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**ECONOMIC GROWTH IN CHILE: EVIDENCE,  
SOURCES AND PROSPECTS**

José De Gregorio

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## **ECONOMIC GROWTH IN CHILE: EVIDENCE, SOURCES AND PROSPECTS**

José De Gregorio  
Vicepresidente  
Banco Central de Chile

### **Resumen**

Este artículo revisa la experiencia chilena de crecimiento, con especial énfasis en el rápido crecimiento que comenzó a mediados de los años ochenta, cuando la economía se recuperaba de la crisis de 1982, para moderarse a fines de los noventa. También se analiza y se descompone la evidencia sobre el crecimiento y la actividad, revisando las fortalezas y debilidades tras el despegue económico de Chile y los elementos que sustentan el crecimiento futuro. Por último, se presentan estimaciones de la tasa de crecimiento potencial de largo plazo para la economía chilena.

### **Abstract**

This paper reviews the Chilean experience of growth, with particular focus on the rapid growth that began in the mid-1980s, as the economy recovered from the crisis of 1982. This process slowed down in the late nineties. This paper also reviews the evidence on growth and decomposes the rate of growth and the level of output into its components. It discusses the strengths and weaknesses that explain Chile's growth take-off and that support future growth. Finally, the paper reviews estimates of the potential rate of long-run growth for the Chilean economy.

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E-mail: [jdegrego@bcentral.cl](mailto:jdegrego@bcentral.cl).

# 1 Introduction

The rates of growth recorded by the Chilean economy since the second half of the 1980s have been high not only by Chile's own historical standards, but also from an international comparative perspective. What have been the causes of this growth take-off? What does this record of growth portend for the future? What were the key underlying factors in Chile's success, and what weaknesses remain? These questions are relevant not only for Chile's policymakers and others interested in Chile, but also for drawing more general lessons for other countries. The purpose of this paper is to address these issues.

I begin by reviewing the history of Chile's growth, beginning in the 19th century, and I conduct a growth accounting analysis for the more recent periods. To summarize, the Chilean economy suffered from slow growth until the mid-1980s. It then enjoyed a sharp recovery after the debt crisis, and growth continued through most of the 1990s. Growth then slowed after 1998 but remained at about its average rate for the 20th century as a whole, and indeed above the rate of the first eighty-five years of the century.

The paper then proceeds to discuss, in the next two sections, the strengths and weaknesses of the Chilean economy. One possible approach would have been to estimate cross-country growth regressions and examine how Chile has performed on the different factors that such an analysis shows to be the determinants of long-run growth.<sup>1</sup> However, a disadvantage of this approach is that one is constrained to a certain set of explanatory variables. Adding variables reduces degrees of freedom, introduces collinearity among the regressors, and theoretical models do not explain properly the simultaneous inclusion of all variables. For this reason I follow a more eclectic approach, considering those determinants of growth that have been shown to be relevant in many other cross-country analyses. This approach, of course, is limited to my own reading of the enormous empirical literature on growth determinants and their relevance for Chile.

Among Chile's strengths, I identify and discuss the roles of low inflation, fiscal discipline, openness to the world economy, a strong financial system, institutional strength, and good infrastructure. Chile ranks very high with respect to the efficiency of its regulation of business and other institutions, but some weaknesses also appear, mainly in the difficulties that owners face in closing a business. Among Chile's weaknesses I emphasize the role of income inequality, although Chile's policies have been able to minimize the distortionary effects that such inequality tends to introduce in policymaking. I also discuss weaknesses in Chilean research and development (both its level and its composition), quality of education, and the regional economic climate and its failure to promote trade.

Next I present evidence from a number of studies on the long-run prospects of the Chilean economy. A rate of GDP growth of 5 percent a year seems a reasonable estimate for the future. A higher rate of growth could be achieved, but it would require overcoming some of the weaknesses in the present growth environment just mentioned. I offer some

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<sup>1</sup>This was done in a very interesting study by Gallego and Loayza (2002).

concluding remarks in the paper's final section.

## 2 Evidence from History, Growth Accounting and International Comparisons

Rapid economic growth is a relatively new phenomenon for Chile. Before growth took off in the mid-1980s, Chile had experienced occasional periods of rapid growth, but the rate of growth in those episodes was much less than in the country's more recent experience, and not very different from the contemporaneous rate of growth in the world economy as a whole.

This section presents evidence from a variety of data sources. The intent is not to give precise and definitive figures, but rather to reveal broad trends, which should be the same whichever data one uses. For national comparisons I will use the official national accounts from the Central Bank of Chile and historical data from Díaz et al. (2003). For long-run international comparisons I will use Maddison (1995), and for more recent cross-country data I will rely on the Penn World Tables version 6.1.

### 2.1 A long term view

Figure 1 traces the history of national output in Chile since independence, using data gathered by Díaz et al. (2003). Table 1 summarizes average rates of growth of GDP and of GDP per capita for selected periods, whose endpoints mark clear changes in trend growth.

From independence until the Pacific War per capita growth was slow, only 0.8 percent a year. Since then and until the Great Depression the economy grew somewhat faster at 1.5 percent a year in per capita terms, but with large fluctuations due mostly to the crisis in the nitrate industry in the 1910s. Chile suffered a precipitous decline in GDP per capita of 45 percent during the Depression years 1930-32, but a strong recovery followed, which continued with moderate growth (2.6 percent a year on average) until 1971. From 1972 until 1983, GDP per capita actually fell. This period started with a fall in output from 1972 to 1975 and ended with the debt crisis and another decline in output in 1982-83. Then began the period of rapid growth, which lasted until the slowdown in the late 1990s. One way to summarize Chile's record of growth during the 20th century is to note that, starting in 1900, it took 62 years for Chile's GDP to double, but from that point it took only another 30 years to double again.

The choice of the year when growth in Chile really took off is necessarily somewhat arbitrary, in particular since the years immediately following the recession of 1982, when output declined by 13.5 percent, were basically a recovery from that downturn. With this caveat in mind, as a simple illustration one can divide the entire century into two periods, before and after 1985. Whereas from 1900 until 1985 GDP per capita grew at a modest

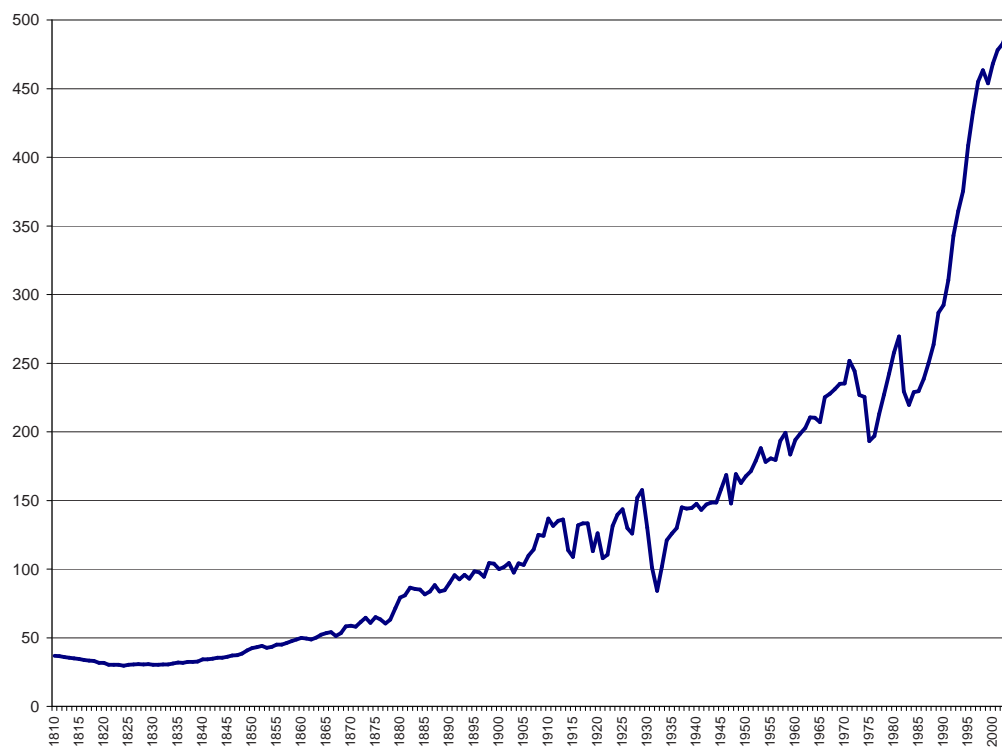


Figure 1: GDP per capita 1810-2003 (1900=100)

Table 1: GDP and GDP per capita growth, 1810-2003

	Per capita	Total
1811-1878	0.8	2.7
1879-1929	1.5	2.6
1930-1950	0.3*	2.1
1950-1971	2.0	4.2
1972-1983	-1.1	0.4
1984-1997	5.3	7.1
1998-2003	1.3	2.6
1900-1999	1.5	3.2
1900-1984	0.9	4.1
1985-2003	4.1	5.7

Source: Díaz et al. (2004) and Central Bank of Chile.

\* The rate of growth of per capita GDP from 1932 to 1950 was 3.9%

annual rate of 0.9 percent, the average annual rate of growth for the century as a whole was 1.5 percent, thanks to the sharp increase in the growth rate after 1985.<sup>2</sup>

Growth slowed once again during 1998, and the repercussions of the Asian crisis and a sharp domestic liquidity crisis led to a decline in output of 0.8 percent in 1999. Growth since then has been slow. For this reason the period 1985-97 is sometimes called Chile's "golden period," during which GDP growth averaged 7.1 percent a year and income per capita doubled. Since then growth in GDP per capita has averaged 1.3 percent a year, a fraction of its rate in the previous 13 years, but still higher than the average for the first 85 years of the 20th century.

One could go further, then, and split the period since 1985 into two periods: the golden period, which lasted until 1997, and the period of slower growth since then. This is what has caused concern about Chile's true capacity to grow: was the golden period only a temporary phenomenon, or can Chile return to that level of growth? A hopeful sign is that, as the economy has recovered from the recession of 1999, it has started to grow at rates between 2 and 5 percent.

Table 2 provides a historical view of Chile's growth performance from an international perspective. The data are taken from Maddison (1995), that is the most comprehensive and complete source of long-term data for historical as well as cross-country comparisons,

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<sup>2</sup>According to Maddison (1995), the source used here for international comparisons, Chile's average annual rate of growth of GDP per capita for the first 85 years of the century was 1.2 percent, and completing the series with official data yields a rate of growth of 1.7 percent for the whole of the 20th century. This is somewhat higher than in the data of Díaz et al. (2004) discussed in the text, but it does not make a significant difference to the interpretation.

Table 2: Per Capita GDP 1900-1992 (PPP, US dollars 1990)

	1900	1913	1950	1960	1970	1992	$\frac{1992}{1900}$
Chile	1949	2653	3827	4304	5217	7238	3.71
Argentina	2756	3797	4987	5559	7970	7616	2.76
Australia	4299	5505	7218	8539	11637	16237	3.78
Brazil	704	839	1673	2335	3913	4637	6.59
China	652	688	614	878	1186	3098	4.75
Finland	1620	2050	4131	6051	9302	14646	9.04
Germany	3134	3833	4281	8463	13152	19351	6.17
Ireland	2495	2733	3518	4368	6250	11711	4.69
Japan	1135	1334	1873	3879	9448	19425	17.11
Korea	850	948	876	1302	2208	10010	11.78
Mexico	1157	1467	2085	2781	4189	5112	4.42
New Zealand	4320	5178	8495	9491	11278	13947	3.23
Norway	1762	2275	4969	6549	9122	17543	9.96
Phillipines	1033	1418	1293	1488	1766	2213	2.14
Spain	2040	2255	2397	3437	7291	12498	6.13
USA	4096	5307	9573	11193	14854	21558	5.26
Chile/USA (%)	47.6	50.0	40.0	38.5	35.1	33.6	
Chile/Western Europe (%)	65.1	77.4	68.3	53.3	41.0	41.3	

Source: Maddison (1995)

although data for most countries are available only until 1992. Among the countries in the table, Chile had one of the lowest rates of growth over the century as a whole: GDP per capita increased by less than fourfold. Within Latin America, only Argentina, one of the world economy's great disappointments, had slower growth. In 1900 both Argentina and Chile were richer than Finland and Norway, but by 1950 Norway had already taken the lead over Chile, followed by Finland by 1960. Within Latin America, Brazil's growth started out very strong in the second half of the century but came to a sharp halt after 1980.

Chile's poor growth performance after 1913, which coincided with the collapse of the nitrate industry, led to a persistently widening gap in terms of income per capita between Chile and the United States and Western Europe. Chile's income per capita fell from half that of the United States in 1913 to only 35 percent in 1970, reaching a minimum of 27 percent in 1975. Since then the gap has narrowed, and it has done so more systematically since the mid-1980s, to reach 39 percent of the U.S. level in 2000.



Table 3: GDP per-capita Growth since 1960

	60s	70s	80s	90s	1960 2000
Chile	2.2	1.2	1.3	4.8	2.4
Latin America*	2.2	2.5	-0.9	1.8	1.4
East Asia **	4.7	5.4	4.5	4.0	4.6
Japan	9.3	3.1	3.5	1.1	4.2
USA	2.9	2.7	2.2	2.3	2.5
World ***	2.5	2.0	1.0	1.3	1.7

Source: De Gregorio and Lee (2004), based on Atten, Summers and Heston (2002).

\* The 15 countries with largest GDP: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Mexico, Paraguay, Peru, Uruguay, Venezuela.

\*\* China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand.

\*\*\* 85 countries for which data are available, the averages are unweighed.

## 2.2 Growth and investment since the 60s

A more recent international comparison is provided in table 3, which uses the growth data from the Penn World Tables version 6.1 since 1960. During the 1960s Chile and Latin America as a whole achieved a reasonable rate of growth of 2.2 percent a year, but this was below the world average and that of the United States, and below what can be considered good performance. During this period the variability of growth in the region was low, and most Latin American countries experienced positive rates of growth. For this reason the 1960s are remembered as a good period for the region. But, as the table shows, it was an even better period for the world as a whole, and therefore the income gap between Latin America and the developed world increased. Of particular importance for Chile, the 1960s saw the highest copper prices of the postwar period until today.

A similar pattern is observed for Latin America in the 1970s, but Chile's performance was well below that of the rest of the region and the world as a whole. This fact is explained not only by the oil shock but also by the domestic policies in place during that decade, starting with the populist experience of the early 1970s, followed by the sharp decline in output during the money-based stabilization of the mid-1970s and the first oil shock. It is interesting to note that, although the oil shock did indeed reduce world growth, Latin

America grew faster than in the previous decade, largely because of Brazil,<sup>3</sup> whose income per capita, adjusted for purchasing power parity (PPP), grew at an annual rate of 5.7 percent. This suggests that the decline of growth in Chile was due much more to domestic factors.

The 1980s, in contrast, were the “lost decade” in Latin America, but less so in Chile, which had already begun to benefit from reforms that encouraged growth. Indeed, despite the steep decline in output in the 1982 collapse, the economy recovered quickly, and its average growth during the decade was 2.2 percentage points a year faster than the average for the 15 largest countries in the region. Comparing the patterns of collapse and recovery in the Latin American crisis and the later East Asian crisis, De Gregorio and Lee (2004) observe that Chile, and Mexico after the Tequila crisis, are the only Latin American countries whose growth trajectory took the V-shape pattern typical of the Asian countries, with a sharp downturn followed by a strong recovery. The table also shows clearly that Chile’s rapid growth was a phenomenon of the 1990s, although it started in the mid-1980s. The Chilean economy was able to achieve a record rate of growth not only by its own historical standards, but also in international comparisons, growing more than three times the average (unweighted) rate of growth of the world as a whole.

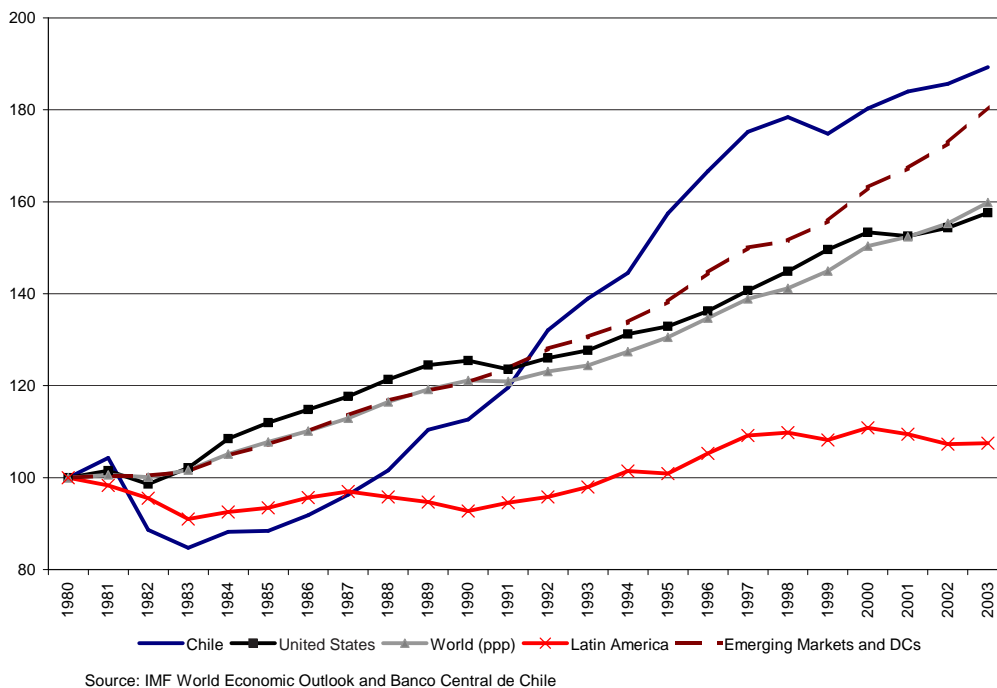


Figure 2: GDP per capita 1980-2003

Figure 2 further highlights the good performance of the Chilean economy in the late

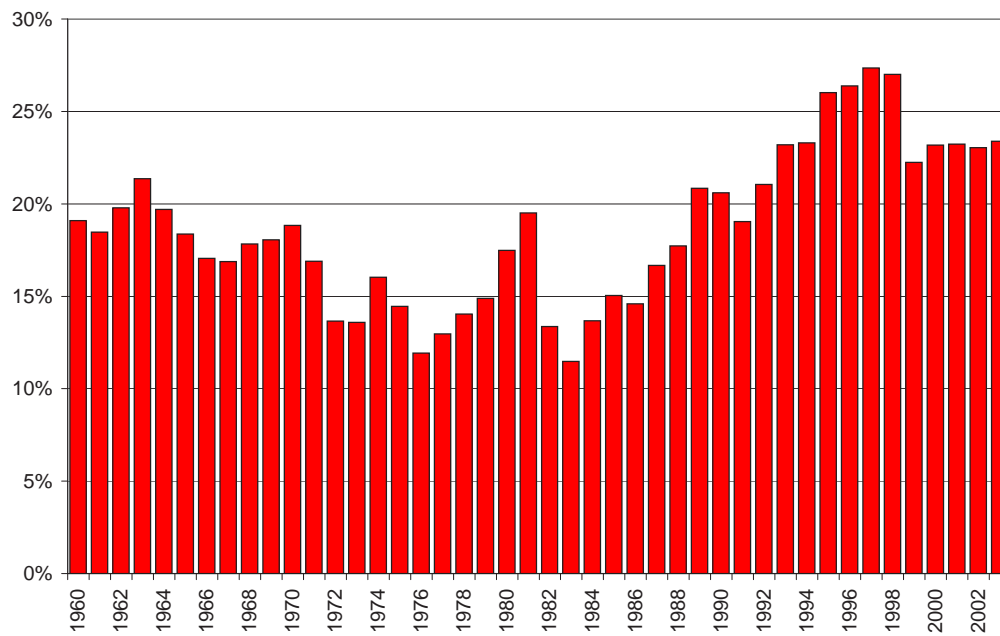
<sup>3</sup> In any case the averages in table 3 are unweighted

1980s and the 1990s and the slowdown of the late 1990s. The figure is based on data from the International Monetary Fund's World Economic Outlook, and the country group averages are computed using PPP weights. Latin America shows no increase in income since the Asian crisis of the late 1990s. Growth in emerging markets as a whole also declined during the Asian crisis but later resumed. The slowdown in Chile started in 1998 and continued with the recession of 1999. Since then, concern over how to restore growth to a rate closer to that of the golden period has been one of the most important topics in policy discussions in Chile. However, taking a longer-term view of the Chilean economy allows us to conclude that even this period of slow growth has been good by historical standards. Between 1998 and 2003 the rate of growth of GDP per capita has averaged 1.3 percent a year, compared with 1.2 percent a year from 1900 to 1985. During this slower-growth period, Chile has grown more slowly than the world average of 2.4 percent a year, and more slowly than the United States at 1.9 percent a year. But with the recovery expected for 2004-05, the rate of growth in GDP per capita should increase to about 1.9 percent a year.

As figure 3 shows, investment in Chile reached a record high during the growth take-off of the 1990s. As I will discuss later, the contribution of capital to growth was key during the 1990s. However, I will not mention investment as a strength or weakness in Chile's growth, for two reasons. First, we know that growth is the result of the accumulation of factors (one of which is physical capital) and of higher productivity, but the factors that foster growth are also those that increase investment and productivity. Moreover, in the standard neoclassical (Solow) growth model, productivity is what drives growth and investment. In other words, investment is endogenous. For example, being an open economy helps both productivity and investment.

Second, higher investment could be caused by factors that do not affect productivity. That is, there could be economic policies that affect only investment, and thus increase growth through capital accumulation only. However, this question has been resolved by the empirical literature. According to most estimates, including the investment rate separately from other factors that determine growth in cross-country regressions results in a coefficient for the investment rate of about 0.07, which implies that even a relatively large increase in the investment-GDP ratio of 5 percentage points would raise the growth rate by only 0.35 percentage point. For this reason I do not include investment, domestic or foreign, as a fundamental factor inducing growth, but rather consider it a result of a good scenario for growth. This has been also the route taken by other studies of the growth take-off in Chile using different approaches (Bergoing et al., 2002; Gallego and Loayza, 2002).

Nevertheless, one can imagine policies that would affect growth mainly, or even exclusively, through investment. Tax policies are an important example, and recent discussions in Chile have focused on the role of corporate taxation. According to existing empirical evidence, changes in the corporate tax would have no effect on the desired stock of capital (Bustos et al., 2003), but recent preliminary evidence has found that changes in the tax rate on investment could have some effect. According to Vergara (2004), whose evidence has been used to argue that large benefits would result from reducing corporate taxation, a large reduction of the corporate tax rate in Chile, from 17 percent to 10 percent, would increase



Source: Central Bank of Chile. 1960-95: Chile Social and Economic Indicators

Figure 3: Investment Rate 1960-2003

the rate of investment by 2 to 3 percentage points. Yet such an increase in investment, according to parameters mentioned above, would increase growth by only 0.15 to 0.21 percent a year.<sup>4</sup>

### 2.3 Sources of economic growth

Economic growth results from an increase in quantity of either or both of the factors of production, labor and capital, or from an increase in total factor productivity (TFP). Along these lines, a first approach to examining the growth experience is to decompose it into the contribution of the increases in labor and capital and the contribution of TFP, using the method pioneered by Solow (1957). Consider the following production function, which transforms labor ( $L$ ) and capital ( $K$ ) into output ( $Y$ ):

$$Y = AF(K, L), \quad (1)$$

where  $A$  is TFP. An increase in TFP implies that the economy can produce more with the same amount of factors. Assuming that the production function exhibits constant returns to scale, and that factor and goods markets are competitive, we can write the percentage change in output ( $\Delta Y/Y$ ) as:

$$\frac{\Delta Y}{Y} = \alpha \frac{\Delta K}{K} + (1 - \alpha) \frac{\Delta L}{L} + \frac{\Delta A}{A}. \quad (2)$$

The parameter  $\alpha$  represents the share of capital in total income and  $1 - \alpha$  the share of labor. Therefore equation (2) allows us to compute the contributions of capital, labor and TFP to output growth.

The table 4 presents a decomposition for Chile for the period 1970-2004. For the income share of labor I use 0.6, a figure somewhat larger than that implied by the national accounts, but smaller than that suggested by evidence at the international level.<sup>5</sup> The results do not change significantly when the labor share is increased to 0.65. To construct the stock of capital, I use the perpetual inventory method with a depreciation rate of 6 percent. Finally,  $L$  is measured as total employment, with no adjustment for the quality of the labor force or for the number of hours worked per person.

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<sup>4</sup>The fact that the effects could be small should not be used as an argument for increasing corporate taxation, however. The evidence discussed in the text is very partial. It does not consider all of the effects that corporate taxes have on the economy, especially on the dynamics of saving. My reading of the current literature on public finance is that capital taxation is generally bad; however, no comprehensive research for the Chilean economy has been done in this area. In any case, the point here is that the issue of how to stimulate investment is much more subtle and complicated than popular discussions suggest. More research is needed to have a full assessment of the effects of the tax-system on growth and how it can be improved to promote it.

<sup>5</sup>Gollin (2002) argues that the lower value obtained from the national accounts stems from the fact that labor income is underestimated in small firms, and that after making the appropriate adjustments the labor share is between 0.65 and 0.8.

Table 4: Sources of Economic Growth, 1970-2004

	Output Growth	Contribution of		
		Capital	Labor	TFP
1970-74	0.93	1.16	0.27	-0.49
1975-79	3.02	0.32	0.89	1.79
1980-84	0.39	0.78	0.96	-1.34
1985-89	6.37	1.19	3.24	1.82
1990-94	7.29	2.70	1.75	2.67
1995-99	5.35	3.44	0.53	1.32
2000-04**	3.69	2.04	0.81	0.79
1990-99	6.32	3.07	1.14	1.99
1970-04	3.83	1.66	1.20	0.93
1985-04	5.67	2.34	1.58	1.65

Source: Author's calculations based on official national accounts. Assumptions: Labor share equal to 0.6 and depreciation of capital equal 6%.

\*Figures are geometric averages of yearly data and they may not sum the total.

\*\* The year 2004 is estimated.

The evidence shows that in two five-year periods, the early 1970s and the early 1980s, TFP in Chile declined. This, however, reveals typical measurement problems, such as not controlling for capacity utilization and labor hoarding, since it is unlikely that there was any actual regression in the use of technology. Other studies, reviewed below, still show negative TFP growth after controlling for the quality of capital and labor as well as capacity utilization, although they do not control for utilization of employment. The table shows the increase in the contribution of TFP growth since the mid-1980s: TFP growth reached a maximum of 2.7 percent a year during 1990-94, which is quite high by international standards.

An interesting feature of Chile's economic growth record is the two distinct phases it displayed in the golden period. The first occurred in the second half of the 1980s, and the second in the 1990s. In the first phase, after the recovery from the recession of 1982, there was a strong recovery of employment. Starting from about 30 percent in the crisis of 1982, the unemployment rate declined to single digits toward the end of the decade. During the second half of the 1980s, fully half of Chile's GDP growth was explained by an increase in employment. After unemployment declined to normal levels, TFP growth during the 1990s averaged 2 percent a year, not significantly higher than its growth rate in the late 1980s. Its rate of growth in the second half of the 1980s was also very similar to that of the 1990s as a whole (table 4). But, in contrast to the second half of the 1980s, during the 1990s almost half of the average growth rate of 6.3 percent a year was accounted for by the accumulation of capital, sustained by record investment rates (gross fixed capital formation

in real terms), as shown in figure 3. The investment rate has since fallen back to about 24 percent in recent years. In summary, the main difference between the late 1980s and the 1990s is that the recovery of the late 1980s was based on employment expansion, whereas that of the 1990s was an investment boom. Output growth and TFP growth were similar in both phases.<sup>6</sup> From table 4 we can conclude that the Chile's rapid growth in the golden period is explained mostly by the accumulation of factors, first labor and later capital. In contrast, TFP growth accounted for less than 30 percent of total growth, and in recent years it has declined to about 20 percent.

Measurement issues aside, this evidence can have either an optimistic or a pessimistic interpretation. On the negative side, it shows that TFP growth has not been the driving force of the growth process; on the positive side, and as discussed below, there clearly remains great potential to increase productivity and thus income.

To assess the robustness of these conclusions, table 5 presents estimates of TFP growth from other studies, some of which adjust their measures of labor by hours and quality, and of capital by quality and utilization. Beyer and Vergara (2002) and Gallego and Loayza (2002) obtain results for TFP growth similar to those of this paper, whereas Fuentes et al (2004) report values that are somewhat higher.<sup>7</sup> Over all, however, a fair assessment is that TFP growth over the last decade has been at most around 2 percent a year.

The figures on TFP growth provide a basis for a first estimate of Chile's growth potential. Since the neoclassical model predicts that, in the long run, growth in GDP per capita is equal to TFP growth divided by the share of labor, one could extrapolate this result to predict potential growth per capita of the Chilean economy to be about 3.3 percent a year. If we add the rate of growth of the population 15 years and older, which since 2000 has averaged 1.7 percent a year, potential growth in GDP can be estimated to be about 5 percent a year. Of course, this estimate does not consider the potential for catch-up, which could increase the contribution of TFP. As I discuss in section 5, an annual rate of growth of 5 percent is fairly close to what other methods and studies show to be the long-run rate of growth in Chile under current conditions. Any researcher looking at the data from the late 1990s, and using an assumption of long-run TFP growth of 3 percent a year (the average for 1990-97 was 2.9 percent), would easily have concluded that long-run growth would be close to 6.7 percent a year, which with hindsight was based on an assumption of TFP growth that was very high by both Chile's own historical standards and international standards.

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<sup>6</sup> For a discussion of the macroeconomic policies that followed the recovery, see Corbo and Fischer (1994).

<sup>7</sup> The differences in average rates of growth are due to the use of arithmetic versus geometric averages, but also to differences in the sources of data, and whether or not data from the revised national accounts are used.

Table 5: Alternative measures of TFP growth

Authors	Period	Output Growth	TFP Growth	Adjustments*
Beyer and Vergara (2002)	1986-2001	6.0	1.72	No
Fuentes et al. (2004)	1990-2003	5.7	2.36	No
Gallego and Loayza (2002)	1986-2000	6.6	1.95	Yes
Fuentes et al. (2004)	1990-2003	5.7	2.47	Yes
This study	1985-2004	5.7	1.67	No

\* Adjustments for utilization and quality of factors.

## 2.4 Income differentials

The above analysis of the sources of economic growth gives a reasonable picture of the forces behind increases in income in Chile. However, there are at least two reasons why this may not be the right way to decompose growth. First, the theory of economic growth refers to differences in income rather than differences in growth rates, and second, from a more practical point of view, we are interested in international comparisons, and for this reason it is useful to explain differences of income across countries. By measuring gaps in the stock of factors of production and in efficiency (TFP), we can explain income differences across countries. For this purpose, I conduct here a “levels” decomposition. In this decomposition, in contrast with the growth accounting previously presented, instead of looking at raw labor I explicitly consider human capital. This becomes relevant because comparing levels of income is important in controlling for differences in the quality of the labor force across countries. I compare Chile’s income per capita with that of the United States, as is usually done in the literature, and I decompose the difference between them into a productivity gap, a capital-output ratio gap, and a human capital gap. I follow the decomposition suggested by Hall and Jones (1999), which is similar to that of Klenow and Rodriguez-Clare (1997).

Consider a Cobb-Douglas production function at time  $t$  for country  $j$ :

$$Y_{jt} = A_{jt} K_{jt}^{\alpha} H_{jt}^{1-\alpha}, \quad (3)$$

where  $A$  is again TFP,  $K$  is physical capital, and  $H$  is labor adjusted for human capital. The last of these can be rewritten as  $Lh$ , where  $L$  is employment and  $h$  is a measure of human capital per worker. Using lowercase letters for per-capita (or, more properly, per-worker) variables, and omitting the time index, we have:

$$y_j = A_j k_j^{\alpha} h_j^{1-\alpha}. \quad (4)$$

Now we can compare the levels of income per capita of two countries  $j$  and  $i$  as

$$\frac{y_j}{y_i} = \frac{A_j}{A_i} \left( \frac{k_j}{k_i} \right)^{\alpha} \left( \frac{h_j}{h_i} \right)^{1-\alpha}. \quad (5)$$



We could simply use this decomposition, but, as we know from growth theory, if there is a productivity shock (that is, if  $A$  rises), this will lead to an increase in the capital-labor ratio in the steady state, and therefore the increase in productivity will be wrongly attributed to an increase in the capital-labor ratio. However, what remains invariant to a productivity increase in the steady state is the capital-output ratio, which depends on the investment rate, which in turn depends on the saving rate. Therefore an increase in investment will lead to an increase in the capital-output ratio, but an increase in productivity will not.<sup>8</sup>

Rewriting equation (4) in terms of the capital-output ratio—that is, dividing and multiplying the right-hand side by  $y^\alpha$  and rearranging, we have

$$y_j = A_j^{1/1-\alpha} \left( \frac{k_j}{y_j} \right)^{\alpha/1-\alpha} h_j. \quad (6)$$

Finally, we can consider two countries and decompose the output gap between them as

$$\frac{y_j}{y_i} = \left( \frac{A_j}{A_i} \right)^{1/1-\alpha} \left( \frac{k_j/y_j}{k_i/y_i} \right)^{\alpha/1-\alpha} \frac{h_j}{h_i}. \quad (7)$$

The comparisons here done with respect to the United States (country  $i$ ). Therefore, if output per capita turns out to be  $Z$  percent of that of the United States,  $Z_a$  percent can be explained by productivity differentials, measured as the first term on the right-hand side of equation (7),  $Z_{ky}$  percent by differences in the capital-output ratio, and  $Z_h$  percent by differences in human capital. By construction, then,  $(1+Z) = (1+Z_a)(1+Z_{ky})(1+Z_h)$ .<sup>9</sup>

Finally, to measure human capital I use the traditional specification based on the returns to education per year of schooling:

$$h = e^{\phi E}, \quad (8)$$

where  $E$  represents years of education and  $\phi$  corresponds to the returns on schooling, which can be estimated using Mincer equations.<sup>10</sup> Following Hall and Jones (1999), the exponent in equation (8) is assumed to be piecewise linear. For the first four years of schooling I use a return of 13.4 percent, which is the return to education in Africa. For the next four years I use a return of 10.1 percent, and for years beyond that I use the return on schooling in OECD countries, which is 6.8 percent.

The rest of the data are constructed in the same way as for the Solow decomposition discussed previously. For the national accounts I use the Penn World Tables version 6.1 from Aten, Heston, and Summers (2002), in order to have internationally comparable data. The results are presented in table 6. Chile's GDP per capita in 2000 was only 39 percent that of the United States when measured at PPP. The capital-output ratio in Chile was only 14

<sup>8</sup> For a skeptical view of this approach, see Bosworth and Collins (2003), who argue that not all increases in capital are the result of increases in TFP.

<sup>9</sup>The decompositions are constructed on a country by country basis, and therefore when tanking averages across countries this identity may not hold.

<sup>10</sup>We have  $(1/h)(dh/dE) = \phi$ , which is the return to schooling.

Table 6: Level Decomposition, GDP per-capita 2000

	Per capita GDP	Capital Output Ratio	Human Capital	Total Factor Productivity
Chile	0.389	0.863	0.694	0.649
		[ 0.450 ]	[ 0.560 ]	[ 0.599 ]
Mexico	0.381	0.922	0.684	0.604
		[ 0.413 ]	[ 0.557 ]	[ 0.631 ]
Korea	0.571	1.185	0.977	0.493
		[ 0.482 ]	[ 0.584 ]	[ 1.158 ]
Asia-4	0.670	1.089	0.885	0.724
		[ 0.640 ]	[ 0.788 ]	[ 0.963 ]
Latin America	0.212	0.728	0.581	0.430
		[ 0.250 ]	[ 0.313 ]	[ 0.423 ]
Asia	0.260	0.960	0.768	0.339
		[ 0.260 ]	[ 0.325 ]	[ 0.737 ]

Source: Author's calculations based on Aten, Summers and Heston (2002).

Data in square brackets represent how much it would be the income differential if that factor were equal to one.

percent lower than that in the United States, and human capital was 31 percent lower. The largest difference is obtained for TFP, which was 35 percent lower than that of the United States. Therefore the most important factor explaining the differences with the United States is TFP, followed closely by human capital.<sup>11</sup> This is consistent with the results from the growth accounting, which shows that, despite reasonable levels of TFP growth, it does not explain more than 30 percent of the rapid rate of growth that Chile has experienced since the mid-1980s.

If Chilean TFP equaled that of the United States, the income gap would decline from 61 percent to only 40 percent; if instead the capital-output ratio were the same, the gap would only decline to 55 percent. The same pattern is obtained for other countries; that is, the largest share of the gap is due to efficiency (TFP), rather than factor quantities. Hence the largest gains in terms of closing the income gap would be obtained by closing the productivity gap, that is, by increasing efficiency in the use of existing factors of production, in order to produce more with the same inputs. It is closely followed by low human capital. The table also shows that the Asian miracle has been more the result of capital deepening than of productivity enhancement, a point originally raised by Young (1995).

<sup>11</sup>The data on human capital are based exclusively on measures of the educational attainment of the labor force and are not adjusted for quality. This is the implicit assumption when using the same return for education across countries. As discussed later, there is evidence of low relative quality of education in Chile, which would increase the human capital gap.

### 3 Long-Run Growth: Strengths

There has been an explosion of literature since the late 1980s on the determinants of economic growth, made possible by the emergence of large databases on which to perform cross-country comparisons, and by developments in the theory of economic growth.<sup>12</sup> In this section, rather than perform cross-country regressions, I identify those areas that are important for economic growth in which Chile is strong. In addition, I discuss whether or not these strengths existed before the golden period. This will help to elucidate what factors helped in Chile's take-off.

The advantage of this approach is that, rather than relying on a single set of regressions, it allows for a broader view of a very abundant and useful literature. The problem with cross-country regressions is that they cannot include all the possible determinants of growth. First, availability of data, degrees of freedom and collinearity in the data makes it difficult to include all potential candidates. In addition, theory in general does not give reasons for the inclusion of all variables. For this reason, most researchers focus only on a certain number of variables starting from some benchmark, but they are unable to provide a full-assessment. In addition, focusing on the details provide also scope for more accurate analysis.

Finally, I do not mean to imply that the areas discussed here as strengths lack the potential for further improvement, but only that these areas cannot be blamed for less-than-optimal growth performance.

#### 3.1 Low inflation

Low inflation, or macroeconomic stability more broadly, is an important factor that allows for more rapid growth.<sup>13</sup> Inflation distorts the allocation of resources, diverts time and talent away from productive activity toward efforts to protect against inflation, introduces inefficiencies in the allocation of credit, and is a symptom of poor macroeconomic policies and institutions. There is no evidence anywhere in the world of sustained rapid growth occurring in a high-inflation environment.

Turning to Chile, the first point to note is that there is a big difference in average inflation in Chile between the period before and the period after 1985; the difference is particularly striking for the period since the mid-1990s, when Chile achieved sustained single-digit inflation for the first time since statistics have been kept. (Two previous periods of single-digit inflation since the 1960s were short-lived, each lasting no more than two years. In addition, both those periods, the early 1960s and the early 1980s, coincided with fixed exchange rate regimes that ended in collapse.) Between 1960 and 1990 the average annual inflation rate (December to December) was 72 percent, although that average falls to 26 percent when

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<sup>12</sup>See Barro and Sala-i-Martin (2004) for a recent review of the evidence.

<sup>13</sup>De Gregorio (1992, 1996), Fischer (1993), and Barro (1997) find that inflation has a significant negative effect on growth.

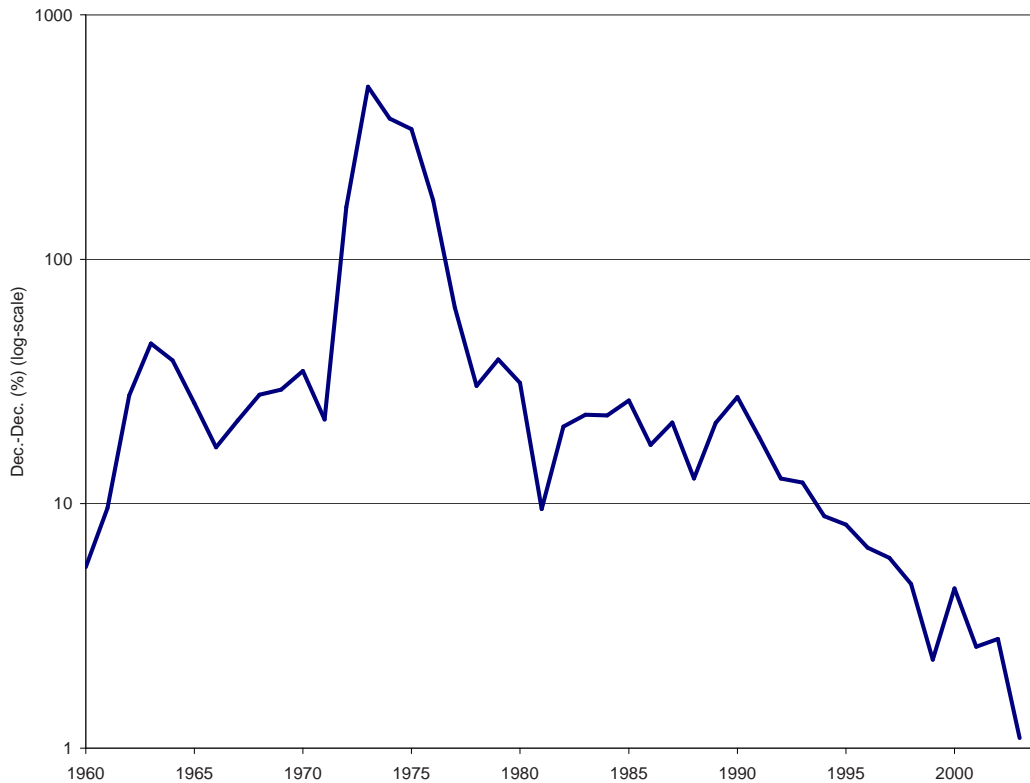


Figure 4: Inflation in Chile: 1960-2004

the years of triple-digit inflation, 1972-76, are excluded. The history of inflation in Chile since 1960 is presented in figure 4.

The persistent reduction of inflation started in 1990, and from 2000 to 2003 inflation averaged only 2.8 percent. The decline of inflation was the result of three important factors. First, the independence of the Central Bank of Chile was granted by a constitutional law in 1989, which establishes price stability and the normal functioning of the payments system as its goals. The central bank has instrument, goal, and budget independence. It is also prohibited from lending to the government. Second, fiscal consolidation, discussed below, was also key in maintaining stability and avoiding inflationary finance through fiscal dominance. Finally, no less important was growth itself. A long history of inflation made the Chilean economy very resistant to efforts at disinflation. Lagged indexation was widespread. Nominal wages, the center of the exchange rate band, regulated prices, and other important values were all indexed to past inflation. In this context it would ordinarily have been very difficult to reduce inflation. However, Chile's high rate of productivity growth made the reduction of inflation possible despite indexation, since the latter ceased to bind as growth increased (De Gregorio, 2004). Instead there was a virtuous circle between inflation and growth, as low inflation became a factor that fostered growth, while growth itself made the disinflation effort less painful.

Low and declining inflation has been both a positive factor in sustaining growth in Chile and part of the explanation for Chile's growth take-off. However, a problem of timing must be addressed: growth started in 1985, but the reduction of inflation came later. In this regard,

the hypothesis, noted above, that the late 1980s were more of a recovery period than one of high persistent growth becomes more relevant. The late 1980s were a period when Chile lacked access to foreign financing and had a very depreciated real exchange rate. Once the economy reached full employment, macroeconomic stability became more important. It is difficult to imagine how Chile could have maintained growth with double-digit inflation.

Currently, monetary policy in Chile operates within an inflation targeting framework, where the central bank is committed to keeping inflation in a band between 2 and 4 percent a year, converging to the center of the band over a two-year horizon. Keeping inflation low and stable is a sound basis for monetary policy to contribute to long-run growth.

### 3.2 Sound fiscal policy

Fiscal policy has been another important factor in promoting economic growth, operating through two channels. First, fiscal policy played a key role in achieving the low inflation and macroeconomic stability just discussed. Second, the size of government has remained at levels that have not inhibited economic growth.

Figure 4 shows the path of the fiscal deficit since 1960.<sup>14</sup> Until 1974 Chile had a persistent fiscal deficit. The first turnaround came in the second half of the 1970s and was followed by a relatively modest deterioration with the crisis of 1982. There was then a 12-year string of fiscal surpluses, followed by an even smaller deterioration in the slow-down after 1998. In 2004 a return to fiscal surplus is expected at the central government level. Therefore, like the anti-inflation policy, fiscal discipline has been not only a factor in explaining Chile's rapid growth, but also part of the explanation for the differences before and after 1985. There have been fluctuations in the budget, but fiscal consolidation clearly took hold after the mid-1970s. This evidence shows that, beyond the contribution of fiscal policy to moderating cyclical fluctuations, the public sector made a strong contribution to growth during the golden period and is one of the most evident sources of strength for future growth.

Another indication of Chile's fiscal conservatism is the level of public debt. Figure 6 compares gross central government debt across a number of mostly middle-income countries, revealing that Chile has a very low ratio of public debt to GDP. The continuous fiscal surpluses of the late 1980s and most of the 1990s have resulted in a sharp decline in the public debt. In 1989 the total debt of the consolidated public sector (central government plus the central bank<sup>15</sup>) was 73 percent of GDP in gross terms and 40 percent of GDP on a

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<sup>14</sup>The figures are not entirely compatible, but looking at different sources they give a reasonable proxy for the fiscal deficit of the central government in the last 40 years. The figures are taken from Velasco (1994) until 1986, and from official (Ministry of Finance) sources thereafter. One of the differences is that in the latter source the fiscal series are on an accrual basis, whereas the former are on a cash basis.

<sup>15</sup>The debt of the central bank originated in the financial crisis of 1982, and was later increased by reserves accumulation during the nineties.

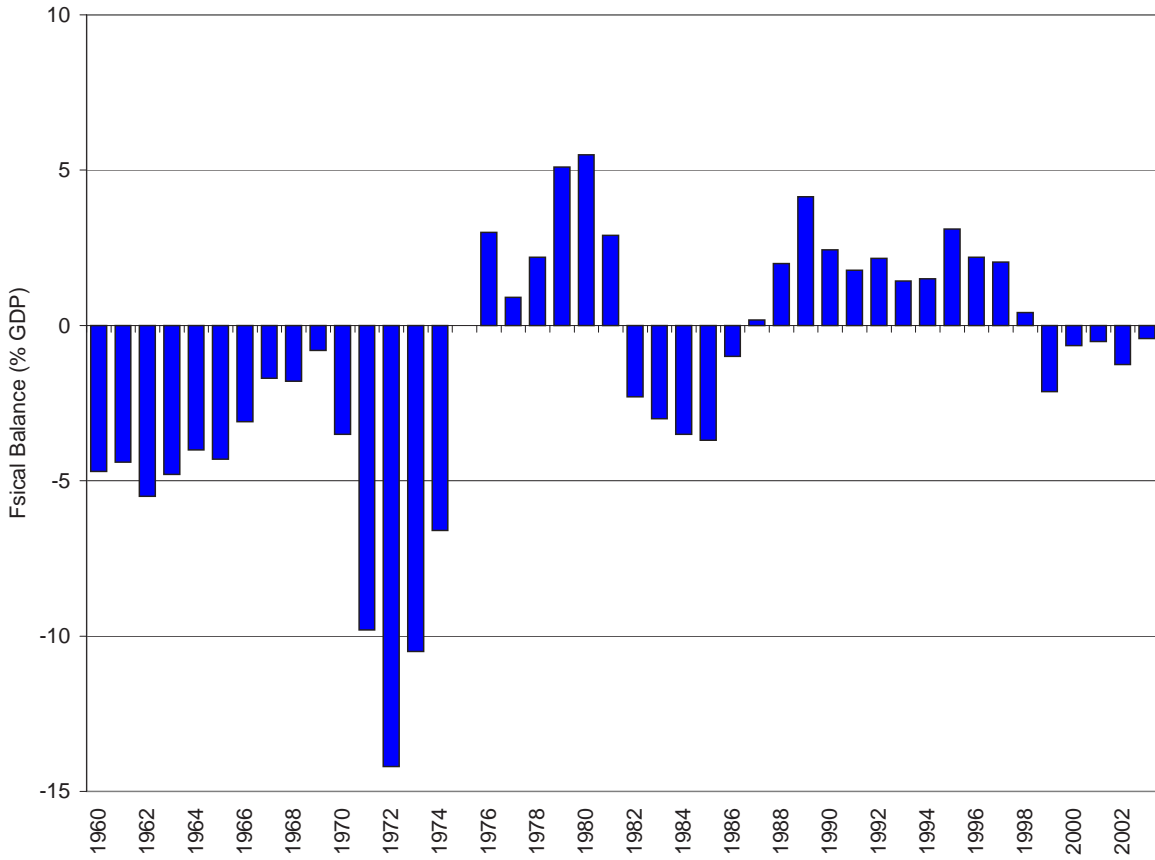


Figure 5: Chile: Fiscal Balance 1960-2003

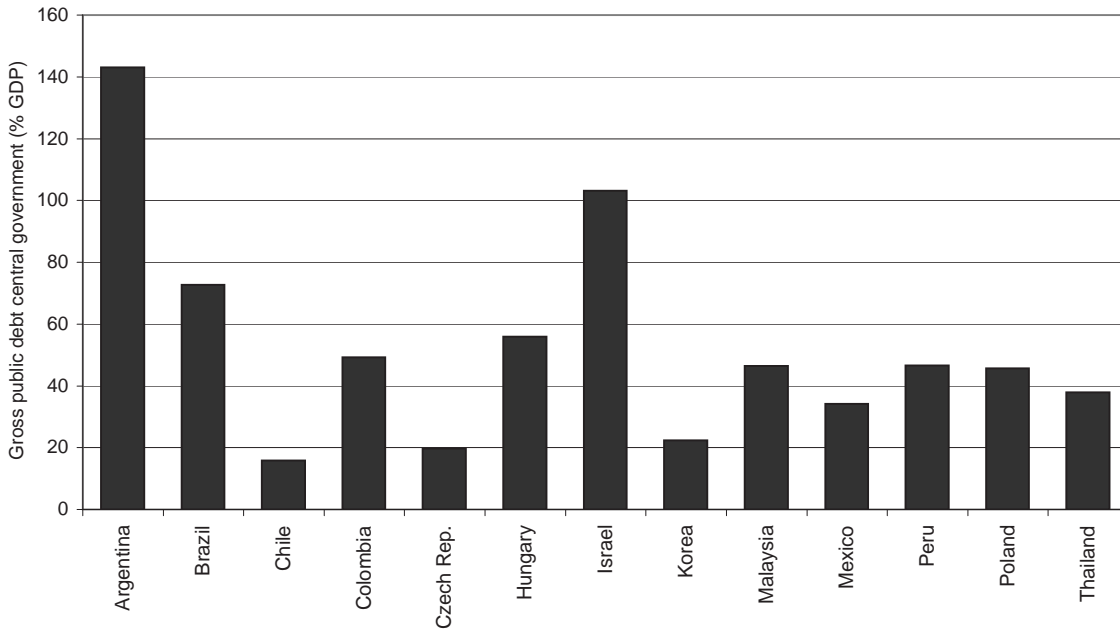


Figure 6: Public debt in selected countries, 2002

net basis. The debt has declined sharply and persistently since then, and in 2003 gross debt was only 34 percent of GDP, and net debt a mere 7 percent. Thanks to this achievement, Chile has one of the lowest public debts among countries with full access to international financial capital. One result is that the interest rate spread between Chilean public debt and U.S. Treasury bills is now below 100 basis points.

Currently, the rule of maintaining a cyclically adjusted (“structural”) fiscal surplus of the central government of 1 percent of GDP has strengthened the commitment to fiscal responsibility. It allows the operation of automatic stabilizers and the use of countercyclical fiscal policy—something unusual among developing countries, and among Latin American countries especially (Gavin and Perotti, 1997).

These international comparisons lead to a clear conclusion: Chile is one of the most fiscally responsible countries in the world. But fiscal policy in Chile also has had another, more structural impact on economic growth, by keeping the size of government relatively small and maintaining a composition of government spending that favors growth. This reflects the view that public investment, education, and certain other forms of spending are good for economic growth, and that what is harmful for growth is nonproductive government spending.

To provide a simple international comparison (and noting all the caveats and difficulties attending such comparisons), figure 7 uses fiscal data from the 2004 World Development Indicators of the World Bank. Given that higher income per capita is associated with a larger government share of GDP, the figure plots various indicators of government expenditure for

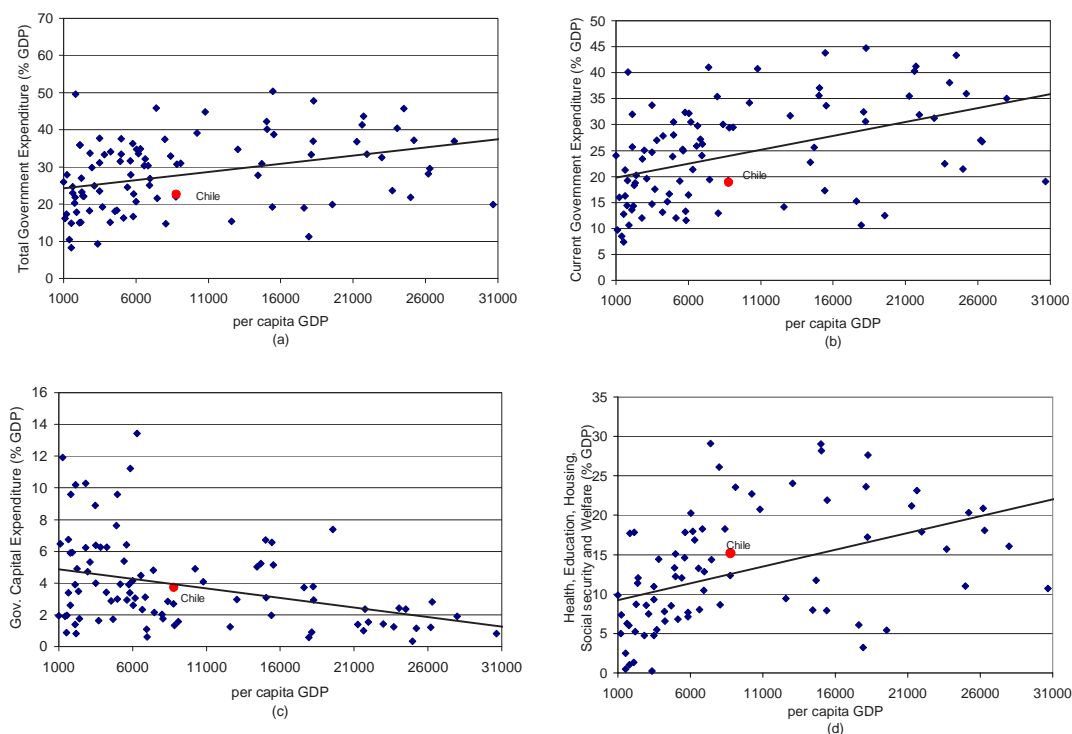


Figure 7: Size of government: International comparisons

a number of countries against their GDP per capita, measured at current international prices adjusted for PPP, and compares the size of Chile's government with what its income level would predict (as indicated by the regression line in each panel).<sup>16</sup> The top two panels plot total government expenditure and total current expenditure against GDP per capita. In both cases the size of Chile's government is about 5 percent of GDP below the level that one would expect for a country with Chile's income per capita. (A similar conclusion would be obtained if we used a more narrow measure of expenditure, such as government final consumption on goods and services.) It follows that the size of Chile's government cannot have been detrimental for Chile's growth.<sup>17</sup>

The bottom two panels of figure 7 show that the composition of government expenditure in Chile is tilted in favor of growth. In the case of capital expenditure, the figure shows a negative relationship with income per capita, and Chile is about where its level of income would predict. However, given that the size of Chile's government as a whole is somewhat smaller than predicted, one can infer that the budget is more tilted toward public investment than in other countries—a factor that should contribute positively to growth. Moreover, the fact that Chile has an ambitious program of road privatization, implemented in the second half of the 1990s, suggests that total investment in infrastructure is much higher than what the figures for public investment reveal.

More definitive is the evidence regarding social expenditure. The bottom right panel

<sup>16</sup>The data in the figure are for 1998, although World Development Indicators has data until 2000. The results are not different using 2000 data, but the international coverage is much smaller.

<sup>17</sup>This point has also been made by Barro (1999)



of figure 7, shows that government expenditure on education, health, social security, and welfare in Chile is high for the country's level of income. To the extent that expenditure on education and health improves the quality of human capital, it should be positively correlated with growth. In this figure, however, education and health expenditure is lumped together with other social expenditure whose effect on growth is unclear.<sup>18</sup> But, as discussed later, social expenditure in Chile has helped to compensate for the country's unequal income distribution. In addition, it is unlikely that the conclusions would change radically if we could disaggregate these data, since public social security expenditure in Chile should be relatively low on an international basis.<sup>19</sup> The social security system was privatized in the early 1980s, and current government expenditure in this area goes only to pay those retirees who chose not to switch from the old pay-as-you-go system.

In summary, Chile's net fiscal position, the limited size of its government, and the favorable composition of government expenditure have all provided a stimulus for economic growth; they may also help to explain why the growth take-off occurred in the mid-1980s and not before. Of course, improvements in the efficiency of government expenditure, a continued commitment to keeping the size of government limited, and improvements in the cyclical aspects of fiscal policy within a fiscal rule would further enhance Chile's growth potential.

### 3.3 Strong financial sector

A well-functioning financial system is key to channeling investible funds to efficient investment projects, and the empirical evidence on economic growth shows that deep financial markets are good for growth (see, for example, Levine, 2004). Of course, a deep but poorly regulated financial system may be very bad for growth, since it can be a source or an amplifier of crisis, and indeed Chile knows this from direct experience.

Chile undertook an ambitious process of financial liberalization in the late 1970s. This process, together with a fixed exchange rate and inadequate prudential regulation, led to a rapid increase in credit from the banking system to the private sector. The government's implicit guarantee of the banking system, the insurance provided by the commitment to a fixed exchange rate, and poor financial regulation (especially the failure to properly regulate connected lending) were key vulnerabilities of the financial sector and of the economy as a whole. This weakness led, in conjunction with a severe external shock in 1982, to a deep currency and banking crisis, whose cost has been estimated at 35 percent of GDP (Sanhueza, 1999).

The collapse of the financial system set the stage for the banking law of 1986, later amended in the 1990s.<sup>20</sup> Perhaps one of the main reforms was to restrict lending to related

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<sup>18</sup> Appropriately assigned, however, social expenditure should increase welfare.

<sup>19</sup> I am not aware of data to provide a full international comparison of social expenditure excluding social security.

<sup>20</sup> For further details on the institutional framework that has supported the development of the

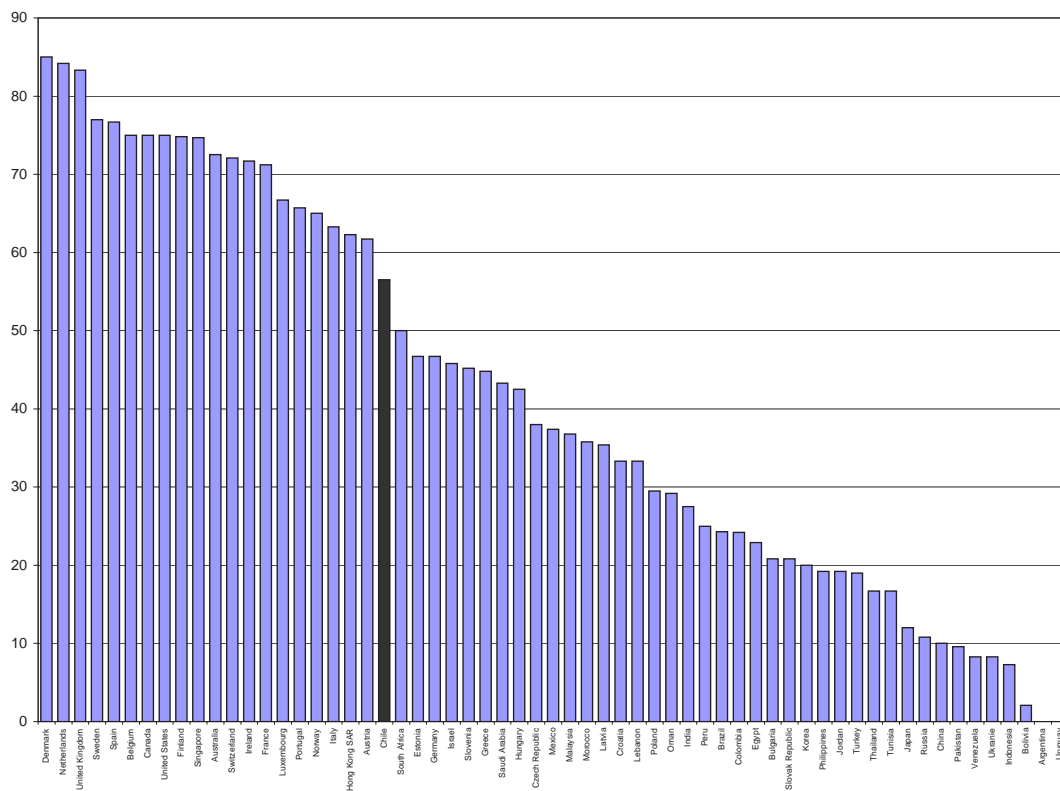


Figure 8: Financial System Strength Index

parties-such lending had been at the center of the crisis of 1982. In addition, several other mechanisms were introduced to strengthen prudential regulation. These developments, plus the recapitalization of the banking system, allowed the expansion of banking activities in a less vulnerable financial environment.

Currently, the strength of Chile’s banking system is rated at the top among emerging markets. Figure 8 shows a recent ranking of countries’ banking systems. The figure is based on Moody’s index of financial system strength, computed in May 2004, converted to an index from 0 to 100 by the IMF (2004, table 28) according to a numerical scale assigned to Moody’s average rating by country. Chile’s financial system is evaluated at a level similar to that of industrialized countries. Out of 61 countries surveyed, Chile ranks 22nd, ahead of all other emerging markets. Likewise in terms of nonperforming loans, returns on assets, and capital-assets ratios (not shown), Chile boasts some of the best scores among all emerging markets.

The Chilean banking sector is very active in intermediating funds. Credit to the private sector as a share of GDP is the highest in Latin America, reaching 65 percent in 2002, a level similar to that of some industrialized countries. The financial market in Chile has been mostly based on banks. However, institutional investors, especially pension funds, which manage a combined portfolio of about 50 percent of GDP, have also played an important role in the development of Chile’s capital markets. More recently, low financial costs as well

banking system, see Fuentes and Maquieira (2001).

as new laws facilitating financial development have led to the development of a large market for corporate fixed-income securities. New forms of financing such as factoring, convertible bonds, leasing, and commercial paper have also emerged. Finally, a law protecting minority shareholders was enacted in the early 2000s to regulate public stock offers. All of these innovations should promote Chile's further financial development, a key factor in ensuring that good investment projects will have sufficient funding.

Another positive aspect of Chile's financial development is its full integration with international financial markets. After a history of capital controls, all controls were removed in 1999, as a result of developments in macroeconomic policy that, in addition to prudential regulation involving the financial system, introduced a flexible exchange rate regime.

As in the case of monetary and fiscal policy, the strength and depth of the Chilean financial system dates from the mid-1980s. Hence Chile's financial development not only provides the basis for future growth, but also helps explain the country's take-off. However, it would be an exaggeration to say that all is as well as could be hoped for in the financial system. As I will discuss later (section 3.5), one problem detected by the World Bank's recent survey of the ease of doing business in developing countries is the high cost of creating collateral in Chile. This has not resulted in financial underdevelopment, but is clearly an area that could be improved to increase intermediation, specially for small and medium enterprises, which are the ones that have more problems to raise collateral.

### 3.4 Openness to trade

The explosion of research in the late 1980s on the determinants of economic growth produced a wide range of disparate results, and most of the factors that were found to promote growth have been questioned by subsequent research. But within this plethora of results, if there is one issue that enjoys broad (but by no means total) consensus, it is that openness to trade fosters economic growth. More-open economies have been able to grow faster than closed ones. This is particularly important in periods of trade liberalization.<sup>21</sup> In addition, Winters et al. (2004), after a detailed review of the evidence, show that effectively openness is associated with poverty reductions in the long run, and even there is a strong presumption that this happen in the short run. Naturally, trade liberalization may also work with some other policies to alleviate poverty. Therefore trade liberalization is good for the economy, and it is advisable to undertake it right away. (The same cannot be said of other areas, such as financial liberalization.)

As documented in De Gregorio and Lee (2004), the single most important factor explaining differentials in growth rates between Latin America and East Asia in the last forty years has been differences in the degree of openness. Of course, one can add many caveats—the strategy of opening up matters, as does the institutional framework in which opening

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<sup>21</sup>For a recent comprehensive review of the facts and additional evidence on the effects of trade liberalization, see Wacziarg and Welch (2003). See also Dollar and Kraay (2002) and Edwards (1997). For a more skeptical view, see Rodriguez and Rodrik (2001).

takes place-but it remains a fact that more-open economies grow faster than closed ones. This lesson is especially important for small economies.

Moreover, the old idea that supported the import-substitution strategy in Latin America in the 1960s, which held that opening to trade would result in developing countries producing “bad goods”-mostly commodities, whose terms of trade would be declining-has been proved wrong. It is true that countries that face unfavorable terms of trade grow less rapidly, but it is also true that there has not been such a deterioration of the terms of trade. Comparing the relative performance of East Asian economies and Latin America, De Gregorio and Lee (2004) found that the behavior of the terms of trade does not explain any significant part of the difference in growth performance. Inward-oriented industrialization has not been a good idea.

The opening of the Chilean economy was one of the most important, if not the most important, reforms undertaken by the military regime of the 1970s and 1980s. In 1973 the average tariff was 100 percent, and there were multiple exchange rates in place, with a ratio of 1 to 52 between the lowest and the highest rate. The process of trade liberalization that followed the military takeover was rapid. By 1979 the tariff rate was already flat at a level of 10 percent.<sup>22</sup> All nontariff barriers were eliminated, and the foreign exchange market was unified.

After the debt crisis, there was a reversal of trade liberalization, starting in March 1983 and culminating in May 1985 with a flat tariff at 35 percent. But within a couple of months tariffs were again reduced, and they had fallen to 15 percent by 1990 in 1988. In 1991 tariffs were reduced to 11 percent, in what some regard as one of the most important signals of the new democratic government’s commitment to trade opening. Starting in 1999, tariffs were gradually reduced further, by 1 percentage point a year, from 11 percent to the current level of 6 percent.

In the meantime Chile has signed a number of free trade agreements (FTAs) with its trading partners. Indeed, except for Mexico, Chile has signed more FTAs than any other country in the world. Chile’s interest in FTAs was first made evident in the early 1990s, when the intention to negotiate an FTA with the United States was announced. After the Summit of the Americas in the early 1990s, talks toward an FTA for all of the Americas was announced, but it has yet to be implemented. Chile signed a number of other FTAs in the 1990s, and finally, in 2003, agreements with the United States and the European Union were signed. These FTAs have resulted in reductions of Chile’s effective tariff below the flat official tariff rate. In 2004 the average tariff rate has been around 2.0 percent (see table 7).

Chile’s openness to trade has increased substantially over the years (figure 9). , so that Chile is today very much integrated into the world economy. Total trade, measured as exports plus imports in nominal terms, reached 70 percent of GDP in 2003, and it has

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<sup>22</sup>There have always been some special exceptions, such as automobiles.

Table 7: Tariffs (%)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
General	11.0	11.0	11.0	11.0	10.0	9.0	8.0	7.0	6.0	6.0
Effective	9.5	8.9	7.9	7.7	7.1	6.1	5.2	4.5	2.7	2.0

averaged 60 percent of GDP since 1996.<sup>23</sup>

An important issue in Chile's trade development has been its concentration in copper. However, despite the great abundance of copper in Chile, its importance has diminished. As figure 9 shows, from 1960 to 1975 copper accounted for about 70 percent of total exports, but this share has declined to less than 40 percent in recent years. Other measures of export concentration, such as Herfindahl indices, also show increased diversification, although Chile's trade remains somewhat more concentrated than that of other countries (Villafuerte, 2004).

The continuing importance of copper exports in Chile is not the result of a stagnant noncopper sector. On the contrary, investment in the copper industry was very active during the 1990s, which resulted in an expansion of copper exports from 1.5 million metric tons in 1990 to 4.8 million in 2003. Despite this positive development, the expansion of other exports has been even more dynamic, and it is this expansion that accounts for the observed decline in copper's share. The volume of total exports grew at an annual rate of 8.1 percent from 1990 to 2003.

As some economists, most notably Sachs and Warner (1995), have argued, an abundance of natural resources may be a curse rather than a blessing. It may induce rent-seeking activities, divert scarce factors such as physical and human capital from growth-enhancing activities, or induce a real appreciation that may result in the contraction of other tradable sectors. There is no evidence of these problems in Chile. Strong institutions, including fiscal discipline, have avoided "voracity" effects. An educated labor force and full access to international capital markets have kept investment in other activities from being hampered, and the real exchange rate has remained at levels that have not prevented exports from taking off. In short, there is no evidence that Chile's abundance of natural resources has been detrimental to growth; on the contrary, it has increased the country's income and welfare.<sup>24</sup>

Figure 10 demonstrates that Chile trades more for its size than any other Latin American

<sup>23</sup>The most recent data in the figure are based on national prices of 1986, which would overestimate the trade share, but regardless of the data source, the trend in the trade share is always increasing.

<sup>24</sup>Bravo-Ortega and De Gregorio (2002) argue that when natural resources shifts scarce human capital away from growth-enhancing activities, the development of natural resources could reduce growth, although not income. Chile's level of human capital is above the one that triggers the negative effects, which does not imply that this level is enough. In the next section I show that despite the level may be consistent with current level of development, the quality is comparatively low.

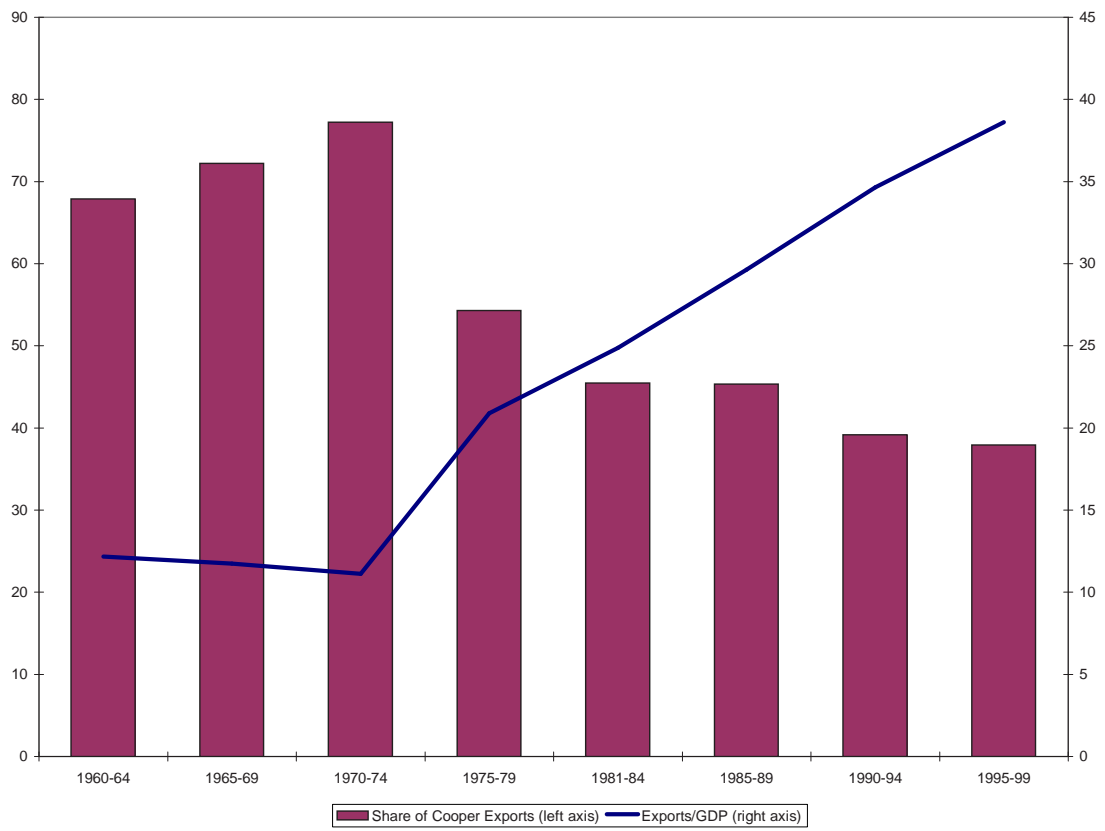
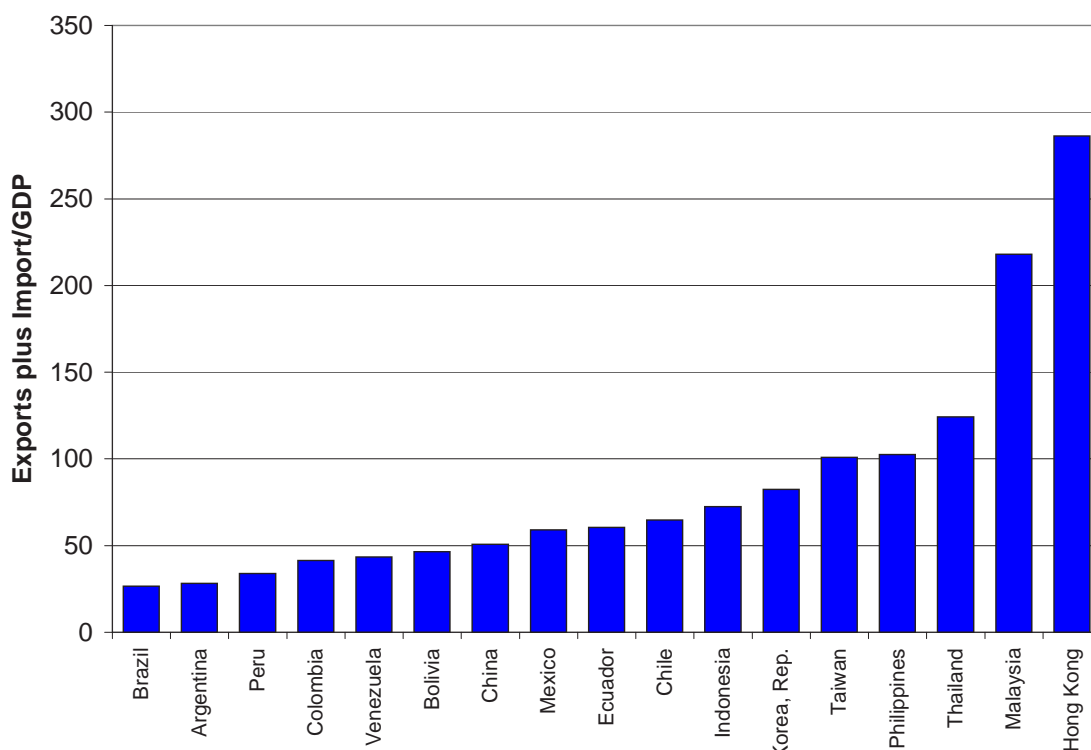


Figure 9: Total Exports as share of GDP and Share of Copper Exports



Source: World development indicators, Department of Statistics of Taiwan, Singapore Statistics. All figures are expressed in dollars of each year.

Figure 10: Trade Shares in Selected Countries

country, and its trade-GDP ratio is similar to those of some Asian economies. Compared with Asia (and as discussed in the next section), however, Latin America has relatively little intraregional trade, and hence trade within the region does not provide much of a boost to increasing trade. I know of no example of a small, relatively high income economy that is not integrated with the rest of the world, and this fact alone argues that Chile needs to be very open. Openness to trade affects growth positively through many channels: it allows the absorption of knowledge, provides access to new and better technologies, and encourages specialization and the exploitation of scale economies. But, in my view, which is naturally based on the Chilean experience, two other factors are the most important. First, trade opens up many new and unexpected business opportunities-it reveals comparative advantages that the country's entrepreneurs did not perceive when it was closed. Second, trade forces domestic producers to be efficient, not just in order to compete in world markets, but also to survive in the presence of foreign-based competitors at home. And this efficiency must extend not only to the production of goods, but also to a firm's logistics, distribution, quality controls, and so forth.

Some research has found that FTAs, especially those involving the United States and Europe, have had only small effects on growth and welfare. This may be surprising given the previous discussion.<sup>25</sup> Most existing calibrations need to make strong assumptions

<sup>25</sup>The most recent calibration can be found in Chumacero et al. (2003). They find that output in steady state would increase by 1 percent, a result similar to that found in static simulations by Coeymans and Larraín (1994).

about TFP gains or reductions in risk premiums in order to find relevant (although still small) effects. The technical reason is that calibrations basically simulate small reductions in tariffs. However, there are many dynamic gains from trade that are not easy to calibrate, such as the effects of increased efficiency and knowledge absorption. In addition, the process of negotiating an FTA with industrialized countries involves a revision of a country's entire institutional setting, as well as the specific changes necessary to adapt to the new agreements, and the impact of these changes is all too often ignored.

Finally, FTAs give open and guaranteed access to the largest and deepest markets in the world. Because of this, Chile's FTAs with the United States and the European Union, and the new negotiations in Asia,<sup>26</sup> have been among the most important policy initiatives of the last 20 years.

### 3.5 Strong institutions and regulation of business

A growing literature has emphasized the role of institutions and governance as key factors in fostering growth. Institutions that protect property rights and allocate resources efficiently are key to encouraging the accumulation of human and physical capital as well as speeding productivity growth. The allocation of talents within an economy is an important determinant of its growth potential.<sup>27</sup> An economy in which distortions encourage rent-seeking behavior will induce effort to be devoted to nonproductive activities. The ability to enforce contracts and to have stable rules of the game is also necessary for growth. Therefore growth and prosperity will be supported by institutions that protect property rights and set limits on government intervention.

A variety of indicators have been developed in an attempt to measure governance, the quality of government, the ability to secure property rights, and other aspects of institutional quality. I have already discussed certain other institutional features, such as the size of government and the independence of monetary policy, that bear directly on traditional economic variables. Here I will focus on two other aspects of good institutions. The first are the usual indicators related to governance, such as corruption, maintenance of the rule of law, and expropriation risk. These can be thought of as institutional characteristics that protect property rights. But, in addition, it is important that institutions encourage business creation and entrepreneurship, and regulation of entry, labor market restrictions, and the quality of government policies are relevant for inducing factor accumulation. For this purpose I will look at the the "Doing Business Index" (DBI) recently put together by the World Bank (2004). Although these indices are recent, looking at these and older data on corruption as well as the rule of law allows us to see whether improvement in the quality of Chile's institutions can help explain the take-off of the mid1980s.

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<sup>26</sup>Chile has already signed a FTA with South Korea.

<sup>27</sup> For recent reviews see Acemoglu and others (2004) and Kaufmann and Kraay (2002). The emphasis on geography as opposed to institutions is discussed in Sachs (2003); on the role of human capital as a more fundamental cause of growth than institutions, see Glaeser and others (2004).



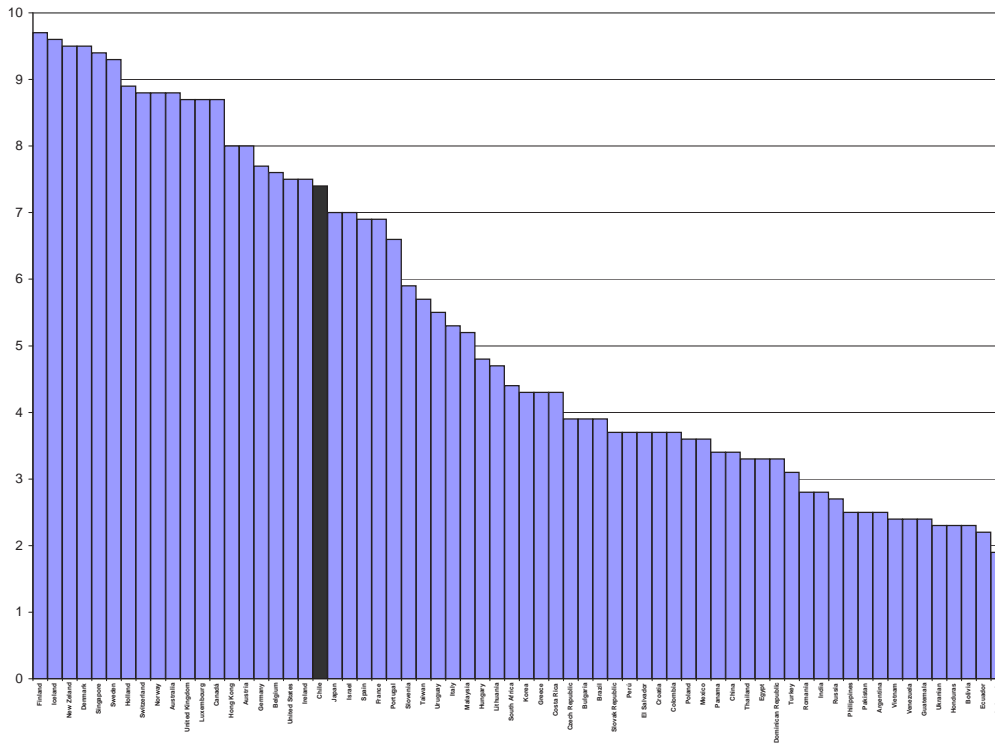


Figure 11: Index of Corruption 2003, Transparency International

Chile ranks as the 20th least corrupt out of 133 countries, a sample of which are presented in figure 11. The corruption index, which takes a value of 10 for the least corrupt country, and 0 for the most corrupt, ranks countries according to the degree to which corruption is perceived to exist among public officials and politicians. The only countries that outperform Chile on the index are industrialized countries, and, except for Hong Kong and Singapore, Chile ranks above all other Latin American and Asian economies and even above some rich economies.

Similar rankings are obtained for the maintenance of rule of law index of the *International Country Risk Guide*. In 2000 Chile ranked 23rd out of 112 countries on this measure. This index is available over a longer time span than the corruption index, with data going back before 1985. The data for 1980 placed Chile 22nd out of 92 countries. There are no comparable data for previous years, but Chile's 1980 ranking is an indication that Chile already had strong institutions even before the growth take-off; hence one cannot argue that it was the buildup of strong institutions that helped spur growth after 1985.

Chile indeed has a long tradition of good institutions. The success of reforms during General Augusto Pinochet's regime was not only the result of good economic policies supported by a dictatorial government; rather, the existence of strong institutions was key to this development and stands as a warning for countries that might consider rushing into reforms without a sound institutional framework. Indeed, as Valenzuela (1994, p. 417) says:

More broadly, the autonomy of the Chilean authoritarian state and its ca-

capacity to institute change was, ironically, also aided by several factors directly related to Chile's long tradition of democratic policies. Chile's armed forces were unique on the continent . . .

But it was not only Chile's tradition of an apolitical military that facilitated the implementation of dramatic reform measures. Chile's open and competitive politics had forged over several generations a relatively strong and efficient state, while fostering widespread respect for the rule of law . . . Although the military regime was forced to take measures to cut back on the bloated size of state agencies, the high degree of probity, professionalism, and experience in Chile's public sector, including the courts and many state enterprises, contributed to easing the reform process. Chileans obeyed the rules drawn up by the new authorities, though many questioned the legitimacy of the rulers themselves. By contrast with the experience of many neighboring countries, privatization and reform schemes were executed with a minimum of corruption, citizens paid their taxes, and private-sector actors quickly learned to adjust to new regulations drawn up to correct the deficiencies of the early moves to open up the Chilean economy.

Indeed, if Chile had had weak institutions, poor maintenance of the rule of law, and rampant corruption in the early 1970s, the orientation of the military government might well have been very different. The episode likely would have ended as did the corrupt dictatorships elsewhere in the region, with a lack of progress in all areas.

In fact, Chile had an institutional basis suitable for introducing free market reforms, and the reforms endured. However, strong institutions and efficient government are not enough by themselves to foster investment and growth. Those institutions must also provide incentives for factor accumulation and productivity growth. Institutions have to secure property rights, and this was perhaps one of the main problems that the first democratic government after Pinochet faced. There was uncertainty about how committed the new government was to an stable and open market economy, and for this reason the reduction of tariffs, the maintenance of fiscal responsibility, and the other pro-market policies of the early 1990s were key in gaining credibility. The initial years of democracy set the basis for the record investment rates and rapid productivity growth of the 1990s, following the recovery phase of the late 1980s, which focused on the recovery of employment. Efficient and strong institutions secured property rights, promoted an open market economy, and provided the social infrastructure for further growth.

Important progress has been made in recent years in the measurement of institutional quality. From an investor's point of view, it is important to evaluate risks and costs when investing in different countries. But it is also important, from the policy point of view, to know, within a comparative perspective, the main weakness and strengths of a country contemplating policy reforms. Since the work of Djankov et al. and others (2002) and of the World Bank on the regulation of entry and the start-up costs of business, the data have evolved into what today is the *Doing Business* report of the World Bank. This report con-

Table 8: Doing Business, Top 36 Countries

1	New Zealand	10	Japan	19	Belgium	28	Russian Feder.
2	Singapore	11	Switzerland	20	Latvia	29	Samoa
3	United States	12	Sweden	21	Ireland	30	Korea, Rep.
4	Norway	13	Puerto Rico	22	Taiwan	31	Tonga
5	Canada	14	Denmark	23	Austria	32	Botswana
6	Hong Kong	15	Lithuania	24	France	33	Solomon Islands
7	Australia	16	Netherlands	25	Kiribati	34	South Africa
8	United Kingdom	17	Armenia	26	Germany	35	Estonia
9	Finland	18	Fiji	27	Thailand	36	Chile

siders seven categories, each of which contains a number of different items, with data for a universe of 145 countries. The indicators are constructed on the basis of surveys, with standardized questions addressed to a group of lawyers and business practitioners. Countries can be ranked on each category, and since they report qualitative indicators of regulation and institutions, I construct indices that are the average ranking in a set of indicators. For each category I compute the average ranking and construct a new ranking based on that average. For the overall ranking I use the average of the average ranking in each category.

Chile ranks 36th in the overall ranking; table 8 lists the top 36 countries. As on the other variables presented here, Chile is the top-ranked Latin American country; it also ranks above most Asian countries and above many industrialized countries. Chile's rankings in each category and subcategory are presented in table 9. On several indicators—including the ease with which one can start a business, register property, hire and fire workers, protect investors, and enforce contracts—Chile ranks high. With respect to getting credit and, especially, closing a business, however, Chile performs less well, in particular in certain subcategories.<sup>28</sup>

In the area of credit, and perhaps surprisingly given the depth and strength of the banking sector discussed above, the main handicap is the cost of creating collateral. This index estimates how much it costs to create and register collateral, as a percentage of income per capita; in the case of Chile the cost is 5.3 times income per capita. To construct this cost, all participants were asked to evaluate the cost of creating collateral of a standard business, including taxes, notary fees, and duties associated with the creation and registry of the collateral. Some countries have no registry, and so the cost could be low, but the uncertainty that creditors face may be greater. One item on which Chile's institutions are weak is the recovery rate on business closures. The recovery rate measures how many cents on the dollar creditors typically recover from an insolvent firm, and is directly associated with

<sup>28</sup>The reason that a country's ranking for a given category could be worse than any of its subcategory rankings has to do with the distribution of rankings and the fact that, for some items, many countries have the same ranking.

weaknesses in bankruptcy laws.<sup>29</sup> Chile ranks 89th on this index, with an average recovery of 19 cents on the dollar. The top 31 countries all have recovery rates above 50 cents on the dollar,<sup>30</sup> which illustrates both Chile's need for improvement and the benefits that improved bankruptcy procedures would bring.

In several other categories Chile ranks in the 20s to the 50s. One of these is the time required to complete various procedures, such as registering property, enforcing contracts, and closing a business. Ensuring a prompt bureaucratic response would also help improve the environment for doing business in Chile. Finally, Chile has a very flexible labor market, but firing costs are comparatively high. Indeed, firing a worker with a regular contract in Chile requires one month of severance pay for each year the employee has worked for the firm, with a cap of 11 years. There has been much discussion in recent years about labor market flexibility and its impact on growth in Chile, but solid evidence is elusive. For example, Calderón and Chong (2003) find mixed results for the link between labor market regulation (its flexibility, the number of regulations, and enforcement) and growth. However, I believe that the important issue, given Chile's current standing, should be poverty alleviation and employment. For example, given recent reforms and proposals for reform, the relevant issue is to what level the long-run rate of unemployment will ultimately converge, and how the poor and the unskilled will be able to find jobs.

Progress can still be achieved in many areas, even those in which Chile's ranking is relatively poor, and progress is all the more relevant for the future given that Chile will have to compete with countries that also have good institutions. Over all, however, Chile already has good institutions and a good regulatory environment for doing business. This is confirmed by many other evaluations and rankings. For example, on the Competitiveness Index of the World Economic Forum, and on the Economic Freedom index of the Heritage Foundation, Chile consistently achieves top rankings among developing countries.

### **3.6 Infrastructure: Strong Investment and Insufficient Stock**

A series of studies have focused on the role of public investment in promoting economic growth. The first important work in this area was that by Aschauer (1989), who found that the stock of public infrastructure is an important determinant of TFP growth. In a more recent series of papers, Calderón and Servén (2004a, 2004b) have revisited this issue with a large, carefully constructed database for international comparisons. They show that the stock and quality of infrastructure are indeed important determinants of the rate of economic growth. The main variables they have explored are indicators of telecommunications, en-

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<sup>29</sup>Bergoeing et al. (2002) argue that one important factor in the recovery of the 1980s was the modification of the bankruptcy law in 1982. This is not inconsistent with the evidence here, since the reforms of 1982 represented important progress; rather, the evidence reported here highlights the weaknesses still present in the bankruptcy procedures regarding recovery rates.

<sup>30</sup>The rate of recovery in the top 15 economies (Japan, Singapore, Finland, Taiwan, Canada, Ireland, Norway, Belgium, the Netherlands, the United Kingdom, Latvia, Spain, Hong Kong, South Korea, and Australia) is above 80 cents on the dollar.

Table 9: Chile's Ranking per-Category

<b>Starting business</b>	<b>19</b>	<b>Getting Credit</b>	<b>61</b>
Number of procedures	8	Cost to create collateral	33
Duration	22	Legal rights index	7
Cost	32	Credit information index	1
Minimum capital	1		
<b>Registering Property</b>	<b>16</b>	<b>Enforcing contracts</b>	<b>30</b>
Number of procedures	6	Number of procedures	14
Time	24	Time	36
Cost	11	Cost	27
<b>Closing a business</b>	<b>111</b>	<b>Hiring and Firing Workers</b>	<b>15</b>
Time	48	Rigidity of employment	8
Cost	10	Firing costs	31
Recovery rate	89		
<b>Protecting investors</b>	<b>6</b>		
Disclosure index	6		

ergy, and roads. In addition, they show that an increase in the stock of public infrastructure reduces income inequality.

A large number of variables can be used to measure the stock of infrastructure as well as its quality. These variables are in general correlated: for example, countries that have good telecommunications infrastructure tend also to have good electric power generating capacity. To facilitate reliable comparisons in cross-country analysis, Calderón and Servén (2004a) construct two synthetic indices, one for the stock of infrastructure and the other for its quality. Each index corresponds to the first principal component of a set of indicators.<sup>31</sup> I will use their dataset to present a summary of the evidence.

The aggregate index of infrastructure stock is constructed on the basis of proxies for infrastructure in telecommunications (number of telephone lines per worker), power generation (generating capacity in gigawatts per worker), and roads (length of the road network, normalized by the country's area). These three variables are highly correlated across countries, and the first principal component explains 81 percent of its variability. The aggregate index of infrastructure quality is computed in a similar way, using the following indicators: waiting time for a telephone line, transmission and distribution losses as a percentage of total electric power production, and paved roads as a share of the total road network.

Figure 12 plots these indices of the stock and quality of infrastructure for Chile for the period since 1971. The figure also shows the world averages for the two indicators and the

<sup>31</sup>In simple terms, given a set of correlated variables, principal components analysis transforms the data in another, uncorrelated set of variables, where the first principal component is the one that accounts for most of the variability in the data.

values predicted for Chile given its level of income. The predicted values are smoothed with a Hodrick-Prescott filter to remove business cycle influences. Growth of Chile's stock of infrastructure was very slow during the 1970s and especially the 1980s, but faster than what would have been predicted given the country's low rate of growth. The stock of infrastructure increased continuously during the 1990s, at a rate faster than that for the world as a whole. Where progress has been more impressive is in terms of quality. After a decline in the quality of infrastructure during the 1980s, in the world and more drastically in Chile, Chile's improvement during the 1990s was remarkable.

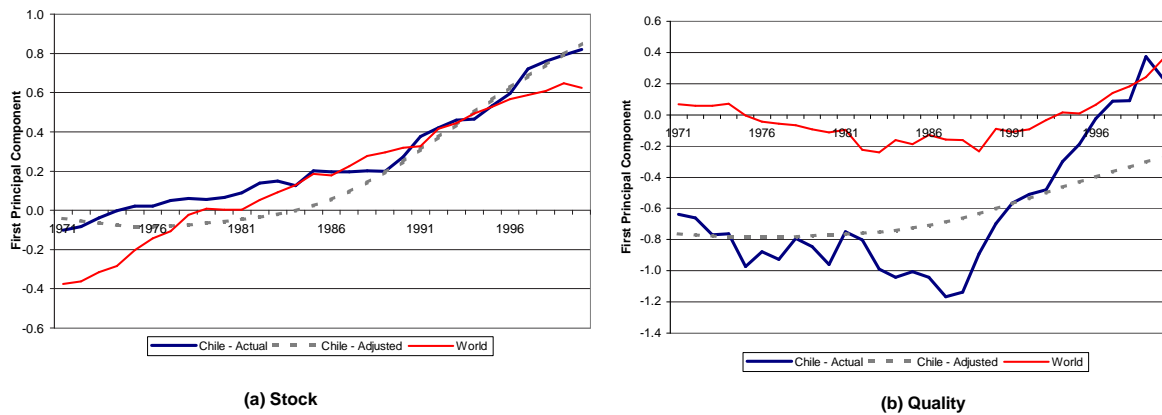


Figure 12: Stock and Quality of Infrastructure

Was public investment responsible for the take-off? Although public investment cannot explain the recovery of the late 1980s (which, as discussed in the context of the growth decompositions in section 2.3, had little to do with investment), it was a key factor supporting growth in the 1990s. First of all, growth in public investment paralleled that of output, so that it did not present a bottleneck to further growth. In addition, the impressive improvement in quality must have had an important impact on TFP growth. Finally, investment in infrastructure was an important vehicle for foreign direct investment, which also had important spillovers on growth during the 1990s. However, it is important to clarify that infrastructure investment helps to explain the sustainability of the take off during the 90s, but the stock of infrastructure, as argued next, is still insufficient.

Thus Chile has seen notable improvements in its infrastructure over time. But how does Chile compare from an international perspective? To answer this question I compare the synthetic indices of infrastructure quantity and quality for Chile in 2000, the latest year available for Chile, with those of all countries for which data are available for that year. The comparison is made both with and without adjustment for level of income, for a sample of about 100 countries, the exact number depending on the indicator in question. On this comparison, Chile ranks 48th on the gross quantity indicator, and 49th when the data are adjusted for income. Therefore the stock of infrastructure in Chile is close to the

world average.<sup>32</sup> Similar rankings are obtained when comparing quality: when the data are adjusted for income, Chile ranks 57th.

In summary, the evidence indicates that the decade of the 1990s was marked by an extraordinary increase in infrastructure in Chile. This growth involved not only public investment, but also substantial private sector involvement, which fostered a surge in foreign direct investment. The surge in investment, in turn, not only affected Chile's long-term growth potential, but also gave a short-term boost to domestic activity. From an international perspective, this effort helped Chile catch up with the world average after a long period of weakness in infrastructure. International comparison also reveals, however, that a gap remains between Chile and the more advanced developing countries, such as the East Asian economies, in terms of both the stock and the quality of infrastructure. For this reason, the pick up of investment was a strength in the 90s, but still the stock can be improved.

## 4 Long-Run Growth: Weaknesses

I have already reviewed some of the institutional factors that may hamper growth in Chile, such as the low level of assets recovered when closing a business, and the high cost of creating collateral, or still some progress that can be done in infrastructure. In this section, however, I will point out some other, broader concerns that may hinder future growth.<sup>33</sup> As in the previous section, I do not base the choice on any particular set of evidence, but rather on a broad empirical look at the developments of recent years.

### 4.1 Research and development

Countries that devote a larger share of GDP than others to research and development (R&D) tend to grow faster (Lederman and Maloney, 2003). R&D allows countries to adopt better technologies and to provide new and better goods, and the fruits of this activity spill over to the rest of the economy. Figure 13 provides a first look at the data, showing expenditure on R&D as a share of GDP for Chile and for selected country groupings. Chile has always had a low level of R&D expenditure, and the increase since 1980 has been meager compared with the East Asian countries, and even compared with the world average. The most recent data from the OECD show that Chile, with R&D expenditure of 0.54 percent of GDP, spends less on R&D than the average of a sample of developing countries (0.7 percent of GDP).<sup>34</sup> This finding is confirmed by the evidence of Lederman and Saenz (2003).

Clearly, however, an income effect is at work here. One would expect that, as an economy becomes richer and better endowed with human capital, it can afford to spend more on R&D. Figure 14 shows that, when R&D expenditure as a ratio to GDP is adjusted for country income, Chile's level of R&D is very close to what one would expect for its income.

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<sup>32</sup>For a precise comparison, one would like to control for other country characteristics, such as geographical features. This is not done here, but for a more comprehensive international comparison

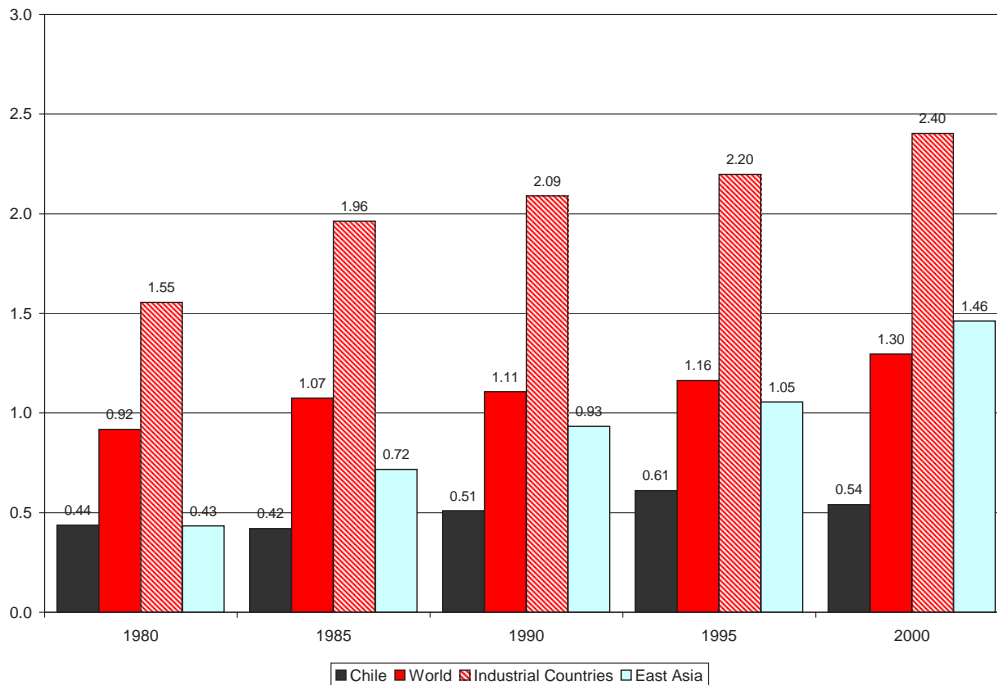


Figure 13: R&D Expenditure (% of GDP)

(The data in figure 14 are from 1995, because later data are unavailable for many countries, but the results are almost the same for a much smaller sample for 2000.) Nevertheless, increased spending on R&D would surely help the country grow faster. Indeed, according to Lederman and Maloney (2003), increasing R&D expenditure by half a percentage point of GDP would raise GDP growth by 0.3 or 0.4 percentage point a year.

The composition of R&D in Chile is very different from what one typically finds in the rest of the world, which raises the question of whether that composition is efficient. In 2000 about 55 percent of Chilean R&D expenditure was in basic science, as opposed to applied research. In the industrialized countries and in the East Asian countries, this share is generally between 10 and 20 percent. There is no reason to think that basic science would be more growth-enhancing than applied research in Chile; indeed, the presumption would be the opposite.

Figure 15 shows the sectoral breakdown of R&D expenditure in Chile and in other developing as well as industrialized countries. The share of private R&D expenditure is relatively low in Chile, only 26 percent, compared with 70 percent in the OECD countries

see Calderón and Servén (2004b), which confirms the discussion in the text.

<sup>33</sup>In Ministerio de Hacienda (2004) there is a useful and detailed discussion on two topics that I cover in this section: R&D and quality of education.

<sup>34</sup>To avoid overrepresenting countries with very high R&D expenditure, I exclude high spenders from Asia and Europe, as well as Brazil, which spends about 1 percent of its GDP on R&D. For further details see OECD (2003).



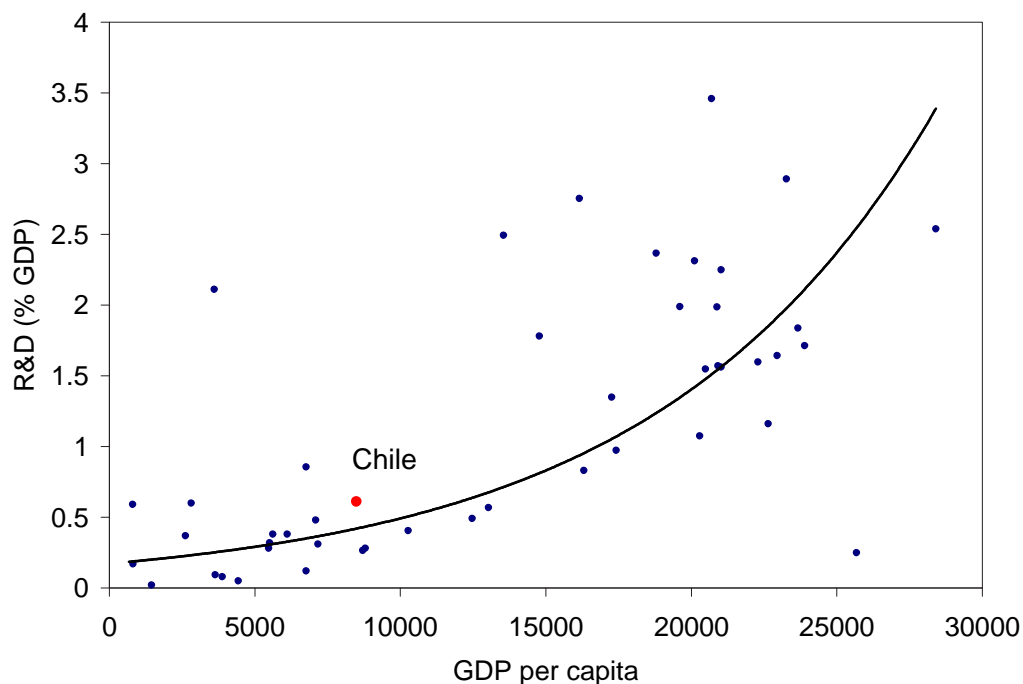


Figure 14: R&D Expenditure and Income, 1995

on average.<sup>35</sup> could be At the other extreme, and consistent with the data on the share of research in basic science, Chile ranks fifth in the share of R&D expenditure by institutions of higher education: that share is 45 of the total, which is twice the world average. Government expenditure, at 29 percent of the total, is somewhat above the world mean of 22 percent. The policy lesson is straightforward. Chile should try to increase its R&D expenditure, and the additional spending should be devoted mainly to applied R&D, performed by the private sector.<sup>36</sup>

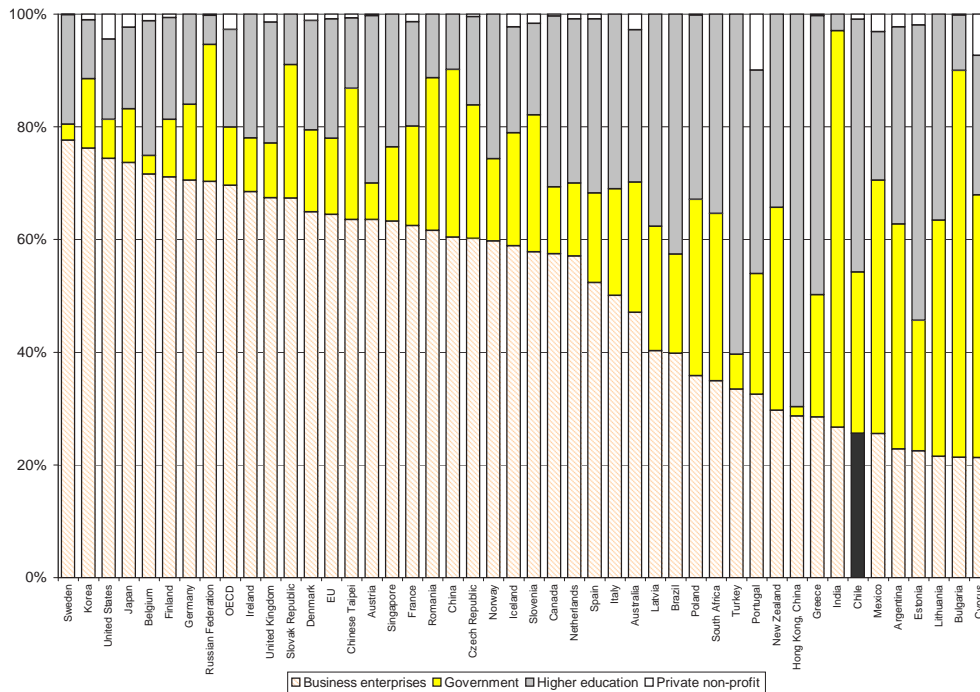
## 4.2 Inequality and policy distortions

Theory as well as empirical evidence suggests that an unequal income distribution is bad for growth, although some recent evidence has challenged this view. Rather than attempt to resolve this debate, it may be more fruitful here to explore the specific mechanisms through which inequality might affect growth. Indeed, the theoretical literature emphasizes that inequality can lead to inefficient policies that actually harm growth, in an attempt to compensate for that inequality. The classic case is the introduction of inefficient taxation for purposes of redistribution.

De Gregorio and Lee (2004) found that, after adjusting for the level of development, countries with more unequal income distributions, as measured by the Gini coefficient, are more likely to have characteristics and policies that are bad for growth. For example, they

<sup>35</sup>However, the figures for OECD countries could be somewhat overstated, since many countries have R&D subsidies, which results in an incentive to declare more expenditure as R&D.

<sup>36</sup>How firms invest in R&D is also relevant. For example, licensing could be a cheap and effective mechanism to acquire technology. Alvarez et al. (2002) have been shown that in the case of Chile returns from licensing may be twice those of investment in physical capital.



Source: OECD Science, Technology and Industry Scoreboard 2003.

Figure 15: R&D Expenditure by Sector

have lower school enrollment rates, probably because, after controlling for average income, they have a larger fraction of the population that cannot afford to go to school. We also found that countries with greater inequality have higher fertility, larger governments, lower levels of educational attainment, and weaker institutions.

Although policymakers will in general prefer policies that both increase growth and reduce inequality, this is not always the case. Some instead adopt redistributive policies that introduce distortions, and fail to adopt other policies, such as universal education for the poor, that have positive effects on growth and inequality. Since the poor will have less incentive to acquire education, an active policy to encourage schooling will be good for growth and for reducing inequality.

What I want to do here is compare the forecast for a given variable that affects growth, after adjusting for the level of income, with the actual level of that variable for Chile, plotted against the level of inequality. This is similar to the above exercise comparing Chile's size of government with what would be predicted for its level of income. The four variables I explore are those examined by De Gregorio and Lee (2004): education (measured by the enrollment rate), fertility, size of government (measured by government expenditure on goods and services), and quality of institutions (measured by an index of the maintenance of the rule of law).

Figure 16 presents the results of this comparison. The first point to emphasize is that Chile has a comparatively unequal income distribution as measured by the Gini coefficient. Indeed, the Gini for Chile is among the highest in the world. The top left panel of the figure relates inequality to secondary school enrollment and shows a negative relationship. After

adjusting for income, however, secondary school enrollment in Chile is higher than what the country's level of inequality would predict (shown in the straight line). This points to a positive role of educational policies, which have raised enrollment above what would be expected for Chile's level of income.

A similar pattern is observed for fertility, as shown in the top right panel. It is known that higher fertility results in slower growth in income per capita, and the figure shows a positive relationship between fertility rates and inequality. Again, however, once fertility is adjusted for income, Chile's fertility rate is lower than would be predicted for its level of inequality. Many factors may account for this, especially health conditions and education.

The relationship between the size of government and inequality, shown in the bottom left panel, is somewhat weaker,<sup>37</sup> and in this case Chile appears to fall exactly at the level predicted for this relationship. Finally, the bottom right panel shows that, for a given level of income, countries with greater inequality have weaker institutions: maintenance of the rule of law declines with greater inequality (similar results are obtained for other institutional indicators, such as corruption). On this measure, however, Chile scores well above what one would predict given its level of inequality. Maintenance of the rule of law in Chile, adjusted for income, is at the level observed in countries with very low inequality.

Over all, although Chile does have a high level of inequality, the evidence reported here shows that Chile has largely avoided the distortions that often hamper growth in countries with similar levels of inequality. Of course, this has been demonstrated only for a limited set of factors for which we have international empirical evidence. However, other experience shows that the trade-off between efficiency and inequality is ever-present in public policy and cannot be avoided. An example is the minimum wage.

Since the early 1990s, in an effort to improve the living conditions of the poor, Chile has legislated significant increases in the minimum wage. During the first part of the decade, output, productivity, and wages were growing strongly, and so there were no noticeable adverse effects of the increased minimum wage on employment. In 1998, however, just as the economy began to slow, a further large increase in the minimum wage was implemented; also, for the first time, minimum wages were set for three years, with increases of around 10 percent a year. Before then, minimum wages had been set every year in a tedious bargaining process, and so the idea of having a long-term agreement sounded attractive. But no provision was made for contingencies, and with the slowing economy, the minimum wage ended up growing faster than the average wage for unskilled workers. By mid-1998 the minimum wage was about 45 percent of the average wage for unskilled workers, and by mid-2000 that ratio had increased to 60 percent. And this happened at precisely the time when the economy was most in need of wage moderation. The higher minimum wage has been shown to be an important cause in the slowdown in employment growth in recent

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<sup>37</sup> Although the approach taken here is a very simple one, it appears that the true relationship between government expenditure and inequality is nonlinear and depends on the level of income, especially since, contrary to the distributive politics argument, inequality and size of government are negatively correlated in OECD countries.

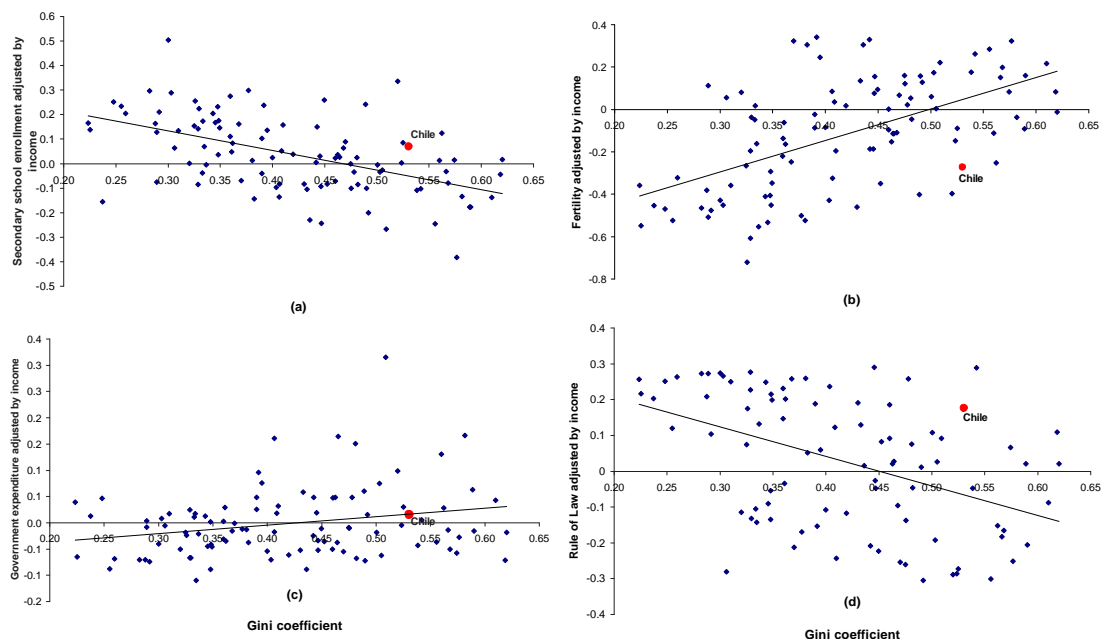


Figure 16: Inequality and Distortions

years, which was higher among unskilled workers (Cowan and others, 2003).

Finally, growth itself helps in the implementation of good policies. Inequality is only one aspect of a country's living conditions, and in a country with a fairly unchanged income distribution from 1987 to 2003, a period of doubling income per capita is also a period of doubling of the incomes of the poor. Indeed, the poverty rate in Chile declined over this period, from 45 percent of the population to 19 percent. This has allowed public policy to focus on alleviating poverty without creating significant distortions in economic growth. Although a country's income distribution changes slowly, and no recipe for dramatic change in the distribution is available (except massive populist redistribution, which is unadvisable), growth can reduce the distortions that inequality imposes on policies and institutions.

### 4.3 Quality of education

Chile has high levels of school enrollment, and progress over the decades has been very encouraging. Currently, the level of education of Chile's labor force is consistent with the country's level of income. However, there is evidence that the quality of education is not as good as the country's high enrollment rates would suggest.<sup>38</sup>

Chile participated in the International Adult Literacy Survey (IALS), which sought to directly measure the quality of a country's working-age population rather than that of its students. As it happened, Chile, which was the only participating Latin American country (besides the high-income countries, only Chile and a couple of middle-income European countries took part), turned in the poorest performance. This, of course, reflects differences

<sup>38</sup>For further discussion of levels and quality of education, see Tokman (2004).

in income, and indeed the worst performers were the countries with the lowest incomes per capita. However, there is evidence that, even after adjusting for income, Chile still performs poorly. Chile also participated in the Third International Mathematics and Science Study (TIMSS) in 1999. On both tests Chile's score was in the lowest quintile. According to Barro (1999), Chile's science score was 24 percent, compared with a sample mean of 46 percent. Given Chile's level of income, its score should have been 43 percent.

Other results of quality are provided by the Programme for International Student Assessment of the OECD. This program administers a test of reading comprehension for students age 15. Figure 17 plots the test results for each country against its expenditure in education and draws a logarithmic trendline through the data. The figure shows that, given its level of expenditure on education, Chile's performance is low. Although these poor results suggest a low quality of education, they could be due to other factors. Villafuerte (2004) shows that educational attainment for Chile is in line with its level of income, but the TIMSS results, consistent with Barro (1999), are low. But Barro also shows that these poor results are in part explained by income inequality.

In summary, it is clear that the quality of education in Chile is low, but this may be the result either of inefficient education expenditure, or of high income inequality, or both. More research needs to be done to separate these effects. Estimates suggest that increasing the quality of education can offer quite a large boost to economic growth. Barro (1999) estimates that if Chile increased its average educational quality to the level it should have, given its per capita income, growth would increase by 2 percentage points; although Barro also notes that that estimate is implausibly large, it does illustrate the potential payoffs from increasing the quality of education.

Finally, it is important to point out that the payoffs of improving quality of education take time to deliver significant results. The children that today could receive good education, will be a large proportion of the labor force in about 20 more years. The same lags has education on income distribution. For this reason is important to also look for improving abilities of people already in the labor force through training programs. However, despite these lags on the effects of education, improving its quality is a powerful tool for equalizing opportunities, and for integrating poor families to the benefits of economic progress.

#### 4.4 Regional trade

The first trading partners a country should have are its neighbors. Distance, language, and culture should be the basis for integration into the world economy. Even when neighboring economies have similar structures, intra-industry trade can help to increase the basis for trade. Unfortunately, intraregional trade in Latin America is low, as is evident from figure 18. The figure, which draws on United Nations direction of trade data, shows the share of intraregional trade in each of several major country groups.

Intraregional trade in Latin America was already low in the 1960s, at about 10 percent of

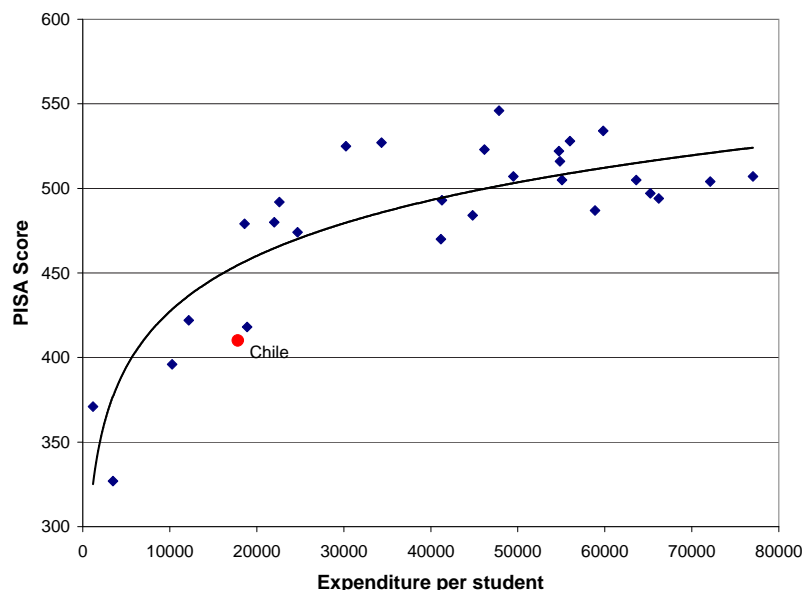


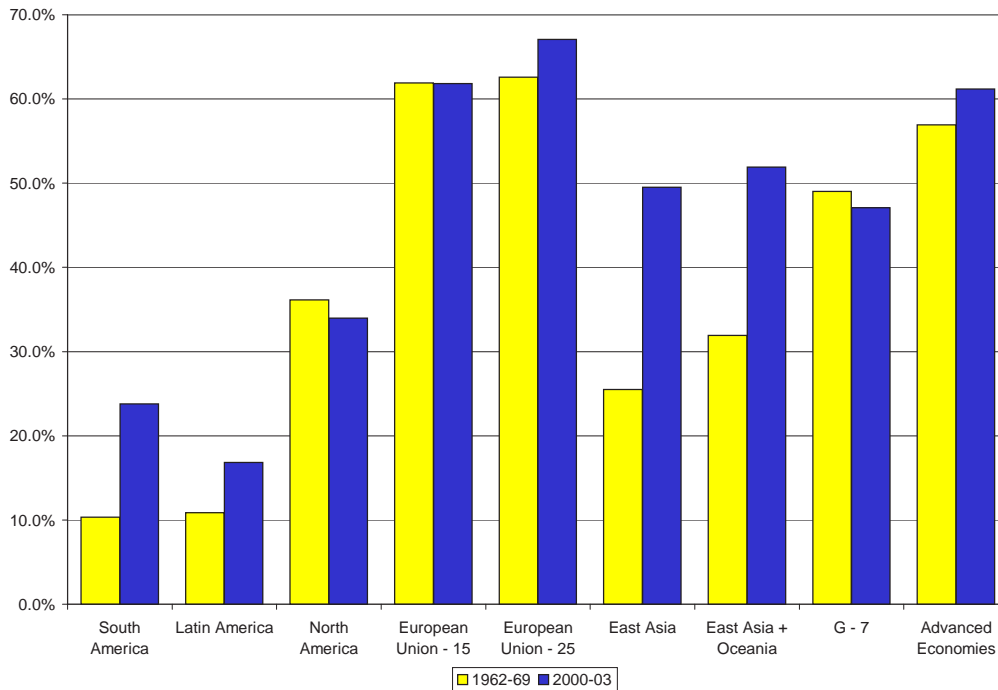
Figure 17: Efficiency of Education Expenditure

the total, and although it has increased in recent years, it remains comparatively low. Trade among the South American countries is 24 percent of their total trade, and that among all Latin American countries is 17 percent, the lowest among the regions shown in the figure. The same pattern of low integration emerges for other country groupings such as Mercosur or Aladi (not shown). These findings stand in sharp contrast to the dynamic intraregional trade among the East Asian countries: already in the 1960s about 26 percent of these countries' trade was with each other, and that figure has increased to 50 percent in recent years. Trade among the industrialized countries has long been an important share of their total trade.

A variety of structural and geographical reasons could explain this low level of trade among Latin American countries. For example, the opening up of a very large East Asian country, China, may explain much of the increase in intraregional trade in that region. Latin America, too, has a large country that could become an important promoter of regional trade, but Brazil has yet to fulfill that role.

It may be that Latin America is a region where the incentives for trade are presently lacking. There have been many attempts at integration-including the Pacto Andino, Aladi, and more recently Mercosur-and intraregional trade has increased modestly since the 1960s. But it is difficult to argue that this increase has been the result of these arrangements, rather than simply a reflection of the trend increase in trade around the world. Formal regional agreements may help, but they are far from being a sufficient stimulus to intraregional trade.

In my view, institutions play a key role in fostering trade. For countries to develop deep and extensive trade relations, each must demonstrate at home the ability to enforce contracts, to maintain the rule of law, and to establish enduring trade relations. The existence of a stable macroeconomic environment is also important, because it reduces uncertainty among trade participants. Yet Latin America has weak institutions and is subject to recur-



Source: Comtrade Database, United Nations.

Figure 18: Intraregional Trade

rent macroeconomic crises, and this impedes the growth of trade linkages. Recent trade disputes-some of which, such as the problems over natural gas with Argentina and Bolivia, have affected the Chilean economy-bear witness to these obstacles. Therefore, low intraregional trade is not the deep problem, but a reflection of weak institutional setting to sustain high trade in the region. A more dynamic region could certainly help to stimulate growth.

## 5 Growth Prospects

Many studies and reports have attempted, using different methodologies, to forecast long-run growth for the Chilean economy. A sample of these studies is summarized in table 10. The different studies use basically three methods. The first is traditional growth accounting along the lines of that presented in section 2.3. In this case, the forecast is based on certain assumptions: some estimate of the expansion of labor, some investment rate from which the rate of growth of capital can be derived, and finally some path for TFP. A second method consists in using time-series techniques such as the popular Hodrick-Prescott filter or other more sophisticated methods. This filtering strategy is sometimes used in combination with growth accounting to smooth factor accumulation and TFP growth. Finally, the results from estimations of cross-country regressions, where some assumption has to be made to forecast the determinants of growth, can be used to forecast potential growth. In addition, the table presents the estimations of Consensus Forecast (2003), which is based on surveys of forecasters' opinions.

Table 10: Growth Forecasts

Source	Projection (% per year)	Period	Method
Barro (1999)	4.7	1996-2006	CCR
De Gregorio and Lee (1999)	5.4	1995-2005	CCR
Coeymans (1999)*	4.7	2001-2008	GA
Gallego and Johnson (2001)	5.0	2000	TS and GA
Hviding (2001)	5.5	2001-2010	TS and GA
de la Cuadra (2002)	4.0	long run	
Gallego and Loayza (2002)	5.3	2001-2010	CCR
Loayza et al. (2002)	5.7	2000-2010	CCR
Consensus Forecast (2003)	4.8	2004-2013	Survey
De Gregorio and Lee (2004)	4.7	2000-2010	CCR
Average	5.0		

CCR: cross-country regressions. TS: time series. GA: growth accounting.

When a study provides more than one estimate the average is taken.

\* Estimates that considers 1.5% of labor and 2% growth of TFP.

Several of the papers summarized in table 10 forecast GDP per capita; to convert this to GDP, I add 1.7 percent, which is the average rate of growth of the population 15 years and older for recent years in Chile. The highest estimate is that of Loayza and others (2002), at 5.7 percent a year, and the lowest that of de la Cuadra (2002) at 4 percent; all the others lie in a range between 4.7 and 5.4 percent. The average of the estimates is 5 percent. This is the same figure presented in section 2.3 as a prediction of long-run growth based on a rate of productivity growth of 2 percent in the steady state of the neoclassical growth model.

A rate of growth of 5 percent would, of course, be below that of the golden period, and below what appears to be the desired rate of growth for Chile, 6 to 7 percent, that one reads in the press. But, taking all of Chile's strengths and weaknesses into account, this seems a reasonable forecast. The implied rate of growth for GDP per capita, at 3.3 percent, is higher than that observed for the whole of the 20th century in any country in the world, although below the rate of growth of certain "miracle" periods, like the golden period in Chile. Over a longer horizon it would be a very healthy rate of growth, indeed more than twice as high as what Chile itself experienced for the 20th century as a whole. Growth of 3.3 percent a year over a period of 30 years would raise income per capita by 165 percent, whereas growth at 1.7 percent a year would raise it by only 65 percent.

However, two caveats need to be considered when looking at these forecasts. The first is that Chile's past success has reduced the income gap between Chile and the richest countries, so that the convergence effect will be negative. This refers to the fact that richer countries grow more slowly, since the marginal productivity of capital declines as income rises. Chile is certainly much richer today than it was in 1985, and hence the potential rate



of growth should be lower than it was then, all else equal. The second, and more important, caveat is that any cross-country regression would have underestimated Chile's growth during the golden period. This implies that there is no way of accounting for all of the high rate of growth achieved during that period. For example, the most comprehensive study looking at this period using growth regressions, that of Gallego and Loayza (2002), cannot fully explain Chile's take-off. In fact, their base regressions explain less than half of the increase in the rate of growth since the mid-1980s. In an expanded regression, using additional variables and interaction terms, they are able to reduce the forecast error, but they still explain only three-quarters of the increase. As expected, there are factors not included in growth regressions that help to explain such growth spurts. This is corroborated in studies that include more countries. Barro and Sala-i-Martin (1995) show that countries with very slow growth have been forecast to grow in per capita terms at a rate of 0 percent a year, yet in the event actually decline at a rate of 1 percent. At the other extreme, some high-growth countries have been forecast to grow at a rate of 3.9 percent yet actually achieved growth of 4.8 percent. Thus errors of 1 percentage point are common among extreme growth experiences.

In the case of Chile, the fact that cross-country regressions cannot fully explain the golden period shows the limitations of focusing on only a single set of regressions with a limited set of regressors. However, a neutral projection of these unknown factors would set them equal to zero. In an optimistic scenario, Chile could grow 1 percentage point faster than forecast on a permanent basis, as the evidence shows is possible for high-growth countries, reaching a rate of 6 percent a year.

In forecasts using cross-country regressions, Chile is still projected to be one of the fastest-growing countries in the region; only very small, poor countries have forecast rates similar to or above that projected for Chile, because of strong convergence effects. In terms of the fundamental factors that determine growth, Chile, as previous sections have shown, ranks at the top of its region. But the East Asian countries are expected to do even better. According to De Gregorio and Lee (2004), a sample of nine East Asian countries can grow at 3.8 percent a year in per capita terms from 2000 to 2010; one of the main differences explaining this gap is that East Asia is much more open and integrated to the world. An interesting alternative case is the projections of Consensus Forecast, which simply combine projections using any methodology done by professional forecasters. Their forecast for Chile is also about 5 percent. This is not generally the case, since, for example, cross-country regressions usually predict higher growth for the East Asian countries than does Consensus Forecast. Indeed, according to Consensus Forecast, Chile is projected to grow faster than many East Asian countries, including South Korea, and indeed Chile's projected growth for the next ten years places it in the top decile of countries.

Growing at an average rate of 5 percent is quite important, since with the usual business cycle fluctuations it would not be unlikely for Chile to have periods of growth close to 7 to 8 percent, and slowdowns at 2 to 3 percent. However, given Chile's current macroeconomic policy framework, it is likely that these fluctuations will moderate. Of course, there are also areas that can be improved and where improvement would pay off in terms of growth and welfare. As already discussed, increasing R&D expenditure would increase innovation and

the adoption of technology, especially if this activity is done in the private sector, where the lack of R&D expenditure is more evident. Improving the quality of education and ensuring more social integration, as a way of compensating for inequality, would also spur growth. There are also some institutional areas, such as closing of businesses and creation of collateral, where substantial progress is possible. Finally, a good and active social policy that decreases the risk to reduce inequality through policies that undermine growth, is very important. The key is to combat inequality without harming growth and employment.

## 6 Concluding Remarks

### 6.1 On Growth Fundamentals

I have listed several policy areas where improvement is possible and would foster growth in Chile. It is tempting to keep adding to what is already a detailed list, but ultimately the question one would like to have answered is, What are the main foundations that support the accumulation of human and physical capital and improvements in productivity-in short, that determine economic growth?

In a recent book, William Easterly (2001) provides a simple yet profound answer to this question: “To find their way from poverty to riches, we need reminding that people do what they get paid to do. We now have statistical evidence to back up theories of how panaceas failed and how incentive-based policies can work” (p. xii). And he concludes, “We have learned once and for all that there are no magical elixirs to bring a happy ending to our quest for growth. Prosperity happens when all players in the development game have the right incentives” (p. 289).

However, I would like to go one step further. I want to ask, What are the fundamental factors that encourage economic growth? What are the incentives that lead people to devote their efforts to productive activity? Given the experience of the Chilean economy, and given the notion that one has to get the incentives right, I think that two basic principles underlie growth:

- *Secure property rights.* When people invest in their own human capital, or when entrepreneurs invest in plant and equipment or in new techniques to increase their productivity, they must be certain that the benefits of these investments will not be taken from them. For this to happen, property rights need to be clearly defined and respected.
- *An adequate structure of rewards.* Investment and effort must be adequately rewarded. This is essential to encouraging creativity, entrepreneurship, and a growth-promoting allocation of talent.

In terms of policy, securing property rights implies setting clear rules of the game.

It is inevitable that some policies, or changes in policies, will have redistributive effects. Changes in tax policies, for example, change the profitability of investment in physical and human capital, in effect reducing or increasing the value of that capital. Improving regulation, too, often changes profitability. A firm that has become a monopoly may be obliged to take steps to reduce its monopoly power, which reduces its profits. In short, redistribution happens. The important thing is to be clear on the limits of property rights. To achieve this, nations must have strong institutions and clear rules to define and delimit property rights, as well as mechanisms for fair compensation when changes in policy have redistributive effects.

In a democracy, taxes are generally decided by the legislature, and no one should be surprised, although some may not like it, when changes in taxes occur. Of course, a sound constitution and good laws will prevent arbitrary enforcement of the tax laws and outright expropriation. The lesson here is again on the need to have strong institutions, and these institutions must have a clear orientation toward protecting property rights.

As this paper has discussed, Chile already had strong institutions well before the growth take-off of the mid-1980s. But even when a country's institutions are oriented to protecting property rights and generating incentives for investment and productivity growth, that is not enough. A stable macroeconomic environment is also an important part of securing property rights. High and unstable inflation also redistributes income, usually from savers to borrowers, and this discourages saving. By, in effect, liquidating nominal public debt, inflation also redistributes wealth from bondholders to governments. The same can be said of sharp changes in interest rates, of freezes on deposits in the event of a banking crisis, and so on. Macroeconomic stability thus promotes growth by providing a safe environment in which to invest, allowing entrepreneurs to focus on the usual and unavoidable risks of business.

But the second principle—an adequate reward structure—is also important. One can imagine a country in which property rights are secure and immutable but the business sector consists of a group of monopolists enjoying significant barriers to entry. No one will then have any incentive to invest or to compete: the established monopolists have no need to do so, and any potential new entrant will find itself at a clear disadvantage. Therefore the means to establish this second principle in the economic arena is competition, full and strong competition, that allows markets to operate efficiently.<sup>39</sup> Openness and free trade, in turn, are essential to ensure and increase competition, especially in a small economy. In order to compete and succeed, firms will need to be efficient and creative. Absent any competitive threat to established business, there will be no incentive for these businesses to be efficient.

Of course, there will be externalities that require public intervention; for example, and recalling the earlier discussion, the inability of innovators to appropriate the full rewards of their innovation means that R&D will tend to be underprovided. Encouraging R&D through

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<sup>39</sup>Parente and Prescott (2000) have formally shown the importance of competition and well-functioning markets for encouraging growth.

public policies is therefore a good thing. But Easterly's principle must always be borne in mind. If support for R&D generates rent seeking and allows dubious projects to profit from government support, a good policy in principle could have bad results in practice. Policies must be designed in a way that is mindful of the incentives they create. Similar considerations apply to public investment.

The second principle also has implications for social policy. It is important that workers, as well as businesses, receive rewards appropriate to their effort. A natural aspiration of parents, especially among the poor, is that their children live more prosperous lives than their own. For this they need opportunities. A person's income from labor will depend on the productivity of that labor, and so the goal of educational policy must be to transfer useful knowledge and so transform people into more productive workers. Stated more generally, this second principle translates into social mobility, or equal opportunity, on the social front.

We can better understand Chile's strengths and challenges in the light of these two principles. Chile's institutions are strong, its macroeconomic environment is stable, and therefore property rights are well protected. In addition, the Chilean economy is very open, competition is robust, social policies are well designed, and the financial sector efficiently allocates funds to good projects and to investors with good ideas. Hence there are good incentives in place for investment, which can expect an adequate reward. The quality of education must be improved, and efforts to reduce inequality, through social policies to improve the living conditions of the poor and to create conditions for greater social mobility, must be reinforced. Increased incentives for innovation and for the adaptation of technological progress will also increase the chances of achieving sustained rapid growth. From the point of view of government activities, it is important to focus on how to foster growth and help the poor and the disadvantaged, while minimizing policy distortions. This is not a trivial challenge, but as long as growth can be sustained, the job is made easier, because populist temptations are then reduced, although never eliminated.

Finally, although public policy can do a lot to create a pro-growth environment, even that is not enough. Some good luck also helps. Luck can take the form of an abundant endowment of resources, a favorable climate, prosperous and cooperative neighbors, a strong international environment, and so on. Unfortunately, a country can do little to improve its luck, but it can prepare itself so as to exploit to the fullest any good luck that does come its way.

## **6.2 On competition, privatization, regulation and innovation**

I have argued that, in order to achieve productivity growth, spur innovation, and allocate talent to productive activities, people's effort and creativity must be rewarded. And in this respect competition is essential. Opening up the economy brings competition. Those who want to play in global markets, or to fend off foreign competition, must be efficient and productive. In the absence of competition, regulation must be designed to replicate competition.

Chile has made progress on this score in recent years, a good example of which is its creation of an independent Competition Tribunal. Like an independent central bank, an independent and specialized competition tribunal can minimize conflicts of interest and guarantee competition. In a more narrow area but along the same lines, the disputes among Chile's electric companies will be resolved in the future by an independent panel, instead of by the Minister of the Economy. Indeed, many regulatory reforms are usually necessary, especially given the rapid technological advances in the utilities sector. But, in my view, the most important institutional basis is to define how conflicts are resolved, who is responsible for setting regulations, and who is charged with administering those regulations. Granting independence to and requiring accountability from regulators and defining independent panels to resolve problems sends a strong signal to investors about the stability of the rules of the game.

Privatization has played an important role in deepening Chile's markets. It has been particularly important in the utilities sector. This is a typical case in which cross-country evidence has not been able to estimate its growth effects, but certainly there must be some, and at times significant, gains. Privatization has fostered investment, and it has been important vehicle for bringing foreign direct investment, which we know it has positive effects on growth. Keeping the government out of productive activity but involved in regulation fosters competition and spurs investment and productivity growth. An entity that is both producer and regulator, the state in the case of public enterprises, faces enormous conflicts of interest, an important case is the continuous struggle of finance ministers to avoid public enterprises being a source of fiscal imbalance, while those firms end up sacrificing profitable investment projects. In addition, incentives of its managers will not necessarily be aligned with innovation and efficiency. Indeed, the corporate governance of Chile's remaining public enterprises, those for which specific reasons exist for not privatizing, must be close to best practice among private firms. This will induce efficiency and reduce political interference, which many times takes the guise of promoting social welfare or other "good" causes. A lot of progress has been done, but there are still areas for improvement.

We do not have good estimates of the extent to which regulatory and other microeconomic reforms may contribute to economic growth. But that should not prevent the pursuit of further reforms, because although their measurement may be elusive, the benefits are certainly large. As I have discussed, institutions that improve the functioning of markets are essential for growth. Even if some of them do not contribute directly through more rapid growth, improving competition has clear welfare gains.

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