, for the very existence of an entrepreneurial state is because the government aims, through public administration, to achieve goals that are to some extent different from those pursued by private management. In the light of this, it is difficult to imagine that a firm's behavior under public administration will be identical to its behavior when managed privately. This is a significant aspect in the social-welfare impact of privatization, which will not be analyzed in this paper. However, it should be kept in mind that the goals pursued by public administration, unrelated to the pursuit of profit, may also be socially valuable —redistributive goals, for example—and should be considered as part of the social value of the firm under public administration.

### **b) Differences in the tax regime applied to the private and public sector**

Before analyzing the differences in the tax regimes applicable to private- and public-sector companies, it should be mentioned that the difference between dividends and taxes, for a public-sector firm, is only of an accounting nature, since both represent fiscal cash inflows. But if the tax rules are changed at the time of divestiture, the private sector's maximum willingness to pay will be affected, and this in turn will affect the fiscal revenues resulting from privatization. If the capital market is efficient and there are no changes in the firm's behavior or efficiency, the change in tax legislation will have no fiscal impact, because the market price of the firm will reflect the future income flow net of taxes. If public-sector firms were enjoying tax advantages, tax revenues will increase as a result of privatization which brings such advantages to an end, but at the cost of a lower market price for the firm. The net fiscal effect, given efficient markets, is nil.

In terms of equation (5), described above, the value of  $T_p$  on the right-hand side, will be greater, but as this term is both subtracted and then added, the fiscal impact will be zero (assuming of course that there are no differences in discount rates).

### **c) Uncertainty and capital market imperfections**

In the absence of uncertainty, the maximum amount the private sector will be willing to pay for risky assets will be a function of the cost of a certain income flow of equal expected value, and the private sector's risk aversion. If the public sector is less risk-averse than the private sector and there are no changes in behavior or in tax regimes, the present value of the flows generated by the firm will be less for the private sector, because the relevant discount rate for this sector will be higher. This may be the case if there is a danger of future re-nationalization at lower than market prices, or if there are imperfections in the capital market, such as favorable borrowing conditions for the government, even though both sectors may be equally risk averse. In either of these two cases, the government will have to transfer part of its wealth to the private sector, to compensate it for the higher discount rate.

In terms of the equations presented above:

$$(6) \quad IFP = \sum \frac{E(F_i - T_i)}{\pi (1 + r_{ip})} - \sum \frac{E(F_i)}{\pi (1 + r_{is})} + \sum \frac{E(T_i)}{\pi (1 + r_{is})}$$

where:

$E()$  = expected value of cash flow.

If there are no changes in the firm's behavior, the expected value of flows will be equal for both sectors. However, if there are different degrees of risk aversion, or if the risk attached to the cash flows is indeed different for the private sector, then  $r_{ip} \neq r_{is}$ .<sup>4</sup> If, as is likely,  $r_{ip} > r_{is}$ , then in the absence of changes in the firm's efficiency the fiscal impact of privatization will be negative.

However, this argument would imply that all investment projects should be carried out by the public sector, because its opportunity cost is lower. Logically, this cannot be true, as it assumes implicitly that the alternative cost of investing the resources is constant. A point will be reached where it will no longer be worthwhile for the public sector to continue concentrating its investment in any project, whereas it will be for the private sector.

#### d) Efficiency Improvements

Before analyzing the fiscal impact of efficiency improvements, it is necessary to define what is meant by efficiency. Economic theory distinguishes between (i) profitability—understood as the maximization of the pecuniary profits arising from an economic activity; (ii) productive efficiency—defined as lowest-cost production; and (iii) economic efficiency—defined as the generation of prices and quantities that are optimal from the resource allocation standpoint. In a perfectly competitive economy, these three definitions coincide. Profit-maximizing producers will be economically efficient, because they will produce optimum quantities at a price equal to marginal cost. On the other hand, if there are distortions in the economy, privatization will likely give rise to profitability improvements, because

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<sup>4</sup>Strictly speaking an adjustment for these differences can be made to the flows themselves. However, in financial valuations it is usually the discount rate that gets adjusted.

incentives to maximize profits are stronger for private-sector firms. The effect on resource allocation will depend on the type of distortions present both before and after privatization.

If changes in the behavior of the firms occur as a result of privatization, future income flows will be different. Efficiency improvements will depend on the rules of the game in force for private and public-sector companies, and on changes in the existing rules as a consequence of privatization.<sup>5</sup> the empirical evidence seems to indicate that private firms react faster to technological changes, and have entrepreneurial skills which are in short supply in the public sector, due to the different set of incentives facing the two types of firm.<sup>6</sup> These improvements will have a favorable impact on the Treasury via the sale price of the firm and /or higher tax revenues.

If the sale is accompanied by restrictions on competition, future income flows will be higher, but resource allocation may worsen. To clarify this point, let us assume the existence of a natural monopoly, administered by the public sector with redistributive objectives but in a productively inefficient way. If this monopoly is privatized, and the private producer is allowed to use his monopoly power, resource allocation will deteriorate as a result, although probably there will be an improvement in productive efficiency. Additionally, account should be taken of the impact on social welfare arising from the use to which the Treasury puts the proceeds of the sale and the taxes paid by this monopoly. The total impact on resource allocation is unclear *a priori*, and depends on the size of the distortions.

Finally, the budgetary impact will depend on the behavior of the economy as a whole. Although a particular firm may improve its efficiency, this could be at the cost of lowering profitability in other competing firms, thereby reducing the taxes paid by these firms.

In terms of the previous equations, an efficiency improvement will increase the price the private sector is willing to pay for the firm. However, if the capital market is not competitive, nobody can guarantee that the price actually paid will correspond to the maximum willingness to pay,<sup>7</sup> in other words:

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<sup>5</sup> There are countries where privatization policies have been accompanied by domestic deregulation.

<sup>6</sup> Generally, bureaucrats are not driven to maximize profits because they do not suffer the consequences of eventual bankruptcy.

<sup>7</sup> If, for example, there are problems of information, bids will not be competitive.

$$(7) \quad PV \leq \sum \frac{E(F_{ip} - T_i)}{\pi (1 + r_{ip})}$$

where:

$F_{ip}$  = cash flow generated under private management in period i.

On the other hand, if there is an improvement in productive efficiency:

$$(8) \quad F_{ip} > F_{is}$$

where:

$F_{is}$  = cash flow generated under public-sector administration.

On the other hand, if there are significant distortions in the economy, the private discount rate is likely to be higher than the social rate. This idea is based on the fact that one of the most regulated markets is the labor market. The presence of minimum wages, unions and professional associations means that the social cost of labor is less than its private cost, or the price actually paid for it. A similar effect is generated by taxes on the capital factor. It is for this reason that some authors assume that the private cost of capital is above its social cost, in other words:

$$(9) \quad r_{ip} > r_{is}$$

To the above one would have to add the indirect effects on other markets. The fiscal impact would be equal to.

$$(10) \quad IFP = PV - \sum \frac{E(F_{is})}{(1 + r_{is})^i} + \sum \frac{E(T_i) + EI}{(1 + r_{is})^i}$$

where:

$EI$  = indirect effects.

The fiscal impact of privatization in these circumstances is not clear *a priori*, so an empirical measurement is needed in each particular case, which will be carried out in the following section.

### e) Effects in the capital market

The potential effects on the capital market will depend on the size of the privatization process being carried out. If this is of little significance, the secondary effects in this market may be negligible. If we assume that privatization is big enough for the capital-market effects to be significant, we will find that when a public-sector company is offered for sale, the supply of shares will increase. If the demand for future income flows does not change (the saving rate remains constant), there will be a crowding-out effect; i.e. the purchase of shares in public-sector companies will be at the expense of investment in other assets. The final result in the capital market will depend on the effect on total saving (public, private domestic and private foreign), and on total investment (public, private domestic and private foreign).

If the capital market is not open internationally, the effects will be as follows.

When the sale begins, investment demand by the public sector will increase if the proceeds are used for investment. If the supply of savings by the private sector remains unchanged, the effect on the interest rate will depend on the what the government plans to do with the sale proceeds. If all the proceeds are destined to public-sector saving, the interest effect will be practically nil, with only temporary increases due to information problems. If part of the proceeds are used to finance current expenditure, there will be an increase in investment demand not fully offset by higher public-sector saving, leading to a higher interest rate. This increase will cause a fall in the prices of the shares in the public companies being offered for sale, with a negative impact on the Treasury.

If the capital market is open internationally, and the country is a small one, there will no effect on the interest rate, nor therefore on share prices, because the interest rate is determined internationally.

### III. PRIVATIZATION AND PUBLIC FINANCES: THE CASE OF CHILE, 1985-1990

The privatization of public-sector firms in Chile during the period 1985-1990 involved some of the country's important productive companies. All these firms were sold to the private sector at prices below their book value. Although this does not say anything about the fiscal impact, as the

accounting principles used do not necessarily reflect economic value, it does raise questions concerning the prices and fiscal impact of the sales.

The next sub-section describes the model used to measure the fiscal impact of the privatization of ten of the largest public-sector companies in Chile.

### 3.1 Description of the Model

a) Estimating the fiscal impact of privatization requires using a general equilibrium model, as the effects generated are not restricted to the firms sold. Privatization can cause behavioral changes in the rest of the productive and financial system, which in turn have effects on government income and expenditure. However, consideration of these elements is impossible in practice, so only the direct impacts caused by the privatization of these ten firms will be included.

b) The time horizon used in the estimation ought to be infinite, because, even if a firm closes down, the liquidation of its assets will generate income for the private sector on which it will have to pay taxes. However, due to the magnitude of the estimated discount rates, income flows in periods in the distant future (more than 20 years hence) cease to be relevant, so the time horizon used will stretch from the moment when the privatization was initiated (1985, 1986) until the year 2008. The fiscal impact of including the final flow is probably negative, because the taxes paid by the distribution of this flow will be less than what the Treasury would have received if the firm had not been privatized (it would have received the total income flow instead of part of it). But if the private sector reinvests the income flows from the firm in a more profitable way than the public sector, this effect could be reversed.

c) The full fiscal impact of privatization for each of the years between 1985 and 1990 is the sum of the annual impacts caused by each privatized firm. The companies included in the sample, which covers more than 80 percent of fiscal revenues from the sale of shares in the period 1985-90, are as follows:

TABLE N° 1

Firm	% of total divested
ENDESA	27.1
CHILGENER	4.6
CHILMETRO	6.1
CHILQUINTA	1.5
CTC	17.4
CAP	3.6
IANSA	2.5
SOQUIMICH	10.9
ENTEL	6.5
LAB. CHILE	1.1
TOTAL	81.3

*Source:* Gerencia de Normalización, CORFO.

d) The central idea of the model is to measure changes in the Treasury's cash flow resulting from the divestiture of these public companies. As was indicated in the theoretical analysis, these flows correspond to:

- Proceeds from the sale of the firm or part thereof.
- Transfers lost to the Treasury, which ceases to receive dividends corresponding to the percentage of the firm that has been privatized.
- Taxes paid to the Treasury by the private sector, corresponding to the privatized percentage.

The revenues arising from divestiture are directly measurable. However, this is not the case with the other flows, as their measurement requires a considerable number of assumptions to be made. The transfer lost to the Treasury is a function of the fraction privatized and the cash flows the firm would have generated in public-sector hands. In turn, these cash flows depend on how efficiently the company would have operated and on the rate of reinvestment of profits. Taxes paid by the private sector arise from two sources: Prime Category Tax, charged on company profits, and the Global Complementary Tax charged on dividends received by the firm's owners. Therefore, factors such as the firm's efficiency in private-sector hands, the dividend rate, and the rates and bases of the Prime Category and Global Complementary Taxes will all affect its measurement.

The impact of a sale in year  $i$  is given by:

$$(11) \quad IFP_i = PV + VP(\alpha_i T) - VP(\alpha_i DVP)$$

where:

$IFP_i$	=	fiscal impact of the privatization carried out in year $i$
$PV$	=	sale price of the firm
$VP(a_i T)$	=	present value of taxes corresponding to the fraction of the firm privatized in year $i$ ( $a_i$ )
$VP(a_i DVP)$	=	present value of the dividends the public sector ceases to receive, corresponding fraction of the firm privatized in year $i$ ( $a_i$ )

e) All flows are expressed in millions of Chilean pesos at 1988 prices, under the implicit assumption that inflation has no real effects inside the firm. Variables are adjusted in line with the variation in the consumer Price Index (CPI).



### 3.2. Measurement of the flows



This section presents an explanation of the model used in estimating the cash flows mentioned.

#### 3.2.1. Measurement of the firm's sale price (PV)

This information is obtained from CORFO, a state entity responsible for privatization. A fraction of the shares of these firms were sold to public sector employees, in lieu of redundancy payments for years of service. Here the Treasury does not receive the cash flow corresponding to this operation at the moment of sale, but a reduction in negative cash flows is produced in the future (at the moment when the Treasury would have had to make the redundancy payments). It will be assumed that the two flows have the same present value, so any sale using this mechanism will be counted as a cash inflow in the present. The same argument is valid for shares sold on credit and for those given to *Cora* creditors.<sup>8</sup> In the cases of Endesa and CTC, a fraction of the shares were sold through popular

<sup>8</sup> Part of the shares of Endesa and Entel were transferred to creditors of the agrarian reform carried out during 1971-1973.

capitalism, with highly advantageous loans in interest-rate terms, which had a negative impact on the Treasury. This effect will not be considered in the estimate, but it is important to keep it in mind.

### 3.2.2. Measurement of taxes paid by the private sector

Income taxes on firms in Chile are charged at the level of the firm and of the owner.

- Prime Category Tax (TE): a proportional tax on the gross earnings of the firms<sup>9</sup>. This tax is credited at the second level, in order to avoid double taxation of the same income source.
- Global Complementary Tax (TP): a progressive tax charged on all income received by domiciled or resident individuals.

As has already been mentioned, to be able to estimate taxes paid by the private sector, one needs to estimate the tax rate and its base, and this will be described below.

#### a) *Prime Category Tax:*

The tax rate corresponds to the statutory rate applied on firms' gross taxable income —10% for the period 1984-1990, and 15% in subsequent years.<sup>10</sup> The tax base corresponds to gross earnings in the period 1984-1988, and from 1990 onwards. For 1989 the base corresponds to the profits distributed to owners or shareholders.<sup>11</sup>

#### b) *Global Complementary Tax:*

Here the tax rate is progressive according to the income level of the owners or shareholders, so an assumption has to be made concerning the level of such income. The average of shareholders' monthly income is estimated at \$600,000 per month in December 1988, for which reason the marginal income taxes are estimated as 15% for the period 1984-1989 and 30% from 1990 onwards.<sup>12</sup>

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<sup>9</sup> This is not exactly equivalent to gross profits according to financial accounting, because certain adjustments have to be made to calculate net Prime Category taxable income. However, this difference will not be considered in the estimation of the fiscal impact of privatization.

<sup>10</sup> This change arises from the approval of the 1990 Tax Reform.

<sup>11</sup> The change between 1989 and 1990 occurs for the same reasons described in the previous note.

<sup>12</sup> The marginal rate for this income level is 25%. However, the reform proposes that the Prime Category Credit should constitute income for shareholders, thereby making them move up to higher income brackets. This is equivalent to an increase in the marginal tax rate.

The tax base corresponds to dividends received by the shareholders.

In order to measure taxes paid by the private sector, gross profits and the dividends distributed need to be estimated. The model used for this purpose is described below.

### 3.2.2.1. *Description of the variables*

In estimating the profits obtained by the firms after privatization — required for calculating taxes—the starting point will be after-tax accounting profitability. For the period 1985-1989 the effective profitability of each firm will be used; for the subsequent period, assumptions will be made according to criteria explained below. Accounting profitability is given by:

$$(12) \quad Ut(t) / PAT(t-1) = RENT(t)$$

where:

$Ut(t)$  = after-tax profit in (t)  
 $PAT(t-1)$  = accounting asset value in the previous period, with (t) ranging from the year in which the privatization was initiated until the year 2008.

The asset value of a firm, presented in the form of an accounting identity, is given by:

$$(13) \quad PAT(t) = PAT(t-1) + Ut(t) - DV(t)$$

where:

$DV(t)$  = dividends or profits distributed in period (t)

Using (12), after-tax profit is given by:

$$(14) \quad UT(t) = PAT(t-1) * RENT(t)$$

In turn, dividends distributed to owners will correspond to the dividend rate (d) multiplied by net profits, i.e.:

$$(15) \quad DV(t) = UT(t) * d(t)$$

The dividend rate (or its inverse, the rate of profit-retention), like profitability, is a variable that is exogenous to the model, to be estimated according to criteria explained below.

- This rate is important for calculating cash flows for two reasons:
- dividends received by shareholders will determine the Global Complementary Tax,
- the higher the rate of profit-retention, the smaller are current flows to shareholders, but future flows are greater provided the funds are invested in projects that have a yield at least equal to the discount rate.

It should be clear that the rate of effective reinvestment will be even greater than  $(1-d)$ , because profit is expressed net of depreciation, so implicitly one is assuming that depreciation also forms part of the reinvestment of profits. In other words, if the dividend rate is 100 percent, the model implies that the firm is reinvesting an amount exactly equal to the depreciation of its assets.

Once profits and dividends received by the private sector have been estimated, constituting the bases for the Prime Category and Global Complementary Taxes, it is possible to calculate total taxes paid (T) as well as the rate applied to net profit (t), as follows:<sup>13</sup>

- Period 1984-1988

Prime Category Tax (TE) is given by the ruling tax rate (tE), applied to gross profits (Ut.B), i.e.:

$$(16) \quad TE = tE * UT.B$$

Global Complementary tax is given by the marginal rate (tP) applied to dividends received, less the credit received by shareholders for Prime Category Tax paid, i.e.:

$$(17) \quad TP = (Ut * d) * tP - (Ut.B * d) * tE$$

Adding the two taxes together, collecting terms and remembering that:

$$(18) \quad Ut = Ut.B * (1 - tE) \quad \text{gives:}$$

$$(19) \quad T = Ut * \left\{ \frac{\tau E}{1 - tE} * (1 - \delta) + (\delta * \tau P) \right\}$$

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<sup>13</sup> The subindices (t) will be omitted in the tax equations.

This gives a tax rate on net profits in this period ( $t_{84-88}$ ) equal to:

$$(20) \quad \tau_{84-88} = \frac{\tau E}{(1 - \tau E)} * (1 - \delta) + \delta * \tau P$$

— 1989

In 1989, a different regime was in force for Prime Category Tax, which involved a tax of 10 percent on distributed profits, not reinvested by owners.<sup>14</sup> Thus, we have:

$$(21) \quad TE = ut.B * d * tE$$

With regard to the Global Complementary Tax, the existing regime remained unchanged, so, combining equations, the total tax paid is equal to:

$$(22) \quad T = (UtB * d * tE) + (Ut * d + tP) - (UT.B * d * tE)$$

This result shows that when the credit is applied, in that year only the Global Complementary Tax was paid, at a rate on net profit equal to:

$$(23) \quad t_{89} = d * tP$$

— Period 1990 onwards

In 1990 tax reforms will come into force which involve taxing gross profits at 15% from 1991 onwards,<sup>15</sup> and changing the income brackets, rates and base of the Global Complementary Tax. From this year onwards, the Prime Category Tax credit will be counted as income for the purpose of charging the Global Complementary Tax, so the total tax paid will be:

$$(24) \quad T = (Ut.B * tE) + (Ut * d + Ut.B * tE * d) * tP - (Ut.B * tE * d)$$

Collecting terms, gives:

$$(25) \quad T = Ut * \left\{ \frac{\tau E}{(1 - \tau E)} * (1 - \delta) + \left( \delta + \frac{\tau E}{(1 - \tau E)} * \delta \right) * \tau P \right\}$$

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<sup>14</sup> In practice, this reform meant the disappearance of company taxation, because they were only taxed at the level of individuals, as equation (23) shows.

<sup>15</sup> In 1990 the previous 10% tax rate will be applied.

So the rate of tax charged on net profit is:

$$(26) \quad t_{90-2008} = \left\{ \frac{\tau E}{(1 - \tau E)} * (1 - \delta) + \left( \delta + \frac{\tau E}{(1 - \tau E)} * \delta \right) * P \right\}$$

At this point it is necessary to introduce the discount rate used in calculating the present value of yearly dividend and tax flows. This discount rate should reflect the opportunity cost of the funds, or the return obtainable on the next best investment, which is the same thing. The choice of discount rate is a particularly sensitive and complicated point. Microeconomic theory argues that if there are significant distortions in the economy, the social discount rate, relevant for discounting taxes collected, will differ from the private rate, relevant for discounting dividends received by the private sector. However, the economic institutional framework in Chile is currently such that social project evaluation experts usually consider it appropriate to use estimates of the private discount rate as a reasonable approximation to the social rate of discount, as well as the best possible estimate of this. This opinion is based mainly on the relative scarcity of distortions caused by state intervention in this country. In addition, it is reasonable to assume that a firm's non-diversifiable risk will be the same for both the private and the public sector. This same argument will be maintained in the estimate of the present value of dividends lost to the Treasury as a result of privatization.

In estimating the discount rate, the CAPM model will be used<sup>16</sup>, which argues:

$$(27) \quad r^d(t) = r^{lr}(t) + PR(t)$$

where:

$$\begin{aligned} r^d(t) &= \text{discount rate in (t)} \\ r^{lr}(t) &= \text{risk-free market rate of return in (t)} \\ PR(t) &= \text{non-diversifiable risk premium in (t)} \end{aligned}$$

For its part, a firm's non-diversifiable risk premium corresponds to the stock-market risk premium, adjusted for the variability of return on the shares of the firm in question.

Once the discount rate for each firm has been obtained, it becomes possible to estimate the present value of the percentage of total taxes

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<sup>16</sup> Capital Asset Pricing Model.

corresponding to the fraction privatized each year. The fiscal impact of privatization carried out in each year between 1985 and 1990 will be the sum of present values of the ten firms for each year.

The value of taxes received by the Treasury is equal to the present value of future tax payments made by the private sector discounted at the rate of discount relevant to the Treasury, i.e.:

$$(28) \quad VP(\alpha_i T)_i = \sum \frac{\alpha_i T(t)}{\pi(1 + r_{is})}$$

### 3.2.2.2 Estimation of the Variables

Asset values in the years 1985-9 are obtained from the Santiago Stock Market, and are adjusted for variations in the CPI.

In estimating the discount rate the following information will be used:

The risk-free rate of return will be represented by the real annual interest rate on bank deposits of 90- to 365-day terms. For the period 1985-8, observed values will be used, as published by the Central Bank, while for 1989 onwards a projection made by the Catholic University of Chile's Economics Institute, based on parity rates, will be used. The resulting estimates are as follows:

Year 19-	85	86	87	88	89	90	91	92	93
Risk-free rate of return	8.16	4.13	4.24	4.56	6.03	5.4	5.0	5.0	5.0

In estimating risk-premium, an extension of the theory of interest-rate parity will be used. The central idea here is that the risk premium in the Chilean market should correspond to that of the United States, adjusted for the degree of variation of the Chilean economy compared with the North American one, under the assumption that rates of variation in GDP for each country are related to the variability of the respective market. In other words:

$$(29) \quad PRM_{CH} = q * PRM_{USA}$$

where:

$PRM$  = Market risk premium

The estimate of q was obtained from the following regression:

$$(30) \quad \Delta\% PGB CH = a + q * \Delta\% PGB USA$$

Using data for the period 1974-87, the following result is obtained:

$$q = 1.884 \quad s = 0.56 \quad t = 3.31$$

In an analogous way to that postulated by the theory of interest rate parity, if the correspondence described above between risk premiums for the USA and Chile did not hold, it would be possible to earn profits by shifting resources from one market to the other.<sup>17</sup> For that reason, given that the market risk premium for the USA estimated by Ibbotson and Sinquefield<sup>18</sup> is 8.3% per year, the average risk premium that ought to be observed in Chile is 15.3% per year.

In estimating present values, it will be assumed that this rate will decline linearly between 1986 and 1996, to reach 10 per cent per year, a rate only marginally above the PRM in the USA. This assumes that the sensitivity of our economy to international fluctuations will gradually decline.

The variability of the return on the shares of the ten firms, compared with the market average, (i.e. in the estimation of bt), will be obtained from estimates<sup>19</sup> of the sectoral bs for the North American economy, adjusted for the leverage of the firm in question. In other words:

$$(31) \quad bpat = bact * (Act / Pat)_{1988}$$

### 3.2.3 Estimation of Dividends Lost to the Treasury

The model used here is based on the same financial concepts described above. To estimate dividends lost to the Treasury, one needs to know the flows the firm would have generated if it had remained under public-sector management. It will be assumed for estimation purposes that a firm behaves as a public company as long as the privatized fraction is less than 51 percent. The main idea here consists of calculating the previous variables under public administration.

Below we will describe the model used in estimating the dividends lost to the Treasury.

<sup>17</sup> The implicit assumption is that there is international mobility of capital and an absence of compartmentalization in the capital market, deriving, for example, from quantitative restrictions imposed on foreign investment in specific sectors. Law N° DFL 600 eliminates this possibility.

<sup>18</sup> Ibbotson, R.G. and Sinquefield, R.A. (1982).

<sup>19</sup> Brealev, R. and Mvers, S. (1988)

### 3.2.3.1 Description of variables

As when estimating taxes, one starts from the profitability that the firm would have obtained if it had remained under public administration.

$$(32) \quad Ut EP(t) / PAT EP(t-1) = RENT EP(t)$$

where:

$Ut EP(t)$  = Net profitability of the public company  
 $PAT EP(t-1)$  = Accounting assets value of the public company in (t-1) with (t) ranging from the year when privatization was initiated to the year 2008.

The asset value of the public firm is given by:

$$(33) \quad PAT EP(t) = PAT EP(t-1) + Ut EP(t) - DV EP(t)$$

where:

$DV EP(t)$  = Dividends of the public company

As in the estimation of the taxes paid by the private sector, this equation is simply an accounting identity. It is necessary to clarify that the dividends the Treasury receives from a firm that it owns correspond to the sum of dividends and taxes the firm pays. Economically, there is no distinction between these two flows. However, they will be estimated separately and added together at the end.

The profitability of the firm administered by the public sector is given by:

$$(34) \quad Ut EP(t) = RENT EP(t) * PAT EP(t-1)$$

The dividends the Treasury would have received, in the absence of privatization, are given by:

$$(35) \quad DVEP(t) = UT EP(t) * d EP(t)$$

where:

$dV EP$  = dividend rate of the public company

The dividend rate of a public-sector firm, as in the case of the private sector, is a variable which is exogenous to the model.

Once the dividends have been calculated one needs to estimate taxes paid by the public company, after which one will have an estimate of the cash flow lost to the Treasury as a result of privatization.

The tax regime applicable to Chilean firms does not differentiate between public- and private-sector firms, so the same Prime Category rates will be applied as in the previous point; i.e. 10 percent on gross profits for the period 1984-88, and 1990; 10 percent on non-reinvested profits for 1989, and 15 percent on gross profits from 1991 onwards.

An important point relating to taxes is that the owner of a public-sector firm (ultimately the Treasury) does not pay Global Complementary Tax on dividends received. In this sense it might be said that privatizing a firm is equivalent to changing its tax regime, with positive effects for the Treasury, provided a lower selling price for the firm does not totally offset this. (It should be remembered that if taxes are higher for the private sector, the price the Treasury receives for the firm will be lower. As we saw in the theoretical analysis, provided the capital market is efficient, different tax regimes do not alter the fiscal impact of privatization).

Thus, we have the following:

$$(36) \quad TEP(t) = Ut.BEP(t) * tE(t)$$

where:

$$\begin{aligned} TEP &= \text{Prime Category tax paid by the public company} \\ tE &= \text{Prime Category tax rate} \end{aligned}$$

The tax rate on net profit will be:

$$(37) \quad \tau E(t) = \frac{\tau E(t)}{(1 - \tau E(t))}$$

The transfer lost to the Treasury as a result of the privatization carried out in year i, is equal to the dividends and taxes lost, corresponding to the percentage sold in year i, in other words.

$$(38) \quad DVp(t)_i = \alpha_i UtEP(t) * dEP(t) + \alpha_i UtEP(t) * \frac{\tau E(t)}{(1 - \tau E(t))}$$

where:

$$UtEP(t) * dEP(t) = \text{dividends the Treasury would have received if the firm had remained under public administration, and}$$

$$UtEP(t) * \frac{\tau E(t)}{(1 - \tau E(t))} = \text{Prime Category tax}$$

The discount rate used for updating public sector flows will be the private discount rate estimated previously. It does not seem necessary to make estimates based on any social discount rate which might be lower than the private discount rate, as the impact of this exercise would be a reduction in both the present value of flows of taxes collected and dividends lost. As these two flows have opposite signs, the effect of altering the rate will not be significant, except, probably, for firms where the discount rate used differs widely from some social rate.<sup>20</sup>

Finally, the sum of the sale price corresponding to the fraction privatized in year i, the present value of taxes paid by the private sector, and the present value of dividends lost to the Treasury corresponding to that fraction, makes it possible to estimate the fiscal impact of the privatization of the ten firms under study during year i. We thus obtain the fiscal impact of the sale of shares in these firms for the years 1985-90.

The estimation of these flows will be carried out as follows. Total taxes paid by the firm will be calculated as described above, and then the flow of taxes for each year will be weighted in accordance with the percentage privatized in that year. The same will be done in estimating dividends lost to the Treasury. By way of example, suppose that for the firm:

Taxes paid in year i : \$ 100

Percentage privatized in year i: 10%

Taxes paid in year i corresponding to the percentage privatized in that year: \$ 100 \* 0.1 = \$10

Taxes paid in year i+1: \$100

Percentage privatized in year i : 20%

Taxes paid in year i +1 corresponding to percentage privatized in year i : \$100 \* 0.1 = \$10

Taxes paid in year i+1 corresponding to percentage privatized in that year: \$100 \* 0.2 = \$20;

which translates into a total for year i+1 of \$ 30, and so forth.

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<sup>20</sup> This exercise was actually carried out in the computer spreadsheet, giving the results indicated.

### 3.3 Advantages and Disadvantages of the Model

The main advantage of this model is that the accounting data needed to estimate the flows are readily available through the Stock Exchange. Another positive factor is that the estimation can be done without great difficulty in a computer spreadsheet, with sensitivity analysis made possible by altering the values of the exogenous variables (profitability, dividend rate, future tax rates and discount rate).

However, it suffers from the disadvantage that the whole estimation is based on the firms' accounting profitability, and this does not show what is happening with the firms' operational and non-operational flows. In other words, it does not make it possible to know what is happening to demand growth, production costs and financial income and expenditure. The inclusion of these elements would obviously make the model more complex and it would also be necessary to estimate a large number of variables for each of the ten firms. The way this problem will be dealt with is by making a more thorough estimation of cash flows for two of the firms, Endesa and Soquimich, and comparing the results with those obtained using the model described above. This will introduce elements of judgment in drawing more cautious conclusions.

The alternative model consists of calculating the annual cash flow which remains available for shareholders, for which the following cash flows need to be estimated:

Operational income
(-)
(Operating costs)
(Administrative and sales expenses)
<hr/>
(=) Operating result
(+)
Non-operating result
(+)
Depreciation of fixed assets
(-)
Taxes
(Reinvestment in fixed capital)
<hr/>
(=) Cash flow available for shareholders

#### IV. RESULTS OF THE ESTIMATION

The fiscal impact of the privatization carried out during the period of the study will be measured under three alternative scenarios:

*Scenario 1:* The fiscal impact will be estimated in the absence of changes in the firm's behavior after privatization, which means assuming:

$$\text{RENT}(t) = \text{RENT EP}(t)$$

$$d(t) = d \text{ Ep}(t)$$

As well as assuming that profitability and dividend rates are the same for the public and private valuations of the firm, some level needs to be assigned to these parameters. The basis for this will be to assume levels similar to historical profitability rates but also assuming values which result in a private valuation of the firm close to its stock market valuation. The stock market value used is the average for the months of March, June, September and December 1988, adjusted for inflation.

*Scenario 2:* An estimate will be made of what the change in the firms' accounting profitability would need to be for the fiscal impact of privatization to be nil or close to zero, for each of the firms in the sample. In this scenario it will be assumed that the dividend rate does not change. With regard to levels of private profitability, the same assumption will be made as in the previous scenario.

*Scenario 3:* This scenario assumes some increase in the firms' accounting profitability as well as differences in the dividend rate, which will vary depending on the firm being analyzed. The firm-specific criteria will be indicated below.

Fiscal revenues resulting from the divestiture of public-sector companies, and the percentages sold each year, used in the estimation, are the following:

TABLE N° 2: PRIVATIZATION: REVENUES FROM THE SALE OF SHARES  
AND PERCENTAGES SOLD  
(\$ million at Dec.1988 prices)\*

FIRM	1985	1986	1987	1988	1989	1990	TOTAL
CHILGENER	545 4	4,395 30	7,169 47	2,790 19			14,899 100
CHILMETRO(1)	1,376 8	7,568 44	10,741 38				19,685 90
CHILQUINTA(1)	323 5	1,642 45	2,841 40				4,806 90
ENDESA			37,798 20	69,500 62	27,080 18		134,378 100
CTC(2)		889 3	3,844 14	39,416 61	17,248 14		61,397 92
CAP	2,058 4	24,530 49	8,357 47				34,945 100
IANSA		1,230 45	147 3	6,124 49	1,268 3		8,769 100
SOQUIMICH	645 7	12,291 50	10,628 25	9,255 18			32,819 100
ENTEL		5,562 30	1,258 3	11,962 29	15,650 33	5,065 5	39,497 100
LAB. CHILE		396 23	600 26	2,064 48	770 3		3,830 100
TOTAL	4,947	58,503	83,383	141,111	62,016	5,065	355,025

\* Figures adjusted for inflation.

(1) Initially 10% belonged to the private sector

(2) Initially 8% belonged to the private sector

Source: Gerencia de Normalización: CORFO

#### 4.1 Result and Analysis of Scenario 1

The following table shows the fiscal impact under the assumptions of Scenario 1.

TABLE N° 3 FISCAL IMPACT OF PRIVATIZATION  
(\$ million at Dec. 1988 prices)  
SCENARIO 1

	1985	1986	1987	1988	1989	1990
1. Revenues from the sale of shares	4,947	58,503	83,113	141,111	71,271	5,065
2. Dividends lost plus taxes collected	324	3,214	3,668	9,996	6,123	299
3. Net gain (1-2)	4,623	55,289	79,445	131,115	65,148	4,766
4. Present value of taxes	2,931	37,256	47,197	74,586	26,865	1,061
5. Present value of lost dividends	9,855	127,968	147,408	194,481	80,763	3,528
6. Net fiscal impact (1+4-5)	-1,977	-32,209	-17,098	21,216	17,373	2,598
7. Fiscal impact/ sale revenue%	-40.0	-55.1	-20.6	15.0	24.4	51.3

The first line shows the fiscal revenue from the sale of shares. The second row shows the difference between the estimated dividends lost each year, corresponding to the percentage privatized that year, and the estimated tax revenue received. The third line shows the fiscal impact, but from a short-run perspective; i.e. without taking into consideration long-term effects caused by the sale of the firm. The fourth row gives an estimate of the present value of taxes to be collected corresponding to the percentage privatized each year. The fifth line estimates the present value of dividends that the Treasury will no longer receive. Then, on the sixth line, the net fiscal impact is the sum of revenues from the sale of shares and the present value of taxes minus the present value of lost dividends. Finally, the last row shows the fiscal impact as a percentage of the sale price.

It is interesting to observe the trend in the fiscal effect of privatization. Initially, the impact is clearly negative, with 1986 being the worst year in fiscal terms, but the trend is reversed increasingly from 1988 onwards. Explanations for this can be found both in the estimation model and in the expected result of any process of this type. For one thing, it should be remembered that in 1985 the economy was just coming out of a crisis, as a result of which firms' profitability rates were low. It is highly likely that this would have negatively affected sale prices if the private sector was not expecting economic recovery to occur to the extent that it did. It should be stressed that the estimate of future profitability, used in this model, was made in the knowledge of the favorable results of the period 1987-9. As well as this, it is to be expected that when a privatizing strategy is initiated, the initial sales achieve low prices due to the risk of the process being reversed.<sup>21</sup> With the passage of time and an intensification of the process, its credibility among the private sector increases, and sale prices reflect the present value of future income flows more faithfully. It is also interesting to find out what happens with the fiscal impact of the firms in the sample. The following table shows this detail.

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<sup>21</sup> This risk was indeed high in 1985-7.

TABLE N° 4: FISCAL IMPACT BY FIRM  
(as a percentage of sale proceeds)  
SCENARIO 1

FIRM	1985	1986	1987	1988	1989	1990
CHILGENER	-12	-23	-23	-39		
CHILMETRO	-44	-61	-6			
CHILQUINTA	-6	-116	-18			
ENDESA			49	1	16	
CTC		-61	-40	39	72	
CAP	1	-35	-352			
IANSA		-1017	-198	-53	52	
SOQUIMICH	-202	-59	-5	-12		
ENTEL		-78	14	3	-1	51

It is interesting to note that the general trend is maintained in most firms. In Chilgener, Chilmetro, Chilquinta and CAP, firms that were privatized at the beginning of the period, the fiscal impact is clearly negative. In Endesa, CTC and Entel, even under the extreme assumptions of this scenario, the fiscal impact is on average positive. In the remainder, the general pattern is maintained.

#### 4.2. Result and Analysis of Scenario 2

Table N° 5 shows the fiscal impact under the assumptions of Scenario 2. Before proceeding to analyze the results, it is worth mentioning that it is impossible to discover the change in profitability for which the fiscal impact for each firm each year is zero, as the calculation methodology itself leads to the fiscal impact being negative in the early years and positive for the rest of the period. An iterative method was used to find the change in profitability that would give rise to a fiscal impact which on average would be close to zero for each firm. As will be seen below, it is interesting that even when the fiscal impact for each firm is zero on average, the total fiscal impact for each year is always positive. This is due to the fact that for three firms, Endesa, CTC and Entel, even without any change in profitability the fiscal impact is on average positive (see Scenario 1). In addition, the negative fiscal impact of certain firms is canceled out by positive effects in others.

TABLE N° 5: FISCAL IMPACT OF PRIVATIZATION  
(\$ million at Dec. 1988 prices)  
SCENARIO 2

	1985	1986	1987	1988	1989	1990
1. Revenues from the sale of shares	58,503	83,113	141,111	71,271	5,065	
2. Dividends lost plus taxes collected	324	3,184	3,731	9,001	4,844	290
3. Net gain (1-2)	4,623	55,319	79,382	132,110	66,427	4,775
4. Present value of taxes	3,059	39,914	49,445	79,210	24,662	1,061
5. Present value of lost dividends	7,399	94,100	117,005	195,259	67,634	3,451
6. Net fiscal impact (1+4-5)	607	4,317	15,553	25,062	28,299	2,675
7. Fiscal impact/sale revenue%	12.3	7.4	18.7	17.8	39.7	52.8

The profitability assumptions behind these results are the following:

TABLE N° 6 PROFIT/ASSET VALUE ASSUMPTIONS  
(Average for the period 1985-2008)  
SCENARIO 2

FIRM	Profitability of Public Company (1)	Profitability of Private Company (2)	Change in profitability (2 - 1)
CHILGENER	6.4	7.5	1.1
CHILMETRO	9.9	11.0	1.1
CHILQUINTA	8.2	10.3	2.1
ENDESA	8.2	8.2	0.0
CTC	11.4	11.4	0.0
CAP	6.2	9.4	3.2
IANSA	12.6	21.9	9.3
SOQUIMICH	21.6	26.3	4.7
ENTEL	23.4	23.4	0.0
LAB. CHILE	16.8	17.2	0.4
AVERAGE	12.5	14.7	2.2

Table N° 7 shows that is sufficient for a firm to raise its profitability by 2 percentage points for the Treasury not to lose from its privatization.

(In fact, the profitability increase could be even less without the Treasury losing from the privatization).

Under Scenario 2, the fiscal impact by firm is as follows:

TABLE N° 7: FISCAL IMPACT BY FIRM  
(as a percentage of sale proceeds)  
SCENARIO 2

FIRM	1985	1986	1987	1988	1989	1990
CHILGENER	8	0	3	-9		
CHILMETRO	-8	-15	26			
CHILQUINTA	27	-44	24			
ENDESA			49	1	16	
CTC		-61	-40	39	72	
CAP	56	40	-102			
IANSA		-292	73	84	95	
SOQUIMICH	-87	3	40	36		
ENTEL		-72	16	6	2	53
LAB. CHILE		-61	-48	8	83	

### 4.3 Result and Analysis of Scenario 3

In this scenario a different behavior pattern is assumed for the firm under public administration than under private management. The specific assumptions made for each firm are the following:

For electrical firms an increase of 1 percentage point in profitability is assumed as a result of privatization. This increase is considered to arise due solely to cost reductions, as electricity rates are regulated by law. In the case of Chilmetro, a profitability increase of 2 percentage points is assumed, because after privatization this firm was turned into a holding company, Enersis, which has diversified its activities. With regard to the dividend rate, it is assumed that this does not change and remains low, due to the high requirements of investment financing.

For CTC, Entel, IANSA and CAP, a profitability increase of 3 percent is assumed, due to cost reductions and some degree of advantage being taken of monopoly power by the first three of these companies. In the case of CAP, this increase is due to the significant diversification of activities that occurred from 1987 onwards. The dividend rate is assumed to be 70 percent for public valuation, and 50 percent for the private valuation, except in the case of IANSA because of the importance of nonular canitalism in this firm.

For Soquimich and Laboratorios Chile, a rise in profitability of 2 percentage points was assumed.

As a general rule, it can be said that the profitability increases assumed are closely in line with what has been seen since 1985.

The following table summarizes these assumptions.

TABLE N° 8 PROFIT/ASSET VALUE AND DIVIDEND RATE ASSUMPTIONS  
(Average for the period 1985-2008)  
SCENARIO 3

FIRM	Public Company		Private Company		Change	
	Profitability (1)	Dividend rate (2)	Profitability (1')	Dividend rate (2')	(1) - (1')	(2) - (2')
CHILGENER	6.6	50	7.5	50	0.9	0
CHILMETRO	8.9	50	11.0	50	2.1	0
CHILQUINTA	8.8	50	10.2	50	1.4	0
ENDESA	8.1	40	9.1	40	1.0	0
CTC	10.7	70	13.7	50	3.0	-20
CAP	7.3	70	10.2	50	2.9	-20
IANSA	14.8	70	17.7	60	2.9	-10
SOQUIMICH	21.8	70	23.6	50	1.8	-20
ENTEL	20.7	70	23.6	50	2.9	-20
LAB. CHILE	15.0	70	17.2	50	2.2	-20
AVERAGE	12.3	61	14.4	50	2.1	-11

Under these assumptions, the resulting fiscal impact is as follows:

TABLE N° 9: FISCAL IMPACT OF PRIVATIZATION  
(\$ million at Dec. 1988 prices)  
SCENARIO 3

	1985	1986	1987	1988	1989	1990
1. Revenues from the sale of shares	4,947	58,503	83,113	141,111	71,271	5,065
2. Dividends lost plus taxes collected	324	4,644	6,051	12,612	5,430	239
3. Net gain (1-2)	4,623	53,859	77,062	128,499	65,841	4,826
4. Present value of taxes	3,108	40,519	53,589	89,285	28,230	1,103
5. Present value of lost dividends	8,355	109,590	131,288	186,435	58,441	2,456
6. Net fiscal impact (1+4-5)	-300	-10,568	5,414	43,961	41,060	3,712
7. Fiscal impact/sale revenue%	-6.1	-18.1	6.5	31.2	57.6	73.3

This table indicates that the trend in results obtained under Scenario 1 assumptions are maintained, in the sense that the initial years of the process imply losses which in this case are strongly compensated in subsequent years. Because of the profitability increases assumed following privatization, the positive effect of privatization tends to be intensified, but there is an opposite effect due to a fall in the dividend rate, as the private sector pays lower taxes in the initial years and so dividends lost to the Treasury are greater.

In this scenario, the fiscal impact by firm is as follows:

TABLE N° 10: FISCAL IMPACT BY FIRM  
(as a percentage of sale revenue)  
SCENARIO 3

FIRM	1985	1986	1987	1988	1989	1990
CHILGENER	-10	-21	-21	-35		
CHILMETRO	8	4	41			
CHILQUINTA	22	-54	17			
ENDESA			58	18	36	
CTC		-23	7	62	83	
CAP	15	-16	-276			
IANSA		-747	-103	-5	65	
SOQUIMICH	-114	11	40	36		
ENTEL		-25	40	34	40	73
LAB. CHILE		-37	-26	22	86	

## V. RESULTS OF THE ALTERNATIVE ESTIMATION

As was mentioned in Section III, an alternative measurement was made of the private value of the firm in order to test the quality of the results obtained. This estimation was carried out for Endesa and Soquimich, producing the following results for each firm's value.

TABLE N° 11: PRIVATE VALUATION UNDER ALTERNATIVE MEASUREMENT  
(\$ million at Dec. 1988 prices)

FIRM	Scenario 1	Scenario 3	Scenario 4	Alternative estimate	Stock market valuation
ENDESA	124,565	124,565	124,372	148,402	120,053
SOQUIMICH	36,111	36,111	32,077	32,623	52,023

These results indicate that Endesa may have been undervalued in the original estimation. However, in December 1988 the market was showing the same bias. In the case of Soquimich, it is notable how high the stock market valuation is compared with the estimated values, but it is important to remember that valuations made in this study were made *ex-post*, i.e. knowing the 1989 outcome. As a result, stock market values may not be directly comparable to the values estimated under the two methods. In the case of Soquimich, 1989 was what might be termed a “bad year” due to the low price of iodine, but that year’s poor result for the firm was not incorporated into its stock market valuation as of December 1988.

## VI. CONCLUSIONS

The following conclusions can be drawn from the analysis carried out in this study:

- There is no evidence to show that the Treasury lost from the privatization of these ten firms. Even in the most pessimistic scenario —where firms are not managed more efficiently by the private sector compared with public administration (Scenario 1)— the Treasury obtained a net gain from the sale of shares in the final years of the process, between 1988 and 1990. However, the net effect under the assumptions of this scenario is negative, although not significantly so.
- The rise in profitability needed for the Treasury not to have lost through the privatization of these ten firms is less than 2 percentage points on average (assuming no changes in the dividend rate).
- Under assumptions considered “normal” regarding changes in profitability and dividend rates, the result is that the Treasury lost from the sale of shares carried out in 1985 and mainly in 1986, but obtained profits which more than compensated for these losses in subsequent sales. This outcome could be due to the following causes:
  - a) At the start the process was strongly criticized, and this led to fears of future re-nationalization. This risk acted against the price of the shares sold, leading to lower income for the Treasury. Once privatization has taken up more than 50 percent of the firm, the chance of re-nationalization is more remote, and so the share price rises.

- b) The privatization of these firms was initiated when the country was just emerging from the debt crisis. At that moment nobody anticipated the favorable results of subsequent years, so share prices were depressed compared with their future trend. As, at the time of estimating the fiscal impact, this favorable trend was already known and was incorporated into the assumptions in the valuation of the firms, this meant that the prices paid for shares sold between 1985 and 1986 are low *ex-post*, although *ex-ante* they would have reflected buyers' expectations correctly.
- It is important to mention that these results were obtained taking the tax 1990 reform into consideration. The effect of not considering it in the estimation is a reduction in fiscal revenues resulting from privatization, which lowers the present value of taxes paid by the private sector. However, this effect is partly reversed by the fact that the previous tax legislation gave strong incentives for the reinvestment of profits, and therefore, future tax payments would have been higher. It is interesting to mention that this assumption can be altered without great difficulty, and therein lies one of the advantages of the model used.
- The results obtained are not independent of the use the Treasury makes of the proceeds of the sale of shares. As has been mentioned, the methodology used implicitly assumes that the Treasury is reinvesting the funds at a yield equal to the discount rate. If the return on Treasury projects is less than the rate of discount, the present value of fiscal incomes resulting from privatization will be less.
- The use of a social discount rate lower than the private rate does not significantly alter the results, because while it raises the present value of taxes collected, it also increases the present value of dividends lost to the Treasury, so the net effect will not be substantially different.

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