

# Trade and growth *in Chile*

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This study analyses the relations between the noteworthy performance of Chilean exports over the last two decades and the high economic growth rate of the country since the mid-1980s. It concludes that the Chilean experience may be described as a case of “export-led growth” rather than one of “growth-led exports”. What were the causes of Chile’s export success? Trade liberalization acted as an important stimulus, but this success was also due to other policies, both horizontal and sectoral: the exchange-rate policy followed since 1982, the introduction of drawback arrangements and export subsidies for exports of relatively minor importance in the mid-1980s, the use of a debt conversion programme to stimulate new production activities for the export of specific goods after the debt crisis, the active participation of the State in providing market information, and the substantial subsidies provided for the forestry sector. The next stage in the development of Chilean exports will be more difficult, however, and will call for more complex policies than the previous stage. Among the issues that must be addressed by such policies are the solution of market flaws in key activities (training and education, technical and marketing know-how, and the provision of long-term resources for investments in new activities not previously undertaken).

# I

## Introduction

Rightly or wrongly, Chile has come to be perceived in academic and policy-making circles as a shining example of the success that awaits countries bold enough to introduce and persevere with reforms to favour the market forces. In the period from 1974 to 1979, the military government which overthrew President Allende in 1973 embarked on an out and out process of trade liberalization, freed domestic financial markets and opened up the balance of payments capital account (see Meller, 1996, chap. 3; Ffrench-Davis, Leiva and Madrid, 1993; Agosin and Ffrench-Davis, 1995). The aim of these reforms was to ring down the curtain on the import substitution industrialization model, which had been the main development paradigm ever since the 1940s and had been kept in being by governments of the most diverse tendencies. The reforms of the 1974-1979 period were guided by the idea that once the full sway of the market forces had been assured, resources would be reallocated (without cost) to the export industries in which the country had comparative advantages, thus leading to rapid growth not only of exports but also of the overall product.

Consequently, in any evaluation of the Chilean policy reforms it is particularly interesting to study the behaviour of exports and the way they relate to the overall growth of the economy. There is no denying that exports grew rapidly after 1974 and have continued to grow up to the present. Thus, it is maintained that one of the prime elements explaining Chile's success has been the exceptionally good performance of exports. However, although the process of expansion and diversification of exports has been very successful, it has only been a driving force for the rest of the economy in recent years. Up to the end of the 1980s, the vigorous growth of exports was not

backed up by a significant rise in the investment rate or a concomitant improvement in the overall economic results. On the contrary, economic growth during the period of the military regime was much slower than during the 1960s, and rates of saving and investment fell off markedly. At the same time, the process of export-based growth is relatively recent, and its long-term sustainability remains an open question.

This article analyses the evolution of exports and the overall product over a lengthy period: 1960-1995. It seeks to identify the main trends in the growth of exports and to assign their due responsibility to the various factors that affect export behaviour, providing answers to the following questions:

- Was trade liberalization responsible for the obvious success in export activities that Chile has had since the mid-1970s and continues to have today?
- What importance should be assigned to other government policies that promoted exports in general and to selective policies at the sectoral level?
- Why has the connection between export growth and overall economic performance been much stronger in the 1990s than before?
- What are the prospects for export-led growth in the coming decades?

This study has been organized along the following lines: after the present Introduction, section II asks whether the Chilean experience can best be described as an example of "export-led growth" or of "growth-led exports". In the case of Chile, it is demonstrated that the view that growth was led by exports is more in line with the facts than the opposite view. Since the mid-1980s, export growth and increased investment have been the motive forces behind the growth of the Chilean economy.

Section III analyses the causes of the expansion and diversification of exports: particularly the link between trade liberalization and exchange policy. Although it was successful in stimulating an increase in exports after a long period of lagging growth, the 1974-1979 trade liberalization process was

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needlessly costly, because a large part of the installed manufacturing capacity was destroyed instead of being gradually reoriented towards the export sector. Although there is no factually verifiable theory for evaluating the degree of success of reforms, it is suggested that a different set of policies (with a more devalued exchange rate and lower real interest rates) would have helped the adaptation of the manufacturing sector and ultimately proved more efficient.

Section IV looks at other policies that affected exports and at sectoral-level policies and factors. The analysis shows that one must not overlook other policies and initial conditions which subsequently strengthened the response of supply and were very important for explaining the export success at the sectoral level.

## II

### The Chilean experience: export-led growth or growth-led exports?

Does the Chilean experience fit in with the theory that exports have been the leading sector in the economy and that export growth has been the motive force responsible for the high growth rates achieved since the mid-1980s? Or has it instead been the rapid growth of the product which has been the main factor in the expansion of exports? The first of these views highlights the role of exports in promoting overall growth. In contrast, the supporters of the idea of growth-led exports emphasize the importance of capital accumulation and the effort to build up national technological capacity as necessary prior conditions for the export boom.<sup>1</sup>

<sup>1</sup> Rodrik (1995) and Akyüz and Gore (1996) attach great importance to the increase in the rate of investment as the fundamental cause of the high growth rates of South Korea and Taiwan. In the opinion of these authors, the rise in the rate of investment is of itself sufficient to explain the high export growth rates of these two economies, without any need to bring trade policies into the picture. On the basis of these analyses, one may nevertheless wonder whether the very marked increases in investment would have taken place if there had not been active trade policies which made the export of new products highly profitable.

Finally, section V sums up the results of the study and gives a general overview of the policy requisites for ensuring the sustainability of the export-oriented model that Chile has been applying for more than two decades. We maintain that the “easy” export promotion stage is already over. So far, apart from a few concrete interventions which did indeed have a very important effect in terms of export growth, as we shall see below, the main role of the State has been to dismantle the system of incentives that were in force during the import substitution period (from 1938 to 1973). The next stage in export development will involve diversification into more highly processed goods and services and will pose much more complex policy demands. Greater linkages between the private and public sectors will also be essential.

Most economic development theories make no distinction between exports and non-exportable production. In almost all economic growth models, whether they be of a neoclassical character (Solow, 1956), inspired by the ideas of Keynes (Pasinetti, 1974), or based on the “endogenous growth” approach (Barro and Sala-i-Martin, 1995), the fundamental variables explaining economic growth are the rate of investment and technological progress. Those which assign a key role to exports run into difficulties because they face an identification problem: as exports are part of GDP (and often quite a large part), rapid increases in exports automatically have an impact on the GDP growth rate although there is no clear causal relation to explain this.

Is there something special about exports, however? This is our hypothesis here. In a small, late-industrializing economy, the growth and diversification of exports are important for two reasons. First, the domestic market is small and cannot support sustained GDP growth on the demand side. Any economic development impulse based on the expansion of domestic demand is bound to be exhausted quite quickly. In contrast, export markets are (al-

most) limitless for a small country and hence do not involve any growth restrictions on the demand side.<sup>2</sup> If the incentives offered have an anti-export bias, however, the expectations of rapid growth will not be fulfilled. Second, as small developing countries do not produce machinery, technological change comes largely from abroad, mainly in the form of imported capital goods. Although such imports can be financed for a time with capital inflows, the sustainability of high economic growth rates normally requires vigorous export promotion. The expansion of exports thus provides the basis for general economic development, with the stability of this process being assured through diversification of exports.<sup>3</sup>

Whichever may be correct, each of these two mutually exclusive concepts has policy implications. If the accumulation of physical and human capital and technical change are key factors for growth, there would be no need to embark on export promotion policies. If, on the other hand, the facts confirm that the export-led growth paradigm is correct, then in order to achieve economic development it would be necessary to encourage an increase in the amount and diversification of exports. It would be important to support the growth process with horizontal policies to correct market failures that impede the diversification of exports, and also, as the developing countries are far behind their technological frontier, policies would be needed to support incipient export sectors.

### 1. Exports and GDP growth, 1960-1995

The broad lines of the Chilean economic growth process may be better understood if we divide the period as from 1960 into five sub-periods: i) 1960-1970, marked by import substitution and the preponderance

of copper, which accounted for 80% of export income; ii) 1971-1973, which corresponds to the Socialist experiment; iii) 1974-1981, when the military government introduced market-friendly reforms that had an impact on trade; iv) 1982-1989, marked by somewhat greater pragmatism in policy formulation, and v) the period from 1990 on, after the return to democracy.

Since 1974, export growth has run ahead of GDP growth (table 1 and figure 1). Only since 1989, however, has the growth of non-traditional exports been accompanied by strong and sustained growth of the GDP and a rise in the rate of investment. In 1974-1989 the gross domestic product not only grew less than exports, but also rates of growth and investment were far below those reached in the 1960s.

Nevertheless, the degree of openness of the Chilean economy has increased significantly since 1974. In 1970 exports of goods and services represented nearly 15% of GDP (at current prices), but by 1995 this proportion had risen to 29%. In a sense, it could be said that one of the objectives of trade liberalization policies has been achieved: the economy has evolved from a situation in which its centre of gravity consisted of the non-tradeable or importable sectors to another in which that centre is made up of the export sectors. In this process, whole areas of the manufacturing sector (such as textiles and the metal products and machinery sector) virtually disappeared, but others later emerged, oriented mainly towards external markets.

TABLE 1  
Chile: Evolution of growth and exports, 1960-1995  
(Percentages)

	Growth of GDP	Gross investment <sup>a</sup>	Growth of exports	
			Total <sup>b</sup>	Excluding copper
1960-1970	4.2	25.1	5.6	4.6
1971-1973	0.5	16.9	-4.4	-11.9
1974-1981	3.7	22.2	12.0	20.9
1982-1989	2.4	19.8	6.5	8.2
1990-1995	6.7	28.5	9.0	9.8

Source: Calculations by the author, based on Central Bank of Chile, 1989 and various other years.

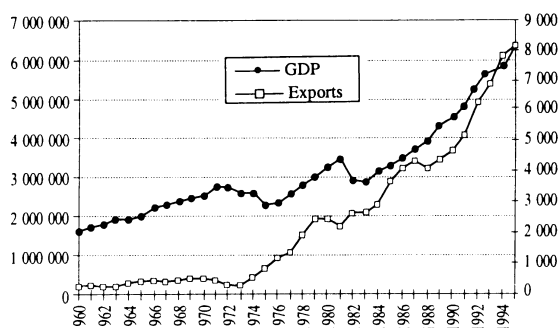
<sup>a</sup> As a percentage of GDP at constant 1986 prices.

<sup>b</sup> Only goods.

<sup>2</sup> Provided, of course, that their shares in the markets of the importing countries do not become too large. In other words, in order for the export-led growth to be sustained on the demand side, the exporting country must continue to be "small" in world markets. This requires ongoing diversification of exports.

<sup>3</sup> Diversification of exports can also be advisable for other reasons. As an economy rises up the "technological ladder" with export diversification, this can also raise real wages, thus further stimulating growth and improving income distribution. This has by no means been the case in the Chilean economy in the last two decades, however. Although exports have been diversified, with very few exceptions their technological content continues to be unsophisticated and wages continue to be much lower than in the advanced industrialized countries.

FIGURE 1

**Chile: Non-mineral exports and GDP growth, 1960-1994***(Exports in millions of 1995 dollars; GDP in millions of 1988 dollars)*

Source: Calculations by the author, based on Central Bank of Chile, 1989, and various other years.

Since 1974 the growth of exports has been very rapid and that of non-mineral exports has been quite spectacular. For the purposes of our analysis, exports of goods have been divided into seven categories: copper, other minerals, agricultural products (mainly fresh fruit and vegetables), fishmeal and fishery products, wood and wood products (including a small but growing furniture sector), paper and pulp (especially pulp), and other manufactures. This latter category covers nearly 3,000 articles of the most varied types. It includes, among many other things, confectionery, fruit juices, prepared foodstuffs, canned and frozen fish, industrially-reared salmon, wine, auto parts, sanitary equipment and metal products. All these goods are marked by intensive use of natural resources or the application of conventional standardized technology. Their main markets are in other Latin American countries, but they form an increasingly large proportion of Chile's exports to the United States and Europe.

Exports of non-factor services have also risen dramatically. It has not been possible to disaggregate exports of services by category, but the qualitative information available indicates that some new services industries have begun to export their products successfully in recent years (computer programmes and engineering services, for example). These are sectors in which the country has been able to acquire comparative advantages through long-term human re-

sources development policies, which, it may be noted in passing, suffered serious setbacks during the military regime.

Thus, exports have not only grown, but have become increasingly diversified. In 1971-1973 copper represented almost 80% of total exports of goods, and if other minerals are added, the share of minerals as a whole came to almost 90%. In the first half of the 1990s, in contrast, the share of copper went down to 40% and that of minerals as a whole to less than 50%.<sup>4</sup> On the other hand, the share of "other manufactures" rose from 5% in 1971-1973 to almost 30% in the first half of the 1990s. If we add paper and pulp, fishmeal and wood products, total exports of manufactures account for over 40% of total exports in the most recent period, compared with only 10% in 1971-1973.

For each of these seven categories of products, we estimated price indexes from which we can derive growth rates of export volumes by category.<sup>5</sup> The volumes of non-mineral products exported have grown rapidly since 1974 (table 2). The growth rates of export volumes were particularly impressive during the early years of the military regime (1974-1981), but this was due above all to their low initial levels (which were also depressed in the case of manufactures) in 1973.

The growth of exports of "other manufactures" –which include articles produced both for export and for the domestic market– in this period was largely due to the enormous excess capacity caused by the trade liberalization policies applied. The adjustment

<sup>4</sup> However, the big investments made by foreign copper companies in the 1980s may reverse these trends in the years to come, when the activities generated by these investments come on stream.

<sup>5</sup> The official Chilean statistics do not include long chronological series on export volumes and prices. For the period between 1960 and 1989 we used the export price indexes calculated by Sáez (1991) as deflators of the price statistics. For the period from 1990 to 1995 there are Central Bank estimates for export prices and volumes. Unfortunately, there are no data for 1990 itself which would allow the two sets of data to be matched. The price indexes for 1990 were therefore calculated with the data of Sáez (1991), using an autoregressive scheme with seven lags. Since both the manufacturing price indexes of Sáez and those of the Central Bank included paper and pulp, fishmeal and wood products, and as we wanted to estimate global prices and volumes with the exclusion of those products, we proceeded to calculate our own index of manufactured export prices and constructed a price index for these three articles using mobile annual averages. In spite of the fragility of the price series, the volume series obtained in this way behaves reasonably well.

TABLE 2

**Chile: Annual average growth rates of export volumes,  
by types of goods, 1960-1995**  
(Percentages)

	1960-1970	1971-1973	1974-1981	1982-1989	1990-1995
Copper	6.2	-1.0	7.8	4.6	7.8
Other minerals	1.6	-2.6	6.7	6.5	3.4
Agricultural products	2.4	-27.5	32.6	11.8	7.0
Fishmeal and fishery products	18.7	-31.1	45.8	11.1	3.0
Wood and wood products	15.9	-25.1	41.0	7.3	4.3
Pulp and paper	16.7	-7.6	18.5	0.8	22.7
Other manufactures	7.1	-28.0	38.6	9.2	12.7
<b>Total non-copper</b>	<b>4.6</b>	<b>-11.9</b>	<b>20.9</b>	<b>8.2</b>	<b>9.8</b>
<b>Total goods</b>	<b>5.6</b>	<b>-4.4</b>	<b>12.0</b>	<b>6.5</b>	<b>9.0</b>
Services	...	...	18.8 <sup>a</sup>	0.1	8.0

Source: Calculations by the author, based on unpublished data of the Central Bank of Chile and on Sáez (1991).

<sup>a</sup> 1976-1981.

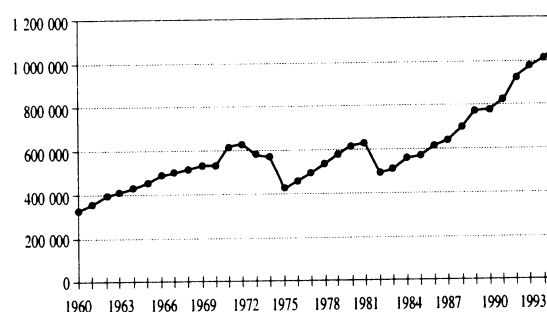
made in order to reduce a fiscal deficit which had grown to the equivalent of almost 20% of GDP, together with the very high interest rates prevailing (which were not only due to tight monetary policies but also to financial liberalization with little or no control over the banks), contributed to the depression of global demand and the contraction of GDP in 1975 by almost 13%. One means of defence open to domestic producers was to seek external markets for the goods they could not sell at home (French-Davis, 1979). The manufacturing sector contracted in absolute terms, its output did not recover its 1972 level until 1987 (figure 2), and the share of manufactures in GDP fell from 26.6% in 1972 to 20.8% in 1987.<sup>6</sup>

The excess of production capacity was also a factor in the growth of exports of manufactures in the period from 1982 to 1989. There was a further severe economic contraction in 1982-1983, when GDP fell by nearly 15%. Only after 1985 could one speak of export-led growth and positive net investment in this sector. Consequently, export-led growth only became firmly established from the mid-1980s. Non-traditional exports have become the most dynamic component in the economy, rates of investment have risen from typical Latin American levels to those of East Asia, and the growth rate of the economy as a whole has been high and sustained. Since 1989, the real product has been close to the po-

<sup>6</sup> Data from Central Bank of Chile (1989). The proportions mentioned in the text were calculated with data at constant 1977 prices.

FIGURE 2

**Chile: Real manufacturing product, 1960-1995**  
(Millions of 1995 pesos)



Source: Calculations by the author based on Central Bank of Chile, 1989 and various other years.

tential product and the excess of production capacity in manufacturing (and in the economy as a whole) has been close to zero, so that this latter factor cannot be the explanation for the increase in exports of manufactures. For these reasons, exports became one of the motive forces for growth with the recovery from the debt crisis; in previous years the excess of production capacity had prevented them from carrying the rest of the economy with them.

## 2. Evolution of growth and exports from 1960 to 1995: an analysis of time series

In order to answer the main question posed at the beginning of this section we constructed an

autoregressive vectors model, using Johansen's estimation technique.<sup>7</sup> This is fully justified because in a system which simultaneously determines GDP and exports we do not know which variable is exogenous and which is endogenous. In reality, the aim of the exercise is to determine the direction of causality between exports and GDP. In the system, it is assumed that the process of generation of data ( $Z$ ) is of the following type:

$$Z_t = [Y_t, K_t, X_t, t] \quad (1)$$

where  $Y$  is GDP,  $K$  is the capital stock,  $X$  is real exports and  $t$  is a trend over time. This system contains an equation in which GDP is a function of the inputs of capital and exports (which may be interpreted as a production function in which exports represent increases in productivity associated with the inputs of capital). The solution of the system naturally includes the possibility that there may be more than one direction of causality. The production function we want to estimate is the following:

$$Y_t = \alpha_0 + \alpha_1 K_t + \alpha_2 X_t + \alpha_3 t + u_t \quad (2)$$

where  $u$  is a well-behaved error term. It is easy to demonstrate (see Appendix 1) that, as the capital stock is the sum of net investment, equation (3) can be transformed into an equation in which the capital stock is replaced by investment ( $I$ ). This gives us the production function which will be used for purposes of estimation:

$$Y_t = \beta_0 + \beta_1 I_t + \beta_2 X_t + \beta_3 t + u_t \quad (3)$$

In the econometric analysis, the proxy used for investment is gross fixed capital formation. As the only long series for export volumes that it was possible to obtain with the available data was for exports of goods, this is the series that was used. In the system, all the values are expressed as natural logarithms. All the variables used in the exercise have unit roots (see the augmented Dickey-Fuller statistics in table 3). A dummy impulse variable was added for 1982 ( $d82$ ) in order to take account of the largely unexplained drop in GDP in that year. The estimated system contains the following equation for GDP:

TABLE 3  
Unit root tests  
(Critical MacKinnon values)

Variable	ADF statigraph <sup>a</sup>	Number of lags	Constant and trend
$\ln Y$	-0.985	0	Yes
$\ln I$	-1.067	0	Yes
$\ln X$	-2.498	0	Yes
$\ln M$	-3.982 <sup>b</sup>	1	Yes
$\ln TR$	-3.506 <sup>c</sup>	3	Yes
$\ln PM$	-3.406 <sup>b</sup>	1	Constant
$\ln EX$	-3.297 <sup>b</sup>	1	Constant
$d \ln Y$	-4.316 <sup>d</sup>	0	Constant
$d \ln I$	-4.307 <sup>d</sup>	0	Constant
$d \ln X$	-5.777 <sup>d</sup>	0	Constant

<sup>a</sup> Augmented Dickey-Fuller statigraph.

<sup>b</sup> Significantly different from zero at the 5% level.

<sup>c</sup> Significantly different from zero at the 10% level.

<sup>d</sup> Significantly different from zero at the 1% level.

$$\ln Y_t = \gamma_0 + \gamma_1 \ln I_t + \gamma_2 \ln X_t + \gamma_3 t + \gamma_4 d82 + u_t'' \quad (4)$$

where  $Y = GDP$ ,  $I =$  gross fixed investment, and  $X =$  volume of exports of goods.

A two-year lag was used for all the variables because this was determined to be the optimal lag according to the criteria of Schwarz and Hannan-Quinn. The criteria of the Bigen maximum values and of the trace values of the stochastic matrix revealed that the system contains only one cointegration vector. Tests were carried out for the weak exogeneity hypothesis and for the zero-value null hypothesis of the coefficients of the long-term equilibrium production function. The results of these tests showed that short-term imbalances in GDP (reflected in the error correction variable obtained in the long-term equilibrium GDP equation) affect short-term movements of GDP but do not affect short-term movements of gross fixed capital formation or exports. In fact, it was not possible to obtain reasonable short-term equations for gross fixed investment or for exports. In other words, GDP is endogenous and fixed investment and exports are weakly exogenous in the system. The hypothesis tests for the coefficients of the production function reject the joint hypothesis that the coefficients of fixed investment and exports are zero (at the 1% level) but do not reject the zero-coefficient hypothesis for the time trend. Thus, the final long-term equilibrium production function obtained was:

<sup>7</sup> Figueroa and Letelier (1994) obtained very similar results using quarterly data for the 1979-1993 period.

TABLE 4  
Stripped vectorial error correction model <sup>a</sup>  
(Dependent variable:  $d \ln Y(t)$ )

Variable	Coefficient	t statistic	t probability
Constant	2.742	4.48	0.0001
$d \ln Y(t-1)$	0.249	1.67	0.1070
$d \ln I(t)$	0.240	5.47	0.0000
$d \ln I(t-1)$	-0.136	-2.35	0.0270
$d \ln X(t-1)$	-0.121	-2.01	0.0560
$d82$	-0.098	-2.68	0.0130
$ECM(t-1)$	-0.376	-4.43	0.0002

<sup>a</sup> ECM is the error of equation (5). Diagnosis statistics: AR(1) = 0.567 [0.575]; Chi squared (normality) = 1.666 [0.435]; ARCH 1 = 0.001 [0.982];  $X_i$  squared = 0.790 [0.648].

$$\ln Y = 0.373 * \ln I + 0.324 * \ln X \quad (5)$$

As we have seen, exports and investment are highly significant variables which explain the behaviour of the long-term equilibrium GDP. The elasticities

obtained indicate that, in the long term, an increase of 3% in exports or investment is reflected grosso modo in 1% growth of GDP. The error correction equation corresponding to equation (5), which shows the short-term trajectory of GDP towards its long-term equilibrium, is shown in table 4 in its stripped-down version (i.e., after eliminating non-significant variables). This equation has good diagnostic properties and shows that imbalances in GDP, as reflected by the deviations of GDP from its long-term trajectory ( $ECM_{t-1}$ ), affect the short-term behaviour of GDP. Almost 40% of the GDP imbalance is corrected within one year, while 90% of the imbalance disappears in five years.

In short, exports have been one of the main causal factors of Chile's economic growth. Increases in the rate of investment have also been important. Both investment and exports are apparently exogenous: i.e., increases in exports did not affect investment but they did affect GDP. Increases in GDP, however, did not have an appreciable impact on exports or investment.

### III

## Trade liberalization, the exchange rate and domestic finances

### 1. The analytical framework

#### a) Exchange rate management and trade liberalization

The central idea in our analysis is that in order to promote export-led growth it is necessary not only that there should be well-designed policies for trade liberalization and for supporting the basic macroeconomic variables (exchange rate and interest rates) but also that measures should be taken to do away with barriers that inhibit a strong response by supply to price signals. Such barriers are not eliminated automatically by the market forces but require more specific policies by governments or other institutions which can ensure the internalization of externalities or the correction of market failures which prevent an adequate response by exportable supply.

The aim of trade liberalization is to change market signals that favour sectors producing goods that

compete with imports or non-tradeable goods and instead encourage the production of exportable goods and of import substitutes that do not require high levels of protection in order to be profitable. The measures recommended by conventional trade policy (which always advocates liberalization, without taking account of the institutional framework of the country concerned) are generally based on a simple trade model with only two sectors –one exportable and the other importable– with no non-tradeable sector. In such a model it is possible to ignore the exchange rate, since it disappears from relative prices. In the real world, however, non-tradeables are an important part of the economy, and moreover there are many types of tradeables and different levels of protection for importable goods. Likewise, there is a whole variety of potentially exportable goods, ranging from those with lower average costs to those with higher costs.



Other conditions being equal, the real exchange rate should undergo devaluation as a result of the liberalization of imports; consequently, those sectors which initially had levels of effective protection lower than the real devaluation brought about by the reduction in import barriers will benefit from the set of trade liberalization and exchange rate devaluation measures. Thus, it cannot be considered that they were inefficient, and hence worthy of disappearing from the economy, simply because before the liberalization of imports they enjoyed a higher rate of effective protection than after the liberalization process. Moreover, devaluation will generate new exports, albeit with some delay, as the economy begins to occupy a lower place in the list of potential exporters rated by costs. Indeed, some of these new exports may even come from sectors that previously enjoyed higher rates of protection than after liberalization.

It can be shown that the compensatory devaluation<sup>8</sup> that should occur as a result of trade liberalization should be as follows (see Appendix 2 for the formal derivation):

$$\hat{e} = \frac{\hat{t}}{h(\varepsilon_x / \varepsilon_m) - 1}$$

where  $e$  is the exchange rate,  $t$  is the average tariff, a circumflex over a variable indicates percentage change,  $\varepsilon_x$  and  $\varepsilon_m$  are the (average) export and import price elasticities, and  $h$  is the ratio of the values of exports and imports at the beginning of the tariff reduction programme. In the case of Chile, the average tariff went down from 94% in 1973 to 10% in 1979, which represented an induced decline of 43% in import prices. If we assume a price-elasticity of export supply of 0.5, a price-elasticity of import demand of unity (less) and a balanced current account (there were no capital flows in 1974), the compensatory devaluation should have been 29%. This means that any importable good with an initial tariff of up to 29% was in fact internationally competitive, and with a final tariff of 10% it should have been able to compete with imports and become exportable.

<sup>8</sup> In this study we have followed the Latin American convention of expressing the exchange rate as the number of units of local currency per unit of foreign currency. Consequently, devaluation represents an increase and appreciation a decrease in the exchange rate.

b) *Ensuring a vigorous response by supply*

Even though the price signals may be favourable for exports, there are, as we already noted, substantial restrictions inhibiting a rapid and powerful response by supply. Some of them are connected with information. Local producers do not have adequate information on: i) technologies that would enable them to produce goods or services that they could sell on foreign markets or that could help them to compete with foreign producers on the domestic market; ii) distribution and marketing channels on external markets; and iii) consumer tastes and production requirements on potential markets. The successful countries, such as those of East Asia, have been able to overcome these problems (see Lall, 1994). The special features of information are its high cost and the fact that it is a public good: on the one hand, it is a **non-rival** consumer good, in the sense that its consumption by one agent does not reduce its value for another, and on the other hand it is **non-exclusive**, that is to say, it is hard for individual agents to prevent others from using it.<sup>9</sup> Economic policies relating to this issue therefore have an important role to play in the process of successfully opening up the economy. They include: i) subsidies for the collection of information on technologies, external markets and foreign tastes; ii) subsidies for building up a reputation for local producers (what has been called "creating a country image" in recent years), and iii) helping existing firms to restructure their operations, orienting them towards external markets and becoming more capable of competing with foreign products on the domestic market.

A less direct way of dealing with this type of obvious externality, which makes use of the market, is to create institutions or enterprises to internalize it. For example, exporters' associations might find it worth collecting information on markets or technologies on behalf of their members. If this kind of solution is selected, the government's role could be limited to promoting the formation of such associations.

<sup>9</sup> These features of information tend to be ignored in standard trade theory and in conventional trade policy recommendations, which assume that all the relevant information is available without cost to all the agents. The consequence of making this assumption more flexible would be to make trade liberalization more costly, since the agents would be less capable of reallocating resources to export-oriented activities. It is therefore essential to adopt supplementary policies to ensure a strong and timely response by supply to changes in the price signals.

In most developing countries, the capital markets are shallow or non-existent. As noted in the abundant literature on this subject (see, for example, Stiglitz and Weiss, 1981), there are serious problems of asymmetry of information which cause flaws in capital markets in all parts of the world, and in developing countries these flaws are further magnified (Stiglitz, 1994). The supply-side response is dulled and inhibited if potential entrepreneurs do not have sufficient access to long-term finance for their investment projects. Consequently, policies to deepen domestic financial markets and improve their operation (through greater regulation and transparency, for example) are an important complement to trade liberalization. Indeed, such policies will probably not be enough: the formal financial markets, no matter how developed they are, tend to discriminate against small producers and firms which do not have an established reputation or lack collateral. It will therefore be necessary to supplement the private financial markets with suitable public action.

Other bottlenecks on the supply side are connected with the low levels of human capital formation and the lack of suitable infrastructure. Public policies are indispensable in these areas, too. Education and training have strong externalities, so the private market will tend to neglect them. Indeed, human capital formation is an investment for which there is practically no private finance. The planning, design and –despite the current fashion– construction of infrastructure continue to be priority tasks for governments in their efforts to improve supply responses.

If this view of the situation is valid, then trade liberalization takes on a more limited (although nevertheless important) role in the promotion of an export-oriented growth process. Trade liberalization is a means of changing the relative prices of an economy and making it more likely that producers will allocate resources to activities where the country has current comparative advantages. As it does absolutely nothing to try to correct market flaws associated with the factors mentioned above, however, it is rather a clumsy tool for encouraging producers to create new comparative advantages. Indeed, some countries, such as South Korea and Taiwan, have promoted highly successful processes of export-oriented growth without liberalizing their trade (Wade, 1990; Amsden, 1993 and 1994; Rodrik, 1995). In Chile, in spite of its much-vaunted free-market approach, there have been some instances of the application of industrial policies since

1974, especially in the forestry sector. Moreover, before 1974 past developments and the policies applied had already created the necessary climate for adequate responses on the supply side.

## 2. Trade liberalization, exchange rate policy and interest rates: a chronology

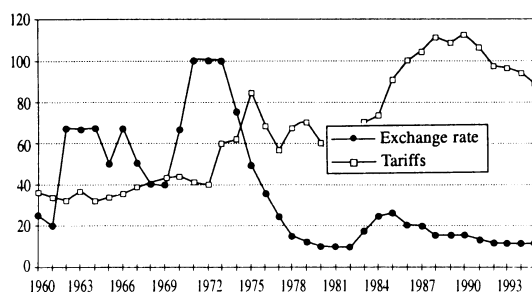
One of the first measures of the military government after the September 1973 coup was to announce a reform of trade policy. Trade policy could indeed have been justly described as chaotic at that time. The (simple) average tariff was 94%. There were 57 different tariff rates, ranging from 0% to 220% (plus tariff surcharges for some goods), many non-tariff measures (prior import deposits, prohibitions, quotas, etc.), and a system of multiple exchange rates with eight values for the dollar, the highest of which was ten times the lowest value. This very peculiar system of protection was not due to any development objective. The disorganization reigning in the period of the Allende government had led to the stagnation of manufacturing production, the disappearance of economic growth, and severe contraction of the infant non-traditional export sector (which included a number of manufactures).

The trade liberalization announced late in 1973 involved the elimination of all non-tariff barriers, the gradual reduction of customs tariffs and their consolidation into three levels (with a maximum rate of 60%), unification of the exchange rate, and a **devaluation to compensate for the reduction in the average tariff**. The exchange rate was indeed devalued in real terms during the 2½ years following the reforms. In the absence of capital flows, this was the result of the market forces: the opening-up of the economy brought with it a flood of imports which caused the exchange rate to go down (i.e., devalue) sharply (figure 3).

Various events took place which changed the course of the reforms. As it proceeded, the trade liberalization programme became more radical. In 1975 the authorities announced a new range of tariff rates, from 10% to 35%, to be reached gradually by 1978. At the end of 1977, however, the objective of attaining a tariff rate of 10% for all imports by mid-1979 was set, with monthly tariff reductions.

Furthermore, the prospects of gaining access to international financial markets changed for the better in the middle of the decade, and this allowed the au-

FIGURE 3

**Chile: Real exchange rate and customs tariffs, 1960-1995***(Exchange rate, 1988=100; tariffs in %)*

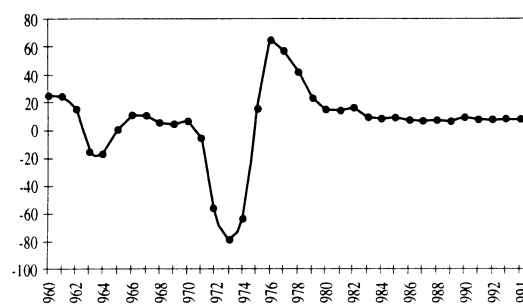
Source: Calculations by the author, based on Central Bank of Chile, 1989 and various other years, and De la Cuadra and Hachette, 1992.

thorities to give exchange policy the objective of reducing inflation (essentially through appreciation of the real exchange rate). Consequently, as from 1976 limitations on international capital movements were systematically eliminated.<sup>10</sup> At the same time, the crawling peg exchange rate regime was abandoned and changes in the nominal exchange rate began to reflect past inflation with a lag. Finally, a fixed nominal exchange rate was adopted in mid-1979. As inflation only went down slowly, considerable appreciation of the peso took place between 1976 and 1981, furthered of course by the heavy inflows of capital. The appreciation in the real exchange rate, together with the liberalization of imports, was a negative disturbance for the whole of the tradeables sector. Instead of setting about the reconversion and orientation of their activities towards international markets, the tradeables sectors of the economy shrank, while the non-tradeables sectors expanded.

The way in which the local financial markets were liberalized was also an important factor in the meagre initial results of the trade liberalization programme. Before the 1973 coup, the domestic financial markets were marked by extreme financial repression: the banks had been nationalized; ceilings had been placed on interest rates which had no relation to domestic inflation, resulting in highly negative real interest rates and the decline of financial

<sup>10</sup> Ironically, this process concluded in 1981, shortly before the beginning of the debt crisis, with complete freedom of international capital flows.

FIGURE 4

**Chile: Real interest rates, 1960-1995***(Percentages)*

Source: Calculations by the author, based on Central Bank of Chile, 1989 and various other years.

intermediation; and the monetary authorities intervened very strongly in the allocation of credit, with a proliferation of special credit lines which, taken together, bore no resemblance to an industrial policy. The 1975 reforms included the privatization of banks, the elimination of the ceilings on interest rates, reduction of the compulsory reserve requirements applicable to banks, and the elimination of all restrictions on credit. At the same time, in an effort to promote competition, the barriers to entry into banking and financial activities were markedly reduced. There was no prudential regulation of the activities of banks or other financial institutions: the reformers were not moved to caution by any considerations of moral hazard in banking and financial activities. As a result, the financial sector grew enormously, financial operations took the place of real investments, and interest rates soared from highly negative levels to levels which were extremely high in real terms (figure 4).<sup>11</sup> In these circumstances, the readaptation of firms producing for the domestic market, or their transformation into export enterprises, was virtually impossible.

As the inflows of foreign capital dried up and the domestic crisis rapidly began to get worse, in mid-1983 the single tariff was raised to 20%, and in September 1984 it was raised again to 35% (the consolidated level that Chile had registered in 1979, at

<sup>11</sup> In his last published article, Díaz-Alejandro (1985) gives a masterly description and makes devastating criticisms of the Chilean financial liberalization process.

the end of the Tokyo Round of the GATT multilateral trade negotiations). Tariff surcharges were imposed on automobiles and consumer electronic goods. When the crisis waned, the single tariff was once again gradually reduced as from 1985. In 1989, at the end of the military regime, it had stabilized at 15%, from which it was reduced to 11% by the new democratic government in 1991. During the 1980s, some policies were adopted to favour export growth: tariff drawbacks for exporters, a subsidy for new exports, and foreign direct investment policies which ultimately favoured non-mining exports. In addition, thanks to rigorous prudential regulation of financial institutions, interest rates settled down at more reasonable levels in real terms, favouring investment and the acquisition of technology. Last but not least, a persistent shortage of foreign exchange was reflected in a series of real devaluations between 1982 and 1988.

Figure 3 provides some information on the evolution of the real exchange rate and average tariffs.<sup>12</sup> Broadly speaking, the relation between the real exchange rate and the average tariff (a crude but probably accurate indicator of trade policy for the period before 1979) behaves as might be expected: the much lower tariffs since the mid-1970s have been accompanied by higher real exchange rates. As the theory would predict, this relation is sustained in the long term. Between 1976 and 1981, however, the dramatic tariff reductions were accompanied with a sharp appreciation of the real exchange rate.

<sup>12</sup> The real exchange rate is calculated as the nominal price of the U.S. dollar, deflated by the consumer price index (CPI) and multiplied by an index of external prices significant for the Chilean economy calculated by the Central Bank. The Central Bank series was used for the period from 1977 on. For previous periods, we constructed our own series using an external price index calculated by Ffrench-Davis (1984). Our figures for the 1974-1976 period correct the official under-estimation of the CPI growth rate. With regard to average tariffs, from 1974 on the series is a simple average. As there were no non-tariff barriers after 1975, the average tariff is a fairly exact reflection of the restrictiveness of the trade regime. No data are available for the period before 1973, which was marked by high tariffs, considerable dispersion of tariff rates, and numerous non-tariff restrictions. We used a trade liberalization index developed by De la Cuadra and Hachette (1992, p. 79) and applied the quotient of that index at its 1980 value to the average tariff for that year (10%) in order to obtain the tariff rate equivalent to all the trade restrictions in the period from 1960 to 1973. The use of the 1980 tariff is justified by the fact that that was the first full year of application of the 10% unified tariff.

During the 1990s, up to the end of 1997, the Chilean economy again enjoyed an abundant inflow of foreign capital. This time, the management of the capital account was more flexible than in the period of abundance in the 1980s. The authorities responded to the growing inflow of external capital by taking measures to discourage the inflow of short-term capital while keeping the doors wide open for foreign direct investment (Agosin and Ffrench-Davis, 1997). In essence, this was done by imposing a 30% non-interest-bearing compulsory reserve requirement (to be maintained for one year, regardless of the term of the financial instrument involved) on loans or financial investment from abroad (including investments on the Chilean stock market). This system is very costly for short-term flows but has only a low cost for those with a time horizon of more than one year. Although this system was effective in reducing short-term credits and inflows between 1993 and 1995, in 1996 and 1997 capital inflows were nevertheless very large, essentially because of Chile's high rating on international financial markets. Consequently, with the policy instruments used the authorities were unable to prevent considerable appreciation of the exchange rate which once again imperilled the export-oriented development strategy. Indeed, since 1995 the volumes of non-mining exports have been growing much more slowly than before.<sup>13</sup> In proportion as the inflow of foreign capital has been declining due to the international financial crisis, the tendency towards appreciation has been checked. The lesson to be drawn from recent experience is clear, however: if greater stability of the real exchange rate is desired, it is essential to manage capital flows more energetically.

### 3. Explaining the growth of manufactured exports: an econometric model

Perhaps the most important feature in the success story of Chilean exports is the appearance of a diversified group of manufactures for export covering a wide variety of products, most of them easy to manufacture or making intensive use of natural resources. And it is this group of products (through their subsequent growth and ongoing diversification) which

<sup>13</sup> This is exactly what might have been predicted using our econometric analysis of manufactured exports (see the following section).

holds out the greatest hope for future growth of exports and of the economy as a whole. It would therefore be very interesting to identify the factors explaining the growth of such exports.

Two studies have been made on the behaviour of Chilean exports in the past. Through a partial adjustment analysis, De Gregorio (1984) estimated the supply functions for non-copper exports, finding statistically significant price-elasticities for export supply. Using an error correction model, Moguillansky and Titelman (1993) estimated supply functions for various categories of non-copper exports. They concluded that the long-term price elasticities are consistently higher than the short-term elasticities (and that both are statistically significant). In their supply functions for exports of manufactures, tariffs (which were incorporated as an additional explanatory variable) proved to be negatively associated with such exports. Moguillansky and Titelman used a more advanced econometric technique than De Gregorio, but they did not include a variable for idle capacity, although in the context in question recession and idle capacity played a dominant role in setting off the process of export growth in the mid-1970s.

Like these authors, we analysed the role of various factors in the framework of a supply function: tariff reduction, real exchange rate devaluation, and idle capacity. Using the "small country" assumption, which is appropriate in the case of Chile, it can be safely posited that the manufactured exports of that country do not affect the prices of such goods on the world market, so that we can ignore possible feedback effects by export volumes on international prices.

In this exercise, exports of manufactures ( $XM$ ) are a function of the real price of manufactures for the export market ( $PM$ , defined as the price index for manufactures, in dollars, multiplied by the nominal exchange rate for the dollar and deflated by nominal wages in manufacturing); the simple average tariff ( $TR$ ), and an index of idle capacity in manufacturing ( $EX$ , defined as the percentage by which potential manufacturing output, calculated by linearly joining the procyclical values, exceeds observed output).<sup>14</sup>

<sup>14</sup> We also tried another definition of idle capacity: the difference between the value added in manufacturing, smoothed with a Hodrik-Prescott filter, and real manufacturing output. However, the results obtained with this more sophisticated method were identical to those obtained with the less refined definition of the idle capacity variable.

The basic idea of the model is that there are two groups of manufactures: i) products which are manufactured for the domestic market but which could be exported in certain circumstances, and whose relative price is the tariff rate, and ii) goods produced primarily for export markets because of the narrowness of domestic markets. The relative price of these goods is expressed in terms of non-tradeables, for which the proxy used here is the nominal wage level. All the variables except idle capacity are expressed as logarithms.

According to the augmented Dickey-Fuller statigraph, the logarithm for exports of manufactures ( $\ln XM$ ) and the logarithm for the average tariff ( $\ln TR$ ) were stationary variables with deterministic tendencies. The rest of the variables ( $\ln EX$ ,  $\ln PM$ ) were also stationary, but without tendencies (see table 3). We thus proceeded to explain variations in  $\ln XM$  by the following set of variables: a time trend (to incorporate the deterministic tendency in two variables,  $\ln XM$  and  $\ln TR$ ),  $\ln TR$ ,  $\ln PM$ , and  $\ln EX$ . The results are shown in table 5.

In table 5 we give two equations, one with the price variable and the other without it. The first equation, which includes all the variables of interest to us, has an autocorrelation problem which it was impossible to eliminate. For this reason, we included the second equation, in which we eliminated the price variable and added two lags in the dependent variable. This gives an equation with well-behaved residues. The reason why two lags are needed for the dependent variable is the high degree of persistence in the volume of exports of manufactures. The two equations show us that reductions in tariffs, increases in the relative prices of manufactures on export markets, and idle capacity give rise to positive changes in the supply function for exports of manufactures but do not affect the trend of the growth rate of such exports.

The two long-term equations are obtained by equalling the lagged and current values of the variables.

$$\ln XM = 2.888 + 0.093t - 0.679 \ln TR + \cdot 0.854 \ln PM_{-1} + 0.064 \ln EX \quad (6)$$

$$\ln XM = 6.52 + 0.097t - 0.598 \ln TR + 0.032 \ln EX \quad (7)$$

TABLE 5

**Explanation of variations in exports of manufactures, 1960-1995**  
(Dependent variable:  $\ln XM$ )

Explanatory variable	Equation (1) Coefficient	t values	Equation (2) Coefficient	t values
Constant	1.268	1.07	5.191	5.84 <sup>a</sup>
Trend	0.041	3.04 <sup>a</sup>	0.077	5.98 <sup>a</sup>
$\ln TR$	-0.298	-2.43 <sup>b</sup>	-0.476	-4.32 <sup>a</sup>
$\ln PM(-1)$	0.375	3.57 <sup>a</sup>		
$\ln EX$	0.028	2.17 <sup>b</sup>	0.026	2.20 <sup>b</sup>
$\ln XM(-1)$	0.561	4.23 <sup>a</sup>	0.781	5.85 <sup>a</sup>
$\ln XM(-2)$			-0.577	-4.92 <sup>a</sup>
Adjusted R <sup>2</sup>	0.976		0.981	
Breusch-Godfrey F statistic	0.019 [0.019] <sup>b</sup>		0.108 [0.898]	
Normality (Jarque-Berg) <sup>a</sup>	2.769 [0.250]		1.999 [0.368]	
Heterocedasticity ( $X_i^2$ )	0.847 [0.591]		0.471 [0.892]	
Heterocedasticity ( $X_i^2 * X_i$ )	0.841 [0.647]		1.031 [0.490]	

<sup>a</sup> Significantly different from zero at the 1% level.

<sup>b</sup> Significantly different from zero at the 5% level.

These equations are reasonably similar. We used the first of them to determine approximate orders of magnitude of the effects that changes in the explanatory variables (tariff reductions, idle capacity and exchange rate devaluation) have on the growth of exports of manufactures. The results, which should be considered as purely illustrative, were as follows:

- Idle capacity in the 1970s: between 1973 and 1975 idle capacity rose from 8% to 46%. This added 8% to the annual growth rate of exports of manufactures, giving a total of 18% for the period as a whole.
- Idle capacity in the 1980s: between 1981 and 1985 idle capacity in manufacturing rose from close to zero to 23%. This contributed 7½ percentage points to the annual growth rate of exports of manufactures (34% over the whole period).
- Trade liberalization in 1974-1979, with exchange rate appreciation in 1975-1982: tariffs went down from close to 100% in 1974 to 10% in early 1979. As a result, exports of manufactures grew for this reason alone by 205% (25% per year). This positive effect on export growth was partly reversed by the adverse effect of exchange rate appreciation, however: between 1976 and 1982 the ratio between manufacturing export prices and wages in manufacturing went down by 75%, causing a 69% drop in the volume of manufactured exports (nearly 15% per year).
- Exchange rate devaluation in 1982-1988: the real price of exports of manufactures (as defined earlier) went up by 118% during this period, causing exports of manufactures to rise by 96% (11.6% per year).

## IV

### Other policies that affect export growth

In addition to trade liberalization and exchange rate policies, there are other policies which have also aided in the rapid growth of Chile's non-copper exports. These policies may be classified in two main groups: general policies affecting all exports (horizontal policies) and sectoral policies and factors.

#### 1. Horizontal policies

##### a) *Drawback systems*

Two drawback systems have been used since the mid-1980s. One is a conventional system, in use since 1988, whereby the import duty on inputs used for the manufacture of exports is recovered after the exports are sold. This programme suffers from certain weaknesses. It involves a good deal of paperwork and financial costs for the entrepreneur, since he first has to pay the import duty and only recovers it after a considerable delay. The other system, introduced in 1985, is termed "simplified drawback". For exports of less than US\$ 20 million, in a given tariff item, all exporters receive a cash subsidy of 3, 5 or 10% (depending on the value of exports for the whole tariff item) of the value of the exports, instead of the regular drawback. Although this system has been presented as an effort to simplify formalities for small exporters, for whom the regular drawback system is a costly process, it does in fact contain an element of subsidy estimated to amount to a maximum of around 6% for the drawback rate of 10% (applied to exports with a value of less than US\$ 10 million for the whole tariff item).<sup>15</sup>

This system has become increasingly important as an export incentive. In 1994 the State paid out a total of US\$ 150 million in respect of simplified

drawback and only US\$ 26 million under the regular drawback system. Approximately 13% of the total value of exports (and 70% of the number of products exported) obtained simplified drawback in that year (Ffrench-Davis and Sáez, 1995, pp. 79 and 89).

Although no detailed econometric studies have been made of the impact of simplified drawback on the appearance of new exports, it cannot be a mere coincidence that since the introduction of that system the number and value of manufactured products exported have grown rapidly. Indeed, this type of incentive is close to being economically optimal: new exports undoubtedly have strong externalities connected with the corresponding stock of information, and when the exports of a good grow, these externalities disappear. Thus, the automatic extinction of the element of subsidy is a particularly attractive feature of this system.

Furthermore, importers of capital goods pay tariffs for terms of up to seven years, but exporters are exempted from these payments, and this undoubtedly stimulates investment in export activities. Both this measure and that providing for simplified drawback are considered as subsidies by the World Trade Organization (WTO) and will have to be eliminated by the end of 2002.

##### b) *Policies on foreign direct investment*

Policies on foreign direct investment have played both a direct and an indirect role in stimulating exports. The regulations in this respect were completely liberalized in 1974 (see Riveros, Vatter and Agosin, 1996), and although foreign direct investment did not increase until 1987 it has grown steadily since then. Around 60% of all new investments under the regular system have gone to the mining sector, in which Chile has clear comparative advantages.

Other foreign direct investment policies have resulted in the stimulation of non-mining exports. In 1985 the authorities instituted a debt-equity swap programme designed to reduce the external

<sup>15</sup> With the present across-the-board 11% tariff, the 10% "simplified drawback" would not represent a subsidy if the imported inputs accounted for 90% of the value of the final exports. The real value of such inputs is probably around 30-40% of the total price.

debt burden while at the same time promoting foreign direct investment. However, this channel for investing in Chile was neither as neutral nor as automatic as the regular foreign direct investment system. As French-Davis (1990) noted, although the debt-equity swap programme represented a heavy subsidy for foreign direct investment, the projects had to be approved on a case-by-case basis, with priority being given to new exports. Thus, the authorities made a virtue out of necessity and applied an industrial policy under another name. During the period in which this programme was in operation (1985-1991), nearly 60% of the investments made under it went to manufacturing and agriculture, mainly to the forestry and pulp and paper sectors. Around 40% of all foreign direct investment during this period was made through debt-equity swaps.

c) *Information on foreign markets*

As already noted, collecting information on foreign markets is an expensive business in which the social yield is much higher than the private benefits obtained. Since 1974, the Chilean government has made significant investments in this activity. With the aid of 32 trade offices abroad, a trade promotion department of the Ministry of Foreign Affairs ("ProChile") has been carrying out market studies and collecting trade information of interest to exporters. It recently launched an aggressive campaign to create a positive image of the country and is on the point of being transformed into an autonomous semi-public corporation with substantial private sector participation. During the 1990s there has been a further increase in officially subsidized trade promotion activities. Firms have been encouraged to group together in associations to promote their products and carry out joint activities to gain a better knowledge of their markets. The overseas activities and management costs of these Export Committees are subsidized on a decreasing scale for a maximum of six years.

d) *Technological development*

The problem of the shortfall in investment in technological development has been handled in an ingenious manner. Fundación Chile—a profit-making institution which has nevertheless (so far) enjoyed a government subsidy and whose equity belongs in equal shares to the Chilean State and ITT<sup>16</sup> has developed appropriate new technologies for export

products and has launched new firms which were subsequently sold to the private sector. Like any other venture capital organization, it has had plenty of failures, but it has also had some notable successes, especially the development of the salmon export industry. Promotion of applied research in the broadest sense (including the development of new products for export markets) is an important component in a comprehensive export promotion effort, and there are grounds for maintaining that the sustained growth and diversification of exports in the future will require the allocation of much greater resources for applied research and that the combined efforts of the private sector, the government and institutions like Fundación Chile will continue to be absolutely insufficient.

e) *Development of infrastructure and human resources*

Chile's infrastructure in terms of roads, ports, airports, tunnels, etc. is currently a serious bottleneck hampering the further intensification of its process of export-led growth, but in the mid-1970s the fact that it had an adequate infrastructure by the standards of the time was undoubtedly an important element which facilitated the rapid growth of its exports. In other words, without the infrastructure which already existed at that time (several large ports, an international airport inaugurated as recently as 1967, and a North-South highway completed in the 1960s, largely with external aid) the mere changes in the price signals would have elicited a much feebler response on the part of supply.

Furthermore, the human resources available at the time were appropriate for the task of reorienting the economy towards export markets. In the early 1970s, Chile had a large number of engineers and managers trained in public (or State-aided) universities in previous decades. The period of import substitution and the active entrepreneurial spirit displayed by the State since the 1940s had also left a legacy of industrial and management professionals who could serve the export effort. For example, the universities

<sup>16</sup> The story of the creation of Fundación Chile is quite interesting. When the military government had to compensate ITT for the nationalization of the Chilean Telephone Company, it was agreed to set up the Fundación Chile, with the government paying ITT's share.



had already begun to turn out graduate forestry engineers in the 1950s, and in the 1960s there were major programmes for creating specific human capital for the agricultural sector, which later proved crucial for the development of fruit and vegetable exports. In 1964 a semi-autonomous agricultural research institute (INIA) had been set up with public funds, and in 1965 a ten-year programme was established between the University of Chile (the country's main public university) and the University of California at Davis to train Chilean agronomists. This relationship became an important means of transfer of technology between two regions with similar climatic and soil conditions (Meller, 1994).

## 2. Sectoral policies

Important sectoral policies have also been applied and there have been special factors which have had a direct influence on the expansion of particular export products. Some of these are described below.

### a) *The forestry conglomerate*

The forestry conglomerate has made an important contribution to export growth (roundwood, chips, lumber, paper and pulp, and more recently, furniture). At 1995 prices, exports of this group of industries increased by a factor of 17 between 1973 and 1995, rising from US\$ 105 million to US\$ 1.8 billion. In spite of the advantages of this natural resource-based sector in Chile, an industrial policy was needed to provide the "big push" that would make it into an important industry. This is perhaps the only example since 1974 of a large-scale and undoubtedly very successful industrial policy. It included special incentives for the development of the sector and a legal framework favourable to private enterprise and exports which did away with liquidity restrictions on investment and furthered the accumulation of specific human capital in the sector.

Public afforestation and reforestation programmes go back to the 1960s. In 1974 a subsidy of 75% of the cost of planting trees was introduced (Decree-Law 701). At the same time, privately planted land was declared inextinguishable, the ban on cutting down trees less than 18 years old was eliminated, and the export of unworked timber was authorized. These changes in the law made vertical integration possible and highly profitable (see Rossi, 1995). In addition, between 1975 and 1979 the Central Bank

granted the private commercial banks and the Banco del Estado (a public commercial bank set up to attend to the needs of small depositors and entrepreneurs) a special credit line for financing forestry development projects, with particularly favourable conditions for natural persons and small enterprises.

It had long been known that Chile has comparative advantages in forestry activities. The weather and soil conditions ensure rapid growth of certain species, especially Monterey Pine. In view of this natural resource endowment, in the 1950s the University of Chile (a public institution) and the Catholic University (which received heavy State subsidies) began to offer courses leading to a degree in forestry, so that, when the sector began to develop, the industry already had a significant corps of specialists in this field. When conditions became favourable, quite a number of these professionals became forestry and lumbering entrepreneurs. Since then, the courses for degrees in forestry have further increased in the public universities and have also begun to be offered in many private universities.

### b) *The salmon-farming industry*

Exports of industrially raised salmon, which were insignificant in 1986, amounted to some US\$ 700 million in 1998. Chile now supplies nearly 15% of the world output of industrially raised salmon and trout and is currently the second biggest exporter in the world after Norway. The salmon industry is a real success story in which the adaptation and development of technology played a leading role.

Fundación Chile began to experiment with the industrial raising of salmon in the second half of the 1970s. In the early 1980s it organized an enterprise to raise salmon in Lake Llanquihue using floating cages: a technique developed in Norway and Scotland which, it was considered, could be well adapted to the natural conditions of the Chilean "Lake District". This enterprise, Salmenes Antártica, was later sold to Nippon Suisan, a Japanese firm which is one of the biggest fishery corporations in the world. The example of Salmenes Antártica attracted many more investments by local and foreign firms (Achurra, 1995).

This industry is very interesting for a number of reasons. One is that it combines technological change induced by a semi-public institution with the natural advantages of the country. Secondly, salmon

exports represent the exploitation of an export niche. Their success shows that it is not necessary to follow the Asian model of penetrating mass markets with consumer goods in which the main comparative advantage of a developing country is low wages. Such sectors are very vulnerable to protectionism, and other approaches may now be much more profitable. Finally, the salmon industry has many positive backward linkages. Thus, it has given a boost to local industries producing floating cages, salmon feed, fishing nets, packing materials and transport services. Since it employs highly qualified professionals (engineers, aquaculture technicians, biologists) it has also had a beneficial impact on the demand for construction services, education and retail trade in the region.

c) *Wine*

Chilean wine exports have registered a meteoric rise over the last ten years or so, from US\$ 10 million in 1985 to around US\$ 550 million in 1998. Winemaking is a traditional economic activity in Chile, going back to colonial times. However, the types of wine produced by Chilean winemakers up to the mid-1980s were not to the taste of consumers in the developed countries: big changes in technology were needed to enable Chilean wines to be sold on a large scale abroad. These changes included the introduction of stainless steel vats, the use of small casks made of new wood instead of the large old barrels previously used for ageing the wine, and investments in new refrigeration plant and equipment for grinding and pressing the grapes. Although it was known that Chilean wines could be produced more advantageously with the new technologies used in Europe and the United States, a demonstration effect was needed. In 1981 the Spanish winemaking firm Miguel Torres bought extensive areas of land near Curicó in the Central Valley and began to produce wine using the new technologies, and its success led to the rapid adoption of the new methods by Chilean firms.

The opening up of the economy made it easier to import new machinery. Furthermore, many of the traditional Chilean wine producers are large firms compared with European winemakers and also operate in other export sectors (particularly fruit exports), so they do not suffer from liquidity constraints which restrict their investments. More recently, investments have also been made by other large firms from Europe and the United States, such as Rothschild, Larose Trintaudon, Grand Marnier, Roberto Mondavi and The Christian Brothers. Furthermore, a number of small specialized winemakers are bringing out new products for the export market and are seeking to sell wines of higher prices and quality than those offered by the traditional winemaking firms. These producers, who have less capital than the big winemakers and the foreign investors, rely on the associations of new wine producers to sell their products abroad (Bordeu, 1995). The marketing services offered by ProChile and the new joint export programmes mentioned earlier have also been actively used by the smaller producers.

d) *The motor industry*

Automobile parts have been a small but significant component of exports of manufactures for over a decade. They have been stimulated by the only performance requirement still in force in Chilean investment policy. A special programme called the Automotive Statute allows assembly firms to import CKD or SKD<sup>17</sup> kits tariff-free provided such imports are covered by exports of domestically produced components with the same value. The Statute also gives assembly firms tax credits for components produced domestically or exported. In order to be eligible for such credits, a component must have at least 70% of local added value if it is for domestic use, or 50% if it is for export. These incentives are not compatible with the Trade-Related Investment Measures of the World Trade Organization and will have to be eliminated by the end of 1999. In fact, the tax credits expired at the end of 1998.

<sup>17</sup> Completely knocked down (CKD) and semi knocked down (SKD) are terms used in the automobile assembly industry and refer to kits of parts without any degree of assembly in the first case and to kits with some partial degree of assembly in the second.

# V

## Looking ahead

There can be little doubt that the expansion and diversification of exports, which began in the mid-1970s but took on a decisive role in development as from the mid-1980s, has been the main driving force in the growth of the Chilean economy. The next stage of export-oriented development will be much more difficult, however. The easy stage of export promotion is now over, and it is unlikely that continuing with the recipe as before will allow the high growth rates of exports and of the GDP to be maintained. Firstly, Chile will have to abandon some policy instruments which have been very profitable in the past (the simplified drawback system, duty-free imports of capital goods for exporters and the Automotive Statute, for example). Secondly, becoming internationally competitive in more sophisticated goods involves more complex requirements than those demanded by the export of primary commodities or the like, ranging from human resources development, improved business capabilities, the acquisition of information and greater applied research efforts by local firms to improvements in the country's ports, highways and tunnels. This will require a more active –and efficient– State than in the past.

In order to further heighten export-oriented growth it will also be necessary to give up the dogmatic insistence on a uniform tariff and take a more aggressive attitude to tariff reduction. There is no reason to keep tariffs on capital goods and the wide range of intermediate goods that are not produced within the country. Export-oriented growth requires a zero tariff for these goods, particularly in the light of the restrictions that Chile will soon be facing on measures designed to compensate for the distortions caused by the tariffs applied to such goods.

Progressing with the export-oriented growth model also calls for better access to markets. The potential that intra-Latin American trade has for Chile, as an exporter of light manufactures and agroindustrial goods and an importer of foodstuffs, makes MERCOSUR a strategically important trading partner.

Foreign direct investment policy can be used to attract investments. While maintaining a liberal attitude to foreign direct investment, the Chilean author-

ities should make a bigger effort to attract transnational corporations with desirable technological or management assets and with access to markets for manufactures. Association with MERCOSUR could be important for attracting such corporations to the manufacturing sector, where they have so far been conspicuous by their absence.

Finally, Chile will have to reinvent development banks. Such banks should provide long-term credit at market interest rates to firms which have good export projects but, in most cases, do not have access to private capital markets. They could also be used to channel funds towards loans for higher and technical education and for financing expenditure on applied research. Development banks do not need to intervene directly in the provision of loans for firms or individuals: they can function as second-tier banks, making credit lines available to private financial institutions for specific purposes. They can also act as intermediaries between the international financial markets and small and medium-sized firms whose activities are in keeping with the development strategy but who do not have access to such resources. It is also important that development banks should ensure that pre- and post-shipment credit is available to the export sector at internationally competitive rates.

This is the most efficient way of supporting infant industries, and moreover it is not prohibited by the rules of the World Trade Organization. It could in fact become the main instrument for promoting specific sectors and activities. Carlos Díaz-Alejandro (1985, pp. 20-21), in a far-sighted article published after his death, said that the experience of Latin America, and also that of continental Europe in the last century, arouses some skepticism about whether the private markets, unaided, will generate financial intermediation flows big enough to support a long-term capital formation rate sufficient to take full advantage of the high social yields available from long-term investments. By providing long-term credit for new, non-traditional activities, development banks would do away with one of the arguments often adduced to justify exaggerated protection against imports.

(Original: Spanish)

## APPENDIX I

## Derivation of the production function to be estimated

Let us assume that the “real” production function has the following form:

$$Y_t = \alpha_0 + \alpha_1 K_t + \alpha_2 X_t + u_t \quad (1)$$

where  $Y$  is the global product,  $K$  is the capital stock,  $X$  is total exports and  $u$  is an error factor with the usual properties.

The capital stock can be expressed as the sum of an infinite flow of net investments:

$$K_t = \sum_{i=1}^{\infty} (1 - \lambda) I_{t-i} \quad (2)$$

where  $\lambda$  is the rate of depreciation.

If we note  $L$  as the lag operator and replace (2) in (1), (1) can be expressed as:

$$Y_t = \alpha_0 + \frac{\alpha_1(1-\lambda)L}{[1-(1-\lambda)L]} I_t + \alpha_2 X_t + u_t \quad (3)$$

Multiplying the terms by the denominator of the  $I_t$  coefficient, (3) can be expressed as:

$$Y_t - (1 - \lambda)Y_{t-1} = \alpha_0 + \alpha_1 (1 - \lambda)I_{t-1} + \alpha_2 [X_t - (1 - \lambda)X_{t-1}] + u_t - (1 - \lambda)u_{t-1} \quad (4)$$

As in the long-term equilibrium all the lagged values of the variables are equal to their current values, (4) is reduced to:

$$Y_t = \beta_0 + \beta_1 I_t + \beta_2 X_t + u_t \quad (5)$$

where

$$\beta_0 = \alpha_0 / \lambda;$$

$$\beta_1 = \alpha_1(1 - \lambda) / \lambda;$$

$$\beta_2 = \alpha_2$$

APPENDIX 2

**Derivation of the compensatory devaluation**

Let us assume that, to begin with, the economy has its balance of payments in equilibrium. If we make  $F^*$  equal to the equilibrium capital flows, the balance of payments equilibrium may be expressed as:

$$p_m^* q_m(p_m) - p_x^* q_x(p_x) = F^* \tag{1}$$

where the asterisks denote international prices (assumed to be independent of the country's levels of trade).

We can differentiate (1) to get:

$$p_m^* dq_m - p_x^* dq_x = 0 \tag{2}$$

Under the small-country assumption, the prices of importable and exportable goods are, respectively:

$$p_m = e(1+t)p_m^* \tag{3}$$

$$p_x = ep_x^*$$

where  $t$  is the tariff (ad valorem) and  $e$  is the nominal exchange rate (pesos per dollar).

Through the elasticity definition, we obtain the following expressions for  $dq_m$  and  $dq_x$ :

$$\begin{aligned} dq_m &= q_m \varepsilon_m (\hat{e} + \hat{t}) \\ dq_x &= q_x \varepsilon_x \hat{e} \end{aligned} \tag{4}$$

where a circumflex over a variable denotes a percentage change.

Replacing (4) and (1) in (2) we get:

$$\hat{e} = \frac{\hat{t}}{h(\varepsilon_x / \varepsilon_m) - 1} \tag{5}$$

where  $h$  is the quotient between the value of exports and the value of imports expressed in foreign currency in the initial period before trade liberalization.

If the current account is balanced to start with, (5) is reduced to:

$$\hat{e} = \frac{\hat{t}}{\varepsilon_x / \varepsilon_m - 1} \tag{5a}$$

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