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PRODUCTIVITY AND ECONOMIC GROWTH: THE CASE OF CHILE

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PRODUCTIVITY AND ECONOMIC GROWTH: THE CASE OF CHILE

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Resumen

Luego de una década y media con tasas de crecimiento del PIB superiores a 7% en promedio, la economía chilena lleva ya cinco años creciendo a tasas inferiores al 3%. En este artículo se argumenta que para retomar elevadas tasas de crecimiento el país necesita un nuevo impulso de productividad. Para ello se requiere la implementación de medidas que tiendan a mejorar la eficiencia de las políticas y de las instituciones. Aunque Chile tiene un buen récord en ambas materias, es posible mejorarlo. Se hace un estudio de corte transversal en que la variable dependiente es la productividad total de factores. Se concluye que cambios razonables en políticas e instituciones podrían tener el efecto de aumentar el crecimiento en 1.5 puntos porcentuales al año.

Abstract

After a decade and a half of economic growth above 7% per year, the Chilean economy has been growing at rates below 3% during the last five years. In this article we suggest that in order to produce a new surge in economic growth, Chile needs a productivity shock arising from economic policy initiatives aimed at improving economic efficiency and institutions. Although Chile has a good record in both, it is still possible to have an upgrade. We run a cross section regression in which the dependent variable is total factor productivity. We conclude that modest changes in the country's policies and institutions may increase Chile's rate of growth in 1.5 percent points.

Paper presented in the fifth annual conference of the Central Bank of Chile "Challenges of Economic Growth", Santiago, November 2001. We are grateful to Jorge Desormeaux, Norman Loayza, Raimundo Soto and the participants in the fifth annual conference of the Central Bank of Chile for their helpful comments.
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I Introduction

The crises that swept through Asia in late 1997 brought Chile's economic boom to an abrupt halt. Having grown at an average rate of 7.3% per year in 1984-97, the Chilean economy has expanded by under 3% a year since then. So what happened?

One answer, often put forward by the authorities, posits significantly worse external conditions as the basic explanation. As Chile is a small open economy, when the world economy slows the demand for its exports declines, leading to lower export prices and volumes. If the price of oil rises at the same time, this small open economy, which imports nearly all the oil it consumes, will suffer even more. Things will become still worse if net capital flows to emerging economies suddenly dry up.

Figure 1 plots the basic external variables affecting the Chilean economy for the period 1980-2001. Panel A shows world GDP growth using IMF data. Although a sharp economic slowdown is predicted for 2001, it is fair to say that the previous few years (particularly 1999 and 2000) were years of high growth for the world economy as a whole. Panel B shows Chile's terms of trade, defined as the price of its exports divided by the price of its imports, using data from the Central Bank of Chile. Although there has been a sharp decline in 2001, the terms of trade over the previous few years (1998-2000) were around their average level for the whole period. Net private capital flows to emerging markets are shown in panel C. These have clearly dropped off very sharply, badly hurting economies that are heavily dependent on external financing. This aspect of the situation is similar to most of the 1980s. Lastly, panel D shows the path of the international interest rate[1] over the last 20 years. This is a key variable since it affects the burden of the external debt; and also the cost of new borrowing in the case of countries with access to international capital markets (including Chile). As this panel shows, interest rates are at their lowest level for the whole period. Although not much attention is

[1] The 180-day US dollar LIBOR is used here.

paid to this variable, it is clearly moving in the opposite direction to the other variables mentioned, for lower interest rates are positive for a country like Chile.

The external scenario is clearly important in an emerging open economy like Chile. However, it is difficult to blame all the slowdown in Chilean economic growth over the last few years on this factor, for the following reasons: (i) The deterioration in external conditions came after Chile's economic slowdown had already begun. In fact, 1998-2000 were not bad years for the world economy, yet Chile grew by under 3% per year.[2] Average growth in the world economy for these three years was above the average for the last two decades. The same can be said about Chile's terms of trade: in 1998-2000 they were less than 1% below the average for the last 20 years. (ii) Although it is true that net private capital flows to emerging economies declined sharply as from 1996-1997 and were almost non-existent during the last couple of years, it can be argued that for any given country there is a degree of endogeneity in this variable. Chilean firms have been able to obtain financing abroad at relatively low interest rates during this period, and the government has issued new debt that has been readily accepted on the world capital market. Chile would thus appear to have access to the international capital market. Moreover, the most significant feature of the balance of payments in recent years has been a huge increase in capital outflows, as Chileans have increased their investments abroad. It could be argued that this has occurred because domestic interest rates (adjusted for country risk and expectations of devaluation) have been relatively low, or simply because there are not many investment projects in the country at the present time.

The final external variable, the international interest rate, has been quite favorable in recent years, with both nominal and real rates below their average for the 1980s and 1990s. The short-term rate has recently fallen to levels not seen in decades.

In short, although external conditions have clearly worsened, this provides only a partial explanation for the weak performance of the Chilean economy. Our impression is

[2] In 2000 the world economy expanded faster than at any time since 1988.

that the slowdown in economic growth can at least partially be reversed. This paper argues that the way to do this is by increasing the growth in total factor productivity (TFP). Chile's golden age in terms of economic growth was explained by a strong expansion in TFP. This, in turn, is explained by the productivity effects of the reforms implemented in the 1980s and early 1990s. To some extent they have now been exhausted. Accordingly, what Chile now needs to reinvigorate economic growth is a new wave of reforms in areas were it has fallen behind — areas relating mainly to the "microeconomic foundations" of growth, namely institutions and the efficiency and efficacy with which they function. Another way to put it would be to say that new microeconomic reforms are needed to enhance the efficiency with which available resources are used.

If we view economic growth not as a linear process but rather as one marked by sporadic productivity shocks that lead to high growth for a period, before fading in convergence until the next productivity boost, then Chile would currently be in a phase in which the most recent productivity shock is contributing its last ammunition. If this is the case, the country needs a new shock to kick-start a new period of rapid economic growth. Of course this new boost could be luck — discovery of oil or a significant positive terms-of-trade shock, for instance. But, as luck is random we prefer to consider a new productivity shock arising from economic policy initiatives aimed at improving economic efficiency. We argue that improvements in these areas are likely to produce a new surge in economic growth in Chile. Furthermore, the deterioration in external conditions increases the need for policies to boost the country's currently sluggish growth rate.

It could be argued that the slowdown that Chile as faced in the last years is the natural state of things. Countries cannot grow forever at 7% and at some point they should converge to more normal rates of growth. Although the point is correct is has to be said that the international experience shows that several countries in Asia, Europe and even in Latin America have grown for longer periods of time –say 20, 30 and even 40

years – at rates in the neighborhood of 7%[3]. The same evidence also suggests that it is possible to sustain longer periods of growth in total factor productivity. Hence, although the fifteen years that Chile grew at 7% is a great achievement, it should not be viewed as the natural end of an era.

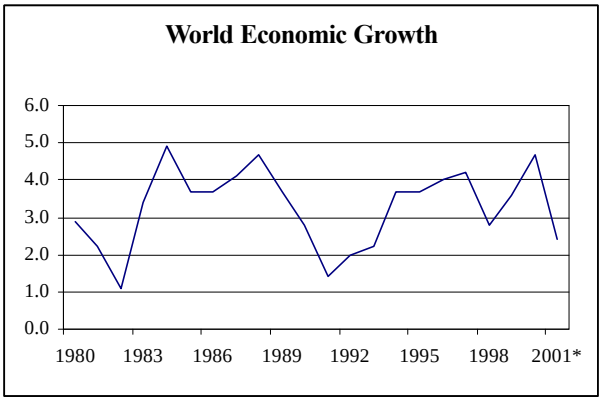
The paper is organized as follows. Section II presents some stylized facts on the Chilean economy, firstly analyzing the behavior of total factor productivity over the last several years. The conclusion is that we are currently going through a significant productivity slowdown. Then several areas where there is significant potential for increasing efficiency through economic reform are identified. Finally in this section we present a number of indicators of microeconomic efficiency for Chile, showing that while the country is highly ranked in many areas, elsewhere it is well below the average for countries of similar per-capita income levels. There is clearly room for upgrading Chile's institutions, and doing so could generate a new productivity boom.

Section III develops a basic model along these lines, showing how TFP can surge when institutions are upgraded. In section IV we run cross-section growth regressions with TFP as the dependent variable. We construct several indicators of efficiency in institutions and examine their effect on growth, and we consider the potential effect on TFP in a country like Chile. Finally, section V presents the conclusions.

[3] See Maddison (2001).

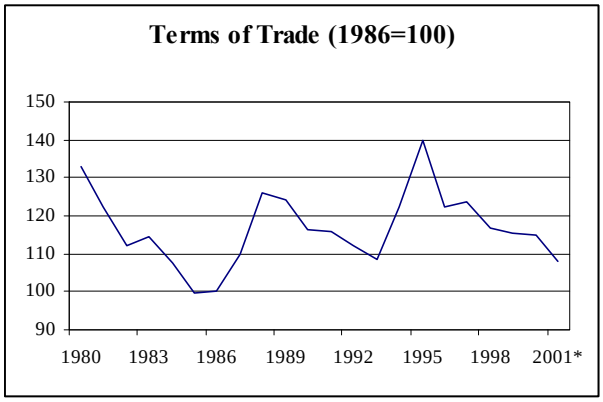
Figure 1
External conditions facing the Chilean Economy

(a)



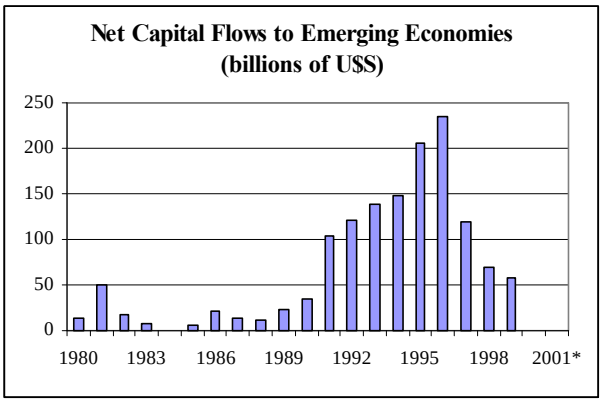
* Estimated
Source: IMF

(b)



* Estimated
Source: Central Bank of Chile

(c)



* Estimated
Source: IMF

(d)

* Estimated
Source: Central Bank of Chile

II TFP , further reforms and microeconomic efficiency in Chile: some stylized facts

The central hypothesis of this paper is that Chile needs to upgrade its institutions if it wants another decade of high growth. Of course it could be argued that the country has already made all necessary reforms and has extracted all the benefits from them. This view would imply that Chile now has to get used to lower growth rates (say 4% per year); provided the country maintains its current level of institutions and pursues a prudent macroeconomic policy it could aspire to this level of economic growth. There are at least three problems with this argument. Firstly, while it is true that Chile's institutions function remarkably well in many respects, this is not the case across the board. There is significant room for improvement in many areas, as documented below. This makes it plausible to envisage a new wave of reforms to modernize the country's institutions and boost economic growth. Secondly, periods of high economic growth in many recent success stories[4] have lasted longer than in Chile. The fact that Chile enjoyed nearly a decade and a half of rapid economic growth in the 1980s and early 1990s is certainly remarkable. But, as mentioned previously, there are several other countries - in Europe, Asia and elsewhere in Latin America - that have enjoyed two, three and even four decades of rapid GDP growth. Moreover, Chile's per capita GDP does not make it one of the leading economies in the world, so there is no reason to invoke a natural tendency towards slower growth rates. Finally, as we show below rich countries are able to keep reasonable rates of productivity growth in spite of their high levels of income per capita suggesting that good economic policies and good institutions are able to introduce some continuity in the growth in TFP.

According to most international rankings, Chile already has institutions that are efficient in an aggregate sense given the country's per-capita income.[5] But this does not

[4] See, for instance, Maddison (2001)

[5] See, for example, the Global Competitiveness Report (2001) or the Index of Economic Freedom (2000).

mean that those institutions cannot be improved, especially if growth has come to a relative standstill. Moreover, the same rankings show that Chile has not progressed in recent years but has stayed more or less in the same place. Most of these indicators have to be understood dynamically in the sense that once a specific place in the ranking has been achieved it doesn't give the country assurance of remaining in that place. The country will keep the place only if there is a continuous "lifting" of their policies and institutions. Therefore, it is possible to see a slowdown in productivity growth even in the absence of "absolute" deterioration in the institutional quality.

On the other hand one of the majors concerns in the last years in Chile has been the efficiency of government spending and of the state bureaucracy. It is worth noting that during the 1990s there has been significant increase in government expenditure in Chile. Indeed, while in 1990 the general government spending represented 22% of GDP, by the end of the decade the figure had climbed to 26.4%. The question that arises is whether higher government spending has resulted in more and better government services.

II.1. Total Factor Productivity

Table 1 presents data on TFP growth for Chile over the last two and a half decades. TFP is measured as the residual GDP growth that is not explained by labor or by capital accumulation. There are no input quality adjustments. A productivity boom occurred in the second half of the 1970s in the wake of the first wave of structural reforms; this was followed by the crisis of the early 1980s. Recovery began in the mid-1980s, when there was a second productivity boom (associated with a second wave of reforms) which reached its peak in the first half of the 1990s. In the second half of that decade, productivity growth slowed down once more, and over the last four years (1998-2001) TFP growth has been nil.

These calculations clearly show that the key difference between this latest period (1998-2001) and the previous fourteen years of high economic growth (1984-1997) is

TFP growth. As Table 1 shows, capital's contribution to growth has been around 2.5 percentage points since the mid-1980s (1986-2000) and has not changed in recent years. On the other hand, labor's contribution to growth averages 1.3 points but has accounted for a declining share in recent years. This is explained by a significant increase in unemployment since 1998. Finally, as mentioned above, TFP rose from two to three percentage points before falling back to a figure close to zero.

Table 1
Chile: Components of Economic Growth

	GDP growth	Contribution of:		
		TFP	Labor	Capital
1976-1980	6.8	3.2	2.4	1.2
1981-1985	-0.1	-2.3	1.2	1.0
1986-1990	6.5	2.2	2.0	2.2
1991-1995	7.5	3.3	1.4	2.8
1996-2000	4.6	1.6	0.5	2.5
1998-2001*	2.9	0.4	0.1	2.4

*For 2001 the data are estimated.
Source: Roldós (1997) and own estimations for the last period.

II.2. Areas for structural reforms

In a recent book edited by Beyer and Vergara (2001) ten areas where there is potential for improvement are identified. If some reforms were made in these areas the authors claim that there would be a new productivity boom and a new era of high economic growth would begin. In what follows of this section we discuss the problems and proposals for change in some of these areas.

(a) Health reform: A recent study of the public health system by Rodríguez and Tokman (2000) shows that the growth of government spending in public health has not generated a corresponding increase in the services produced in this sector. While government spending on health has risen by 190%, total services have increased by only 22%. This means that the productivity of expenditure has fallen by over 50%. Beyer (2001) calculates that if productivity were at its 1990 level, the public health system today could provide additional services worth about 1.5% of GDP. On the other hand, there is also growing dissatisfaction with the private health sector. First, it has not been able to cope with the issue of catastrophic diseases. And second, because of cost considerations, the number of people in the private health system has declined in the last years.

Beyer (2001) suggests three basic principles for a health reform: (i) The change of the current system where everybody pays 7% of his income to get a health plan for a system where people pay the cost of having a minimum health insurance plan. The poor would receive a subsidy if they cannot pay for this minimum. If some people want to have a broader insurance they will have to pay for it. (ii) The government subsidy will be portable. This is, people can choose whatever health insurance institution (ISAPRE) they want to be in and they can move with their subsidy to other institution whenever they want. ISAPREs will not be able to discriminate by health risk. (iii) Independent councils will administer public hospitals. The hospitals will not

receive direct resources from the state but only indirectly through the subsidies that poor people receive.

These mechanisms are aimed at improving the productivity of the private and public sectors. Beyer admits that is likely that it is impossible to reach the productivity levels of the early nineties because those levels are probably overstated due to the declining resources of the public health system at that time. However, a significant improvement in the current efficiency levels is perfectly achievable.

(b) Education reform: Human capital is one of the variables to have attracted most attention in the economic growth literature.[6] Barro (1999) applies his cross-section growth regressions to the Chilean case, and estimates that if the quality of education in this country were at a level compatible with its per-capita income, growth would be as much as two percentage points higher per year. Barro uses scores achieved in an international science test to measure education quality.[7] Although education is not one of the focus variables in this article, we are convinced that is one of the major forces behind economic growth. Moreover, measuring education quality through international examination scores clearly reveals this as an area in which Chile performs well below its development level. This suggests that growth could be significantly accelerated if education quality were improved. We return to this point in section 4.

The education budget grew from 2.5% of GDP in 1990 to 4.2% of GDP in 2000, but there have been no clear signs of any improvement in education quality. It is true that education is a long-run issue, but the emphasis seems to have been on throwing additional resources at this sector, rather than focusing on how to actually improve educational outcomes.[8]

[6] See Lucas (1988); Barro and Sala-i-Martin (1995); Barro (1991).
[7] See Barro R. and J.W. Lee (1997 and 2000).
[8] See Eyzaguirre and Fontaine (2001).

Eyzaguirre and Fontaine (2001) propose to have explicit targets for school achievement. To verify the meeting of these targets they propose external national tests. These authors emphasize the need to improve the information that parents get about the quality of schools. This will produce an increasing pressure to schools in order to improve their quality. These proposals are complemented with proposals to increase the autonomy of public schools, especially regarding the administration of human resources (teachers). The current system of subsidies for children attending public schools[9] will remain but it should be made progressive, with the poorest students getting a higher subsidy.

(c) Labor reform: As documented by Heckman and Pagés (2000) Chile is one of the Latin American countries with the highest firing costs. They estimate a significant effect of these costs on employment and especially on youth unemployment. The present value of the expected cost of firing a worker is well above the average for the region. The labor reform approved in 2001 adds to the problem since it goes in the direction of less and not more flexibility[10].

(d) Other microeconomic reforms: Several other microeconomic reforms that go in the direction of increasing productivity have been identified[11]. They are aimed at improving the efficiency of institutions. For instance, Paredes (2001) finds out that the antitrust regulation and institutions in Chile are obsolete. They neither have a clear objective nor there is a clear understanding of the type of problems that should be addressed by the antitrust institutions. The author also claims that is necessary to increase the autonomy of these institutions. The issue of antitrust is becoming increasingly important because, as it is the trend all over the world, there has been an increase of industry concentration. It is key for achieving the objective of an efficient market economy to have professional and efficient institutions looking after the

[9] Municipals and privates with state subsidies.
[10] For a proposal to increase the flexibility in the labor market in Chile see Coloma (2001).
[11] Beyer and Vergara (2001, Op. cit.).

preservation of competitive markets. The current system in Chile needs an upgrade to guarantee the achievement of this objective.

Irarrázaval (2001) finds out that the government programs directed to poverty reduction are also obsolete. They were designed in the eighties when more than 40% of the population was defined as being poor. However, as poverty has reduced to about 20% of the population nowadays, it is necessary to increase the focalization efforts in this smaller group of people. For instance, if subsidies such as the "family subsidy", the "drinking water subsidy", the "assistance pension program" were focused in the poorest 30% of the population, between one third and two thirds of the resources spent in these programs would be saved and could be used for other social programs. Focalization becomes more necessary. However, it must be said, it is also more difficult to achieve.

There are also several sectors in which regulation needs to be updated, such as electricity, telecommunications and banking. Environmental policy and regulation are also in the list[12].

II.3. Microeconomic efficiency

Several different variables have been used in the literature to capture a country's degree of microeconomic efficiency. In some of these indices, Chile is comparatively well placed compared to other developing countries, albeit well behind developed countries. In other indices, however, it lags behind countries of similar development level.

Djankov *et al.* (2000) present a data set on the time and cost involved in starting up a new firm. In terms of time, the process takes in Chile 78 days, ranking it 55th out of 75 countries — far behind countries like Canada (2 days), United States (7 days), or even

[12] For specific proposal and analysis see Beyer and Vergara (2001, Op.cit.).

South Africa (30 days). On this measure Chile is in a worse position that most countries of similar per-capita income. In terms of monetary costs (in relation to per-capita GDP) Chile ranks 25th at 12% of per capita GDP. This is good compared to a country such as Israel (20%) but much higher than in the US or Canada (1%), Australia and Norway (2%), or even Turkey (3%).

The Current Competitiveness Index published in the Global Competitiveness Report (2001) also provides information on microeconomic efficiency. This is an aggregate index intended to capture "an economy's effective utilization of its current stock of resources". The index is constructed from several variables, such as the number of permits needed and days taken to start up a new firm, bureaucratic red tape, and so forth. In terms of days taken to start up a new firm, Chile has more or less the same position as in the previous index (54th among 75 countries). In terms of permits, Chile ranks 35th with 5 permits, which is more than the UK (2), New Zealand (3) or the US (4), but less than Brazil (7) or Mexico (10).

Evans and Rauch (1999) study the effects of State bureaucracy on growth, considering in particular salary structure and policy, along with the procedures used for hiring top managers in public administration. They find that the more that public managers are hired on merit, and the more attractive their salaries, the higher the economic growth of the country concerned. Valdés (2001) uses the coefficients obtained by Evans and Rauch and finds that if the quality of Chile's public administration had been equal to that of Hong Kong in 1970-1990, its growth rate would have been as much as 1.5 percentage points higher per year.

Kaufmann *et al.* (1999) construct a database with a number of variables on governance, including the regulatory framework. Here Chile ranks 18th among 145 countries, which puts it above most other countries of similar per-capita income, but well behind countries such as the US, the UK and New Zealand. Corruption is a variable that undermines the proper functioning of institutions. These authors also construct an index

of corruption control, in which Chile is again well ranked (24 among 136) but still far behind the leaders. The index goes from +2.5 (the less corrupted) to –2.5 (the more corrupted). Chile has 1.03, which well above the mean but behind countries such as New Zealand (2.1), Canada (2.1) or the US (1.4).

III Some theoretical considerations

We would like to focus our analysis mainly in the growth of total factor productivity. In general, early growth studies started by considering an aggregate Cobb-Douglas production function with technological change so that growth in output could be expressed as a function of capital accumulation and labor accumulation. Under the assumption of perfect competition, the weights of the inputs were their respective shares. These studies found that the unexplained part of output growth, the residual or total factor productivity (TFP), was the most important element in explaining the growth rate of different countries. For example, Solow (1957) found that TFP explained a 52% of the growth rate of the US between 1909-1949. Denison (1967) estimated that for the period 1950-62, TFP explained 40% of the growth rate in the US, while in the case of a group of countries of Europe it contributed on average a 62%. These high rates of growth in TFP were immediately a source of debate in the profession. On the one hand, some pointed out that these early studies failed to recognize the heterogeneity of the different inputs (for example, Jorgenson and Griliches, 1971.) New estimates of TFP were carried out. Inputs were categorized by type, so that the growth of capital and labor became a weighted average of the growth of the different input types. The weights were the income shares of the different types of labor and capital in total labor and capital compensation, respectively. Hence, this procedure corrected by marginal productivity of the different input types. Using this corrected methodology, Jorgenson (1995) found that TFP accounted for only 21.6% of the growth rate of the US in the period 1947-85. Capital accumulation was the most important factor in explaining growth.

A second line of thought uses the evidence coming from these early studies to argue that there was something wrong with the neoclassical theory of growth. Economists argued that if the main source of economic growth was left unexplained, then we had no satisfactory theory of growth (for example, Romer, 1986). New models of growth were developed that were trying to deal with this problem. It was the origin of the endogenous growth literature. In Romer (1986) and Lucas (1988) the basic idea is that individuals do not internalize the externalities associated to the accumulation of knowledge. These so called AK (where K is broadly defined) models have strong implications. Among them that differences in savings rates among countries or in population growth may result in permanent differences in rates of economic growth which has the strong implication of no convergence in income per capita among countries as predicted by the neoclassical theory of growth.

The constant marginal product of capital and the (conditional) divergence in income per capita is however not possible to sustain empirically. Although the empirical growth literature (for a revision see Barro and Sala-i-Martin, 1995) tends to support the endogenous growth theory, it also shows that there is conditional convergence and diminishing returns to capital. The failure of the AK models to predict adequately these facts have lead to a revision of these early endogenous models. The augmented Solow model of Mankiw, Romer and Weil (1992) fits more adequately the data. The basic model is augmented to include human capital. Their empirical results are consistent with decreasing returns to capital and a slow convergence to the steady state. Moreover the model is able to reconcile large differences in output per capita once differences in savings rate and population growth are accounted for: a clear improvement on the basic Solow model.

Although the augmented Solow model does a much better work in fitting the actual data that the basic model and the AK models, it has an evident shortcoming. In the steady state the growth rate in income per capita is defined by the rate of technological change which is exogenously determined and therefore unexplained. An important amount of

effort has been put in trying to understand the forces behind the rate of technological progress. The most successful in this line of research have been those linked to the Schumpeterian tradition of growth through creative destruction. In the basic model (see Aghion and Howitt, 1992) succeeding vintages of intermediate goods embody quality improvements which render their predecessor obsolete. These quality improvements are a source of economic growth but they are the result of an uncertain research process leading to a stochastic growth. The possibility of monopoly profits introduce incentives to hire labor for research instead of hiring it for the manufacturing of the latest generation of intermediate goods. In the steady state equilibrium the division of labor between research and manufacturing remains unchanged although given the nature of research activities growth is stochastic. The average growth rate in this steady state equilibrium depends on the propensity to save, the productivity of the research technology and the degree of market power enjoyed by a successful innovator.

Chile has shown for the last 15 years an impressive economic performance[13]. Hence, it is not an easy task to suggest areas that have been **important** obstacles to Chile's economic growth. The recent slowdown is to a great extent the result of the world economic downturn. There are, however, as we argued above some indications that Chile is facing a productivity slowdown that is independent of the current international scenario and that may be the result of bad performing institutions and policies. If these institutions or policies are affecting the accumulation of both human and physical capital, lead to misspending of resources or impeding efficiency gains they will be unable to promote growth. Most of the time countries rely on institutions and policies that instead of providing the right incentives for growth tend to deprive countries from the fuel necessary to start the growth process. Otherwise is impossible to understand why there are so many countries that are unable to achieve a more permanent process of economic growth. Therefore, it is important to measure institutions and policies against their ability to

[13] Only 14 countries had a larger rate of GDP growth than Chile in the period 1980-20. We have to remember that in 1982 GDP felt a 15%.

promote growth[14]. If not there is a strong case for arguing that these institutions or policies have to be amended. Of course if there is a conflict with another objective the political process is the responsible of balancing both objectives.

In order to model the impact of institutions an policies on growth we expand the framework developed by Mankiw et. al. (1992). So we can think of the level of GDP as determined by:

$$Y(t) = K_t^{\alpha} H_t^{\beta} (A_t L)^{1-\alpha-\beta}$$

where K, H, and L represent physical capital, human capital, and basic labor respectively. As usual α is the partial elasticity of output with respect to K, and β is the partial elasticity of output with respect to H. A(t) will be assumed to have two components: the level of economic efficiency (E(t)) that depends on the quality of economic policies and institutions, and the level of technological progress $\Phi(t)$. We further assume that E(t) can be written as a log linear function of economic policies and institutions, and that $\Phi(t)$ grows at an exogenous rate g(t)[15]. Making the usual assumptions about the dynamics of K and L we have the following system:

$$\begin{aligned}
\dot{K}(t) &= s_K Y(t), \\
H(t) &= s_H Y(t), \\
\dot{L}(t) &= nL(t), \\
A(t) &= E(t)\Phi(t), \\
\ln E(t) &= \lambda_o + \sum\nolimits_i p_i \ln I_i(t), \\
\dot{\Phi}(t) &= g(t)\Phi(t).
\end{aligned}$$

[14] Of course we are not suggesting that every institution or policy have to measured against that benchmark. We are thinking in those institutions y policies that are more directly involved or exclusively involved with the economic sphere.

[15] This rate of technological growth could eventually be "endogeneized" by assuming, for example, that it is the result of intentional investment in R&D of profit seeking firms. These firms invest in R&D to capture "monopoly rents" associated to a product innovation.

where the I_i stand for the different policies we are interested in. Defining k, h, and y as K/ΦL, H/ΦL, and Y/ΦL, respectively, we can write the first two equations of the former system as follows:

$$\dot{k}(t) = s_k E(t)^{1-\alpha-\beta} k(t)^{\alpha} h(t)^{\beta} - (n+g)k(t)$$
$$\dot{h}(t) = s_h E(t)^{1-\alpha-\beta} k(t)^{\alpha} h(t)^{\beta} - (n+g)h(t)$$

Solving for the steady state values of physical capital and human capital we get the following expressions:

$$\ln k^* = \frac{1-\beta}{1-\alpha-\beta}\ln s_k + \frac{\beta}{1-\alpha-\beta}\ln s_h + \ln E(t) - \frac{1}{1-\alpha-\beta}\ln(n+g)$$
$$\ln h^* = \frac{\alpha}{1-\alpha-\beta}\ln s_k + \frac{1-\alpha}{1-\alpha-\beta}\ln s_h + \ln E(t) - \frac{1}{1-\alpha-\beta}\ln(n+g)$$

The level of income per capita in this steady equilibrium is as follows:

$$\ln y^* = \ln E + \frac{\alpha}{1-\alpha-\beta}\ln s_k + \frac{\beta}{1-\alpha-\beta}\ln s_h - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g)$$

Note that the level of income per capita in the steady state equilibrium is influenced by the quality of economic policies and institutions[16]. Of course, this last specification would be valid only if countries are in their steady state. Since this is not the case the dynamics ha to be modeled explicitly. If we consider the production function defined earlier and the equations of motion for k and h, it is possible to take log linear first order Taylor approximation around ln k* and ln h* (i.e. the steady state values of h and k) to obtain the following balance growth path:

[16]We have dropped the time subscript from the variable associated to the quality of economic policies and institutions which indicates that we are assuming that they do not change persistently in the long run.

$$\frac{d[\ln y(t)]}{dt} = -(1-\alpha-\beta)(n+g)[\ln y(t) - \ln y^*]$$

which shows that y converges to y* at rate (1-α-β)(n+g). This is a differential equation with the following solution

$$\ln y(t) - \ln y^* = e^{-(1-\alpha-\beta)(n+g)}[\ln y(0) - \ln y^*]$$

which implies that y approaches y* exponentially. To find an expression for the growth in income per capita we add ln y* - ln y(0) to both sides producing the following growth equation:

$$\ln y(t) - \ln y(0) = (1 - e^{-(1-\alpha-\beta)(n+g)t}) \cdot \ln y^* - (1 - e^{-(1-\alpha-\beta)(n+g)t}) \ln y(0)$$

where $(1-\alpha-\beta)\cdot(n+g)$ determines the speed of convergence and indicates how rapidly an economy's output per capita, y, approaches its steady-state value, y*. The starting level of income per capita is given by y(0). Since we got before an expression for ln y* we can substitute it in the previous equation to obtain the following equation.

$$\begin{aligned}\ln y(t) - \ln y(0) = (1 - e^{-(1-\alpha-\beta)(n+g)t}) \cdot (\lambda_o + \sum_i p_i \ln I_i(t)) + (1 - e^{-(1-\alpha-\beta)(n+g)t}) \frac{\alpha}{1-\alpha-\beta} s_k \\ + (1 - e^{-(1-\alpha-\beta)(n+g)t}) \frac{\beta}{1-\alpha-\beta} s_h - (1 - e^{-(1-\alpha-\beta)(n+g)t}) \frac{\alpha+\beta}{1-\alpha-\beta} \ln(n+g) \\ - (1 - e^{-(1-\alpha-\beta)(n+g)t}) \ln y(0)\end{aligned}$$

This function can be empirically tested. We would like to remind the reader that we are in particular interested in the rate of the growth of total factor productivity. The growth in TFP is a more natural framework to think about economic policies and institutions. The argument behind is that the contribution to economic growth of similar rates of accumulation in physical capital or human capital accumulation will differ across countries if their economic policies and institutions also differ. In the early empirical

studies of growth the effect of these variables were captured in the so called residual. Researchers were aware of the fact that this residual was the result of omitted factor influencing the growth process. Indeed they knew that exogenous technological progress was a convenient way of expressing the output growth due to factors unrelated with the accumulation of inputs. For example, Denison (1967), broke down the residual obtained in his growth estimation in several components. Among them, advances in knowledge, improved allocation of resources and economies of scale. These concepts are fully integrated in the modern endogenous growth models.

The lack of formal models and adequate data to test them were important factors behind the slow move towards an endogenous theory of economic growth. We may add to the picture the widespread impression that the residual was the outcome of several factors none of them most important than the other. As Harberger (1990) puts it: the residual is better understood in terms of reduction in real costs. In this definition almost anything fits.

Recent studies, however, build on the idea that TFP has been overestimated as a source of growth (for example, Young, 1995). In our opinion, whether TFP calculations are large or small is not a relevant issue for growth theory, unless we have a satisfactory theory of what makes TFP large or small. We know of the importance of input accumulation for growth. We have quiet satisfactory theories of how input accumulation occur. Differences in growth due to differences in capital accumulation are easily understand by the profession. We have a lot of insights of why investment rates differ across countries. However, we don't have many insights of why TFP rates differ across countries. The argument that TFP increases with efficiency gains is very appalling. An example may illustrate this idea well. Let's assume that in a firm there are economies of scales not fully utilized. If this is the case a rearrangement in production (probably an increase at the plant level) may produce an advance in TFP. This is explained by the fact that the reduction in average costs associated to a complete utilization of economies of scale makes room to a possible increase of the rewards to the existing productive factor

without an increase in output prices. An increase in the payments to productive factor is an increase in value added and therefore in growth. Therefore it is almost inevitable to think about economic growth as a very decentralized process that occurs at the level of individual firms. In such a scenario the relevant policy questions are related to the general question of how to facilitate this process of efficiency gains to the individual firms.

But is TFP an important source of economic growth? Or if you prefer, is economic growth affected by the quality of policies and institutions? To answer this question we do a very simple exercise in growth accounting for the period 1980-2000. This consist in estimating the unexplained rate of GDP growth after controlling for investment and increases in employment. We used the data of the IMF collected in the International Financial Statistics. We take the labor share in GDP to be 0.6. Assuming a stock of capital that is 2.5 times output and a depreciation rate of 5%, this implies an average rate of return of capital of 11%, a reasonable return for the entire physical capital stock. Since we do not have consistent data on employment for our sample we use population data. TFP is the result of calculating the following equation:

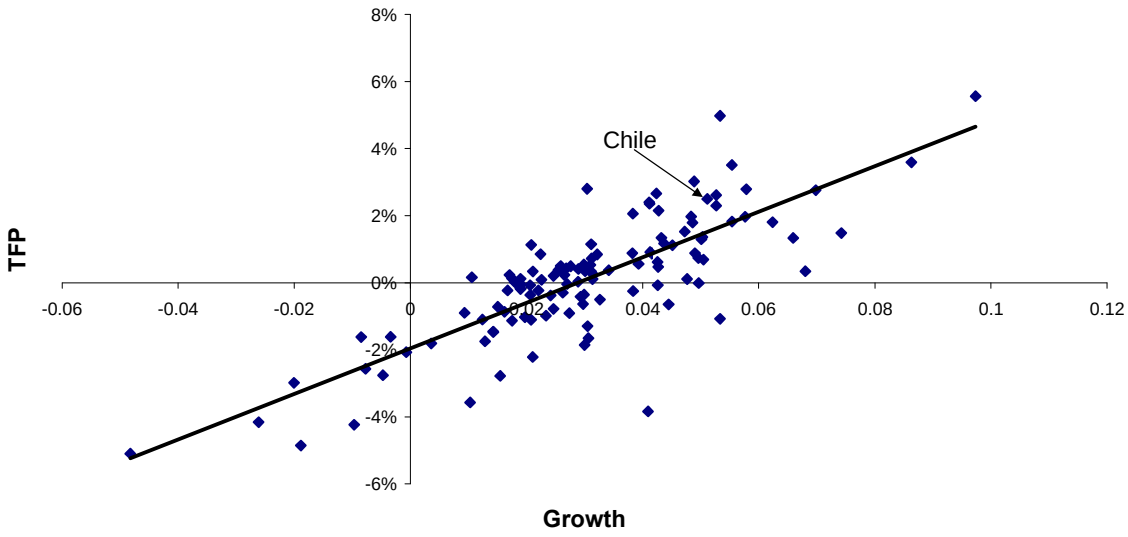
$$TFP_t = \hat{Y}_t - (r + \delta)I_t - s_L\hat{L}$$

meaning that TFP is the result of subtracting from the rate of growth in GDP net investment weighted by the gross rate of return of capital (δ is the depreciation rate) and the rate of growth of labor weighted by the labor's share in GDP.

There is no doubt of the importance of TFP as an explanation for growth. Figure 2 draws the relationship between TFP and the rate of economic growth for the period between 1980 and 2000. Two thirds of the variance in growth rates is explained by variations in the rate of TFP growth. Of course this observation doesn't mean that factor accumulations do not play a role in explaining the differences in economic growth among countries. Since our estimations do not correct for human capital it could be argued that

our calculations for TFP exaggerate its actual importance. However it would be surprising if the inclusion of human capital reduced significantly the importance of TFP[17]. Chile shows a very good rate of economic growth that is explained by an important rate of growth of TFP. Here it is possible to notice the impact of the many reforms that have transformed Chile from a very closed and over – regulated economy in an open and competitive economy[18]. To repeat these high rates of TFP growth is precisely the challenge for Chile and as the same graph shows this is not an easy task. Many countries did have rates of TFP growth close to zero and indeed some did have negative rates of TFP growth.

Figure 2
TFP and growth: average growth in 1980 2000



To confirm the role that TFP plays in economic growth let's look an instant to table 2. Since we were able to build TFP for 107 countries in the period 1980 –2000 we take 10 years average growth in TFP for each country. This allows us to analyze 214 periods. We

[17]Indeed for a smaller sample and the period 1970-1991, Beyer (1997) corrects for human capital accumulation finding that on average TFP felt 0.48 percentage points ranging from 0.04 to 1.01 percentage points.
[18]See Larraín and Vergara, editors, (2000) for a description of these reforms.

select the top 10% and bottom 10% of the periods in terms of economic performance and compare the importance of TFP in explaining the differences in the rate of growth of GDP.

Table 2
The Sources of Growth

		Output	Factor Accumulation	TFP
10% Highest growth rates	Mean	7.55	3.88	3.67
10% Lowest growth rates	Mean	-1.19	2.29	-3.48
Difference in Mean		8.74	1.59	7.15

The differences in the rate of growth in GDP among countries is explained almost exclusively by the differences in the rate of growth in TFP. Factor accumulation plays a relatively modest role. That TFP is an important source of economic growth for every country is confirmed if we concentrate our results in specific groups of countries. To show this we do the following exercise. We rank the 107 countries according to its level of GDP per capita in 1980 (the first year of our analysis). To do so we use the Penn Tables. Then for the group of countries whose GDP per capita is in the top quartile of the ranking we select the highest periodic rates of economic growth and the lowest periodic rates of economic growth. Each group considers a 25% of the sample. The time spans are 1981-1990 and 1990-2000. The next step is to compare the average rates of economic growth across the two groups. These calculations are presented in Table 3. In table 4 we do the same exercise but now for the countries whose GDP per capita is in the bottom quartile of the GDP per capita ranking.

Table 3
The Sources of Growth: countries with highest GDP per capita

		Output	Factor Accumulation	TFP
Highest periodic growth rates	Mean	4.57	3.48	1.09
Lowest periodic Growth rates	Mean	0.50	2.79	-2.29
Difference in Mean		4.07	0.69	3.38

The rates of growth among "similar" countries may differ substantially from one period to the other or from one country to the other. Moreover we can hardly find in the differences in capital accumulation a consistent explanation for these significant variations. The important discrepancies in the rate of economic growth have to be linked to the differences in the rate of growth of TFP. Indeed in periods of low growth both in rich and poor countries the rate of factor accumulation is quite high but it is the rate of TFP growth that defines if there will be a bad or good period of economic growth. We have to remember here that this tables are built on 10 years averages so we are not talking here about cyclical downturns in the economy.

Table 4
The Sources of Growth: Countries with lowest GDP per capita

		Output	Factor accumulation	TFP
Highest periodic growth rates	Mean	6.22	3.10	3.12
Lowest periodic Growth rates	Mean	-0.21	2.08	-2.29
Difference in Mean		6.43	1.02	5.41

We did very simple exercises that show the importance that TFP plays in the process of economic growth. Of course these exercises may contain flaws that we are not taking into account (for example that TFP may be correlated with investment) but we don't think they obscure the general picture. That TFP, and hence policies and institutions, play a major role in the process of economic growth. Therefore, if we are interested in fostering economic growth in Chile we have to look carefully at the performance of Chilean institutions and policies.

IV Economic Growth, Policies and Institutions

In the previous sections we showed that growing countries exhibit positive rates of growth in TFP. We also suggested that factor accumulation does a poor job in explaining differences in economic growth across countries. Hence if we want to explain growth we have to explain TFP growth which is strongly linked to the quality of institutions and economic policies. But, which institutions and economic policies are the ones that have the greatest impact on economic growth? Since Chile is a success story, we also have to ask ourselves which are the marginal initiatives that may increase the economic growth of an already high growing economy. The candidates for increasing growth are therefore not as obvious as is the cases of non growing economies. The extensive research done in the last two decades tells us very broadly how to increase economic growth. However, it is not as conclusive on the specific policies. We know however that there is a large body of literature (for example, Easterly, 1993, and Krueger, 1990) that points out that bad economic policies may affect economic performance heavily. One could argue that there is room for improvement in the Chilean economic policies but generally speaking they are sound and respond more o less to economic dictums. A related literature targets the role that institutions play in the process of economic growth (for example North, 1990). Their impact is notwithstanding less obvious. Moreover to modify institutions is a very hard task. Here however there is more room for improvement in Chile. As stated at the beginning the educational sector and the government bureaucracy are obvious targets of reform. Their impact on economic growth

is indirect but not of less significance. An inefficient government bureaucracy, for example, may hinder permanently efficiency gains. Therefore, a reform that improves substantially the efficiency of the state bureaucracy may generate an increase in the economic efficiency of an economy almost continuously if there is entry of new economic activities. The same thing can be said of a once and for all improvement in the quality of education. The increases in productivity associated to the entering of the "new" school graduates to the labor force will last until there is a complete replacement of the "old" labor force. This may occur even if the schooling level of the new labor is the same as the one leaving the labor force.

One of the problems faced by the empirical work in this subject is the lack of data on much of the economic policies and institutions we are interested in. However in the last two decades there has been a systematic effort of different institutions trying to collect reliable data on the quality of economic policies and institutions. Unfortunately, much of the data relies on subjective measures of the quality of institutions. Another problem is that different indicators tend to be highly correlated within each data set. Probably this is not surprising since most of the high quality policies and institutions come in a package. So a country with a good regulatory framework probably has simultaneously a highly qualified bureaucracy and at the same times low levels of corruption. The reverse is true in the case of countries with a bad regulatory framework. Moreover "good" institutions may be the result of strong economic growth and therefore the result and not the cause of growth. However there are good reasons to treat institutions as exogenous. There is growing evidence that in most countries institutions have been around for a long time and that they have changed modestly across time. Also that they have affected economic performance (on both aspects see Acemoglu et. al. 2001).

In order to focus our work in reforms that may have a long run impact on economic growth in Chile we take a somewhat loose empirical strategy. Starting from a very basic empirical model we look one at a time at policies or institutions that if upgraded may

contribute to an increase in the rate of growth in Chile. The objective is to have a minimum check of the viability, in terms of economic growth, of the proposed reforms. We run cross - section regressions for our sample of countries. Table 5 presents the results of the basic model. The dependent variable is the rate of growth in TFP for the period 1980 – 2000. The independent variables are the log of GDP per capita in 1980 (lrgdpch to control for convergence and the data comes from the Penn Tables), the degree of openness (open the Sachs and Warner measure), total years of education of the population 15 years and over in 1980 (tyr1580 from Barro and Lee, 2001), and the average ratio of private domestic credit over GDP for the entire period in log form (logcpgdp from the IMF Statistical Yearbook). The results are more or less in line with previous research on the subject. The larger the level of initial GDP per capita the lower the rate of growth in TFP. Openness, educational level and the deepness of financial markets affects positively TFP growth.

Table 5: The basic model of TFP growth

Dependent Variable: TFP
Method: Least Squares
Date: 07/24/02 Time: 14:28
Sample(adjusted): 2 153
Included observations: 80
Excluded observations: 72 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.123152	0.032756	3.759660	0.0003
LRGDPCH	-0.016339	0.004187	-3.902475	0.0002
OPEN	0.015492	0.005549	2.792071	0.0066
TYR1580	0.002132	0.001064	2.004475	0.0486
LOGCPGDP	0.005847	0.003210	1.821676	0.0725

R-squared	0.250721	Mean dependent var	0.003065
Adjusted R-squared	0.210759	S.D. dependent var	0.016157
S.E. of regression	0.014354	Akaike info criterion	-5.589157
Sum squared resid	0.015452	Schwarz criterion	-5.440280
Log likelihood	228.5663	F-statistic	6.274045
Durbin-Watson stat	1.384728	Prob(F-statistic)	0.000207

Table 6

Dependent Variable: TFP
Method: Least Squares
Date: 07/24/02 Time: 14:39
Sample(adjusted): 2 153
Included observations: 78
Excluded observations: 74 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.139951	0.034232	4.088356	0.0001
LRGDPCH	-0.018198	0.004432	-4.105978	0.0001
OPEN	0.011162	0.005284	2.112337	0.0381
TYR1580	0.001323	0.001149	1.151013	0.2535
LOGCPGDP	0.004529	0.003324	1.362517	0.1773
INDEXGOV	0.009108	0.004016	2.268082	0.0263

R-squared	0.291156	Mean dependent var	0.002947
Adjusted R-squared	0.241930	S.D. dependent var	0.016322
S.E. of regression	0.014211	Akaike info criterion	-5.595756
Sum squared resid	0.014541	Schwarz criterion	-5.414471
Log likelihood	224.2345	F-statistic	5.914752
Durbin-Watson stat	1.319161	Prob(F-statistic)	0.000123

In Table 6 we try to evaluate the impact of governance on economic growth. The data comes from Kaufmann et. al. (1999). These authors aggregate different measures of governance originated from various sources of information in six robust indicators. “Voice and Accountability” (VA) measures the extent to which citizens of a country are able to participate in the selection of governments; “Political Instability and Violence” (PIV) measures the perceptions of the likelihood that the government will be destabilized; “Government Effectiveness” (GE) attempts to capture the quality of government by combining among other indicators the perceptions of the quality of public services, the independence and competence of the civil service; “Regulatory Burden” (RB) tries to capture the extent to which there are market unfriendly policies in a country as well as perceptions of the burdens imposed by excessive regulation; “Rule of Law” (RL) includes several indicators which measure the extent to which agents have confidence in and abide by the rules of society, and finally “Graft” (CP) measures perception of corruption. The choice of units of governance assures that the estimates of governance have a mean of zero, a standard deviation of one, and range from around –2.5 to around 2.5. Higher values correspond to better outcomes.

One of the problems with these indicators are that they are for the years 1997-98. Some of them are less time invariant than others. For example, political systems have changed substantially in some countries in the last two decades which may affect substantially VA and PIV. RL may also be influenced heavily by such changes. GE, CP and RB are probably less sensible to changes in political systems. Since our dependent variable covers the period 1980-2000 these are the candidates to include in our regression. However these indicators are highly correlated with partial correlations ranging from 0.68 to 0.93. Therefore we include in the regression an average of the three indexes as a measure of government efficiency. 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 proves to be highly significant. In spite of Chile's good performance a plausible objective is to shorten in a half the distance between the maximum value in the ranking and Chile's value. If achieved there are about 0.4 percentage points that could be add to Chile's TFP growth.

An alternative measure of government effectiveness is the one provided by the International Country Risk Guide. This is a publication from The PRS Group, Inc. that tries to evaluate the risks faced by business in countries around the globe. Among its product is the IRIS dataset that includes scores for six variables: corruption in government, rule of law, bureaucratic quality, ethnic tensions, repudiation of contracts by government, and risk of expropriation. We consider as a measure of government effectiveness the scores for bureaucratic quality. The scores range from 1 (low quality) to 4 (high quality). There is data available for the years 1982 to 1997. However, only a few countries have data for the entire period. For each country we take the mode of the available data. Table 7 shows the results of this exercise. Our measure of government effectiveness is positively correlated with TFP growth. Increasing our current score of 3 to the highest level may increase Chile's TFP growth by 0.8 percentage points. This result confirms our previous finding and suggest that the impact of a state reform on economic growth may be significant.

Table 7

Dependent Variable: TFP
Method: Least Squares
Date: 07/24/02 Time: 19:40
Sample(adjusted): 2 153
Included observations: 77
Excluded observations: 75 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.115096	0.034068	3.378392	0.0012
LRGDPCH	-0.016723	0.004400	-3.801046	0.0003
OPEN	0.009717	0.005714	1.700565	0.0934
TYR1580	0.000424	0.001194	0.354892	0.7237
LOGCPGDP	0.004157	0.003220	1.290733	0.2010
BUREAQUAL	0.008245	0.002980	2.766967	0.0072

R-squared	0.329125	Mean dependent var	0.002752
Adjusted R-squared	0.281880	S.D. dependent var	0.016338
S.E. of regression	0.013845	Akaike info criterion	-5.647047
Sum squared resid	0.013610	Schwarz criterion	-5.464413
Log likelihood	223.4113	F-statistic	6.966372
Durbin-Watson stat	1.288396	Prob(F-statistic)	0.000024

Finally we look at the potential impact of the quality of education. To do so we take the Barro and Lee (2000) data on educational quality. Specifically we take the data on achievements in international tests of mathematics to add to the basic empirical model. For the countries where no mathematics test were available we choose the achievement in the science test. If none of them was available we choose the achievements in reading. We took the last observation available. In some cases the only tests available were in the early 70. Since educational institutions do not change rapidly we don't think that we are making a serious mistake. We upgrade the Barro and Lee data with the results of the 1999 TIMSS and the "Laboratorio Latinoamericano de Educación". In this last case we use the fact that both Colombia and Chile took part not only in the "Laboratorio" but also in the TIMSS to convert the achievements in this last test to the scale reported by the TIMSS. Following Barro and Lee we uniformed all the different tests on a 0 to 100 % scale. Table 8 presents the impact of our indicator of educational quality on the rate of growth in per capita income. This last variable enters very strongly in the regression suggesting that a good educational may increase TFP growth significantly. Since Chile is almost 11 percentage points below the average in the TIMSS achieving that average may increase

TFP in almost 0.7 percentage point. There is a lot to gain by improving our educational system.

Table 8

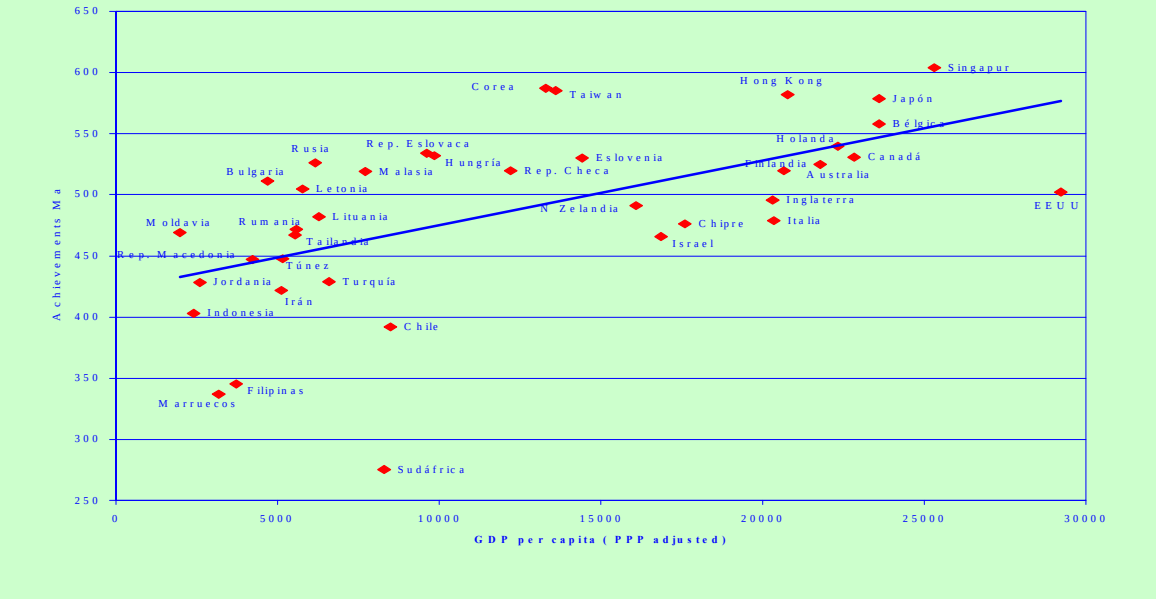
Dependent Variable: TFP
Method: Least Squares
Date: 07/24/02 Time: 20:05
Sample(adjusted): 2 153
Included observations: 53
Excluded observations: 99 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.087146	0.031603	2.757507	0.0083
LRGDPCH	-0.014769	0.003477	-4.247755	0.0001
OPEN	0.014842	0.005947	2.495772	0.0161
TYR1580	0.000588	0.001017	0.578089	0.5660
LOGCPGDP	-0.000596	0.002572	-0.231658	0.8178
TIMSS100	0.062497	0.030439	2.053175	0.0456

R-squared	0.457331	Mean dependent var	0.004911
Adjusted R-squared	0.399600	S.D. dependent var	0.014178
S.E. of regression	0.010986	Akaike info criterion	-6.078184
Sum squared resid	0.005672	Schwarz criterion	-5.855132
Log likelihood	167.0719	F-statistic	7.921788
Durbin-Watson stat	1.471706	Prob(F-statistic)	0.000018

An average achievement will put a country like Chile at the level of Thailand or Lithuania, and below countries like Latvia, Malaysia or Bulgaria. None of these countries have a GDP per capita higher than Chile at PPP levels. Figure 3 shows the comparative performance of Chilean students in the mathematics test of the TIMSS. The results are plotted against the level of GDP per capita (PPP adjusted). Chile is well below its level of GDP per capita. The challenge is clear.

Figure 3
Achievement in mathematics (TIMSS) and GDP per capita (PPP adjusted)



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). If this is the case it is urgent to reform educational institutions in order to assure accountability among schools. It is rather strange that although Chile finance its schools through a voucher parents do not exercise their choice to move their children to better schools. Part of the problem is that the information on school performance do not flow easily to parents. Results on school achievements have been available only since 1995 but are difficult to understand. It is indispensable that parents are alerted on bad performing schools and that they are able to move their children to better schools.

In this respect a major problem is that there are many counties where the choice is made among municipal schools that perform equally bad. In such cases parents need to have the possibility of opting out through transport vouchers or through their direct intervention in the management of these schools. To introduce this last alternative it is necessary to reform the teachers' labor statue that protects teachers heavily without clear obligations. Under this statue teachers are entitled to a series of benefits without clear obligations. It is almost impossible to fire them regardless of student performance. If we

compare Chile with Malaysia as is done in Figure 4 (Table 9 accompanies the figure) we realize how far is Chile from achieving a good educational system.

Figure 4
A comparison between Chile and Malaysia
Achievements in Math in the TIMSS

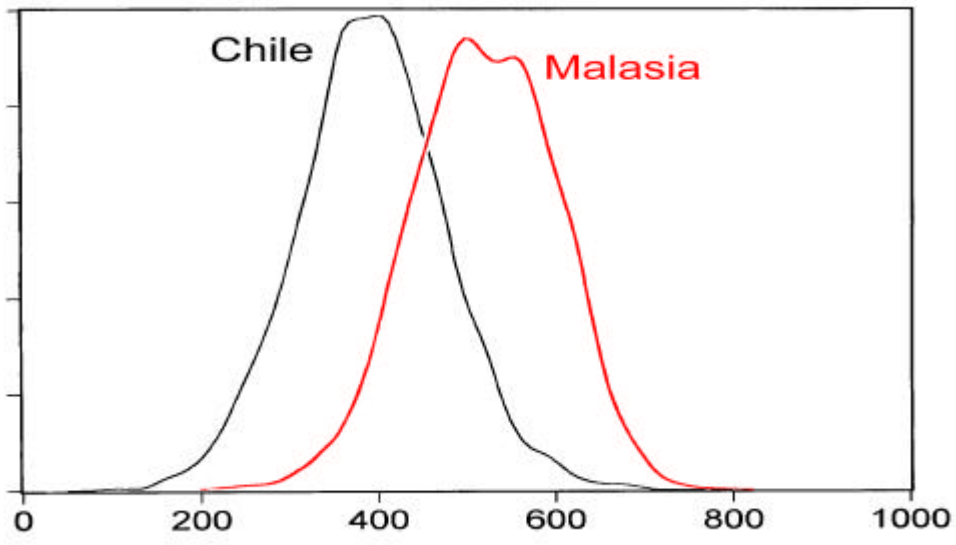


Table 9
Complementary Information of Chile and Malaysia

	Chile	Malasia
Per capita GDP 1970 (PPP 90)[a]	5.293	2.079
Per capita GDP 1998 (PPP 90)[a]	9.757	7.100
Population 15 and over with no education 1970[b]	13,6%	41,4%
Gini	0,519	0,485
Ratio of incomes earned by 5th quintile over 1st quantile	13,5	12,0
Public expenditure in education (% PIB 98)[c]	4,2%	4,0%
Total expenditures (%PIB 98)[c]	7,3%	4,7%
Population 1998[a]	14.790.000	20.930.000
Primary enrolment [d]	96,4%	100%
Public expenditure per student primary (US$ PPP 98)[c]	1.764	1.123
Public expenditure per student secondary (US$ PPP 98)[c]	1.713	1.460

Fuentes: a Maddison (2001); b Barro y Lee (2000); c OECD (2001); d UNESCO (2000).

It is disappointing that our best students coming from expensive schools are outperformed heavily by the Malaysian students. If Chile fails to achieve high standards in education it will be very difficult to keep a rapid rate of economic growth.

V Conclusions

We have argued that the rate at which economies may grow is not only constrained by their level of resources and technology but also by the structure of incentives embodied in its institutions and economic policies. In particular, Chile's economic success in the last years is associated to the application of sensible economic policies and the existence of a sound institutional environment. If the country is able to keep and improve these policies and institutions an additional period of high growth may be assured. The mayor gains in economic growth for a country like Chile may come from an improvement in its educational system. Reasonable and reachable improvements may increase the rate of TFP growth in Chile in 0.7 percentage points. Further gains are possible if the country increases government efficiency. Taking our results together it is possible to conclude that modest changes in the country's policies and institutions may increase Chile's rate of growth in 1.5 percent points.

VI References

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