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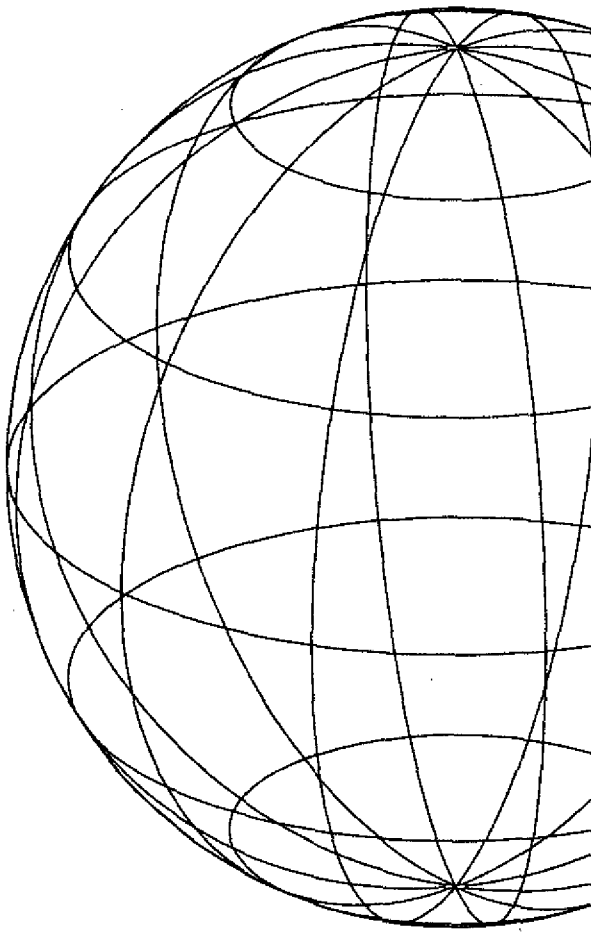
UNIDO RESEARCH PROGRAMME

Productivity Performance in Developing Countries

Country Case Studies

Chile



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Chile

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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna, 2005

I thank Elena Arzola for excellent research assistance.

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Executive summary

A. Introduction

The purpose of this report paper is to examine and analyze the productivity trends in Chile over the last four decades. An interpretation of the productivity cycles will be provided and the correlation between the productivity trends and the overall economic growth performance of the country will be examined. The major determinants of productivity are identified and, in this context, the country's strengths and weaknesses are assessed with regard to the factors behind productivity growth. The basic goal of the report, which is part of a broader UNIDO research project entitled *Productivity Performance in Developing Countries*, is to provide information material for the public policy community on the impact of policy on the productivity process in Chile.

The report consists of four sections. Section two, after this introduction, comprises an interpretation of the data provided on productivity trends in Chile over the last forty years. In Section three the country's strengths and weaknesses in five groups of determinants of productivity are assessed. Finally, in Section four and based on the previous section, government policies that have an impact on productivity are discussed.

B. An Account of Productivity Growth in Chile in 1960-2000

The purpose of this section is to provide a broad interpretation of the data provided by UNIDO on productivity growth over the last four decades provided by UNIDO. The idea is to identify both episodes of rapid productivity growth and episodes of sluggish or declining productivity.

The figures show that TFP growth was very volatile in Chile during this period and only appears to have become more stable in the 1990s. The sub-periods of high TFP growth were1965-1970 and 1976-1980. The first of these sub-periods was characterized by a significant increase in the terms of trade of the Chilean economy. The second sub-period of high productivity growth (1976-1980) was characterized by two factors: the first was the recovery from the recessions of 1973 and 1975 and the second a deep process of economic reform that was initiated in the mid-seventies. The sub-periods with significantly negative productivity growth were 1971-75 and 1981-85. The first of these sub-periods was characterized by the populist experience of 1971-1973 and the second sub-period (1981-1985) by the recession of 1982-83.

TFP growth and GDP growth are highly correlated. Indeed, the coefficient of correlation is 0.78. The coefficient of correlation was higher in the earlier periods. Indeed, GDP growth was particularly high between 1986and 1995, however, productivity growth, according to UNIDO data, was rather modest. During this period the higher GDP growth was more closely related to larger contributions from capital accumulation rather than from TFP growth.

In 1961 labour productivity in Chile was 39.5% that of the USA and 38.9% in 2000. In broad terms it can be said that labour productivity in Chile relative to labor productivity in the USA remained more or less at the same level between 1960 and 2000. This is a poor result for a middle-income country which is supposed to be on a convergence path towards the level of the leading economies. The reason behind this is a very poor performance in the first half of the period analyzed, which was compensated by better results in the second half. The basic reforms in the Chilean economy started to be implemented in the mid-seventies and have yielded permanent fruits since the mid-eighties. Since then the Chilean economy has been in a process of convergence towards the leading economies.

There have been several studies of TFP for Chile in the last several years. The main difference from UNIDO data is that, according to these other sources of information, there was a productivity boom in Chile between 1986 and 1997. In the UNIDO data, productivity growth in this period is positive but significantly lower.

C. An Assessment of the Major Determinants of Productivity

The purpose of this section is to assess the country's strengths and weaknesses in the following five groups of determinants of productivity: (i) creation, transmission and absorption of knowledge; (ii) factor supply and allocation; (iii) institutions, integration and invariants; (iv) competition, social dimension and environment; (v) issues specific the country. The objective is to identify the major determinants of productivity performance in the last four decades within these five components, and to describe how, with what intensity and through which channels it was influenced.

Regarding group 1 (creation, transmission and absorption of knowledge), Chile is found to have clear strengths in trade and foreign direct investment. A key element of the whole Chilean reform process was precisely the trade liberalization reform. In 1974 Chile initiated a unilateral strategy of trade liberalization which consisted of a drastic reduction in tariffs. In 1990 the new economic authorities decided to continue the process of tariff reduction, and to complement it with free trade agreements. A new FDI statute (DL 600) was also implemented with the aim of encouraging foreign investment. In the beginning FDI increased gradually, but with the return of democracy, FDI inflows to Chile increased at unprecedented levels.

The lack of a specific R&D policy has been frequently mentioned as one of the weaknesses of the Chilean economy. Chile spends 0.5% of GDP on R&D compared with the world average of 1.3%. Chile's expenditure in R&D is not only lower than the world average, but also below that of industrial countries and that of East Asian countries. Two characteristics of this low level of R&D expenditure are also a source of concern. Firstly, Chile devotes too many resources to basic science, where it is more difficult to produce results. Secondly, there is very little R&D expenditure by private enterprises in Chile. In broad terms, the analysis suggests that the country would benefit if invested more and better in R&D. This is not to say that the country should embark on industrial policies directed at promoting information technology sectors. This type of picking-the-winners policy produced major resource misallocation and stagnation in Chile in the past.

Regarding group 2 (factor supply and allocation), the quality of education was identified as one of the most significant weaknesses of the Chilean economy. According to different studies, this variable is below the level which corresponds to Chile's status of development. If the quality of education were to be improved there would be significant positive effects on productivity growth. Beyer and Vergara (2002) estimate that this effect could represent an increase of up to 0.7 percentage points per annum. Barro (1999) is even more optimistic and estimates that if Chile had the test scores in science that correspond to its per capita GDP, growth would be 2 percentage points higher. The level of schooling (amount of education on offer) is found to be roughly average in Chile, and hence does not explain growth differentials.

Physical capital is considered to be a strength of the Chilean economy. The country experienced an investment boom from the late eighties onwards. Fixed capital investment increased from less than 15% of GDP in the mid-eighties after the recession of 1982-83 to over 27% of GDP in the mid-nineties. This places Chile among the Latin American countries with the highest investment rates, although they are still lower than in many East Asian countries. By contrast, there has recently been an impressive boom in investment in infrastructure. However, Chile still lags behind in terms of the stock of infrastructure as compared to countries with a similar level of development. This means that it is necessary for the infrastructure investment boom in Chile to last for several more years if adequate standards are to be achieved.

The situation in the financial sector in Chile is explored through an analysis of three major reforms undertaken in the country over the past decades: reforms of the banking sector, pensions and the central bank. In all three areas Chile has carried out major reforms with positive and significant effects on productivity. As discussed in the report, the financial sector now constitutes one of the key strengths of the Chilean economy.

Regarding institutions, integration and invariants (group 3), Chile has well- functioning institutions and, in broad terms, is well placed in this respect. However this does not mean that there is not room for improvement. Some studies state that going to the top in terms of government effectiveness (which is measured by some indices of bureaucratic quality), could have positive and significant effects on TFP growth in Chile.

According to several indices Chile is the least corrupt country among developing countries and is in a better position than many developed countries which is undoubtedly an important strength of its economy.

Another issue that has been a subject of debate in Chile is labour regulation. Firing costs in Chile are among the highest in Latin America and it has been estimated that these costs have a significant effect on employment, especially on youth unemployment. The present expected cost of firing a worker is well above the average for the region. There have been a number of proposals to make the labour market more flexible, such as reducing the aforementioned costs. This discussion suggests that labour regulation can be counted as one of the weaknesses of the Chilean economy.

Macroeconomic stability, and more specifically low inflation, has been found to have a positive effect on growth. Since 1989 Chile has had an independent central bank whose goal is to maintain price stability. It also has an institutional framework designed to promote fiscal responsibility. Macroeconomic policy in broad terms can be considered among the strengths of the Chilean economy.

Integration into the world economy is certainly one of the major strong points of the Chilean economy as measured by its flows of trade and capital and by the degree of exposure and adaptation to world events.

The effect on productivity of some invariants, such as location, size and natural resource endowment, was analyzed. The conclusion is that while Chile's location is one of its weak points, the other two variables considered (size and natural resource endowment) can considered neutral and are neither disadvantages nor advantages.

Regarding competition, social dimension and environment (group 4), the basic finding was that the very unequal income distribution of Chile is a major weakness in terms of productivity growth. Latin America is one of the regions of the world with the highest income inequality and Chile is not an exception to this. Moreover, Chile is among the Latin American countries with highest level of inequality. Widespread income inequality can create social tensions that hamper productivity growth.

Competition has been at the core of the Chilean reform process that started in the mid-1970s. The analysis suggests that Chile is an economy where there is a reasonable amount of competition. However, there has been a growing concern for the environment in Chile in the last couple of decades and, in the early 1990s, new laws were passed introducing the so-called system of environmental impact evaluation to incorporate the environmental variable into investment decisions. Nonetheless, the fact that Chile is below several Latin American countries in indices measuring environmental sustainability, suggests that there is room for improvement in this area.

Two issues specific to the country were analyzed: the low female participation in the labour force (a weakness) and the economic and political stability of the country (a strength).

D. A Discussion of Policies Affecting Productivity

In Section 4 government policies that have an impact on productivity are analyzed. The analysis is based on the determinants of productivity indicated in Section 3. In the first part of this section there is a brief summary of Chile's strengths and weaknesses in the different areas that affect productivity. The second part focuses on policies and their effect on productivity.

The different policies analyzed in this section are:

- Policies to foster integration into the world economy.
- Policies to improve the quality of education.
- Policies to upgrade institutions.
- Macroeconomic policies.

- Policies directed at promoting R&D.
- Policies directed at promoting competition.
- Policies directed at reducing income inequality.
- Policies to induce larger female participation in the labour force
- Policies to promote physical investment and investment in infrastructure.
- Policies to achieve a deep and efficient financial system.

Finally, some brief thoughts are provided on ways and possibilities of enhancing productivity through technical cooperation activities. Institutions represent the greatest weakness of developing countries in terms of their productivity performance. It is possible to convince a country to follow certain policies, but if there are no good institutions to support them, they are likely to fail. By contrast, with well-functioning institutions it is more likely that good policies will be actually implemented.

I. Productivity performance in Chile: Introduction

1. 1 Overview and Context

The purpose of this report is to examine and analyze productivity trends in Chile over the last four decades. An interpretation of the productivity cycles will be provided and the correlation between the productivity trends and the overall economic growth performance of the country will be examined. The major determinants of productivity are identified and, in this context, the country's strengths and weaknesses are assessed with regard to the factors behind productivity growth.

The goal of this report, which is part of a broader UNIDO research project entitled *Productivity Performance in Developing Countries*, is to provide material for the public policy community on the role of policy in the productivity process in Chile.

1.2 Objective of study

This study aims to investigate productivity performance in Chile, with the growth of the overall economy as the main focus. The investigation is intended to analyse general factors as well as factors specific to Chile.

1.3 Methodology

Secondary data from official government documents have been used. In particular, comparative cross-country TFP data provided by UNIDO were used to discern trends. Primary data were generated through a limited sample survey to validate some of the assertions made.

1.4 Organization of report

The paper consists of four sections. Section 2, after this introduction, comprises an analysis and broad interpretation of the data - provided by UNIDO - on productivity for Chile over the last forty years with the objective of reviewing the episodes of rapid growth and also the slumps in productivity. In addition, this Section examines the relationship between productivity and output growth and provides a breakdown of the latter into productivity growth and the contribution of capital and labour. Finally, there is an explanation in this Section of Chile's level of productivity as compared to that of the United States (considered to be the "world's technology frontier") and some comparisons are made regarding the conclusions derived from the data and those of previous studies on this subject.

Section 3 provides an assessment of the country's strengths and weaknesses in the following five groups of determinants of productivity:

a) Creation, transmission and absorption of knowledge
b) Factor supply and allocation
c) Institutions, integration and invariants
d) Competition, social dimension and environment
e) Issues specific to the country

The objective is to identify the major determinants which influenced productivity performance in the last three decades within these five components, and to describe the specific impact, intensity and channels of that influence. The intention is to provide as much information as possible on the different variables and also reflect previous literature on the subject. Drawing on these elements and on experience it will be possible to broadly identify the key determinants of productivity in Chile since 1960.

Section 4, based on the previous section, discusses the government policies that have had an impact on productivity and also identifies constraints to its growth levels in Chile. Measures will be proposed to overcome these constraints and proposals outlined for possible interventions by institutions, such as UNIDO, to promote productivity growth in Chile.

II. Growth of the economy and productivity trends

2.1 Record of GDP growth

The purpose of this section is to provide a broad interpretation of the data on productivity growth over the last four decades. The data on productivity were provided by UNIDO. The objective is to identify episodes of rapid productivity growth as well as episodes of sluggish or declining productivity and also examine the correlation between productivity and output growth. A breakdown of output growth into the individual contributions of total factor productivity and factor (labour and capital) accumulation is also included along with a review of the country's position relative to the United States. The data show that 25% of economic growth is attributable to productivity growth and that there has been practically no change in Chile's relative position vis-à-vis the United States, in terms of labour productivity levels. Also included is a sub-section comparing these results with those of other studies. The conclusion is that, although overall trends are similar, there are some differences in certain sub-periods.

The data

Table 2.1 shows average TFP growth between 1962 and 2000 for sub-periods of five years[1]. As the table indicates, TFP growth fluctuated from negative in the period 1962-65, to positive and high from 1966 to 1970 and negative again between 1971 and 1975. A reversed trend led to positive and high TFP growth again in 1976-80. The growth patterns became negative once more in the 1980s and positive in the 1990s. The figures recorded reflect a very volatile total factor productivity growth in Chile in the period under review. Only in the 1990s does TFP appear to become more stable again.

Table 2.1
TFP Growth
(UNIDO data)

1962 - 1965	-0.3
1966 - 1970	5.3
1971 - 1975	-1.0
1976 - 1980	5.3
1981 - 1985	-2.1
1986 - 1990	-1.1
1991 - 1995	1.9
1996 - 2000	0.3
1962 - 2000	1.1

[1] With the exception of the four years of the sub-period 1962-1965.

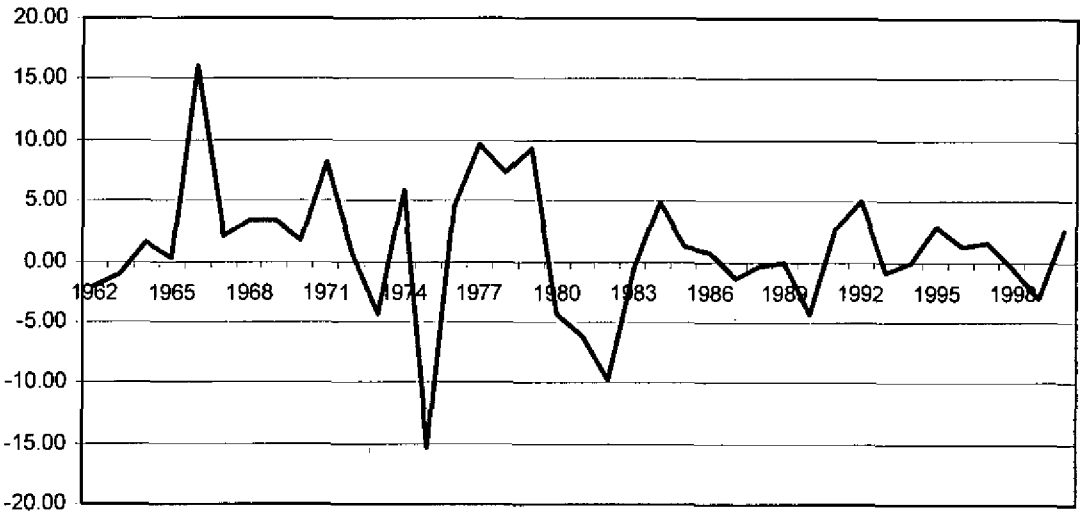
In Figure 2.1 TFP is depicted for the whole period and, once again looks very volatile, probably related to the volatility of the Chilean business cycle. As will be seen later in this section, both TFP and GDP growth are highly correlated. The periods of high productivity growth are generally, but not always, also periods of high economic growth. For instance, average GDP growth in between 1966 and 1970 was 5.4% and TFP grew 5.3%, on average, in the same period. From 1971 to 1975 both variables showed negative growth rates and only in two sub-periods in this sample do TFP and GDP growth rates diverge. The first phase is from 1962 to 1965 when TFP growth was, on average, negative while average output growth was 3.6%. The second sub-period was between 1986 and 1990 when an even greater difference became apparent as GDP grew by 6.1% while TFP declined by 1.1%. It should be mentioned that the TFP trends reflected in the data for this sub-period (1986-1990) are different to those documented in other studies which - as will emerge later in this section, show a positive and high TFP growth in the second half of the eighties. Another surprising finding is the relatively low, though positive TFP growth in the 1990s compared to the high economic growth in the same period.

The sub-periods of high TFP growth were 1965-1970 and 1976-1980. The first of these sub-periods was characterized by a significant increase in the terms of trade of the Chilean economy. At that time copper represented about 80% of Chilean exports and its price went up significantly and, measured in real terms reached its maximum level in fifty years in the second half of the 1960s. The absolute peak was reached in 1966 when GDP grew by 13.6%.

As a small open economy in which commodities represent more than half of total exports, the business cycle in Chile is very much correlated with the price of its exports in the international markets. The higher the terms of trade the higher the national income. This boosts aggregate demand which, in turn, has a positive impact on output and productivity at least in the short-run[2].

[2] This assumes that there is capacity available to increase production. But even if there is not, there is also a supply channel. Indeed, the higher terms of trade allow for more imports of capital goods that expand the production capacity.

Figure 2.1
TFP Growth



The second sub-period of high productivity growth (1976-1980) was characterized by two factors: the recovery from the recessions of 1973 and 1975 and a deep process of economic reform that had been initiated in the mid-seventies. In the early seventies Chile was an extremely closed economy with subject to excessive government intervention. The ECLA (Economic Commission for Latin America) import substitution and directed industrialization strategy (a type of picking-the-winners exercise) had been adopted by Chile (and most Latin American countries) back in the 1940s. The new economic authorities completely changed the economic model leading to liberalized prices, reduced tariffs and the privatization of state-owned firms, the new model also included a fiscal adjustment programme, a tax and pension reform and financial sector liberalization, among other measures. Education, health, and other reforms were implemented in many areas, all with a free-market orientation. Chile was the first country in Latin America to adopt this type of model, although many other countries followed course in the late eighties and early nineties.

The reforms were initiated by the newly established economic authorities of the authoritarian government in the mid-seventies. However, they were accepted and adopted as their own by the new democratic government in the 1990s and extended to many other areas[3]. In the next section some of these reforms will be described and analyzed in depth. The reforms extended to the most diverse areas of the Chilean economy and all of them made a very important contribution to what subsequently came to be known as the golden age of economic growth in Chile.

[3] One of the most discussed issues in Chile's economic reform has been the combination of an authoritarian government and a free-market economic programme. This was not usual for Latin America, where most military governments were also very interventionist in terms of economic policy. Fontaine (1992) describes this combination as the "original sin" of the Chilean economic reform process. He argues that when - in 1990 - *the free market model was adopted by the new democratic authorities, the sin was expiated and the model* legitimized.

The initial results were impressive. Chilean GDP grew by 7%, on average, between 1976 and 1980, despite terms of trade that were significantly below the level of the last decade. Chile then suffered the worst recession since the Great Depression. GDP fell 16% in 1982-83 and unemployment climbed to 30% of the labour force. Two phenomena are suggested to explain this recession. Firstly, the world economic recession of the early 1980s when the huge increase in international interest rates as a result of the very tight monetary policy in the United States, had a devastating effect on Chile and the rest of Latin America.

Secondly, there were clearly some policy mistakes which contributed to making this a major recession. Supervision of the banking sector was, in particular, very lacking and many banks collapsed in the ensuing crisis. In addition and from a macroeconomic perspective, the authorities watched passively and took no corrective measures as the real exchange rate appreciated dramatically and huge current account deficits built up (in 1981 the current account deficit reached 14.5% of GDP).

According to UNIDO data, productivity growth was, on average, 0.8% per year from 1986 to 1995. This was a period when GDP growth was the highest in our sample (7.3% on average). As discussed below, other sources[4] suggest that the productivity boom in Chile began in the mid-eighties. These other studies show a much higher increase in TFP during this period. The economic boom that started in the mid-1980s was associated with the economic reforms that had been implemented from the mid-seventies onwards. In the mid-1980s Chile started to experience what was later known as the golden age of the Chilean economy.

Between 1984 and 1997 the Chilean economy expanded at 7%, on average, per year, investment and savings boomed, inflation was reduced from around 25% to a 2 - 4% range, unemployment was significantly checked and the number of people living under the poverty line fell from over 40% in 1987 to about 20% in the late 1990s. However, these results took time to become apparent. Indeed, as stated above, just after the initial reforms in the mid-1970s the economy boomed, to fall into a deep recession a few years later in the early 1980s. There were external and internal reasons for this recession, among the latter, lax banking regulation and supervision. The cost of the banking crisis was huge and the lesson clear: financial sector liberalization has to come hand in hand with appropriate legislation and the creation of a strong supervisory agency.

The lesson from the Chilean experience is that patience is very important. Often reforms take time to yield benefits which are more likely to become apparent after costs have been incurred. However, in the end the balance is very positive and Chile, from a long- term perspective, is an example of a successful reform process. The consensus on this in the country is such that the model was maintained in the period of democracy despite the fact that it was implemented during a dictatorship.

[4] See Vergara (2003), Beyer and Vergara (2002), Gallego and Loayza (2002).

The sub-periods with significantly negative[5] productivity growth were 1971-75 and 1981-85. The first of these sub-periods was characterized by the populist phase between 1971and 1973. The government of the Unidad Popular implemented a plan of excessive government intervention, huge increases in government spending, very loose monetary policy, massive wage rises for public employees and other populist policies[6]. The monetary and fiscal expansion resulted in a very high rate of economic growth in 1971 which fell back to almost zero in 1972, followed by a recession in 1973. The very severe fiscal adjustment of 1975 together with a dramatic fall in the terms of trade[7]were the main explanations behind the recession which set in that same year. GDP fell 14.5% and productivity suffered a very severe negative setback.

The second sub-period (1981-1985) was characterized by the recession of 1982-83. The causes of that recession have already been discussed and were a mix of international (and hence exogenous) factors plus some internal policy errors. The domestic financial crisis and the external debt crisis triggered off a slump in productivity.

Chile's economy has come to be known as a success story in international fora thanks to the reforms and the subsequent period of high economic growth - known as the golden age of this economy. This golden age was the product of a series of reforms aimed at liberalization and the creation of a real market economy, though it unfortunately now appears to be over. In recent times there were six consecutive years of modest average growth in Chile (about three percent on average per annum from 1998 to 2003). Although this is not as low as in other Latin American countries, it is quite a poor record when compared to the recent economic performance of Chile and has opened a debate on what must be done to return to a high-growth path. Chile's economic success in recent years is associated with the application of sensible economic policies and the existence of a sound institutional environment. Recent research has suggested that if the country is able to maintain and improve these policies and institutions, an additional period of high growth may be assured. The reform process can, however, never be regarded as completed. In a dynamic world, countries that are not constantly upgrading their institutions and policies will sooner or later experience a slowdown in economic growth[8].

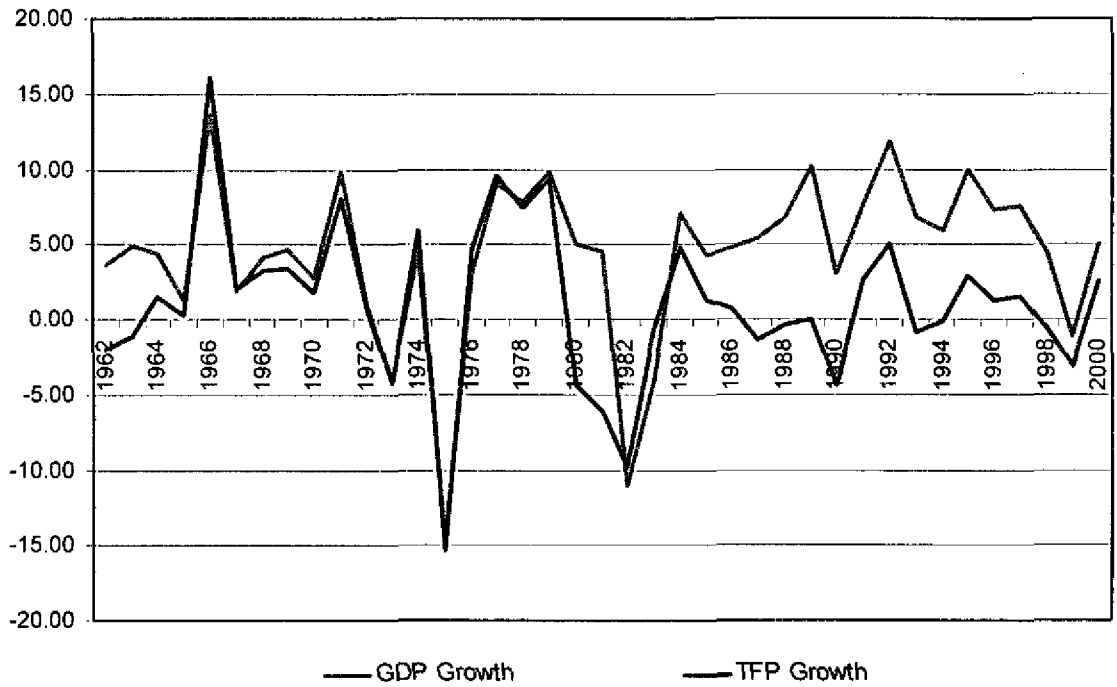
After a very marked upward trend in the terms of trade, Chile resumed high rates of economic growth in 2004 when GDP grew by 5.9%. It remains to be seen whether this a transitory event related to the increase in the terms of trade or a more permanent phenomenon.

[5] By significantly negative we imply an average growth below -0.5% per year. In 1962-65 productivity growth was also negative, albeit only marginally.
[6] See Meller and Larraín (1991).
[7] The price of copper fell 45% between 1974 and 1975.
[8] Beyer and Vergara (op.cit.) define four areas for further reforms: health, education, labour market and microeconomic reforms (regulation). Some of these reforms will be discussed later in the report.

TFP and GDP Growth

Figure 2.2 shows TFP and GDP growth, reflecting highly correlated trends in both variables. Indeed, the coefficient of correlation is 0.78 and it is also apparent that this was higher in the earlier periods. Both variables appear to have been quite correlated until 1985 and since then - although they broadly followed the same patterns - the correlation seems to be smaller. This is demonstrated in the finding that the coefficient of correlation of TFP growth and output growth is 0.86 for the period 1962-1985 and 0.75 for 1986-2000.

Figure 2.2



Another interesting feature of Figure 2.2 is that both lines representing GDP and TFP growth almost coincided between 1965 and 1985. However, from 1985 onwards they followed the same pattern but at different levels. Indeed, GDP growth has been much higher than TFP growth since the second half of the eighties.

As mentioned above, the business cycle in Chile is very much related to the terms of trade, which until the 1970s, were basically dictated by the price of copper. Although copper remains very important for the Chilean economy, its share in total exports has fallen from 80% in the early seventies to about 35% at present, making Chile is now less sensitive to the international price of copper. In addition, the country has established a copper compensation fund to balance out the "bad" and the "good" years (in terms of copper prices). In other words, when the price of copper increases the extra gains are saved and, in times of low prices, these additional resources are spent. Hence, the diversification of exports and a fiscal policy based on a long-term rather than the current price of copper have reduced the dependence of the business cycle on the copper prices. This makes the Chilean economy less sensitive to what happens in the rest of the world and, in particular, to the evolution of the prices of its exports. Its reduced sensitivity is

reflected in the fact that, since the mid-eighties, there have been a number of changes in the world economy and the Chilean economy has had only one mild recession. Output volatility is much lower now that what it used to be and, for example, the standard deviation of Chilean GDP growth in the period 1962-1985 was twice that recorded between 1985 and 2000.

Breakdown of growth

Table 2.2 shows a breakdown of economic growth in Chile into the contributions of capital, labour and TFP for the years 1962 to 2000[9], taking the averages of sub-periods of five years and the average for the whole period. As can be seen from the table, average GDP growth for the whole period was 4.3% and average TFP growth 1.1%. This means that TFP accounted for 25% of Chilean growth in the last four decades. The contributions of labor and capital were 1.2% and 2.0%, respectively. According to these figures, capital accumulation is the most important factor behind growth in Chile in the period 1962-2000, accounting for about 47% of GDP growth.

Table 2.2
GDP Growth Decomposition
(UNIDO data)

	GDP Growth	Contribution of :		
		Labor	Capital	TFP
1962 - 1965	3.6	1.0	2.9	-0.3
1966 - 1970	5.4	0.9	-0.8	5.3
1971 - 1975	-0.7	1.4	-1.1	-1.0
1976 - 1980	7.0	1.3	0.4	5.3
1981 - 1985	0.2	1.4	0.9	-2.1
1986 - 1990	6.1	1.3	5.9	-1.1
1991 - 1995	8.4	1.6	4.9	1.9
1996 - 2000	4.6	1.1	3.2	0.3
1962 - 2000	4.3	1.2	2.1	1.1

The initial literature on this subject concluded broadly that the unexplained part of output growth, the residual or total factor productivity (TFP), is the most important element behind the growth rate of different countries. For example, Solow (1957) finds that TFP explains 52 percent of the growth rate of the United States between 1909 and 1949. Denison (1967) estimates that, for the period 1950–62, TFP explains 40 percent of the U.S. growth rate, while it contributes 62 percent, on average, in a group of European countries. These high rates of TFP growth immediately triggered off a debate among experts. Some researchers, such as Jorgenson and Griliches (1971), pointed out that these early studies fail to recognize the heterogeneity of the different inputs. New estimates of TFP were calculated, with inputs categorized by type so that the growth of capital and labour became a weighted average of the growth of the different input types. The weights

[9] The statistical discrepancies were attributed to the capital with the sum of labour, TFP and capital making up GDP growth.

were the income shares of the different types of labour and capital in total labour and capital compensation, respectively. This procedure thus corrected marginal productivity of the different input types. Using this methodology, Jorgenson (1995) finds that TFP accounts for only 21.6 percent of the growth rate of the United States in the period 1947–85. Capital accumulation is the most important factor behind growth. The results found for Chile seem more in line with those latterly established for the United States.

From Table 2.2 it is also clear that, until 1985, years of high economic growth were also periods of high productivity growth (e.g. 1966 - 1970 and 1976 - 1980). By the same token, years of low or negative growth are associated with low or negative productivity growth (e.g. 1971 - 1975 and 1981 - 1985). Hence, the different growth rates between periods coincide with different rates of productivity growth. Easterly (2002) argues that differences in growth among and within countries for different periods of time are basically explained by differences in TFP. The results for Chile in these years bear out this claim although things looked different in the period 1986-2000. Indeed, GDP growth was particularly high from 1986 to 1995, albeit accompanied by rather modest productivity growth. In this period the higher level GDP growth is more closely related to larger contributions from capital accumulation rather than TFP growth.

Table 2.2 also clearly shows that the contribution of labour was stable over the whole period and this further evidenced in Figure 2.3 that indicates GDP and labour productivity growth, measured as average labour productivity (Y/L). As the growth rate of labour is relatively constant, all the variation in labour productivity comes from the variation in output. The coefficient of correlation between both series is close to one. Figure 2.4 depicts the contribution of labour, capital and TFP for every year since 1962. It is clear that the volatility of growth came mostly from TFP until 1985 and from the accumulation of capital since that year.

Figure 2.3

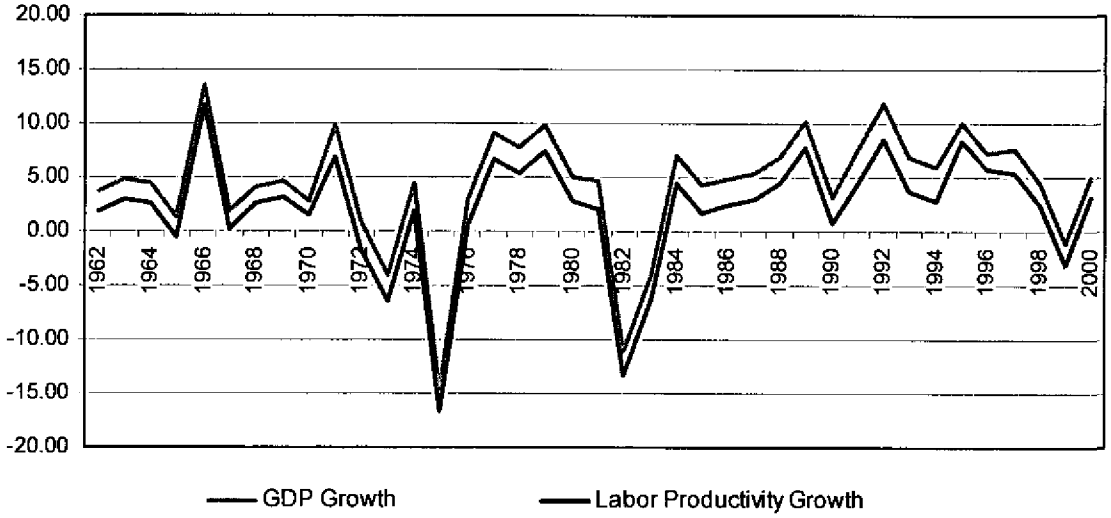
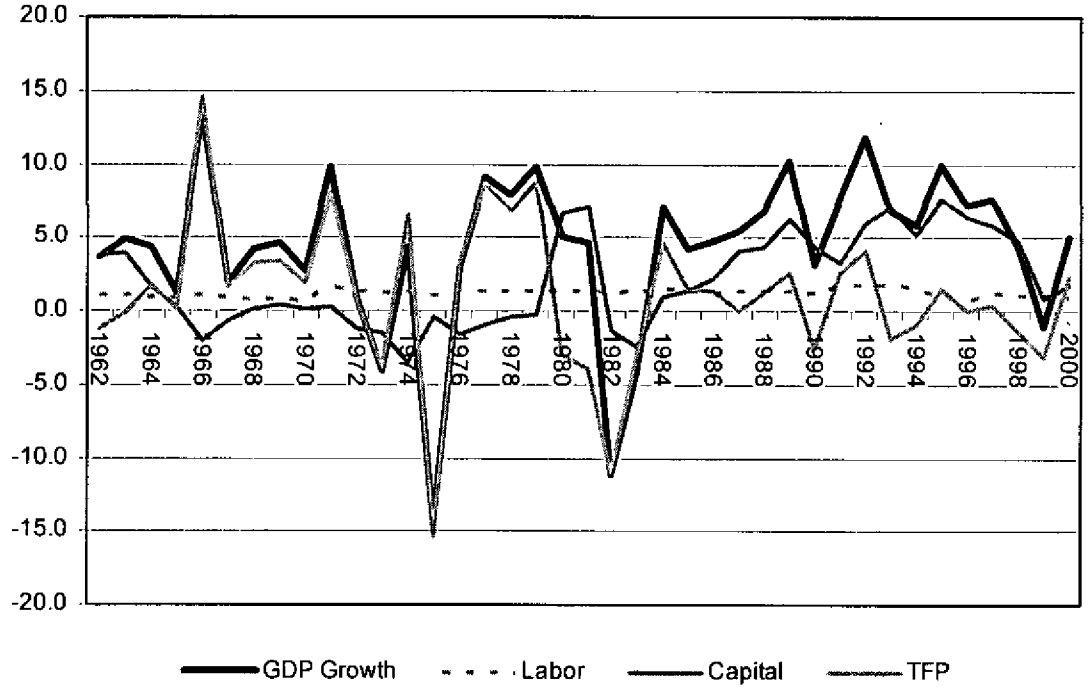


Figure 2.4



When TFP growth is broken down into change in technical efficiency and technical change, the data show that the change is TFP is mostly (90%) explained by technical change. This result comes as a surprise since it seems reasonable to think that, at the beginning of the reform process, growth was driven mostly by movements towards the technological frontier rather than by the shift of the frontier, given the major inefficiencies in the economy at that time. In the nineties, when most of the inefficiencies had been removed, the situation changed as there was little room for further technical improvements. Hence, it would be reasonable to assume productivity growth since then has been driven mostly by shifts in the technological frontier. This latter effect dominates in the data available. It is not, however, possible to discount the fact that this result could also be stem from the difficulty of separating both sources of productivity increase (technical change and technical efficiency).

Labour productivity relative to the USA

In 1961 labour productivity in Chile was 39.5% that of the USA and 38.9% in 2000. In broad terms it can be said that labour productivity in Chile relative to that of the USA remained more or less the same between 1960 and 2000. This is not a good result for a middle-income country which is supposed to be on a convergence path towards the economic level of the leading countries

The reason behind this mediocre record is a very poor performance in the first half of the period analyzed, which was offset by better results in the second half. The basic reforms in the Chilean economy date back to the mid-seventies and have been showing lasting results since the mid-eighties. Since then the Chilean economy has been in a process of convergence toward the leading economies. However, this has been the case only for fifteen years, which represent less than half the period covered by this report. Average labor productivity in Chile increased on average 0.9% per year from 1962 to 1985, compared to 3.8% between 1986 and 2000 (Table 2.3).

Table 2.3
Average Labor Productivity Growth
Chile: 1962 - 2000

Period	ALP Growth
1962 - 1985	0.9
1985 - 2000	3.8
1962 - 2000	2.1

The labour productivity growth rates since the mid-eighties were significantly higher than the rates of productivity growth in the developed world. Hence, there is an indication of convergence which, if continued, will bring more significant progress in one or two decades and the productivity gap between Chile and the United States will narrow.

2.2 Comparison with other studies

There have been several studies of TFP for Chile in the last several years[10]. The overall findings do not differ significantly from the data provided by UNIDO, although there are some differences in the sub-periods. The main difference, according to these alternative sources, is the suggestion of a productivity boom in Chile between 1986 and 1997 whereas the UNIDO data shows productivity growth in this period as positive but significantly lower. For instance, UNIDO data for the period 1986-2000 show an average productivity growth of 0.4% as compared to rate of 3.5% found by Vergara (2003).

Vergara (2003, op. cit.) measured total factor productivity in Chile since the mid- 70s and found an acceleration of productivity after the economic crisis of the early 80s. The Chilean literature on this subject[11] emphasized the economic reforms of the 1970s, 1980s and early 1990s as a driving force behind this productivity boom. Tables 2.4 and 2.5 show two measures of total factor productivity in Chile since the 1960s, based on the official figures of the country.

Table 2.4 does not adjust for factor quality, while Table 2.5 does reflect such adjustment for. Both tables show, on average, low (negative in some cases) productivity growth between 1960 and 1975, an acceleration in the second half of the 1970s after the initial economic reforms, a huge reduction in productivity in the first half of the 1980s, associated with the deep recession of that time, a further surge between the mid- eighties until 1997 - during the so- called "golden period of the Chilean economy" and, finally, a slowdown after 1997 (beginning with the Asian crisis).

Table 2.4
TFP: Not adjusting by factor's quality

	GDP Growth	Contribution of :		
		Labor	Capital	TFP
1960 - 1965	3.8	0.7	1.7	1.3
1966 - 1970	4.7	0.0	1.6	3.1
1971 - 1975	-2.2	0.1	0.8	-3.2
1976 - 1980	7.5	2.1	0.4	5.1
1981 - 1985	-0.7	0.9	0.7	-2.3
1986 - 1990	6.7	3.2	1.5	2.1
1991 - 1995	8.7	1.1	2.8	4.9
1996 - 2000	4.2	0.3	3.0	0.9
1998 - 2003	2.5	-0.1	2.0	0.5

[10] Rojas et. al, 1997; Roldós, 1997; Coeymans, 1999; Beyer & Vergara, op.cit.; Chumacero & Fuentes, 2002; Bergoing et. al., 2002; Fuentes et. al., 2004; Vergara & Rivero (2005).
[11] See Vergara & Rivero (2004) and De Gregorio (2004) for a review of the literature.

Table 2.5
TFP: Adjusting by factor´s quality

	GDP Growth	Contribution of :		
		Labor	Capital	TFP
1960 - 1965	3.8	2.2	1.8	-0.2
1966 - 1970	4.7	1.3	1.6	1.8
1971 - 1975	-2.2	2.4	-0.1	-4.6
1976 - 1980	7.5	1.3	1.4	4.9
1981 - 1985	-0.7	2.3	0.3	-3.4
1986 - 1990	6.7	2.6	2.2	1.9
1991 - 1995	8.7	2.9	2.2	3.5
1996 - 2000	4.2	1.2	2.8	0.2
1998 - 2003	2.5	0.8	1.8	-0.1

III. Assessment of the major determinants of productivity

The purpose of this section is to assess the country's strengths and weaknesses in the following five groups of determinants of productivity:

1. Creation, transmission and absorption of knowledge
2. Factor supply and allocation
3. Institutions, integration and invariants
4. Competition, social dimension and environment
5. Issues specific the country

The objective is to identify the major determinants of productivity performance in the last four decades within these five groups, and to describe their specific impact, intensity and channels of influence. The idea is to provide as most information as possible in terms of data on the different variables and also reflect previous literature on the subject. Drawing on these elements and on experience it will be possible to broadly identify the key determinants of productivity in Chile since 1960.

3.1. Creation, transmission and absorption of knowledge

In this group I assess the importance of research and development in the country. In the case of Chile technology transfer from abroad is an important source of knowledge. Trade and foreign direct investment are channels through which technology is transferred. Hence, the level of knowledge depends to a great extent on the country's absorptive capacity for new technology. The greater this capacity, the more likely that the transferred technology will be put to productive use.

Research and Development

The lack of a specific R&D policy has been frequently mentioned as one of the weaknesses of the Chilean economy (De Gregorio, 2004). There is evidence that countries which devote a larger portion of GDP to R&D have, on average, higher rates of growth (Lederman and Maloney, 2003). The theory is that R&D facilitates the adoption of new technologies and the production of better goods and services.

Table 3.1 shows the Growth Competitiveness Index (GCI) of the World Economic Forum for 2004 and 2003. In the latest index (2004) Chile is ranked in 22nd place which puts it ahead of all Latin American countries, in 3rd place among developing countries after the United Arab Emirates (16) and Estonia (20), and above several developed economies.

This is an outstanding result and is related to the good economic performance of Chile in the last twenty years. However, it is interesting to note that Chile ranks much lower in the Technology Index (TI), which is a sub-index within the GCI (Table 3.2). Indeed, in the TI Chile is ranked in 32nd place - ten positions below its ranking in the global index. The

WEF report argues that one of the important factors behind this relatively poor performance in technology is the poor quality of education, which will be discussed later. Another factor mentioned in literature is the relatively low investment in R&D (De Gregorio, op. cit.; Ministerio de Hacienda, 2004).

Table 3.1
Growth Competitiveness Index Rankings and 2003 Comparisons

Country	CGI 2004 Rank	CGI 2004 Score	CGI 2003 Rank*
Finland	1	5.95	1
United States	2	5.82	2
Sweden	3	5.72	3
Taiwan	4	5.69	5
Denmark	5	5.66	4
Norway	6	5.56	9
Singapore	7	5.56	6
Switzerland	8	5.49	7
Japan	9	5.48	11
Iceland	10	5.44	8
United Kingdom	11	5.30	15
Netherlands	12	5.30	12
Germany	13	5.28	13
Australia	14	5.25	10
Canada	15	5.23	16
United Arab Emirates	16	5.21	-
Austria	17	5.20	17
New Zealand	18	5.18	14
Israel	19	5.09	20
Estonia	20	5.08	22
Hong Kong	21	5.06	24
Chile	**22**	**5.01**	**28**
Spain	23	5.00	23
Portugal	24	4.96	25
Belgium	25	4.95	27
Luxembourg	26	4.95	21
France	27	4.92	26
Bahrain	28	4.91	-
Korea	29	4.90	18
Ireland	30	4.90	30
Malaysia	31	4.88	29
Malta	32	4.79	19
Slovenia	33	4.75	31
Thailand	34	4.58	32
Jordan	35	4.58	34
Lithuania	36	4.57	40
Greece	37	4.56	35
Cyprus	38	4.56	-
Hungary	39	4.56	33
Czech Republic	40	4.55	39
South Africa	41	4.53	42
Tunisia	42	4.51	38
Slovak Republic	43	4.43	43
Latvia	44	4.43	37
Botswana	45	4.30	36
China	46	4.29	44
Italy	47	4.27	41
Mexico	48	4.17	47
Mauritius	49	4.14	46
Costa Rica	50	4.12	51
Trinidad & Tobago	51	4.12	49
Namibia	52	4.11	52
El Salvador	53	4.10	48
Uruguay	54	4.08	50
India	55	4.07	56
Morocco	56	4.06	61
Brazil	57	4.05	54
Panama	58	4.01	59
Bulgaria	59	3.98	64
Poland	60	3.98	45
Croatia	61	3.94	53
Egypt	62	3.88	58
Romania	63	3.86	75
Colombia	64	3.84	63
Jamaica	65	3.82	67
Turkey	66	3.82	65
Peru	67	3.78	57
Ghana	68	3.78	71
Indonesia	69	3.72	72
Russian Federation	70	3.68	70
Algeria	71	3.67	74
Dominican Republic	72	3.63	62
Sri Lanka	73	3.57	68
Argentina	74	3.54	78
Gambia	75	3.52	55
Philippines	76	3.51	66
Vietnam	77	3.47	60
Kenya	78	3.45	83
Uganda	79	3.41	80
Guatemala	80	3.38	89
Bosnia & Hercegovina	81	3.38	-
Tanzania	82	3.38	69
Zambia	83	3.36	88
Macedonia, FYR	84	3.34	81
Venezuela	85	3.30	82
Ukraine	86	3.27	84
Malawi	87	3.24	76
Mali	88	3.24	99
Serbia & Montenegro	89	3.23	77
Ecuador	90	3.18	86
Pakistan	91	3.17	73
Mozambique	92	3.17	93
Nigeria	93	3.16	87
Georgia	94	3.14	-
Nicaragua	95	3.12	90
Madagascar	96	3.11	96
Honduras	97	3.10	94
Bolivia	98	3.09	85
Zimbabwe	99	3.03	97
Paraguay	100	2.99	95
Ethiopia	101	2.93	92
Bangladesh	102	2.84	98
Angola	103	2.72	100
Chad	104	2.50	101

* Note that these are the published rankings from 2003.
The three countries not coveres this year (Cameroon, Haiti and Senegal) covered this year (Cameroon, Haiti, and Senegal) are not shown.
Source: Global Competitiveness Report 2004 - 2005, World Economic Forum

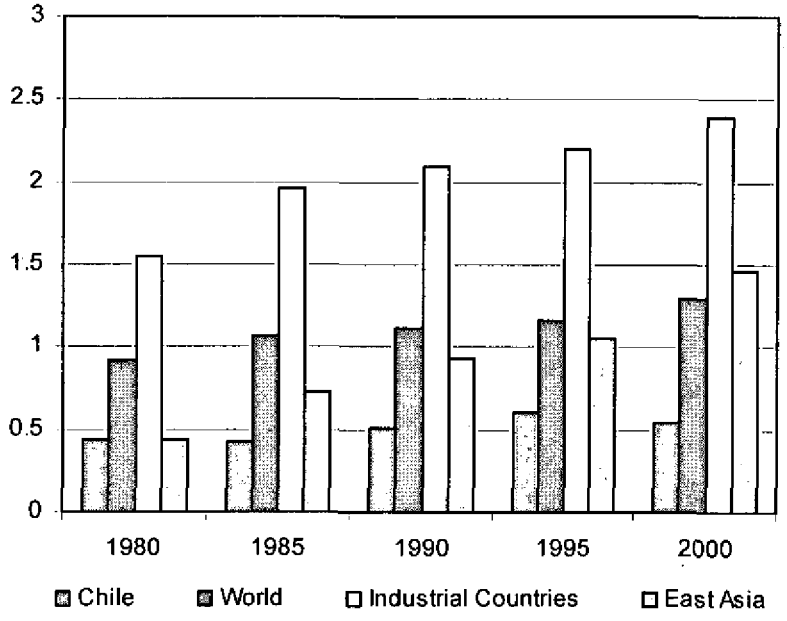
Table 3.2
GCI Components: Technology Index

Country	Rank	Score
United States	1	6.24
Taiwan	2	6.04
Finland	3	5.92
Sweden	4	5.80
Japan	5	5.68
Denmark	6	5.34
Switzerland	7	5.25
Israel	8	5.25
Korea	9	5.18
Norway	10	5.17
Singapore	11	5.11
Germany	12	5.08
Canada	13	5.05
Iceland	14	5.05
Estonia	15	5.01
Netherlands	16	4.98
Australia	17	4.93
United Kingdom	18	4.92
Czech	19	4.88
Spain	20	4.86
Malta	21	4.85
Austria	22	4.85
Portugal	23	4.78
New Zealand	24	4.76
United Arab Emirates	25	4.71
Slovenia	26	4.71
Malaysia	27	4.67
Slovak Republic	28	4.67
Hungary	29	4.66
France	30	4.65
Belgium	31	4.59
Chile	**32**	**4.55**
Lithuania	33	4.51
Hong Kong	34	4.49
Bahrain	35	4.47
Latvia	36	4.46
Ireland	37	4.43
Greece	38	4.42
Cyprus	39	4.36
South Africa	40	4.33
Luxembourg	41	4.28
Brazil	42	4.24
Thailand	43	4.24
Mauritius	44	4.19
Poland	45	4.19
Croatia	46	4.15
Romania	47	4.13
Mexico	48	4.13
Jamaica	49	4.12
Italy	50	4.08
Jordan	51	4.02
Turkey	52	4.01
Panama	53	4.00
Trinidad & Tobago	54	3.98
Costa Rica	55	3.97
Uruguay	56	3.92
Argentina	57	3.87
Tunisia	58	3.87
Bulgaria	59	3.82
Dominican Republic	60	3.80
Philippines	61	3.72
China	62	3.72
India	63	3.72
Botswana	64	3.70
Egypt	65	3.68
Namibia	66	3.66
Russian Federation	67	3.65
Colombia	68	3.60
El Salvador	69	3.60
Venezuela	70	3.60
Peru	71	3.45
Kenya	72	3.31
Indonesia	73	3.31
Morocco	74	3.30
Serbia & Montenegro	75	3.30
Macedonia, FYR	76	3.26
Uganda	77	3.22
Ghana	78	3.21
Guatemala	79	3.18
Georgia	80	3.18
Sri Lanka	81	3.17
Bosnia and Herzegovinaa	82	3.15
Ukraine	83	3.15
Tanzania	84	3.12
Gambia	85	3.12
Zimbabwe	86	3.04
Pakistan	87	3.02
Ecuador	88	3.01
Nigeria	89	2.99
Zambia	90	2.98
Paraguay	91	2.94
Vietnam	92	2.92
Honduras	93	2.89
Mozambique	94	2.89
Bolivia	95	2.81
Nicaragua	96	2.78
Malawi	97	2.74
Algeria	98	2.67
Madagascar	99	2.64
Bangladesh	100	2.62
Mali	101	2.52
Angola	102	2.30
Ethiopia	103	2.17
Chad	104	1.81

Source: Global Competitiveness Report 2004 - 2005, World Economic Forum

Figure 3.1 shows R&D expenditure as a percentage of GDP for certain groups of countries and for Chile. Chilean expenditure on R&D represents 0.5% of GDP, lower than the world's average of 1.3% and below the averages for industrial countries and for East Asia. In 1980 Chile spent more on R&D than the East Asian countries. These latter now devote about three times more funding to R&D than Chile (relative to their GDP).

Figure 3.1
R&D Expenditure (% of GDP)



Source: De Gregorio (2004)

Chile emerges more favourably in a comparison with Latin America. Table 3.3 shows the R&D expenditure of several Latin American countries for the period 1996 – 2000. All countries spend far less than the world's average in R&D. However, only Cuba and Brazil spend more than Chile. After adjusting per capita income by PPP, De Gregorio (op. cit.) concludes that Chile's expenditure on R&D is about the average of what could be expected, given its per capita income. Despite this, he suggests that the country would benefit from more investment in R&D.

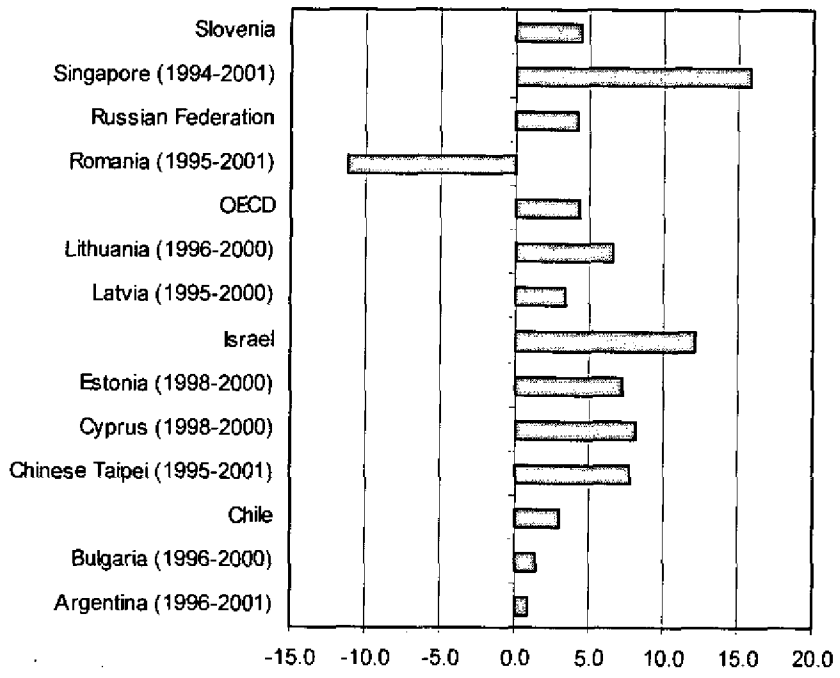
Table 3.3
R&D Expenditure
(% GDP)

	1996	1997	1998	1999	2000	2001
Argentina	0.42	0.42	0.41	0.45	0.44	0.42
Bolivia		-	-	0.30	0.29	0.34
Brazil	0.77	-	-	0.77	0.75	
Chile	0.58	0.54	0.54	0.55	0.56	0.54
Colombia	0.30	0.27	0.21	0.20	0.18	0.17
Costa Rica	0.21	0.21	0.20	-	-	-
Cuba	0.38	0.44	0.54	0.51	0.53	0.65
Ecuador	0.10	0.09	0.09	-	-	-
Mexico	0.31	0.34	0.38	0.43	-	-
Nicaragua		0.15	-	-	-	-
Panama	0.38	0.37	0.33	0.35	0.45	0.44
Peru		0.08	0.10	0.10	0.11	0.11
Uruguay	0.26	0.39	0.20	0.26	0.24	-
Venezuela	0.29	0.33	0.35	0.33	0.34	0.44
United States	2.55	2.58	2.60	2.64	2.70	2.80
Korea	2.60	2.69	2.55	2.47	2.68	2.96
Finland	2.54	2.72	2.89	3.19	3.35	3.42

Source:UNESCO

Figure 3.2 shows the average growth rate of expenditure on R&D for a selected group of countries. Chile's expenditure on R&D has grown at 3% per year - lower than the average for this group of countries (5%) - despite the fact that, during this period, Chile experienced an economic boom and its economy was one of the fastest growing in the world.

Figure 3.2
Evolution of Gross Domestic Expenditure on R&D
1993 - 2001
(average anual growth rate)



Source: Science, Technology and Industry Scoreboard 2003

Another aspect of R&D that has received attention in Chile is that some 55% of the expenditure is devoted to basic science, as compared to about 20% in East Asian countries. It is suggested that it is more efficient for a small developing country to adopt rather than produce new technologies. The concern is that Chile is devoting too many resources to basic science, where it is more difficult to achieve results and probably also spillovers from research for the rest of the economy.

Figure 3.3 shows expenditure in R&D by performing sector in OECD countries and Figure 3.4 shows the same data for developing countries. Total R&D expenditure is divided up according to the entities involved: business enterprises, the government, higher education institutions and private non-profit institutions. In OECD countries about 60% of R&D is carried out by business enterprises and only about 20% by the government. In non-OECD countries about 41% of R&D is undertaken by business enterprises and about 29 by the government. In Chile business enterprises account for only 24% of total R&D and the government 30%. Most of R&D (about 45% of total expenditure) in Chile is carried out by the universities, suggesting that there is very little private sector expenditure in this area.

It has been argued that the low level of R&D has been a deterrent for productivity growth in Chile. For countries such as Chile it makes more sense to adopt new technologies rather that develop them, except in a few product areas where the country is important in the global market and has clear comparative advantages. The capacity to adopt new technologies depends basically on the quality of the labour force which implies that the basic problem for Chile with respect to R&D is more likely to lie in the poor quality of education.

Figure 3.3
OECD Countries:R & D Expenditures by Performing Sector
(Percentage Share in National Total, 2001)

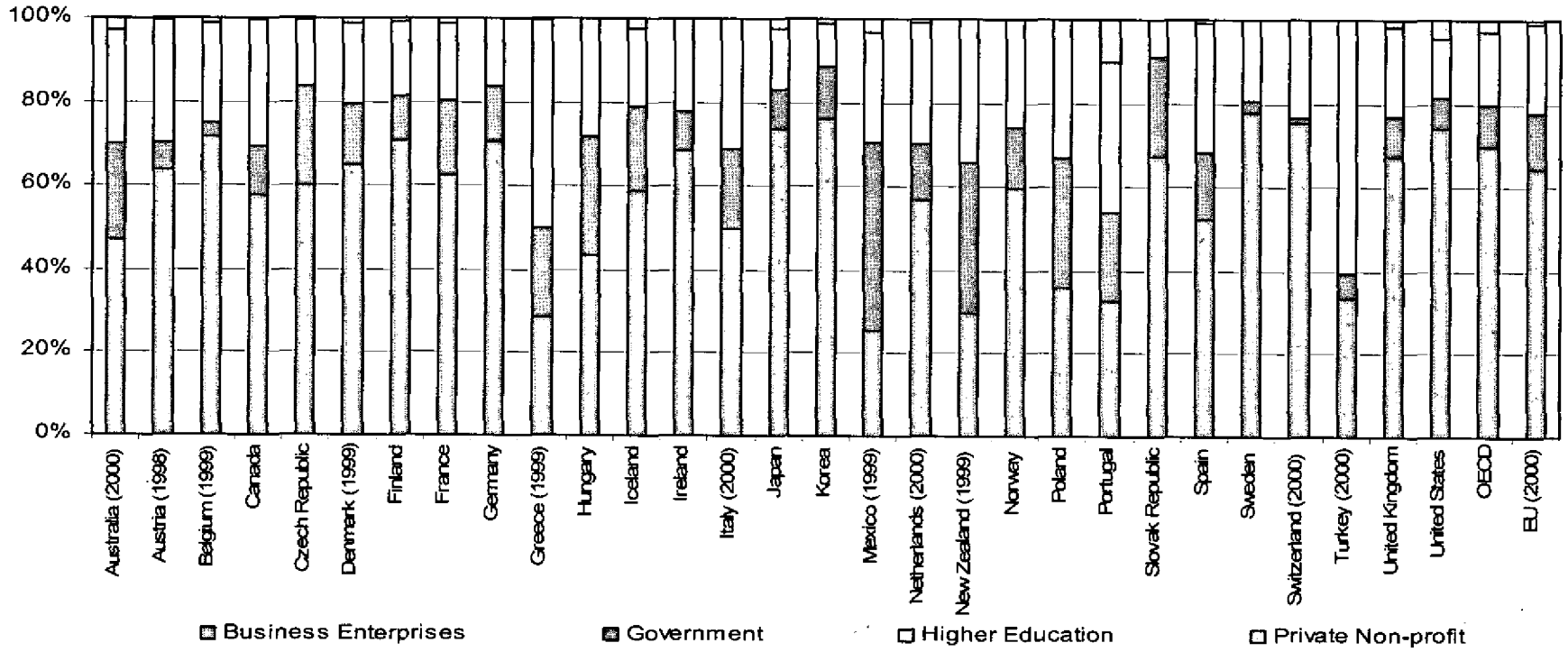
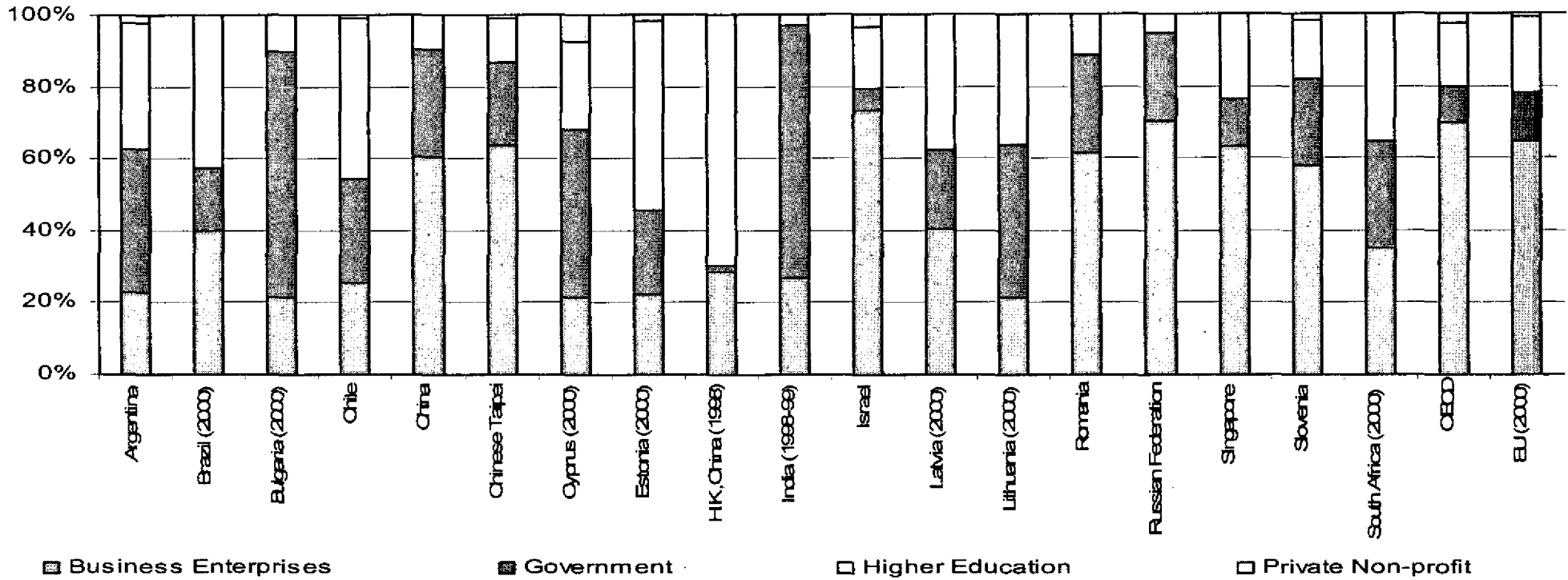


Figure 3.4
Non-OECD Conutries:R & D Expenditures by Performing Sector
(Percentage Share in National Total, 2001)



Source: OECD Science, Technology and Industry Scoreboard 2003

Trade

It has been suggested that one of the channels through which technology can be transferred is trade (another channel is foreign direct investment as discussed below). Goods and services incorporate new technologies that can be adopted and have spillover effects on the whole economy.

One of the key areas of the Chilean reform process is precisely trade liberalization[12]. Up until the early 1970s Chile was an extremely closed economy with an ECLA type of import substitution strategy. The average tariff was 105% (Table 3.4) and there was a wide dispersion of tariffs, depending on the type of goods in question. In addition there were several non-tariff restrictions to trade, such as quotas.

Table 3.4
Average Tariffs

1973	105%
1979	10%
1991	11%
2000	5%
2004	2%

Source: Central Bank of Chile

In 1974 Chile initiated a unilateral strategy of trade liberalization. The strategy entailed tariff reductions - independently of initiatives pursued by other countries - in order to converge towards a low and flat duty rate, and the elimination of the non-tariff restrictions. By 1979 the tariff level had fallen to a uniform rate of 10%. After the crisis of the 1980s there was some attempt at protectionism and tariffs were raised again. However, starting in the mid-1980s the process of tariff reduction was resumed and a level of 15% was reached in 1989.

In 1990 the new economic authorities decided to continue the process of tariff reduction and to complement it with free trade agreements with individual countries or groups of countries. Tariffs were initially reduced to 11% and then gradually to the current 6%.

Regarding the free trade agreements (FTAs), Chile embarked in a series of negotiations with different countries and today has FTAs with a number of them, including the United States and the European Union and also Mexico, Canada and Korea. Apart from Mexico, Chile is the country that has signed the most FTAs in the world and currently in negotiations with Japan, China and India.

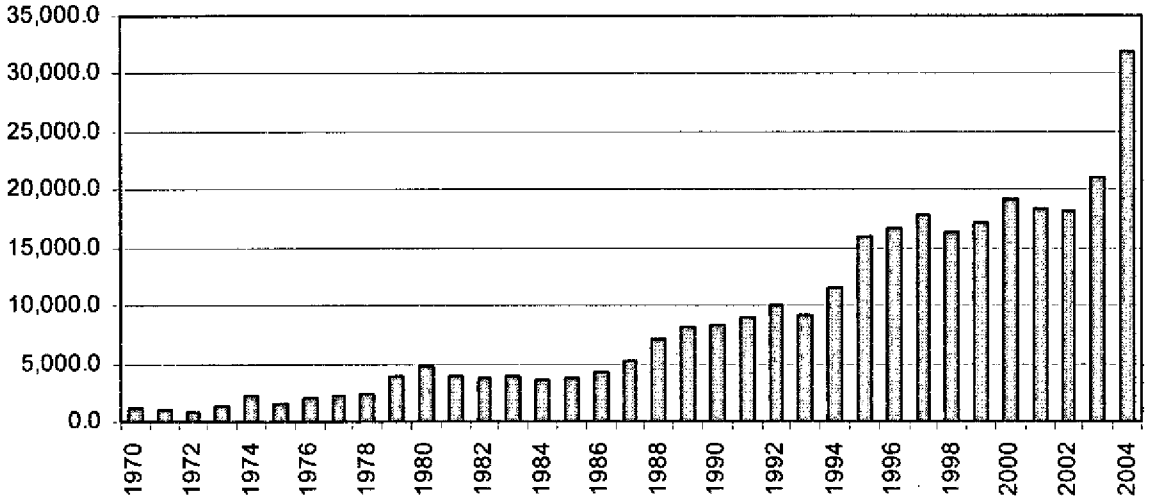
The free trade agreements have brought about a further reduction in the average tariff in force in Chile. Indeed, the common tariff is 6%, but it is actually zero for most imports from countries with which there is an FTA[13]. In addition there are some few agricultural

[12] See Hachette (2001a) for a comprehensive analysis of the Chilean trade reform.
[13] These countries represent more than 50% of Chilean foreign trade.

products that are subject to higher tariffs, although the average import tariff in the country is currently about 2%.

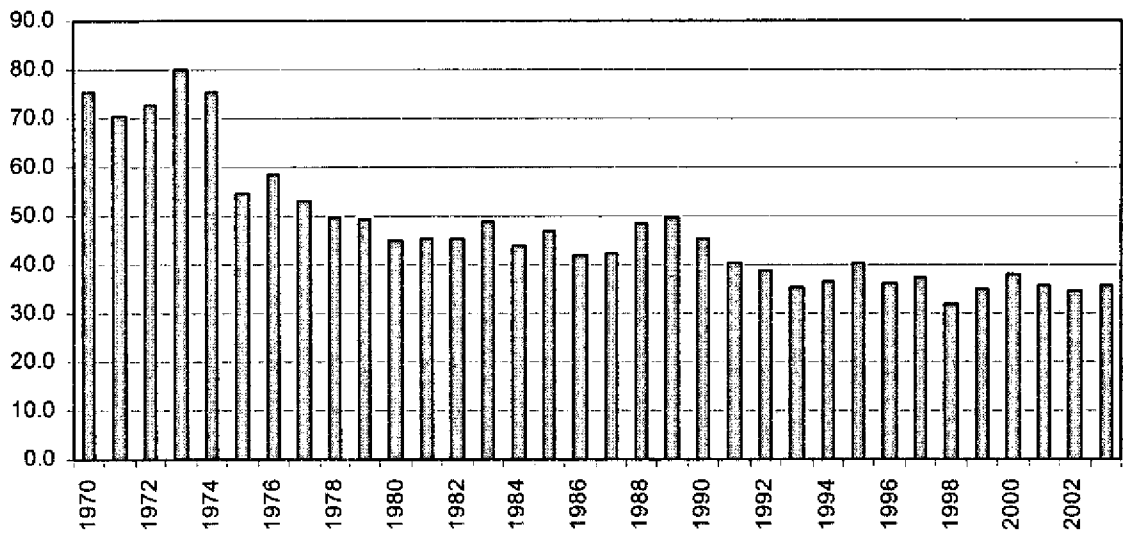
One of the effects of the trade liberalization was a significant increase in exports, which went from US$1 billion in 1970 to close to US$32 billion currently (Figure 3.5). It has to be mentioned that the huge surge in exports in 2004 (52%) is attributable to a large extent to the soaring price of copper that year. The share of copper in total exports declined from 76% in 1970 to 36% in 2003, while industrial exports increased their share in total exports from 12% to 47% (Figures 3.6 and 3.7).

Figure 3.5
1970 - 2004: Total Exports
(Billions US$)



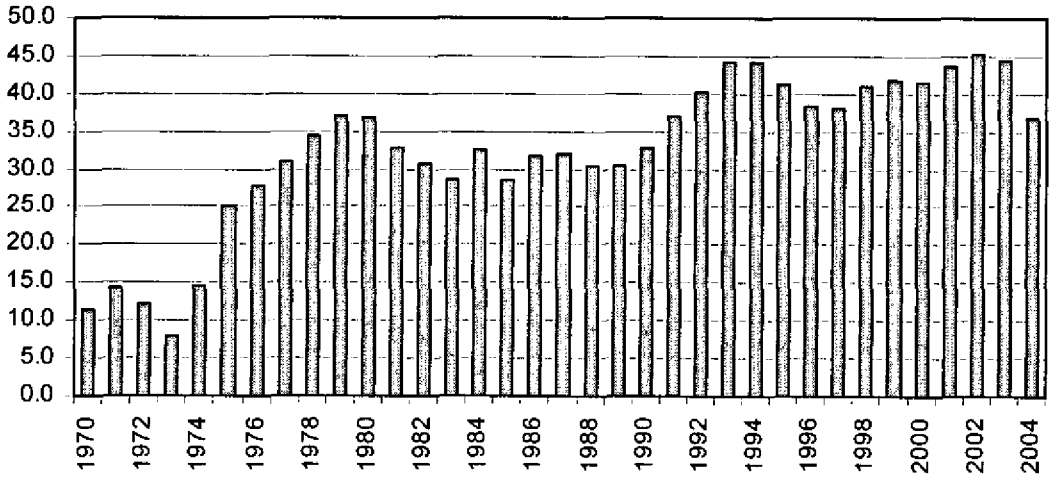
Source: Central Bank of Chile

Figure 3.6
Share of copper in total exports 1970 - 2003



Source: Central Bank of Chile

Figure 3.7
Industrial exports (% of total exports)



Source: Central Bank of Chile

Rojas et.al.(1997) find that 80% of the increase in total factor productivity in Chile in the period 1986-1996 is attributable to the increase in international trade. They argue that the channel through which openness to trade induces productivity growth is the increasing competition that it generates. In a very competitive environment the more efficient survive, hence there is a clear incentive to increase productivity. Additionally, if a country is open to free trade, there is less room for the discretion of the authorities involved. Rent-seeking is less profitable and companies devote more time to production, investment and innovation, thereby enhancing productivity growth.

De Gregorio and Lee (2004) find that the single most important factor explaining growth differences between East Asia and Latin America is trade openness. All this evidence confirms the importance of trade openness for the Chilean economic growth process of the last 20 years.

Although the share of industrial exports has increased in the last four decades, it has been claimed that most of these exports represent natural resources with relatively little value added (for instance wood pulp, fruits, furniture, and the like)[14]. This could be a natural consequence of Chile's low quality of education which hampers efforts to upgrade production processes towards higher value added goods. As discussed later in this paper, the quality of education is a problem in Chile, although, it is debatable whether it actually impedes change in the production mix in its economy. In fact, the value added levels of export products have increased in the last decades and Chile has also recently become an exporter of some services.

[14] World Economic Forum (2004).

Foreign direct investment

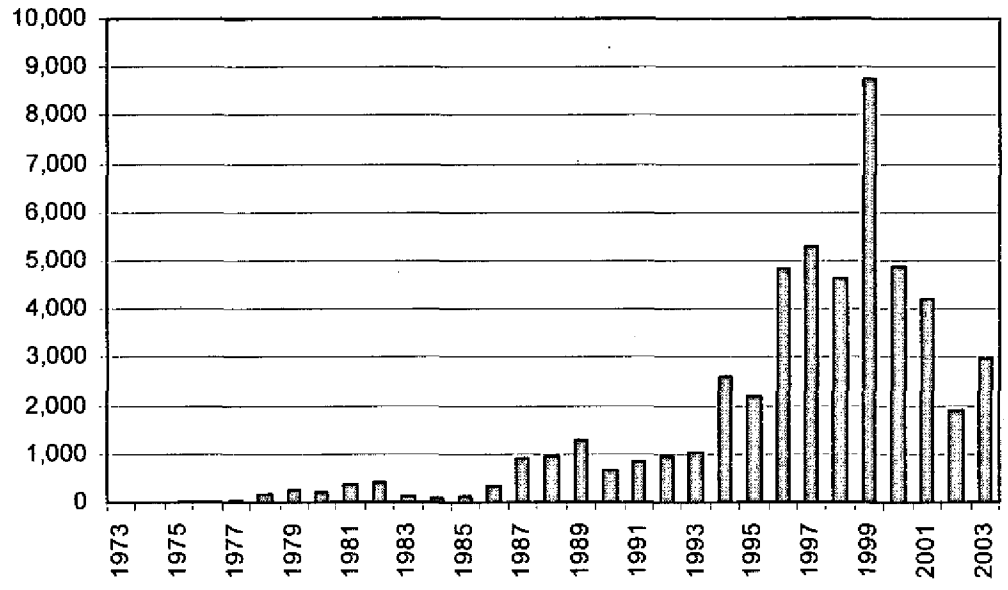
Foreign direct investment (FDI) is also a channel for the transmission of technology. In Chile FDI was very low in the early seventies due to uncertainty regarding property rights.

It must also be mentioned that the foreign-owned mining companies were expropriated by the Allende government. A new statute on FDI (DL 600) was implemented with the aim of increasing inflows and assures foreign investors ownership rights of their investments in the country. Figure 3.8 shows FDI in Chile in the period 1973-2003. After very low levels in the 1970s, FDI increased to about US$1 billion per year in the second half of the eighties. However, the big increase in FDI came after the return of democracy in 1990.

Between 1997 and 2001 inflows of FDI averaged US$5,500 million per year, or 7.4% of GDP.

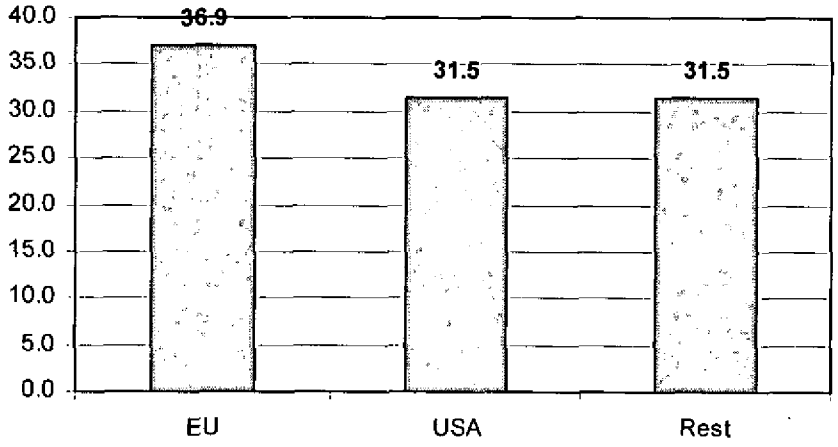
The countries of origin of FDI in Chile are mainly the European Union (37%) and the United Stated (32%) (Figure 3.9). By sector of destination, FDI has gone mostly to mining (35%), electricity gas and water (17%), manufacturing (13%) and financial services (11%) (Table 3.5).

Figure 3.8
Foreign Direct Investment
Chile: 1973 - 2003



Source: Central Bank of Chile

Figure 3.9
FDI by country of origin



Source: Central Bank of Chile

Table 3.5
Materialized investment by sector 1974 - 2003
(% of total)

Sector	1974 - 2003
Mining and quarrying	34.9
Manufacturing industries	13.3
Electricity, gas & water supply	17.4
Construction	2.4
Wholesale and retail trade	2.4
Communications	8.5
Financial services	11.4
Other Services	9.8
Total	100.0

Source: Foreign Investment Committee. Provisional figures as of December 31, 2003

The importance of FDI for the adoption of new technologies in Chile is clear. Its contribution to the upgrading of the production technology in mining, telecommunications, electricity, industry and other sectors is well established (Hachette, 2001b). Today more than 3,000 companies from 60 countries have operations in Chile. In addition, increasingly multinational companies have begun to view Chile as a springboard from which to do business throughout Latin America.

Anecdotal evidence suggests that foreign investors have been key players in the development of different industries. Bordeu (1995), for instance, suggests that the boom in the wine industry in Chile is directly linked to FDI. He argues that Chilean red wine became accepted worldwide after a Spanish company decided to invest in this industry in Chile. They realized that some changes in the production process were needed and,

specifically, found that the storage process was deficient and it was affecting the quality of the red wine. The storage technologies were upgraded and the quality of the wine soared.

Absorptive capacity

A country's absorptive capacity for new technologies is crucial for putting them to productive use. This capacity is very much related to two factors: education and institutional development. The higher the quality of education available to the workforce, the easier it is to absorb new technologies. As discussed in Section 3.2, Chile is unfortunately not well-positioned in terms of standards of education. With regard to institutions, in an environment where they work properly and there is little corruption, people devote more time to productive and less to rent-seeking activities. In this climate there is more likelihood that new technology is put to productive use (this is in fact the case for all economic activities and not just for those related to the absorption of knowledge). Chile, as will become clear in Section 3.3, is in a favourable position regarding the functioning of its institutions and the incidence of corruption in the country.

Vergara and Riveros (2005, op. cit.) found that, for the period 1986-2001, the sectors with the highest increase in TFP in Chile were those which deployed a high level of new technology in their activities. This suggests that there is good potential capacity to absorb new technologies.

3.2. Factor supply and allocation

Factor supply refers to investment in human capital, in labour quality, physical capital and physical infrastructure, while allocation refers to the structural change in production and the financial system.

a) Investment in human capital (quantity and quality)
In Table 3.6 different quantitative and qualitative education indicators are presented for a group of countries. The first column shows the average years of schooling. Chile, with 9.9 years, is ahead of the Latin American countries and even others such as Portugal, Spain and Thailand, but behind Ireland, Finland and New Zealand. In this quantitative indicator of education, Chile is close to the sample mean. The second column shows the share of population that has attained at least upper secondary education in the age group 25-64 years. Chile, with 46%, is marginally below the sample mean, but significantly below countries that can be looked as targets, such as Ireland, Finland and New Zealand. Regarding the net enrolment in secondary education (column 3), Chile is also marginally below the sample mean and significantly below it for the gross enrolment ratio in tertiary education – above only Mexico and Brazil within this sample of countries.

Table 3.6
Average years of schooling across countries

	Average years of schooling a/	Secondary education b/	Net enrollment ratio in secundary education c/	Gross enrollment ratio in tertiary education d/	Ratio of students to teaching staff e/ primary education	Educational attainment of 15 year-olds f/	
						% at or below level 1	% at levels 4 & 5
Argentina	8.3	42	81	57	22.7	47.7	11.9
Brazil	7.5	26	72	18	24.8	67.5	2.6
Chile	**9.9**	**46**	**79**	**37**	**33.4**	**57.7**	**4.9**
Mexico	8.0	22	60	20	27.0	51.7	7.0
New Zealand	12.1	76	92	72	19.6	14.2	47.4
Denmark	12.2	80	-	59	10.0	19.3	31.9
Spain	9.5	40	94	57	14.7	20.3	23.0
Finland	11.7	74	95	85	16.1	7.9	53.8
Ireland	10.2	58	82	47	20.3	12.7	41.0
Israel	-	-	89	53	20.1	40.4	16.9
Portugal	7.3	20	85	50	11.6	32.1	19.2
Thailand	7.5	38	-	37	20.4	49.9	4.3

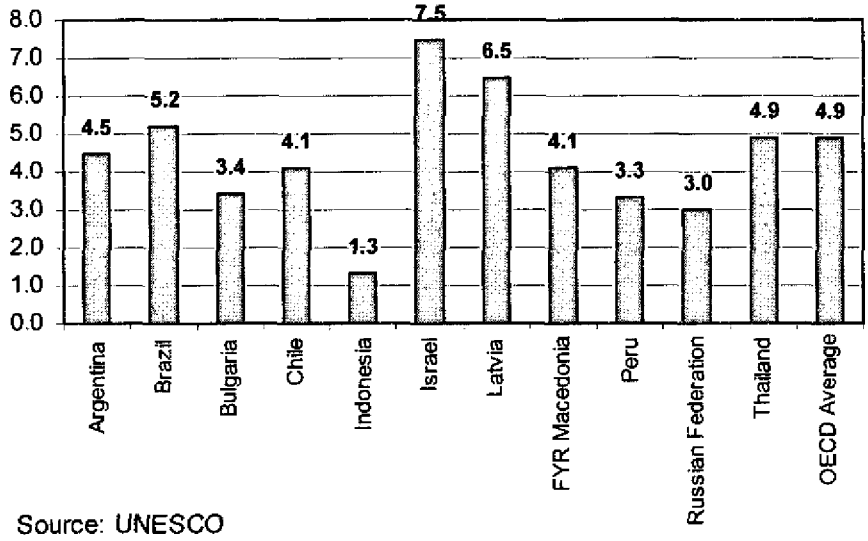
a/ For population aged 15 - 64 not studying (2000). OECD Development Centre, Techical Papers, No. 179.

b/ Population share that has attained at least upper secondary education in the age group 25 - 64 years (2001). OECD, Education at a Glance 2003

c/ For 2001 - 2002. UNESCO Institute for Satistics, Montreal, Global Education digest 2004, Comparing Education Statistics Across de world.
d/ The World Bank, World Development Indicators 2004, for 2001 - 2002
e/ In public and private institutions by level of education based on full time equivalents (2001). OECD, Education at a Glance 2003.
f/ Percentage of students at different levels of proficiency in the combined reading literacy scale (2000). OECD, Literacy skills for the World of Tomorrow. Further Results from PISA 2000
Fuente: World Economic Forum

Public expenditure on education as a percentage of GDP is presented for a group of countries in Figure 3.10. Chile spends 4.1% of GDP on public education, which is less than the OECD average but close to the mean of this sample of countries.

Figure 3.10
Public Expenditure on Education as Percentage of GDP
1999 - 2000



Source: UNESCO

In broad terms, the quantitative figures on education presented so far show that Chile is behind the developed countries and about average with respect to a group of developing countries.

Columns five to seven of Table 3.6 show qualitative indicators of education. Column five shows the ratio of students to teaching staff in primary education. Chile, with 33.4 students per teacher, has the highest ratio within the sample. This level of ratio is considered to have a negative impact in the quality of education. Columns six and seven show results of the Programme for International Student Assessment (PISA) of the OECD. This programme administers a reading comprehension test for students aged 15.

Column six shows that 58% of fifteen-year-old students in Chile are at or below the lowest level (level 1). Only Brazil does worse than Chile in this indicator. Column seven shows that only 4.9% of Chilean students are at level 4 and 5. In this indicator Chile is only above Brazil and Thailand.

Table 3.7 shows the PISA results by individual test. The mean scores for Chile in the three tests is 403, which places this country in position 35 out of a total of 41 countries that participated in the programme.

Chile also participated in the Third International Mathematics and Science Study (TIMSS) in 1999. In both tests the scores were in the lowest 20%. Chile's score in the science test was 24%, compared with a sample mean of 46%. Barro (1999) estimates that the projected level for Chile - given its per capita GDP at PPP - is 43%. His growth regression calculations suggest that, if Chile improves its science test score to this level, it would raise the GDP growth rate on impact by 2% per year. He argues

that this result is too high to be plausible, but that it suggests a substantial payoff for improved quality of schooling.

Barro (op. cit) concludes that the level of schooling is roughly average in Chile and therefore does not explain growth rate differentials. As the schooling variable he uses the average years of attainment by males at the secondary and higher levels, and the value for Chile (1.96) is similar to the sample mean (1.87). The value for Chile is also similar to that which would be predicted from its level of GDP (1.84). The greater difference in the case of Chile is in the quality of education which explains growth rate differentials in the country.

Table 3.7
PISA: Student performance on the combined reading, scientific & mathematical literacy scales and national income

Country	Performance on the combined reading literacy scale		Performance on the mathematical literacy scale		Performance on the scientific literacy scale		Total Mean Score	GDP per capita (US$) (2000)	Cumulative expenditure on educational institutions per student f/ (US$ a/) (1999)	
	Mean Score	S.E.	Mean Score	S.E.	Mean Score	S.E.				
1 Japan	522.0	5.2	557.0	5.5	550.0	5.5	543.0	26,011	54,737	
2 Hong Kong, China	525.0	2.9	560.0	3.3	541.0	3.0	542.0	25,153		
3 Korea	525.0	2.4	547.0	2.8	552.0	2.7	541.3	15,186	30,246	
4 Finland	546.0	2.6	536.0	2.2	538.0	2.5	540.0	25,357	47,854	
5 Canada	534.0	1.6	533.0	1.4	529.0	1.6	532.0	28,130	59,808	
6 New Zealand	529.0	2.8	537.0	3.1	528.0	2.4	531.3	20,372		
7 Australia	528.0	3.5	533.0	3.5	528.0	3.5	529.7	26,325	55,987	
8 United Kingdom	523.0	2.6	529.0	2.5	532.0	2.7	528.0	24,964	46,175	
9 Ireland	527.0	3.2	503.0	2.7	513.0	3.2	514.3	28,285	34,329	
10 Austria	507.0	2.4	515.0	2.5	519.0	2.6	513.7	28,070	77,027	
11 Sweden	516.0	2.2	510.0	2.5	512.0	2.5	512.7	26,161	54,845	
12 Belgium	507.0	3.6	520.0	3.9	496.0	4.3	507.7	26,392	49,489	
13 France	505.0	2.7	517.0	2.7	500.0	3.2	507.3	25,090	55,086	
14 Switzerland	494.0	4.3	529.0	4.4	496.0	4.4	506.3	29,617	66,214	b/
15 Iceland	507.0	1.5	514.0	2.3	496.0	2.2	505.7	28,143		
16 Norway	505.0	2.8	499.0	2.8	500.0	2.8	501.3	36,242	63,599	
17 Czech Republic	492.0	2.4	498.0	2.8	511.0	2.4	500.3	13,806	22,606	
18 United States	504.0	7.1	493.0	7.6	499.0	7.3	498.7	34,602	72,119	e/
19 Denmark	497.0	2.4	514.0	2.4	481.0	2.8	497.3	28,755	65,244	
20 Liechtenstein	483.0	4.1	514.0	7.0	476.0	7.1	491.0			
21 Hungary	480.0	4.0	488.0	4.0	496.0	4.2	488.0	12,204	21,997	b/
22 Germany	484.0	2.5	490.0	2.5	487.0	2.4	487.0	26,139	44,800	
23 Spain	493.0	2.7	476.0	3.1	491.0	3.0	486.7	20,195	41,267	
24 Poland	479.0	4.5	470.0	5.5	483.0	5.1	477.3	9,547	18,586	
25 Italy	487.0	2.9	457.0	2.9	478.0	3.1	474.0	25,095	58,868	b/
26 Russian Federation	462.0	4.2	478.0	5.5	460.0	4.7	466.7	8,377		
27 Portugal	470.0	4.5	454.0	4.1	459.0	4.0	461.0	16,780	41,166	b/
28 Greece	474.0	5.0	447.0	5.6	461.0	4.9	460.7	15,885	24,671	b/
29 Latvia	458.0	5.3	463.0	4.5	460.0	5.6	460.3	7,045		
30 Luxembourg	441.0	1.6	446.0	2.0	443.0	2.3	443.3	48,239		
31 Israel	452.0	8.5	433.0	9.3	434.0	9.0	439.7	20,131		
32 Bulgaria	430.0	4.9	430.0	5.7	448.0	4.6	436.0	5,710		
33 Thailand	431.0	3.2	432.0	3.6	436.0	3.1	433.0	6,402		
34 Mexico	422.0	3.3	387.0	3.4	422.0	3.2	410.3	9,117	12,189	
35 Chile	**410.0**	**3.6**	**384.0**	**3.7**	**415.0**	**3.4**	**403.0**	**9,417**	**17,820**	
36 Argentina	418.0	9.9	388.0	9.4	396.0	8.6	400.7	12,377	18,893	
37 FYR Macedonia	373.0	1.9	381.0	2.7	401.0	2.1	385.0	5,086		
38 Indonesia	371.0	4.0	367.0	4.5	393.0	3.9	377.0	3,043	1,164	d/
39 Albania	349.0	3.3	381.0	3.1	376.0	2.9	368.7	3,506		
40 Brazil	396.0	3.1	334.0	3.7	375.0	3.3	368.3	7,625	10,269	b,c/
41 Peru	327.0	4.4	292.0	4.4	333.0	4.0	317.3	4,799	3,479	
OECD average	500.0	0.6	500.0	0.7	500.0	0.7				
OECD total	499.0	2.0	498.0	2.1	502.0	2.0				

a/ US$ converted using PPP's.
b/ Public institutions only.
c/ Year of reference 1998.
d/ Year of refereboe 2000.
e/ Public and independent private institutions only.
f/ Average amount of money that countries spend per student from the beginning of primary education up to the age of 15.
Source: OECD (2003c) for OECD countries and World Bank (2002) for non-OECD countries.

Beyer and Vergara (2002) measure the potential impact of the quality of education using data from Barro and Lee (2000). Specifically, they incorporate their data on achievements on the international mathematics scale into a basic empirical model of TFP. They made cross-section regression calculations for average TFP growth for the period 1980 - 2000 and in respect of 107 countries. The indicator of educational

quality enters very strongly into the regression, suggesting that a good education may increase TFP growth significantly. Since Chile is almost 11 percentage points below the average in the TIMSS, achieving that average might raise TFP by almost 0.7 percent. This result is more modest than Barro's 2 percentage points, but is likely to be more plausible. In addition Beyer and Vergara (op.cit.) find that the channel for more economic expansion is productivity growth. A more qualified labour force is more productive and generates more economic growth (can more easily adopt new technologies, rapidly find solutions to new problems, better understand challenges as they arise etc.).

Chile has a lot to gain by improving its educational system. An average achievement would put the country at the level of Thailand and Lithuania, and below countries such as Latvia, Malaysia, and Bulgaria. None of these countries have a higher per capita GDP than Chile at purchasing power parity (PPP) levels. Beyer and Vergara compare the results of the TIMSS mathematics test against the level of per capita GDP (PPP-adjusted).Chile should have a much better performance in this test, given its level of GDP per capita.

One of the main factors behind the underachievement of Chilean students is that schools are rarely held accountable for their performance (Eyzaguirre and Fontaine, 2001). Educational institutions should therefore be reformed as a matter of urgency in order to ensure accountability among schools. Although Chile finances its schools through a voucher system, parents currently do not exercise their choice to move their children to better schools. Part of the problem is that the information on school performance does not flow easily to parents. Results on school achievements have only been available since 1995, and they are difficult to understand. It is indispensable that parents be alerted to poor school performance to enable them to move their children to better schools.

A major problem in this respect is that, in many counties, parents must choose among municipal schools that perform equally badly. In such cases, parents should have the possibility of opting out through transport vouchers or through direct intervention in the management of these schools. Introducing this last alternative would require a reform of the statute governing the employment of teachers which protects them to an extreme extent without assigning clear professional obligations. Under the terms of the current statute, it is almost impossible to fire teachers regardless of student performance.

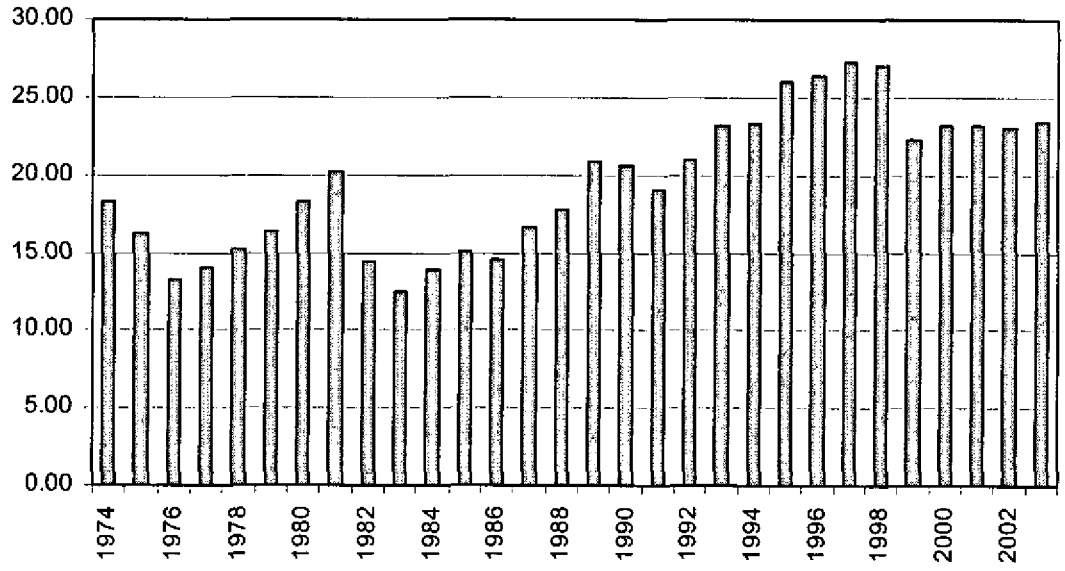
b) Physical capital

The calculations of TFP in Section 2 suggest that physical capital has not been the problem with Chilean economic growth, at least over the last two decades. According to Table 2.2 physical capital explains about 50% of growth between 1962 and 2000 and its contribution was even higher in the second half of this period.

Chile experienced an investment boom from the late eighties onwards. Fixed capital investment increased from less than 15% of GDP in the mid-eighties, after the recession of 1982-83, to over 27% of GDP in the mid-nineties (Figure 3.11). This makes Chile one of the Latin American countries with the highest investment rates, although they are still lower than in many East Asian countries (Larrain and Vergara,

1993). The stock of physical capital increased by a factor of 2.3 between 1980 and 2000.

Figure 3.11
Fixed Capital Investment (% GDP)



Source: Central Bank of Chile

Investment responds to the overall economic environment. The improved economic conditions, the rule of law, the macroeconomic stability, well established property rights, efficient regulations (most of them incorporated in the economic reforms of the last three decades) have been important factors behind the increase in physical investment. Other research (Vergara, 2004; Hsieh y Parker, 2003) also singles out fiscal policy as a driving force behind part of the investment boom in Chile (this subject will be discussed in more detail in Section 4).

On the other hand, the allocation of physical capital among sectors could be a measure of how flexible the economy is and how it responds to different shocks. It can be argued that the more flexible an economy, the better for productivity growth. Although imperfect, a possible proxy for production flexibility is the change in its composition. Figures 3.12a and 3.12b show the composition of GDP by sector in 1960 and in 2000. The most noticeable findings are the declining share of agriculture and the increasing shares of financial services and communications. The declining share of agriculture is an important issue for many developing countries, but, in the case of Chile, it had reached a relatively low level already in the 1960s and has therefore not been a major issue in the last four decades.

Figure 3.12a.
Composition of GDP by sector 1960

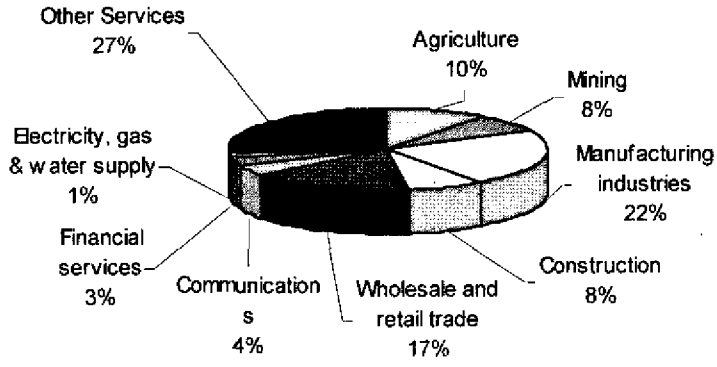
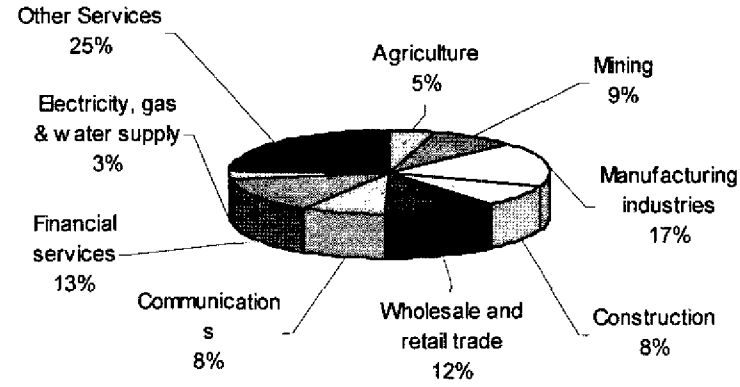


Figure 3.12b
Composition of GDP by sector 2003



Source: Central Bank of Chile

Vergara and Rivero (op. cit.) calculated the stocks of capital by sector for the period 1986-2001. The average growth rate of capital accumulation varied between 2% and 4%. Over a period of 15 year, these different rates gave rise to a significant accumulated difference among sectors. Better allocation of investment funds increases productivity since resources are channeled into areas where they are more productive.

c) Infrastructure

Aschauer (1989) found that public infrastructure is an important determinant in TFP growth. Servén and Solimano established that the relationship between private and public investment depends crucially on the composition of the former. Investment in infrastructure is likely to draw in private investment while other types of public investment have the opposite effect. Their estimates suggest that there are strong

complementarities between public and private investment for a group of developing countries.

Calderón and Servén (2003) developed an index of the infrastructure stock as well as an index of the quality of this infrastructure. The index of the infrastructure stock is based on proxies for telecommunications, power generation and roads. The index of infrastructure quality is based on indicators such as the waiting time for a new telephone line, the share of paved roads in the total network and transmission and distribution losses as a percentage of total electric production.

De Gregorio (2004, op. cit.) used this information to analyze the evolution of the infrastructure stocks in Chile. He found that the growth in the stock of infrastructure in Chile was very slow during the 1970s and the 1980s, but faster than what would have been predicted given the country's low (on average) rate of growth. He found that, in the 1990s, the stock of infrastructure in Chile increased at a faster rate than for the world as a whole.

De Gregorio also established that the improvement of the quality of infrastructure was more impressive in the 1990s. He attributes these changes both to an increase in public investment and also to a striking increase in foreign direct investment in the infrastructure. This increase in the stock of infrastructure has had an important effect on productivity.

Finally, when comparing the indices for Chile with those for the rest of the world, it emerges that, although there has been an impressive improvement in the last decade, Chile still lags behind in infrastructure as compared to countries with a similar level of development. This means that it is necessary for the infrastructure investment boom in Chile to last for several more years if adequate infrastructural standards are to be achieved. It also means that the poor infrastructure has negatively affected productivity over the last several years.

d) Financial sector

The position of the financial sector in Chile is explored by an analysis of three major reforms in the areas of banking, pensions and the central bank which were undertaken in the country over the past decades. All three reforms had positive and significant effects on productivity. As suggested below, the financial sector now constitutes one of the key strengths of the Chilean economy.

d.1) Banks

In the mid-seventies Chile initiated a process of financial liberalization. State-owned banks (with one exception) were privatized. Interest rates, previously set by the government, were liberalized and reserve requirements were lowered. The scope of the banking sector was widened and banks became involved in a variety of new business activities.

However, there were also cases of persons becoming bankers without any previous banking experience. Some of these persons were, at the same time, owners of major companies in the country and - as supervision was very lax - used banks to lend to their own businesses.

Although the government liberalized the market, it soon became clear that it would intervene to protect depositors if a bank failed and were obliged to do so in 1977 when a major bank failed. This, of course, created a serious moral hazard problem.

At the beginning everything looked very well, except that interest rates remained high during the whole period. In the early 1980s the world recession and domestic policy errors triggered a slowdown in economic activity. Profits declined and it became difficult to serve the debt through the banking system. Companies rolled over and asked for more loans in a situation that can be described as distress borrowing. As the owners of banks and the owners of the companies were often the same persons, old loans were rolled over and new ones granted. Nonetheless, depositors continued lending to banks on the premise that there was an implicit state deposit insurance. The system collapsed over the period 1982-83. In January 1983 the government took over four banks (among them the two largest private banks) and four other financial institutions and assumed control of about 50% of total bank credit.

The cost of the banking crisis was enormous[15]. The lesson was that the banking sector was not like any other sector in the economy, banking supervision was strengthened and a new banking act introduced in 1986. Today, banking supervision in Chile is considered to be one of the best systems in the emerging economies. Despite the recession and slowdown of the late 1990s, for example, the banking sector remains very strong.

Financial deepening, as measured by different monetary aggregates to GDP, has increased significantly. For instance, M3 increased from 14% of GDP in 1970 to 48% of GDP in 2003 (Table 3.8). Table 3.9 shows the index of bank financial strength developed by Moody's for a sample of 64 countries. According to this index of May 2004 (the latest available), Chile has the strongest banking sector among developing countries. Compared to the rest of Latin America, Chile has by far the healthiest banking sector of the region.

Banking sector strength and financial deepening are clearly some of Chile's strengths regarding productivity and economic growth. A deeper and well functioning financial system is crucial for channeling savings to investment projects. The deeper and more efficient the financial system is, the more effective the investment process. This, in turn, means a higher productivity for the country. Levine (2004) found that the deeper the financial system the higher the rate of growth.

[15] Eyzaguirre and Larrañaga (1990) estimate the total cost at about 25% of the 1990 Chilean GDP.

Table 3.8
Financial liberalization
(% of GDP)

	M3	M7
1970	14%	n/a
1980	25%	24%
1990	28%	54%
2003	48%	90%

Source: Central Bank of Chile

Table 3.9
Moody's Weighted Average Bank Financial Strength Index

	Country	Financial Strength Index				Percent change from Dec. 2003
		Dec. 2001	Dec. 2002	Dec. 2003	May. 2004	
Latin America	Argentina	13.3	0.0	0.0	0.0	0.0
	Bolivia	25.0	8.3	2.1	2.1	0.0
	Brazil	37.9	25.0	24.3	24.3	0.0
	Chile	**50.6**	**52.5**	**56.5**	**56.5**	**0.0**
	Colombia	23.3	24.2	24.2	24.2	0.0
	Ecuador	8.3	8.3	8.3	-	-
	Mexico	36.3	39.6	39.6	37.4	-5.5
	Peru	22.9	23.3	23.3	25.0	7.1
	Uruguay	31.3	0.0	0.0	0.0	-
	Venezuela	28.8	15.4	8.3	8.3	0.0
	Average	**27.8**	**19.7**	**18.7**	**19.8**	-
Emerging Europe	Bulgaria	-	16.7	20.8	20.8	0.0
	Croatia	33.3	33.3	33.3	33.3	0.0
	Czech Republic	29.2	32.5	33.9	38.0	12.0
	Estonia	38.3	46.7	46.7	46.7	0.0
	Hungary	41.7	45.0	42.5	42.5	0.0
	Israel	48.3	45.8	45.8	45.8	0.0
	Latvia	29.2	32.1	32.1	35.4	10.3
	Lithuania	-	-	-	-	-
	Poland	29.6	28.3	29.5	29.5	0.0
	Russia	12.5	10.8	10.8	10.8	0.0
	Slovak Republic	9.6	15.0	17.5	20.8	18.9
	Slovenia	40.2	40.8	45.2	45.2	0.0
	Turkey	30.0	20.4	20.4	19.0	-6.9
	Ukraine	8.3	8.3	8.3	8.3	0.0
	Average	**29.2**	**28.9**	**29.6**	**30.5**	-

	Country	Financial Strength Index				Percent change from Dec. 2003
		Dec. 2001	Dec. 2002	Dec. 2003	May. 2004	
Asia	China	10.0	10.0	10.0	10.0	0.0
	Hong Kong SAR	66.6	62.3	62.3	62.3	0.0
	India	25.8	27.5	27.5	27.5	0.0
	Indonesia	1.7	3.0	3.0	7.3	143.3
	Korea	14.2	16.7	18.3	20.0	9.0
	Malaysia	30.4	31.7	33.3	36.8	10.5
	Pakistan	2.1	5.0	9.6	9.6	0.0
	Philippines	17.5	20.4	20.4	19.2	-6.2
	Singapore	75.0	74.7	74.7	74.7	0.0
	Thailand	15.8	15.8	15.8	16.7	5.3
	Average	**25.9**	**26.7**	**27.5**	**28.4**	-
Middle East	Egypt	22.9	22.9	22.9	22.9	0.0
	Jordan	25.0	19.2	19.2	19.2	0.0
	Lebanon	33.3	33.3	33.3	33.3	0.0
	Morocco	35.8	35.8	35.8	35.8	0.0
	Oman	31.7	29.2	29.2	29.2	0.0
	Saudi Arabia	43.3	43.3	43.3	43.3	0.0
	Tunisia	16.7	16.7	16.7	16.7	0.0
	Average	**29.6**	**28.6**	**28.6**	**28.6**	-
Africa	South Africa	53.5	49.0	50.0	50.0	0.0
Other	Australia	71.7	72.5	72.5	72.5	0.0
	Canada	77.1	75.0	75.0	75.0	0.0
	Japan	16.7	12.9	12.0	12.0	0.0
	United States	77.1	75.0	75.0	75.0	0.0
	Average	**59.2**	**56.9**	**56.9**	**56.9**	-

1/ Constructed according to a numerical scale assigned to Moody's weighted average bank ratings by country.

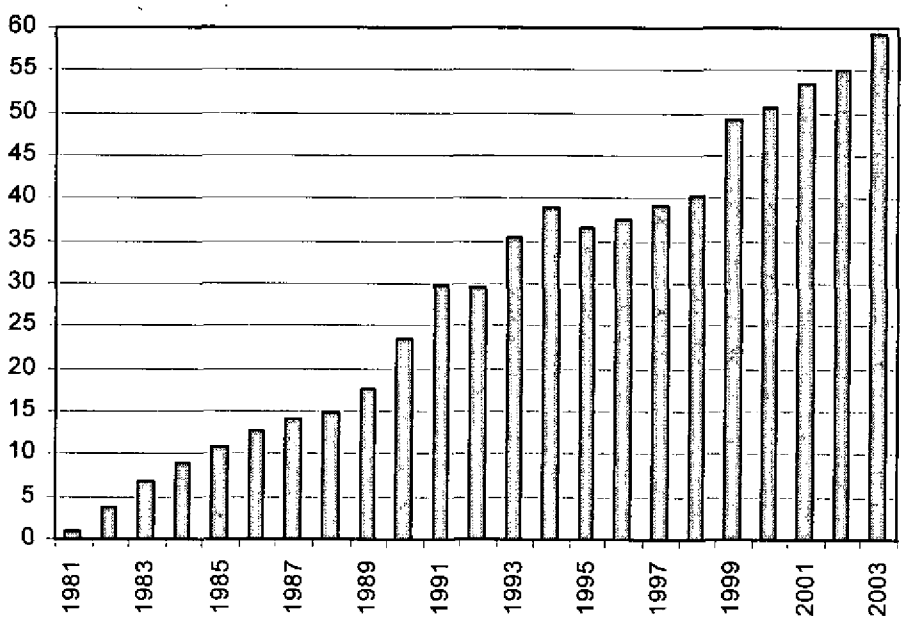
After the banking reform of 1985, the sector became a key factor promoting productivity growth in Chile. As it channels savings funds to investment projects in an efficient manner, it ensures that they are allocated where they are more productive, enhancing in this way the overall productivity of the country.

d.2) Pensions

In 1981 Chile adopted an individual capitalization pension system based on each working person saving a certain percentage of his/her salary (with a ceiling) for retirement. These funds go into an individual account administered by a private company and the individual can freely move his funds among different private companies if he feels that they are not properly administered. These companies are regulated and supervised and, for example, there are restrictions on the composition of their portfolio to ensure a certain level of diversification[16].

Pension funds have steadily expanded over the past two decades and currently approach US$50 billion or over 50% of GDP (Figure 3.13).

Figure 3.13
Pension fund (% GDP)



Fuente: Superintendencia de AFP

Private pension funds have been key players in the development of the financial sector in Chile, especially in the development of the long-term market. Chile is one of the very few

[16] There are at least two reasons why it is reasonable to regulate these companies. Firstly, the funds correspond to mandatory savings – i.e. each individual is required by law to save in one of these companies for his retirement. In this sense there is a degree of responsibility on the part of the state regarding the prudent administration of the funds. Secondly, there are explicit state guarantees.

emerging economies with a long-term market denominated in its own currency. Twenty-year and longer-term bonds and mortgages are issued and traded. Without the pension system it would have been difficult to achieve this level of development. It is also important to mention that private pension systems of the Chilean type have been adopted in a number of Latin American and Eastern European countries.
This long-term capital market has ensured that long-term investment projects have access to financing in the country at reasonable rates in. As these can be among the most productive projects, the overall productivity of the economy is boosted.

d.3) Central Bank independence
Chile had a long tradition of high inflation - even longer than most other Latin American countries – and, for this reason a new law giving independence to the Central Bank was adopted in 1989. Under the terms of this new act, the board of the Central Bank consists of five members nominated by the president and approved by the senate. Each board member has a 10-year term and one is changed every two years. They are independent of the government (cannot be removed from their position). The Ministry of Finance has the right to participate in the board meetings, but does not have any voting power.
The record of the Central Bank in terms of inflation control is impressive. After the periods of massive inflation in the early 1970s (in 1973 inflation was 500%), levels have ranged from 20%-30%. The new autonomous central bank decided to implement inflation targets starting in 1991. The objective was to achieve a persistent and gradual decline in inflation which has been below 3% in the last four years. As seen in Table 3.10, inflation targets have been met every year since 1991, with minor exceptions such as in 2000 when the prevailing level of 4.5% was somewhat above the target of 3.5%. This shortfall was due to the increase in the price of oil[17].

Since 2000 the target has become a permanent one (rather than a year-to-year rate as it was previously), and ranges between 2% and 4%.
As discussed below, macroeconomic stability (including the low inflation rate) is one of the major strengths of the Chilean economy. It has created a good environment for investment, innovation, and productivity growth.

[17] In Chile the target is headline rather than core inflation.

Table 3.10
Inflation target (IT) and actual inflation (AI)
(%)

Year	IT	AT
1991	15 - 20	18.7
1992	13 -16	12.7
1993	10 - 12	12.2
1994	9 - 11	8.9
1995	9.0	8.2
1996	6.5	6.6
1997	5.5	6.0
1998	4.5	4.7
1999	4.3	2.3
2000	3.5	4.5
2001	2 - 4	2.6
2002	2 - 4	2.8
2003	2 - 4	1.1
2004	2 - 4	2.4

Source: Central Bank of Chile

3.3. Institutions, Integration and Invariants

The role of good institutions and integration into the global economy are seen as crucial to economic growth. In this sub-section the influence of institutions on productivity in Chile is analyzed. The integration of Chile in the world economy was analyzed in detail in Section 3.1, hence only a brief further examination of this issue follows here. Invariants refer to factors such as geographic location, natural resource endowments and size which will also be reviewed in Sub-section 3.3.

a) Institutions and economic policies

TFP growth is strongly linked to the quality of institutions and economic policies[18] in place. Which institutions and economic policies have the greatest impact on economic growth? In the case of Chile, it is necessary to also identify the marginal initiatives that increase economic growth in an economy which already enjoys a reasonable rate of expansion. The driving forces behind growth are not as obvious here as in the case of a stagnant economy. The extensive research of the last two decades provides a broad orientation for increasing economic growth, but is not conclusive on specific policy recommendations. A large body of literature (for example, Easterly, 1993; Krueger, 1990) suggests that poor policies may profoundly affect economic performance heavily. This is not, however, the case in Chile: while the country's economic policies may show room for improvement, they are generally sound and largely respond to economic dictums. Related literature focuses on the role of institutions in the process of economic growth (e.g. North, op.cit.). Modifying institutions is a very hard task and the impact of such efforts is less obvious than other forms of policy actions.

Here, however, there is more room for improvement in Chile, the educational sector and the government bureaucracy being obvious targets for reform. Their impact on economic growth is indirect but highly significant. An inefficient government bureaucracy, for example, may permanently hinder efficiency gains. A reform initiative that would substantially improve the efficiency of the state bureaucracy could generate an almost continuous increase in the country's economic efficiency if it generates new economic activities. The same can be said of a once-and-for-all improvement in the quality of education. Productivity will increase as new school graduates enter the labour force, and the increases will continue until the old workforce is completely replaced. This may occur even if the schooling level of the new workers is the same as that of the workers leaving the labour market.

One of the problems associated with empirical work on this subject has been the lack of data on many of the relevant economic policies and institutions. In the last two decades, however, different organizations have systematically collected reliable data on the quality of economic policies and institutions, although much of the information relies on subjective measures of institutional quality. Another problem is that different indicators tend to be highly correlated within each dataset which is hardly surprising, as most high-quality policies and institutions come in a package. A country with a good regulatory framework probably also has a highly qualified bureaucracy and low levels of corruption, while the reverse is true in the case of countries with a poor regulatory framework. Moreover, good institutions may be the result - and not the cause - of strong economic

[18] North (1992), Beyer and Vergara (op.cit.).

growth. Even so, there are good reasons to treat institutions as exogenous. Growing evidence indicates that most countries have long-standing institutions and that these have changed only slightly over time. The same evidence also shows that the institutions have affected economic performance[19].

Institutions and economic policies have been mentioned as a single issue up to now. Although they are related, it is clear that they can be treated separately. The analysis that follows makes this separation, firstly focusing on institutions. Aspects such as bureaucracy, rule of law, corruption and related issues are examined, followed by an analysis of economic policies in Chile with the emphasis on macroeconomic policies.

Institutions

Table 3.11 shows the Public Institutions Index of the World Economic Forum Global Competitiveness Index in which Chile occupies 20th position, which is higher that its overall ranking (22). This puts Chile second among developing countries, just behind the UAE. It is undoubtedly a very good position and, in broad terms, shows that Chile has a solid starting basis in terms of institutional development, but also suggests that there is room for improvement.

Kaufmann, Kraay, and Zoido-Lobatón (1999) aggregate different measures of governance, from various sources of information, into six solid indicators: voice and accountability measures the extent to which citizens of a country are able to participate in government selection; political instability and violence measures perceptions of the likelihood of government destabilization; government effectiveness reflects the quality of governance by combining perceptions of the public services with the independence and competence of the civil service, among other indicators; regulatory burden records the extent to which a country's policies are market-unfriendly and perceptions of the burdens imposed by excessive regulation; rule of law includes several indicators that measure the extent to which agents have confidence in and abide by the rules of society and, finally, graft assesses perceptions of corruption. The choice of units of governance ensures that the estimates have a mean of zero, a standard deviation of one, and a range from around –2.5 to around 2.5. Higher values correspond to better outcomes.

Beyer and Vergara (op.cit.) developed a composite index of governance based on these indicators for 78 countries. This index has a mean of 0.11, a maximum value of 1.75, a minimum of –2.09 and a standard deviation of 0.775. Chile ranks high with a value of 1.031, suggesting that the Chilean government is doing a relatively good job. The index is then included in their cross-section regressions on TFP growth which proves to be highly significant. The authors argue that, despite Chile's good performance, a plausible objective is to shorten by half the distance between the maximum value in the ranking and Chile's value. This would add about 0.4 percentage points to Chile's TFP growth.

[19] On both aspects, see Acemoglu, Johnson, and Robinson (2001).

Table 3.11
GCI Components: Public Institutions Index

Country	Rank	Score
Denmark	1	6.59
Iceland	2	6.58
Finland	3	6.48
New Zealand	4	6.41
Norway	5	6.35
Sweden	6	6.31
United Kingdom	7	6.23
Switzerland	8	6.22
Hong Kong SAR	9	6.22
Singapore	10	6.21
Germany	11	6.21
Australia	12	6.10
Netherlands	13	6.08
Luxembourg	14	5.99
Austria	15	5.99
Japan	16	5.88
Ireland	17	5.87
Canada	18	5.84
United Arab Emirates	19	5.82
Chile	**20**	**5.77**
United States	21	5.74
Belgium	22	5.71
Portugal	23	5.69
Israel	24	5.64
France	25	5.62
Estonia	26	5.59
Taiwan	27	5.56
Bahrain	28	5.56
Jordan	29	5.43
Malta	30	5.39
Slovenia	31	5.28
Uruguay	32	5.23
Cyprus	33	5.18
Spain	34	5.16
South Africa	35	5.15
Tunisia	36	5.14
Hungary	37	5.07
Malaysia	38	5.06
Botswana	39	4.98
Namibia	40	4.92
Korea	41	4.81
Morocco	42	4.75
Lithuania	43	4.75
Greece	44	4.74
Thailand	45	4.71
El Salvador	46	4.71
Costa Rica	47	4.69
Italy	48	4.64
Slovak Republic	49	4.64
Brazil	50	4.62
Czech Republic	51	4.56
Latvia	52	4.55
India	53	4.45
Ghana	54	4.44
China	55	4.39
Bulgaria	56	4.36
Gambia	57	4.30
Peru	58	4.28
Mexico	59	4.28
Panama	60	4.26
Colombia	61	4.25
Turkey	62	4.22
Malawi	63	4.20
Trinidad and Tobago	64	4.18
Mauritius	65	4.16
Zambia	66	4.16
Algeria	67	4.13
Indonesia	68	4.12
Jamaica	69	4.11
Egypt	70	4.10
Dominican Republic	71	4.08
Sri Lanka	72	4.08
Zimbabwe	73	3.99
Romania	74	3.94
Kenya	75	3.87
Croatia	76	3.86
Ethiopia	77	3.80
Bosnia & Hercegovina	78	3.80
Argentina	79	3.77
Poland	80	3.70
Nicaragua	81	3.68
Vietnam	82	3.66
Mali	83	3.66
Guatemala	84	3.61
Serbia & Montenegro	85	3.61
Uganda	86	3.61
Bolivia	87	3.55
Tanzania	88	3.54
Russian Federation	89	3.54
Ecuador	90	3.42
Venezuela	91	3.41
Macedonia, FYR	92	3.41
Angola	93	3.38
Mozambique	94	3.36
Madagascar	95	3.32
Nigeria	96	3.31
Ukraine	97	3.29
Paraguay	98	3.24
Philippines	99	3.21
Honduras	100	3.19
Georgia	101	3.17
Pakistan	102	2.87
Chad	103	2.61
Bangladesh	104	2.47

Source: World Economic Forum

In the case of Chile, well-functioning institutions have promoted productivity growth through many different channels. Firstly, more efficient institutions reduce the time and resources spent on doing business. If, instead of devoting time to bureaucratic paperwork, companies concentrate on productive activities, overall productivity obviously increases. Secondly, there are fewer resources devoted to rent-seeking activities and more to production matters.

Thirdly, the rule of law offers more security with regard to property rights, creating a more enabling environment for investment, production and innovation. Chile has been in a position to exploit all these benefits over the past decades.

An alternative measure of government effectiveness is provided by the *International Country Risk Guide*, published by the PRS Group. This guide evaluates the risks faced by business in countries around the globe. It includes the IRIS dataset, which compiles country scores for six variables: corruption in government, rule of law, bureaucratic quality, ethnic tensions, repudiation of contracts by government, and risk of expropriation. Beyer and Vergara (op.cit.) use the scores – ranging from 1 (low quality) to 4 (high quality) – for bureaucratic quality as a measure of government effectiveness. Figures are available for the period 1982–97, although only a few countries have data for the entire period. For each country, they take the mode of the available data. They show that this measure of government effectiveness is positively correlated with TFP growth. More specifically, their regressions suggest that increasing Chile's current score of 3 to the highest level may increase TFP growth by 0.8 percent. This confirms the previous finding and suggests that a state reform may have a significant impact on economic growth.

Transparency International produces an index of corruption, defined as the abuse of public office for private gain. It also measures the degree to which corruption is perceived to exist among a country's officials and politicians. The scores range from 10 (completely clean) to 0 (highly corrupt). Chile is in position 20, with a score of 7.4. (Table 3.12) which ranks the country as the least corrupt among developing countries and in a better position than many developed countries. This is undoubtedly constitutes a major strength of the Chilean economy.

Table 3.12
Transparency International Corruption Perceptions Index, 2003 (*)

Country	Rank	Score
Finland	1	9.7
Iceland	2	9.6
Denmark	3	9.5
New Zealand	4	9.5
Singapore	5	9.4
Sweden	6	9.3
Netherlands	7	8.9
Australia	8	8.8
Norway	9	8.8
Switzerland	10	8.8
Canada	11	8.7
Luxembourg	12	8.7
United Kingdom	13	8.7
Austria	14	8.0
Hong Kong	15	8.0
Germany	16	7.7
Belgium	17	7.6
Ireland	18	7.5
United States	19	7.5
Chile	**20**	**7.4**
Israel	21	7.0
Japan	22	7.0
France	23	6.9
Spain	24	6.9
Portugal	25	6.6
Oman	26	6.3
Bahrain	27	6.1
Cyprus	28	6.1
Slovenia	29	5.9
Botswana	30	5.7
Taiwan	31	5.7
Qatar	32	5.6
Estonia	33	5.5
Uruguay	34	5.5
Italy	35	5.3
Kuwait	36	5.3
Malaysia	37	5.2
United Arab Emirates	38	5.2
Tunisia	39	4.9
Hungary	40	4.8
Lithuania	41	4.7
Namibia	42	4.7
Cuba	43	4.6
Jordan	44	4.6
Trinidad and Tobago	45	4.6
Belize	46	4.5
Saudi Arabia	47	4.5
Mauritius	48	4.4
South Africa	49	4.4
Costa Rica	50	4.3
Greece	51	4.3
South Korea	52	4.3
Belarus	53	4.2
Brazil	54	3.9
Bulgaria	55	3.9
Czech Republic	56	3.9
Jamaica	57	3.8
Latvia	58	3.8
Colombia	59	3.7
Croatia	60	3.7
El Salvador	61	3.7
Peru	62	3.7
Slovakia	63	3.7
Mexico	64	3.6
Poland	65	3.6
China	66	3.4
Panama	67	3.4
Sri Lanka	68	3.4
Syria	69	3.4
Bosnia and Herzegovina	70	3.3
Dominican Republic	71	3.3
Egypt	72	3.3
Ghana	73	3.3
Morocco	74	3.3
Thailand	75	3.3
Senegal	76	3.2
Turkey	77	3.1
Armenia	78	3.0
Iran	79	3.0
Lebanon	80	3.0
Mali	81	3.0
Palestine	82	3.0
India	83	2.8
Malawi	84	2.8
Romania	85	2.8
Mozambique	86	2.7
Russia	87	2.7
Algeria	88	2.6
Madagascar	89	2.6
Nicaragua	90	2.6
Yemen	91	2.6
Albania	92	2.5
Argentina	93	2.5
Ethiopia	94	2.5
Gambia	95	2.5
Pakistan	96	2.5
Philippines	97	2.5
Tanzania	98	2.5
Zambia	99	2.5
Guatamala	100	2.4
Kazakhstan	101	2.4
Moldova	102	2.4
Uzbekistan	103	2.4
Venezuela	104	2.4
Vietnam	105	2.4
Bolivia	106	2.3
Honduras	107	2.3
Macedonia	108	2.3
Serbia and Montenegro	109	2.3
Sudan	110	2.3
Ukraine	111	2.3
Zimbabwe	112	2.3
Congo, Republic of the	113	2.2
Ecuador	114	2.2
Iraq	115	2.2
Sierra Leone	116	2.2
Uganda	117	2.2
Côte d'Ivoire	118	2.1
Kyrgyzstan	119	2.1
Libya	120	2.1
Papua New Guinea	121	2.1
Indonesia	122	1.9
Kenya	123	1.9
Angola	124	1.8
Azerbaijan	125	1.8
Cameroon	126	1.8
Georgia	127	1.8
Tajikistan	128	1.8
Myanmar	129	1.6
Paraguay	130	1.6
Haiti	131	1.5
Nigeria	132	1.4
Bangladesh	133	1.3

(*) The index defines corruption as the abuse of public office for private gain, and measures the degree to which corruption is perceived to exist among a country's public officials and politicians. The scores range from 10 (squeaky clean) to zero (highly corrupt).
Source: Transparency International

Table 3.13 shows the Business Competitiveness Index of the GCI. Chile ranks 29, which is below its overall ranking (22) and puts it in first place among Latin American countries and fourth among developing countries. Table 3.14 shows some indicators that may give insights into Chile's weaknesses with respect to business competitiveness. The different indicators shown in this table concern the costs of starting a business and of enforcing a contract in a sample of countries, combining both the advanced and the Latin American economies. In Chile there are ten procedures involved in starting a business - in line with the sample mean (9). It takes a total of 28 days to set up a business, which is significantly lower than the sample mean (58). However, the cost of starting a business is slightly above the sample mean.

Regarding the cost of enforcing a contract, Chile is slightly above the sample mean in terms of the number of procedures and expenses, but below the sample mean with regard to the time (number of days) involved. In summary, Chile is about average regarding the cost of initiating a business and enforcing a contract, but significantly above the average in the more general indices. Here further advances should be made and it should be possible to streamline the bureaucratic procedures for new businesses in Chile without great difficulty.

Another issue that has been a subject of debate in Chile is labour regulation. As documented by Heckman and Pagés (2000), the cost of workers in Chile is among the highest in Latin America. It is estimated that these costs have a significant impact on employment and, especially, on youth unemployment. At present, the expected cost of firing a worker in Chile is well above the average for the region. Research suggests that labour regulation can be counted as one of the weaknesses of the Chilean economy. There have been a number of proposals to make the labour market more flexible, such as reducing the aforementioned costs and these proposals will be analyzed in Section 4.

Table 3.13
The Business Competitiveness Index

Country	Ranking	Company operations & strategy ranking	Quality of the national business environment ranking
United States	1	2	2
Finland	2	7	1
Germany	3	1	5
Sweden	4	5	6
Switzerland	5	4	7
United Kingdom	6	8	4
Denmark	7	9	3
Japan	8	3	11
Netherlands	9	6	9
Singapore	10	13	8
Hong Kong SAR	11	15	10
France	12	10	16
Australia	13	19	12
Belgium	14	11	19
Canada	15	16	13
Austria	16	14	17
Taiwan	17	12	20
New Zealand	18	20	15
Iceland	19	17	18
Norway	20	23	14
Israel	21	18	21
Ireland	22	22	22
Malaysia	23	28	23
Korea	24	21	28
South Africa	25	24	25
Spain	26	25	27
Estonia	27	34	24
United Arab Emirates*	28	32	26
Chile	**29**	**33**	**29**
India	30	30	32
Slovenia	31	27	33
Tunisia	32	43	30
Portugal	33	42	31
Italy	34	26	43
Czech Republic	35	31	37
Lithuania	36	37	35
Thailand	37	36	36
Brazil	38	29	44
Slovak Republic	39	41	39
Bahrain*	40	53	34
Greece	41	40	42
Hungary	42	48	38
Jordan	43	54	40
Indonesia	44	38	46
Cyprus	45	59	41
Morocco	46	45	45
China	47	39	47
Costa Rica	48	35	50
Latvia	49	51	48
Malta	50	60	49
Namibia	51	63	51
Turkey	52	44	55
Mauritius	53	49	54
Jamaica	54	52	53
Mexico	55	46	56
Romania	56	61	57
Poland	57	47	64
Colombia	58	58	61
Trinidad & Tobago	59	55	62
Panama	60	66	58
Russian Federation	61	62	60
Botswana	62	73	52
Kenya	63	66	63
Ghana	64	71	59
El Salvador	65	65	65
Egypt*	66	57	68
Gambia*	67	70	66
Sri Lanka	68	69	67
Ukraine	69	64	71
Philippines	70	50	77
Uganda*	71	75	69
Croatia	72	72	70
Pakistan	73	67	75
Argentina	74	68	78
Bulgaria	75	86	72
Peru	76	77	74
Uruguay	77	80	76
Zambia*	78	85	73
Vietnam	79	81	79
Dominican Republic	80	74	83
Nigeria*	81	76	80
Zimbabwe	82	79	84
Macedonia, FYR	83	84	82
Malawi	84	83	85
Serbia & Montenegro	85	87	81
Guatemala	86	78	90
Madagascar	87	88	88
Venezuela	88	82	91
Algeria	89	93	86
Tanzania	90	92	87
Mali*	91	95	89
Georgia	92	89	93
Bosnia & Hercegovina	93	96	92
Ecuador	94	90	95
Bangladesh	95	97	94
Mozambique	96	94	98
Honduras	97	91	100
Paraguay	98	98	96
Ethiopia	99	101	97
Nicaragua	100	100	99
Bolivia	101	99	101
Chad*	102	103	102
Angola*	103	102	103

* Survey data for these countries have high within-country variance. Until the reliability of survey responses improves, with future educational efforts and improved sampling in these countries, their rankings should be interpreted with caution.
Source: World Economic Forum

Table 3.14
Doing Business in Chile in 2004

Country	Starting a business			Enforcing a contract		
	Number of Procedures	Time (1)	Cost (2)	Number of Procedures	Time (1)	Cost (2)
Argentina	15	68	8.0	32	300	8.5
Brazil	15	152	11.6	16	380	2.4
Chile	**10**	**28**	**11.6**	**21**	**200**	**14.7**
Colombia	19	60	27.2	37	527	5.9
Costa Rica	11	80	21.4	11	80	21.4
Denmark	4	4	0.0	14	83	3.8
Finland	4	33	3.1	19	240	15.8
Ireland	3	12	10.4	16	183	7.2
Israel	5	34	4.7	19	315	34.1
Mexico	7	51	18.8	47	325	10.0
New Zealand	3	3	0.2	19	50	11.6
Portugal	11	95	12.5	22	420	4.9
Spain	11	115	18.7	20	147	10.7
Sweden	3	16	0.8	21	190	7.6
Venezuela	14	119	19.3	41	360	46.9
Sample Average	9	58	11.2	24	253	13.7

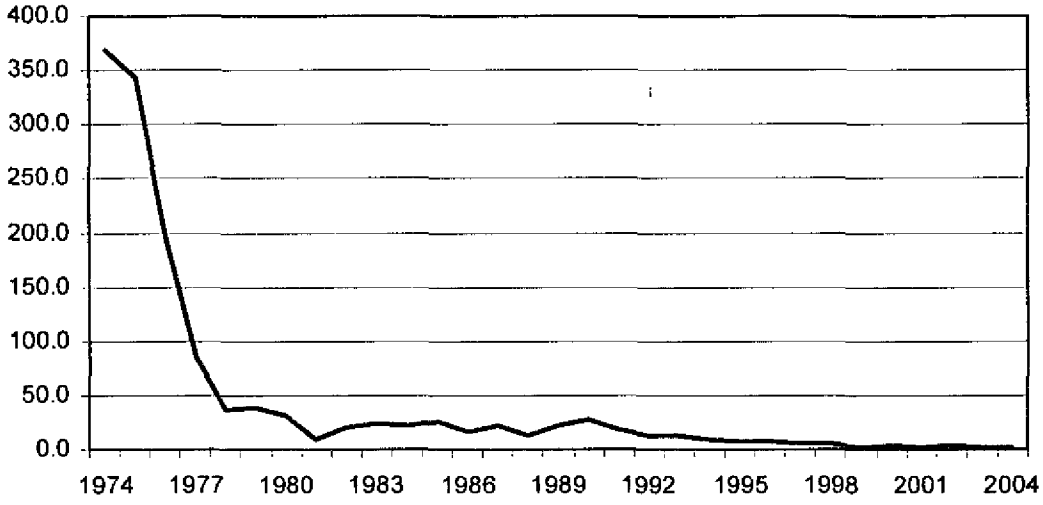
(1) Time measured in days.
(2) Cost measured as percent income per capita.
Source: Doing Business in 2004, Worldbank.

Economic policy

Macroeconomic stability and, more specifically, low inflation, have been found to have a positive effect on growth[20]. High inflation rates give rise to greater costs when inflation is unexpected. Chile had a long tradition of inflation starting in the 1940s. The peak was reached in 1973 when a level of over 500% was recorded. In the eighties it fluctuated in the range of 20%-30%. In the nineties it declined initially to a one-digit level and then assumed what can be called international ranges (the target is currently between 2%-4%. As mentioned in Section 3.2, since this policy was implemented, inflation has always been within the target range) (Figure 3.14).

[20] Fischer (1993), Barro (1997), de Gregorio (1992).

Figure 3.14
Inflation



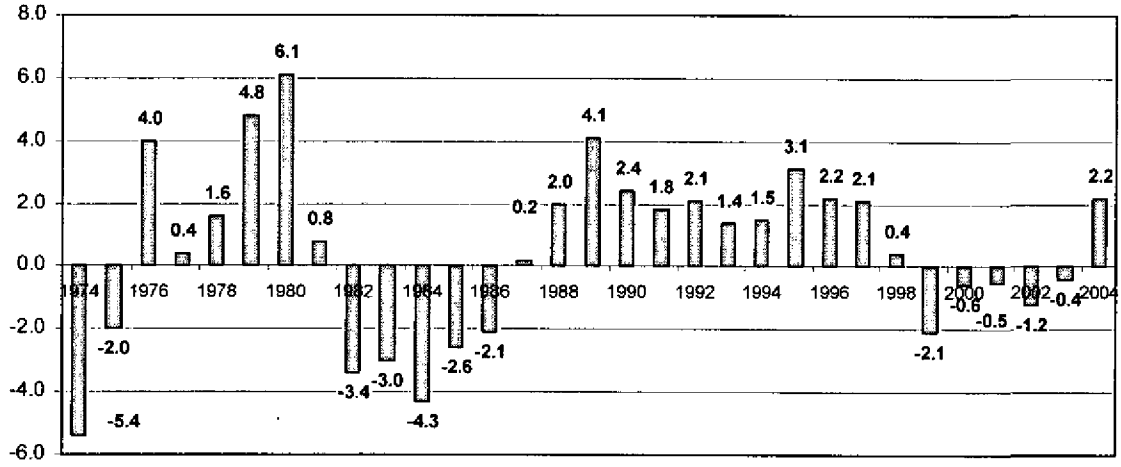
Source: Central Bank of Chile.

Since 1989 Chile has an independent central bank whose goal is to maintain price stability and, as previously mentioned, it follows an inflation target policy. The board members are nominated by the President of the Republic and presented to the Senate that can approve or reject the nomination. Most of the nominees are persons with high professional qualifications.

This is one of the reasons why the Central Bank of Chile enjoys high prestige and credibility and it is not an exaggeration to state that one of the key strengths of the country is its autonomous and highly professional central bank.

Fiscal policy used to be one of Chile's greatest weaknesses. The persistent and high budget deficits were financed through money creation which, in turn, translated into inflation. The record level was reached in 1973 (as with inflation) when the central government had a deficit equivalent to 11% of GDP and the broader non-financial public sector had a deficit of 30% GDP. After 1973 a fiscal adjustment a tax reform were implemented. Budget deficits declined substantially and there was a surplus by 1976. With the recession of 1982-83 the deficits returned, but at a much lower level than in the 70s (the highest deficit of 4.3% of GDP was reached in 1984). The government again achieved a surplus in 1987 and this situation continued until 1998. The recession of 1999 led to the first deficit in more than a decade which, although low, persisted until 2003. In 2004 there was a surplus of 2.2% of GDP (Figure 3.15). The high economic growth and the budget surpluses of the period 1987-98 were reflected in a substantial decline in the level of public debt. The consolidated net debt of the non-financial public sector and the Central Bank was 50% of GDP in 1989 and has fallen to about 15% of GDP at present.

Figure 3.15
Central Government Budget
(% GDP)



Source: DIPRES

In addition, in 2000 the government implemented a policy aimed at achieving a structural surplus of 1% of GDP for the central government[21]. In the case of Chile this means a surplus of 1% of GDP after adjusting for the long-run price of copper and the business cycle (in order to calculate revenues assuming that the economy is in its long-term trend). In practice this means that - in bad years - there will be a surplus below 1% (possibly a deficit) and - in good years - a surplus above 1% of GDP. There are least two benefits of this policy (Vergara 2002): firstly, it is a rule for fiscal sustainability and, secondly, it allows for a countercyclical fiscal policy.

The problem with the budget until 1973 was not only the lack of fiscal austerity, but also the chaotic administration of public spending. Indeed, there was no clear accountability for expenditure and, in practice, there was not clear overview of the handling of the public finances. In 1975 the new organic law of the "financial administration of the state" was approved. According to this law, only the executive branch is responsible for proposing the budget for the year (both estimates of revenues and expenditures) and Congress cannot increase spending. It only can approve the proposal of the executive or suggest a reduction in public spending, if it considers it to be excessive. All public debt matters must be approved by the Budget Office and have to be in line with the approved budget. There is some flexibility in the allocation of resources within the different areas of the state, but the budget imposes an absolute ceiling for public expenditure.

This new institutional framework established clear responsibilities for the administration of the budget and allowed the government to control spending[22].

[21] See Marcel et. al (2001).
[22] See Larraín and Vergara (2001).

In conclusion, it is safe to say that current fiscal policy and the institutions engaged in implementing this policy are major strengths of the Chilean economy.

Integration

Section 3.1 included a detailed description and analysis of Chilean external trade and foreign direct investment in the country, showing that the country is integrated into the global economy. Being a small economy, Chile decided long ago that it was in its own interest to play as active a role as possible in the world economy. The trade and financial reforms of the 1970s, 1980s and 1990s are a proof of this policy and the recent FTAs signed by Chile confirm that there has been no departure from it. Furthermore, the country has made every effort to continuously deepen its integration into the world economy, an approach which is reflected in the ongoing negotiations with China, India and Japan and which can also be considered as one of the strengths of the Chilean economy.

Nonetheless, there is still some room for further work on the financial integration of Chile, mainly in respect of the capital account of the balance of payments. There has already been considerable progress in this area, specially in the 1990s (the charter of the Central Bank incorporates, as a permanent policy, the provision that "any person may freely engage in foreign exchange transactions", although it also states that there can be some transitory restrictions), but there are still some few measures to be taken to achieve full integration into the global financial system. For instance, pension funds cannot invest more than 30% of their assets abroad and there are also some restrictions on the operation of foreign financial companies in Chile.

Invariants

Here there are brief outlines of the invariants: geographic location, size and natural resource endowment.

Location

Location is important and it pays to be close to the market. Chile is far away from the world markets: San Antonio and Valparaiso (the two major Chilean ports) are 6,300 miles away from Lisbon, 11,300 miles from Seoul and 5,100 miles from New York. Nonetheless, the country has managed to maintain very dynamic international trade relations and the structure of Chilean exports in terms of countries of destination is quite diversified. In gross terms one-third goes to Asia, one-third to the Americas and one third to Europe.

The factor distance means that, in order to compete, Chile needs to have a very good infrastructure (airports, ports, telecommunications, etc.). This issue has already been discussed and the conclusion was that, although the level of investment in infrastructure is relatively high, Chile still lags behind regarding stocks of infrastructure and its location and distance from the world markets are clearly weak points in its economy.

Size

Chile is a small economy with a population of 15 million people and a GDP of US$92 billion. Larger economies offer firms bigger markets for their products. If there are scale economies in the manufacturing industries, firms have a great advantage when operating in large markets which offer a greater payoff on innovative activities. However, it is possible to overcome this disadvantage if the country participates in the world economy, as Chile does. Its firms therefore have access to the global market and are not confined only the local market.

Natural resource endowment

Chile is rich is natural resources, especially in the area of mining, and is the largest producer of copper in the world. It has also a long coastline which gives it considerable marine resources; its climate and soil in the south make it very competitive in wood products and, in the centre, in fruits. For these reasons most Chilean exports are based on natural resources.

It has been suggested that the abundance of resources is an important determinant of economic failure (Sachs and Warner, 1995). Some authors have argued that the greater the abundance of resources, the more economies can tend to shift away from manufacturing sectors in which many externalities necessary for growth are generated (Sachs and Warner, op.cit.). Other authors have proposed that resource booms tend to put a high proportion of them in the hands of the state, thus creating an incentive for agents to participate in rent- seeking as opposed to productive activities that spur growth (Lane and Tornell, 1996).

Rodríguez and Sachs (1999) suggest that resource-rich economies grow less because they are likely to be living beyond their means. This means that the economy approaches the steady state from above, displaying negative growth rates in the transition.
It is difficult to assess whether this claim is true for the average country abundant in natural resources and, in the case of Chile, it can be considered to be both a potential blessing and a curse. The key is not whether a country is rich in natural resources or not, but whether there are institutions and policies in place to administer the resources. Chile was been rich in natural resources before and after the mid-seventies, although its economic performance was completely different in both periods. This difference is not related to the abundance of natural resources itself, but rather to policies and institutions.

3.4. Competition, Social Dimension and Environment

A competitive economic environment boosts productivity growth. Environmental concerns may, however, hamper productivity growth, as may income inequality which creates social tensions.

Competition

In the mid-seventies, Chile decided to change its economic policy towards an open and free market economy. Competition was essential to achieve this goal. A whole new set of microeconomic reforms were implemented to guarantee this competition. Prices were allowed to be freely determined by the market to which free entry was also guaranteed. As the country opened its borders to external trade, foreign competition also helped to promote overall competition in the economy. In addition, the privatization of state-owned companies, together with free market entry and foreign trade, meant the end of some state- protected monopolies.

However, the privatization of firms in markets without natural monopolies created a new problem. Prior to these privatizations, it was necessary to put in place a regulatory framework that prevented the use of monopolistic power and created the conditions for efficient enterprises. Although it is beyond the scope of this paper to analyze the regulatory reforms in each sector, it is fair to say that there were revolutionary changes in regulations governing electricity, telecommunications, infrastructure, ports, airports, water, etc[23]. In addition to what has already been said about regulation of the financial sector, pension funds, fiscal policy, and other areas, Paredes (2001a) argues that the general concepts associated with regulatory initiatives in Chile have been:

i) A strong antitrust policy
ii) Free market entry
iii) No regulation as a principle
iv) Clear procedures
v) The encouragement of private resolution of disputes
vi) Autonomy of the regulatory agencies.

Regarding the antitrust law, it became clear a few years ago that it needed updating (Paredes, 2001b) and new legislation was passed in 2003 which created a new, technical and independent Tribunal for Free Competition. It is composed of five members nominated by the President of the Republic, the Central Bank, and the Supreme Court. Unlike its predecessor this tribunal is more technical in nature, more independent from the government and operates with a clearer delimitation of responsibilities. It is considered to represent a significant improvement in the area of antitrust legislation.

As in the rest of the world, there has also been a tendency in Chile towards more concentration on different industries: banking, the retail sector, telecommunications, public utilities, etc. Although it is clear that this increased

[23] See Paredes (2001a) for more details on the regulatory reforms in each of these sectors.

concentration is a matter of concern, it is also obvious that it is most likely the result of economies of scale driven by technological change. In addition, in a global economy it appears to be easier to survive with larger-scale activities.

A possible measure of the efficiency of the regulatory measures is the availability of goods and services produced by regulated firms. The different indices show major advances in the provision of these goods and services to the public (telephone lines, electricity, cellular phones, clean water, infrastructure, etc.)[24].

However, two-thirds of the Information and Communication Technology (ICT) sub-index of the GCI represent hard data on cellular mobile subscribers per 100 inhabitants, internet users and hosts per 10,000 inhabitants and main telephone lines and personal computers per 100 inhabitants. In this hard data component Chile ranks 39, while in the overall sub-index it is in 36th and in the overall GCI 22nd place – suggesting the country is relatively weak (compared to its overall performance) in this particular area. However, as it is a composite index it is difficult to say exactly where the weakness lies. Furthermore, the GCR also suggests that the problem is more related to the overall policy on technology than to lack of competition.

Social Dimension

One of the clear weaknesses of the Chilean economy is its income inequality. Latin America overall is one of the regions of the world with the highest income inequality and Chile is no exception to this and is, in fact, among the Latin American countries with highest level of income inequality. A high level of income inequality can create social tension which hampers productivity growth[25]. Beyer (2000) shows that the source of income inequality in Chile is inequality in labour rather than in capital income, as is commonly believed. For this reason most of the research in this area in Chile highlights the role of education in explaining the differences in income.

Table 3.15 shows different indicators of income inequality for different regions of the world and for Chile. The indicators of inequality are the GINI coefficient and the share in national income of the different quintiles of the population. Latin America is the region with the highest income inequality. The GINI coefficient (0.49) is even higher than the coefficient for Sub-Saharan Africa (0.47) and above those of developed countries (0.34), South Asia (0.32) and Eastern Europe (0.29). The percentage of income received by the richest quintile in Latin America (53%) is also the highest and that of income received by the poorest quintile (4.5%) is the lowest in the world. Chile is even more unequal than the average Latin American country: its GINI coefficient is 56.5, the percentage of income received by the richest quintile 61% and that of the income received by the poorest quintile only 3.5%.

[24] See Paredes (2001a) for a set of data on this subject.
[25] See Larraín and Vergara (1993), Alesina and Rodrick (1994).

Table 3.15
Income Inequality by Region of the World

Region	GINI	Share of income by quintile of income			
		1	2	3 and 4	5
Sub-Saharan Africa	0.470	5.2	8.9	33.5	52.4
Latin America and the Caribbean	0.493	4.5	8.7	33.8	52.9
East Asia and the Pacific	0.381	6.8	11.3	37.5	44.3
South Asia	0.319	8.8	12.9	38.4	39.9
Eastern Europe	0.289	8.8	13.4	40.0	37.8
Middle East and North Africa	0.380	6.9	10.9	36.8	45.4
Developed Countries	0.338	6.3	12.2	41.8	39.8
Chile	0.565	3.5	6.6	28.9	61.0

Source: Beyer (2000).

Table 3.16 shows GINI coefficients for Latin American countries from 1990 to 2002. It divides them in countries with very high income inequality (GINI between 0.58 and 1), high income inequality (between 0.52 and 0.579), medium income inequality (between 0.47 and 0.519) and countries with low inequality (below 0.47). It is important to point out that these labels are rather optimistic as, by world standards, a GINI coefficient of 0.47 is relatively high. Chile has been constantly among the countries with "high" income inequality and the data also show that there has been no noticeable change in this since 1990[26]. The GINI coefficient has been between 0.55 and 0.56 which means that the high average growth rates experienced by the Chilean economy in the last twenty years have not induced major changes in income inequality[27].

[26] Other studies suggest that there have been no major changes in the last four decades (Beyer and Vegara, op. cit.).
[27] The high growth rates have, however, significantly reduced the number of people living under the poverty line.

Table 3.16
Latin American Countries: GINI Coefficient 1990-2002

Inequality	1990		1994		1997		1999		2002	
Very high 0.56 - 1.0	Brazil	0,627	Brazil	0,621	Brazil	0,638	Brazil	0,640	Brazil	0,639
	Honduras	0,615	Nicaragua	0,582	Nicaragua	0,584			Argentina c/	0,590
	Guatemala	0,582							Honduras	0,588
High 0.520 - 0.579	**Chile**	**0,564**	Colombia b/	0,579	Colombia b/	0,577	Honduras	0,564	Nicaragua	0,579
	Panama b/	0,545	Honduras	0,560	Guatemala	0,560	Colombia b/	0,564	Colombia b/	0,575
	Bolivia d/	0,538	**Chile**	**0,553**	**Chile**	**0,560**	**Chile**	**0,559**	Bolivia b/	0,554
	Mexico	0,536	Panama b/	0,548	Honduras	0,558	Rep. Dominic	0,554	**Chile**	**0,550**
	Colombia b/	0,531	Mexico	0,539	Panamá b/	0,552	Peru	0,545	Rep. Dominic	0,544
					Mexico	0,539	Mexico	0,542	Guatemala	0,543
					Peru	0,532	Argentina c/	0,542	El Salvador	0,525
					Bolivia b/	0,531	Panama b/	0,533	Peru	0,525
					Argentina c/	0,530	Ecuador b/	0,521		
Medium 0.470 - 0.519	Argentina c/	0,501	Bolivia b/	0,514	El Salvador	0,510	El Salvador	0,518	Panama b/	0,515
	Uruguay b/	0,492	Paraguay b/	0,511	Venezuela	0,507	Bolivia b/	0,504	Mexico	0,514
	Venezuela	0,471	Argentina c/	0,508	Paraguay b/	0,493	Vnezuela	0,498	Ecuador b/	0,513
			El Salvador	0,507			Paraguay b/	0,497	Paraguay b/	0,511
			Venezuela	0,486			Costa Rica	0,473	Venezuela	0,500
			Ecuador b/	0,479					Costa Rica	0,488
Low 0 - 0.469	Ecuador b/	0,461	Costa Rica	0,461	Ecuador b/	0,469	Uruguay b/	0,440	Uruguay b/	0,455
	Costa Rica	0,436	Uruguay b/	0,423	Costa Rica	0,459				
					Uruguay b/	0,430				

Source: CEPAL
b/ Urban areas.
c/ Buenos Aires.
d/ Eight major cities plus El Alto.

The issue of income inequality is on the agenda of all major political parties in Chile. There is a consensus that this is a key variable if productivity and output growth are to be sustained in the future and that it has lagged behind in the Chilean development process. It is also a matter of consensus that the key factor to reduce this inequality is education. As previously stated, the quality of education is generally low in Chile, but especially low among the poorer members of the population. The quality of public education has to be improved if income inequality is to be reduced.

The Environment

There has been a growing concern for the environment in Chile in the last couple of decades. In the early 1990s new laws were passed introducing the so-called system of environmental impact evaluation. Under this system, an environmental certificate is required for all major investment projects. Del Fávero and Katz (2001) see major advances with the introduction this system. Firstly, the environmental variable has been incorporated into the investment decisions and, secondly, into the early phases of the investment projects. Thirdly, it has encouraged the participation of communities in the discussion of the environmental impact of projects that affect them. Fourthly, it has brought about coordination among different government agencies and, finally, generated a whole new market for environmental research. Del Fávero and Katz criticize, nonetheless, the lack of objective parameters in order to limit the government's discretion and maintain that the legislation is primarily based on command and control rather than on market mechanisms. In this regard, they also criticize the

lack of a broad legal framework to allow for the issuing of emission permits that cover the different industries across the country[28].

The environment is an important and growing concern in Chile and, among the most outstanding problems, are the air pollution in Santiago and the water pollution in several parts of the country. Table 3.17 shows the Environmental Sustainability Index (ESI) of the World Economic Forum. Chile ranks 35, below its overall ranking, and is behind many developing countries, though also ahead of several developed countries[29]. The fact that Chile is below several Latin American countries in this index suggests that there is room for improvement in this area.

[28] There is, however, one successful experience with the market for emission permits for a particulate situation in Santiago (see Montero et. al., 2002). A law that would extend this to the whole country has been before Congress since 1995.
[29] The US, for instance, is in place 45.

Table 3.17
Environmental Sustainability Index

Rank	Country	ESI
1	Finland	73.9
2	Norway	73.0
3	Sweden	72.6
4	Canada	70.6
5	Switzerland	66.5
6	Uruguay	66.0
7	Austria	64.2
8	Iceland	63.9
9	Costa Rica	63.2
10	Latvia	63.0
11	Hungary	62.7
12	Croatia	62.5
13	Botswana	61.8
14	Slovakia	61.6
15	Argentina	61.5
16	Australia	60.3
17	Panama	60.0
18	Estonia	60.0
19	New Zealand	59.9
20	Brazil	59.6
21	Bolivia	59.4
22	Colombia	59.1
23	Slovenia	58.8
24	Albania	57.9
25	Paraguay	57.8
26	Namibia	57.4
27	Lithuania	57.2
28	Portugal	57.1
29	Peru	56.5
30	Bhutan	56.3
31	Denmark	56.2
32	Laos	56.2
33	France	55.5
34	Netherlands	55.4
35	**Chile**	**55.1**
36	Gabon	54.9
37	Ireland	54.8
38	Armenia	54.8
39	Moldova	54.5
40	Congo	54.3
41	Ecuador	54.3
42	Mongolia	54.2
43	Central Af. Rep.	54.1
44	Spain	54.1
45	United States	53.2
46	Zimbabwe	53.2
47	Honduras	53.1
48	Venezuela	53.0
49	Byelarus	52.8
50	Germany	52.5
51	Papua New Guinea	51.8
52	Nicaragua	51.8
53	Jordan	51.7
54	Thailand	51.6
55	Sri Lanka	51.3
56	Kyrgyzstan	51.3
57	Bosnia and Herze.	51.3
58	Cuba	51.2
59	Mozambique	51.1
60	Greece	50.9
61	Tunisia	50.8
62	Turkey	50.8
63	Israel	50.4
64	Czech Republic	50.2
65	Ghana	50.2
66	Romania	50.0
67	Guatemala	49.6
68	Malaysia	49.5
69	Zambia	49.5
70	Algeria	49.4
71	Bulgaria	49.3
72	Russia	49.1
73	Morocco	49.1
74	Egypt	48.8
75	El Salvador	48.7
76	Uganda	48.7
77	South Africa	48.7
78	Japan	48.6
79	Dominican Rep.	48.4
80	Tanzania	48.1
81	Senegal	47.6
82	Malawi	47.3
83	Macedonia	47.2
84	Italy	47.2
85	Mali	47.1
86	Bangladesh	46.9
87	Poland	46.7
88	Kazakhstan	46.5
89	Kenya	46.3
90	Myanmar (Burma)	46.2
91	United Kingdom	46.1
92	Mexico	45.9
93	Cameroon	45.9
94	Vietnam	45.7
95	Benin	45.7
96	Chad	45.7
97	Cambodia	45.6
98	Guinea	45.3
99	Nepal	45.2
100	Indonesia	45.1
101	Burkina Faso	45.0
102	Sudan	44.7
103	Gambia	44.7
104	Iran	44.5
105	Togo	44.3
106	Lebanon	43.8
107	Syria	43.6
108	Ivory Coast	43.4
109	Zaire	43.3
110	Tajikistan	42.4
111	Angola	42.4
112	Pakistan	42.1
113	Ethiopia	41.8
114	Azerbaijan	41.8
115	Burundi	41.6
116	India	41.6
117	Philippines	41.6
118	Uzbekistan	41.3
119	Rwanda	40.6
120	Oman	40.2
121	Trinidad and Tob.	40.1
122	Jamaica	40.1
123	Niger	39.4
124	Libya	39.3
125	Belgium	39.1
126	Mauritania	38.9
127	Guinea-Bissau	38.8
128	Madagascar	38.8
129	China	38.5
130	Liberia	37.7
131	Turkmenistan	37.3
132	Somalia	37.1
133	Nigeria	36.7
134	Sierra Leone	36.5
135	South Korea	35.9
136	Ukraine	35.0
137	Haiti	34.8
138	Saudi Arabia	34.2
139	Iraq	33.2
140	North Korea	32.3
141	United Arab Em.	25.7
142	Kuwait	23.9

Source: Global Leaders for Tomorrow Environment Task Force, World Economic Forum 2002.

3.5. Issues Specific to Chile

A review follows of two factors considered to have a significant impact on productivity and which have not been mentioned so far: the low level of female participation in the labour force and the economic and political stability of the country.

Female participation in the labor force

In Chile the female participation in the labour force in only 37% and, although it has increased in recent years (in 1995 it was 33%), it is still very low by world and even Latin American standards. In developed countries female participation in the labour force is generally above 50% and, in many cases, above 60% and even 70%. In developing countries the level of female participation is somewhat below these figures but still significantly above the statistic for Chile[30].

Low participation of women in the labour force can have at least two negative consequences. In the first place, the skills of a significant share of the population are not being used in the work place. As there is no reason to believe a priori that men are more able than women, an increase in the participation of women in the labour force would increase average productivity.

In the second place, as poor women participate less than more affluent women in the labour force, this increases family income inequality. Beyer (1997) shows that women in the richest quintile of the population participate three times as much in the labour force as those in the poorest quintile.

There are at least two issues that should be addressed to increase the participation of women, and especially poor women, in the labour force. Firstly, it is more difficult for poor women to find childcare while working and, in this regard, it could be argued that a more comprehensive childcare policy is needed. Secondly and for the same reason, poor women need more flexible working arrangements (in terms of hours, days, leave, place of work, etc.). There is an ongoing discussion on this issue in Chile, but so far few results have been achieved.

Economic and political stability

From an economic point of view, political elections in Chile represent - since the return of democracy in 1990 - a competition between forces that share the belief that a market-based system is best for the country. Hence, there are no major differences in the economic policies of the different coalitions and this has given the country a stability and continuity in economic policies that it is rare in many Latin American countries. This situation generates a good climate for investment, innovation and productivity growth. It has to be said, however, that this has not always been the case and, indeed, until the early 1970s, each political election in Chile was a major issue as the new government could implement a whole new set of policies different to those of the outgoing one.

[30] Beyer (1997).

It appears that the country now has not only stability in terms of economic policies but also that it has chosen, in broad terms, those policies which favour productivity, investment and output growth.

IV. Discussion of policies with effect on productivity

In this section government policies that have an impact on productivity are discussed on the basis of the analysis of determinants of productivity in the previous section. The first part briefly summarizes the strengths and weaknesses of Chile in the different areas that affect productivity, while the second part focuses on policies and their effect on productivity. This latter part also includes some policy recommendations that could be adopted to overcome the constraints facing the country with regard to productivity growth.

The policies to be examined can be divided into three different categories:

a) In a narrow sense, policies directly influencing productivity increase (as opposed to other sources of growth), such as those promoting R&D and the adoption of new technologies.

b) In a broad sense, policies fostering economic performance and growth in general with implications for TFP change, such as those directed at promoting investment in physical and human capital.

c) In the broadest sense, policies aiming primarily at goals other than growth, but with hypothesized consequences for productivity developments.

The policies under discussion will be assigned to the above-mentioned three categories as appropriate in the analysis which follows.

The final part of this section will contain some comments on the issue of enhancing productivity through technical cooperation activities.

4.1. Chile: a summary of strengths and weaknesses for productivity growth

In Section 3 a detailed analysis of the factors affecting productivity was made and this section will start with a summary of the main findings in order to facilitate the policy analysis which forms its main topic.

Table 4.1 summarizes the main findings of Section 3. The different variables analyzed in that section are classified according to whether they were considered as strengths or weaknesses for productivity growth in Chile. There are also variables categorized as neutral in the sense that their current level is considered to be "normal". This does not, however, mean that there cannot be improvements in these areas (some are, in fact, suggested in most case, but simply that it would be difficult to sustain that these variables represent a major deterrent for productivity growth in Chile.

According to the classification, the following variables are considered strengths of the Chilean economy (in terms of productivity growth):

a) Foreign trade
b) Foreign direct investment
c) Investment in physical capital
d) The financial sector
e) Institutions (the country is well positioned, but there is room for improvement).
f) Macroeconomic Policy
g) Integration into the world economy
h) Natural resource endowments (although this is admittedly a controversial point).
i) Political stability

The variables considered as weaknesses of the Chilean economy (in terms of productivity growth) are as follows:

a) Research & Development
b) The quality of human capital
c) Infrastructure (the stock is still below what can be considered an adequate level although there has been a significant improvement in the last decade).
d) Location
e) Income inequality
f) Female participation in the labour force

Finally, the variables below are considered as "neutral" in terms of productivity growth:

a) Absorptive capacity
b) Amount of education on offer (i.e.: rates of enrollment).
c) Size of country
d) Competition
e) Environment

Table 4.1
Chile: Strengths and weaknesses for productivity growth

Variable	S	W	N
1 Research and Development		X	
2 Foreign Trade	X		
3 Foreign Direct Investment	X		
4 Absorptive Capacity			X
5 Quality of Human Capital		X	
6 Quantity of Education			X
7 Physical Capital	X		
8 Infrastructure		X	
9 Financial Sector	X		
10 Institutions	X		
11 Macroeconomic Policy	X		
12 Integration	X		
13 Location		X	
14 Size			X
15 Natural Resource Endowment	X		
16 Competition			X
17 Income Inequality		X	
18 Environment			X
19 Female Participation in Labor Force		X	
20 Political Stability	X		

S: Strenghts
W: Weaknesses
N: Neutral

4.2. Policies affecting productivity

In this sub-section an analysis policies based on the aforementioned variables and the Chilean experience is provided.

Integration into the world economy

This area includes variables related to foreign trade, foreign direct investment (foreign investment in Chile and Chilean investment abroad), capital movements and other related issues. As mentioned, this is one of the strengths of the Chilean economy and has had a positive effect on productivity growth. The effect on productivity is related to the enhancement of competition, access to more and better products and services, the increase in investment, upgrading of technologies, access to a larger market and the reduction of the capital cost of investment.

The policy of integration into the world economy can be considered as one promoting economic performance and growth in general (as opposed to the more

narrow sense in which the policy directly affects productivity increase), but with implications for TFP change.

In general terms, the policy is to open up to foreign trade and capital movements. Some evidence suggests that the sequencing is important and, in line with this, the initial phase should be the removal of trade restrictions and then the liberalization of the capital account.

In the case of Chile, in the initial phase of the reforms in the-mid 1970s both were liberalized together and very abruptly. Subsequently, with the crisis of 1982-83 there was an increase in tariffs and in capital account restrictions. After the crisis, in what can be called the second phase of the integration process, the sequencing favored firstly continuing the liberalization of the current account and secondly the liberalization of the capital account.

Trade integration can be pursued through the unilateral removal of trade barriers and/or free trade agreements. Chile started with the former, but - in the 1990s - also signed several free trade agreements. If the country has high trade restrictions (tariffs, quotas, export taxes and the like) it is necessary to start unilaterally reducing these restrictions before engaging in free trade agreement negotiations.

The evidence for Chile suggests that opening up to foreign trade is one of the most effective policies for productivity enhancement. As mentioned in Section 3, Rojas found that 80% of the increase in total factor productivity in Chile in the period 1986-1996 was attributable to openness to trade, while De Gregorio and Lee (2004) established that this is the single most important factor explaining growth differences between East Asia and Latin America. This evidence confirms the importance of trade liberalization for Chilean productivity growth trends of the last 20 years.

It is interesting to note that the policy of openness to trade, implemented in its first phase in the 1970s, was not based on a consensus at the beginning. There was huge opposition to the policy on the grounds that it would destroy domestic industry. The economic team of the military government, a group of young economists with qualifications from the University of Chicago, persisted with the policy despite these objections. In the crisis of 1982-83 pressures to reverse the policy of openness to trade increased and tariffs were indeed raised and some non-tariff barriers imposed. However, by that time most of the population was convinced of the benefits of trade and, after the recession, tariffs were lowered again. The proof that wide consensus had been reached on the benefits of openness to trade came after the return to democracy in 1990. The new democratic government not only accepted this type of regime as its own policy but also took it further. In the late eighties the average tariff in Chile was 15% and nowadays is about 2%. The lesson to learn from Chilean experience is that it is important to persist. From time to time, especially at the beginning of a trade liberalization process, there are pressures to revert the process. As the benefits of openness to trade become evident only after some years after liberalization, it is absolutely necessary to persist so that the population becomes aware of those benefits.

Regarding FDI, at the beginning of the reform process it was clear that the problem was the uncertainty surrounding property rights. This is why Chile decided to implement a new statute for foreign direct investment to give foreign investors more certainty about their property rights, since a contract between the investor and the government was involved. It is clear that regulatory stability and the overall business and political environment of the country are also very important for FDI. Property rights, for instance, are more likely to be better protected in a democracy which might explain why FDI boomed after Chile's return to democracy in 1990. However, democracy itself is not sufficient to attract FDI. Among other things, it is necessary to have a favorable business climate and economic stability.

Democratic but fiscally irresponsible countries do not attract a significant amount of FDI. The liberalization of Chilean investment abroad came up much later than the liberalization of foreign investment in Chile. The usual restrictions on foreign exchange that are in place in most developing countries made the authorities very cautious about this step of the liberalization process which finally came in the 1990s.

Finally, regarding capital flows, full integration could be problematic if the country is not stable enough (which is mostly the case in the early stages of a reform process). Hence it is recommended to follow a sequence of measures in which the capital account liberalization comes after the current account liberalization.

Although Chile is quite integrated into the world economy, there are still things to be done. For instance, it is currently initiating negotiations for FTAs with India, Japan and China and, if these are successful, the already very low tariffs will become almost zero. In addition, as these agreements also include chapters on investment and capital movements, they will further foster FDI and capital integration. From the point of view of the capital account, there are still some limitations such as the relatively severe restrictions on pension funds in terms of their investment abroad which should be eased (though not eliminated altogether).

Human capital

As discussed in Section 3, in Chile the amount of education on offer (rates of enrolment, average years of schooling, and the like) is about average as compared to countries with similar levels of development. The initial efforts to increase the rates of enrolment and the years of schooling date back to the 19th century (when the state started to take a more active role in education) and were directed at primary education (in which the current rate of enrolment is 100%). However, the most significant advances in this area started to take place in the early 1960s (Beyer, 1999), when the efforts were extended to include secondary education and were highly successful in terms of coverage in the decades which followed.

In the 1980s, concerns arose about the quality of education. It was thought that the centralization of the public education system in the central government reduced the incentives for competition and quality improvements. In 1980 the responsibility for administering public schools was transferred to the municipalities. The curriculum remained centralized in the ministry of education but the management of the schools was left to each municipality. The second reform was the provision of a demand-driven subsidy, with the allocation of resources to schools on the basis of enrolment levels. Although it is not an explicit voucher system, it functions as if it were. Each school receives a given amount of resources monthly per student attending classes. A third initiative was the granting of permission to commercial organizations to establish schools. They get the same subsidy per student as municipal schools. This right of free entry to the educational market was designed to produce more competition and thus to improve the quality of education. This reform, was, however, resisted by many sectors of society that did not like this form of "privatization" of public education and, for this reason, the progress of the initiative was more modest than initially envisaged.

As it was difficult for parents to evaluate the quality of the different schools, the idea was to establish a national test that could help parents to select schools for their children. However, just after its preliminary implementation the test was suspended. The reform, thus, was incomplete because it lacked one of its major cornerstones, namely the provision of information needed to allow parents to make efficient decisions and in this way to induce more competition[31] in the area of schooling.

With the recession of 1982-83 the educational reforms were paralyzed. Some authors (Beyer, 2001, op.cit.) argue that the voucher system was far from complete given (i) the limitations introduced over time with regard to competition and to the free entry of new schools to the market; (ii) the limited autonomy of the new schools; (iii) the deficiency in terms of information for parents; (iv) the reduction in the value of the voucher after the recession of 1982-83; and (iv) the "teacher's labour statute, introduced in 1991, which strongly protects teachers without assigning them clear obligations. Under this statute it is almost impossible to fire teachers regardless of student performance. All these reasons make it difficult to characterize the current Chilean system as a pure decentralized voucher system.

As documented in Section 3, the results, in terms of the quality of education, are poor, despite the fact that the public budget in education has more than tripled in the last fifteen years in real terms[32]. The quality of education in Chile is below the standards of countries with a similar per capita income. However, there have been some interesting results regarding school attendance. Indeed, as the voucher depends on the student's attendance, schools have the incentive to motivate students to attend classes.

In terms of productivity, Chile could make a major leap forward if it were able to improve its educational system. According to the findings detailed in Section 3,

[31] The national test was restarted years later and the results have only become public since 1995.
[32] This fact makes it clear that the solution to the problem goes beyond to just spending more resources.

average productivity growth might increase between 0.5 and 1 percentage points per year, whilst more optimistic estimates project an impact as great as two percentage points annually.

A reform of the Chilean educational system should include at least the following three elements: (i) schools should be held accountable for their performance (Eyzaguirre and Fontaine, 2001, op. cit); (ii) information on school performance should be easily available to parents. If parents are aware that their children's school is not performing well in national tests, they will have more incentive to move them to better schools; (iii) allow parents to intervene directly in the management of poorly performing schools. This last alternative would require a reform of the teachers' labour statute.

This reform, oriented at increasing the quality of education, would have a positive effect in promoting economic performance and growth in general, but would also directly affect productivity increase. Improving the quality of public education would also have a positive impact on improving income distribution. This can be seen as a goal in itself, but one that also influences productivity growth.

Institutions

Well-functioning institutions are essential for economic and productivity growth. It was argued in Section 3 that Chile has relatively well developed institutions and that this distinguishes it from many other developing countries. Some examples follow. (i) In Chile, for instance, there is a strong, highly professional and reputable tax administration. Tax compliance is close to the level of developed countries. (ii) There are institutions and rules that give a certain assurance that the monetary and fiscal policies are driven by technical rather than political objectives; (iii) There was recently a state reform aimed at drastically reducing the number of political appointments which should guarantee a more professional government; (iv) despite some incidents of corruption, it does not seem to be as generalized as in many developing (and developed) countries. The police, for example, have a very good reputation in this regard.

Nonetheless, Chile has room for improvement with regard to its economic institutions. In the previous section some such areas were identified (such as the procedures and costs involved in starting a business). This and other improvements of this nature are considered to have a positive impact in productivity. Beyer and Vergara (op.cit) estimate that a reasonable upgrading of institutions could result in an increase in productivity growth of about 0.4 percentage points per year for the Chilean economy.

The policies directed at improving the institutions of the economy generally have objectives other than a mere productivity increase (e.g. the reduction of corruption and inequities, the improvement of the social environment, and the like), but they also have obvious effects on productivity.

Macroeconomic policies

Macroeconomic stability has been found to have a positive effect on economic growth. Policies directed at fostering macroeconomic stability influence productivity since they create a favourable environment for investment and innovation. Chile has a clear strength on this issue. A highly independent and technically competent central bank is a guarantee for a solid monetary policy. A few simple fiscal rules and reasonable institutions to oversee the budgetary process[33] make it more difficult (though not impossible) to drift into an irresponsible fiscal policy.

Chile has a further strength in the area of macroeconomic policy, namely the relatively broad consensus among the population that macroeconomic stability is central to growth and productivity in the long-term. This makes it less easy (though, as said before, not impossible) for a government to embark upon a populist adventure.

Research and Development

R&D has been identified as one of the weaknesses for productivity growth in the case of Chile. The problem is basically the low little R&D expenditure by private enterprises. In addition, an excessive share of the R&D expenditure is devoted to basic rather than applied science.

In this area it is important to be very cautious. One approach is to give some type of incentive to R&D and another completely different one would be for the government to decide ex-ante) what sectors will to be promoted by increasing R&D expenditure. This would constitute an active industrial policy (or picking-the-winner strategy) that would be more likely to be costly rather than beneficial and was the type of strategy adopted in Chile - with very negative consequences - in the period 1940-1960.

A completely different (and in my view accepted) strategy is to give some (moderate) tax incentives to R&D expenditure by corporations. These incentives could be such that applied science has some advantages (in terms of tax incentives) over basic science, but never such that there is a bias between sectors.

Finally it has to be mentioned that R&D is the type of variable that affects productivity increase in a direct manner as opposed to some other policies mentioned before that have a more general impact on growth and that indirectly affect productivity performance.

[33] For instance, by law, all public debt has to be approved by the Ministry of Finance. The Executive is responsible for proposing expenditures and estimating revenues. The Congress can only reduce expenditures but never increase them. In addition, there is also the recent structural budget rule mentioned in Section 3.

Political stability

Political stability has been a key factor in the productivity growth process in Chile and even more so since the return to democracy in 1990. Political stability creates an enabling environment for investment, innovation and productivity growth. This relates to productivity in the broadest sense as policies and institutions designed to achieve political stability do not specifically target growth or productivity increase.

It is not the subject of this paper (nor the field expertise of the author) to identify the institutions and policies that are likely to boost political stability. However, it is safe to say that this variable is an advantage in terms of productivity growth in the case of Chile.

Competition

A more competitive environment enhances productivity growth as firms constantly seek ways of reducing costs and becoming more competitive. Policies directed at promoting competition affect productivity in a broad sense in that they stimulate economic performance and growth in general, with implications for TFP growth in particular.

In the case of Chile there are several policies that have been important in terms of competition, among them:

- Free trade: as free trade implies competition from the rest of the world it is perhaps the most effective way to sustain it, at least in the markets of tradable goods.
- An effective antitrust law and the corresponding institutions in order to avoid monopoly practices. In this regard it is crucial to avoid all regulations or practices that impede free entry into a market.
- Efficient regulation of natural monopolies: this mechanism in Chile (i.e. for some public utilities) is designed so as to replicate the operations of an efficient firm.
- No regulation as a default. If there is no clear evidence of a monopoly or other market failures, no special regulation should be imposed. Excess of intervention and regulation in different markets has usually been a major problem for Latin American economies.

Income inequality

As discussed in Section 3, widespread income inequality can give rise to social tensions that hamper economic and productivity growth. Hence, policies directed at reducing the inequality will spur productivity growth. They also affect productivity in the broadest sense as they are aimed primarily at goals other than growth, however, but obvious or hypothesized consequences for productivity trends.

Two types of policies have been used in Chile to reduce income inequality. Firstly, policies against poverty were implemented with the idea of expanding the set of opportunities for the poor. The key for the efficiency of these policies is to focus the resources on the very poor, precisely because one of the weaknesses of these programmes is that the resources can end up going to middle or even the high-income groups. Chile has been relatively successful with its policies in this area and they have helped to reduce poverty. However, income inequality has remained at more or less the same level over the past decades.

Secondly, policies were devised to improve the quality of education for the poor, but were not successful in Chile. Some of with the policies that can have a positive effect on the quality of education were analyzed previously.

Female participation in the labour force

The low level of female participation in the labour force in Chile is considered a weakness in terms of productivity growth. On the one hand, the skills of a large group of the population are not used in the productive process and, on the other hand, greater female participation in the labour force participation should, in principle, increase average productivity. In addition, as the participation of poor women is even lower than that of rich women, this makes the income inequality at family level more pronounced.

Chile has not been successful in improving this problem. This failure can probably be explained in part by the relatively inflexible labour rules that make it more difficult to arrange part-time employment, jobs with flexible schedules etc. In fact this has also been used as an explanation for the high youth unemployment in Chile[34]. From this perspective policies that make the labour market more flexible can be seen as those that ease the entry to workforce for women and young persons. As learning opportunities tend to be concentrated in the working environment, policies directed at more labour flexibility can also be regarded as improving the quality of human capital.

The policy lesson is to avoid labour regulations or standards that make the market more rigid. Unions tend to oppose labour flexibility on the grounds that it will harm workers. In fact, as labour rigidity makes hiring and firing more costly, it may generate some benefits for insiders and organized labour, but definitively harms the rest of the workforce and especially those employees that need flexible work schedules (generally the poor).

Policies aiming at labour flexibility affect productivity in a broad sense in that stimulate economic performance and growth in general, with implications also for TFP growth.

Investment in physical capital and infrastructure

Investment in physical capital is one of the strengths of the Chilean economy. Total investment reached 25% of GDP in 2004 - which is one of the highest in

[34] Beyer (2000b).

Latin America, although still below that of many East Asian countries. Investment in physical capital depends, among other variables, on a stable macroeconomic environment and on solid and efficient institutions. Hence, the first policy recommendation regarding this matter is to discard populist experiments and to establish well-functioning institutions[35].

However, it is also true that, in the case of Chile, some more direct policy instruments that have been used. Hsieh and Parker (2003, op.cit.) and Vergara (2004, op. cit.) argue that the reduction of the corporate income tax in the mid-eighties (from 50% to 17% at present) is related to the investment boom of the late eighties and early nineties. In a world where capital can move freely among countries, an excessively too high corporate income tax rate can harm investment. In summary, tax policy should be designed so as to minimize the potential negative effects of taxes on investment.

Regarding infrastructure, Chile is still behind in terms of adequate stocks given its level of development, but is in the process of catching up. The dynamic evolution of this area in the last decade and a half is related to a policy of involving the private sector in infrastructure projects through concessions and to the increase of FDI. With the concession system, the government auctions the project and the recipient builds and operates the facility in question, charging a fee or a toll for the use of the highway, tunnel, bridge, port, airport, etc. This policy of concessions has had a major impact on the quantity and quality of infrastructure projects in Chile and has recently been extended recently to some other areas, for instance to the construction and operation of jails. In this case the state offers concessions for the construction and operation of the jail. The cost of construction is paid separately and the state pays the operator a given amount per inmate/day for the operation of the jail.

FDI has been a driving force in these initiatives because many of the infrastructure projects have been developed by foreign investors.

Policies aiming at promoting investment in physical capital and infrastructure affect productivity in a broad sense and also are stimuli for economic performance and growth in general, with implications also for TFP growth.

Financial sector

A deeper financial system promotes a more efficient allocation of resources and hence induces higher productivity growth. The relatively well developed financial system in Chile is therefore a strength regarding the country's productivity performance.

[35] The issue of institutions was discussed in detail in Section 3 and also previously in this section.

The following basic policies implemented in Chile since the mid- seventies have had a positive impact on the financial sector (in broad terms):

- The liberalization of interest rates. Previously they were set by an authority.
- The internationalization of the financial system. This includes the liberalization of the capital account of the balance of payments (a process which is still incomplete, as previously described).
- The broadening of banking activities.
- Reasonable and prudential regulation. It has to be mentioned that the financial crisis of 1982-83 was very much related to the lack of a proper regulatory framework. After this crisis, in the mid-eighties, a new banking law was approved and the emphasis from almost no regulation to a prudential approach to regulatory measures. This helped the development of the sector and has been important in preventing financial crises since then.
- Strong and technically competent supervisory agencies.
- New institutional investors, such as the pension funds created by the pension reform. This helped to develop a market for long-term maturities in domestic currency, which is almost non-existent in most Latin American countries.
- An independent central bank.

4.3. Productivity and technical cooperation

This report concludes with a brief outline of ways and possibilities to enhance productivity through technical cooperation activities provided by institutions such as UNIDO.

The Chilean experience suggests that the factors that induce the highest productivity increases are related to both the upgrading of institutions and the improvement of economic policies. Well-structured institutions enhance productivity growth. For instance, a country in which government officials are appointed on merit rather than on the basis of political affiliation is likely to generate a better environment for investment and innovation. Officials thus appointed are more likely to design more efficient norms and regulations and make better decisions which will help both the productivity growth of the public and the private sectors.

Polices, in turn, depend on both institutions and on the decisions of policy-makers. On the one hand, the better the institutions and the policies, the higher the increase in productivity. On the other hand, policies also depend also on the ideology of the government in power and the support of Congress. This in turn depends very much on the level of public support for the reforms in question.

In the case of Chile some of the reforms were implemented under an authoritarian regime, but were then adopted and even deepened by the democratic government.

For instance, there are several studies that show that trade liberalization was a key factor behind growth and productivity increase in Chile since the seventies. This policy was initially implemented by the military government. The new democratic government elected in 1990 not only adopted the policy but even reduced tariffs further and embarked on a series of free trade agreements.

The basic issue was that there was widespread public consensus behind trade liberalization in Chilean at that point in time. Hence, in a democratic society it is necessary to generate some consensus on policies that may affect the status quo. In this context, an institution such as UNIDO can collaborate in two ways. Firstly, technical cooperation can be provided to support policy design, drawing on the experience of other countries. Secondly, technical cooperation can be availed of to help communicate the benefits of the new policy to the population. The more accepted the policy is, the greater the chances of its success in the medium-term. This is not only because it will have less opposition but also because it will most likely be better implemented. Policies that are not well accepted are amended in order to generate more consensus and the amendments undertaken may ultimately distort completely the initial objective of the policy.

Perhaps, however, the area in which institutions such as UNIDO can have the most significant and long-lasting effect is in the improvement of institutions and it is advisable to devote the largest amount of resources available to this type of reforms. Institutions represent the greatest weakness of developing countries in terms of their productivity performance. A country can be convinced to follow certain policies, but if there are no good institutions to support the policies, they are likely to fail. A sound institutional framework increases the likelihood that good policies will actually be implemented.

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