

CEPAL

Review

Executive Secretary of ECLAC
Gert Rosenthal

Deputy Executive Secretary
Carlos Massad

Director of the Review
Aníbal Pinto

Technical Secretary
Eugenio Lahera



UNITED NATIONS
ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN
SANTIAGO, CHILE, APRIL 1992

CEPAL

Review

Santiago, Chile

April 1992

Number 46

CONTENTS

In memory of Fernando Fajnzylber. <i>Gert Rosenthal</i> , Executive Secretary, ECLAC	7
Latin America and the internationalization of the world economy. <i>Mikio Kuwayama</i> .	9
Privatizing and rolling back the Latin American State. <i>David Félix</i> .	31
State-owned enterprise reform in Latin America. <i>Antonio Martín del Campo</i> and <i>Donald R. Winkler</i> .	47
The Central American entrepreneur as economic and social actor. <i>Andrés Pérez</i> .	69
Why are men so irresponsible?. <i>Rubén Kaztman</i> .	79
Erroneous theses on youth in the 1990s. <i>John Durston</i> .	89
Decentralization and equity. <i>Sergio Boisier</i> .	105
Reorientation of Central American integration. <i>Rómulo Caballeros</i> .	125
MERCOSUR and the new circumstances for its integration. <i>Mónica Hirst</i> .	139
International industrial linkages and export development: the case of Chile. <i>Alejandra Mizala</i> .	151
The ideas of Prebisch. <i>Ronald Sprout</i> .	177
Guidelines for contributors to <i>CEPAL Review</i> .	193
Recent ECLAC publications	195

WORLD BANK

International industrial linkages and export development: the case of Chile

*Alejandra Mizala**

This article analyses the role played by international industrial linkages in the export development of Chile. International industrial linkages or cooperation are taken here to cover a wide range of international entrepreneurial activities other than majority equity contributions.

In order to study this subject, interviews were arranged with executives of 32 enterprises in four sectors of activity specially defined for this study: i) marine products and related industries; ii) agriculture and agroindustry; iii) forestry, lumbering and paper and pulp industries; and iv) chemical industry.

It is concluded that the special features of the Chilean export process, which makes use of natural resources in which the country has comparative advantages, mean that in an initial phase the export potential of national industries does not depend to a major extent on industrial linkages with enterprises in developed countries. Export-oriented Chilean firms probably need to have recourse to cooperation agreements with such enterprises, however, since the penetration of new markets calls for products with a high component of technology. This is because most countries have tended to set up non-tariff barriers by raising quality standards and imposing strict requirements on products seeking to enter their markets.

*Professor/researcher in the Department of Industrial Engineering of the University of Chile.

This article is the result of a study made by the author for the Joint ECLAC/CTC Unit on Transnational Enterprises. The author wishes to express her thanks to Gustavo Riveros, for his efficient help in carrying out the study; to Rodrigo Donoso, for his generous support in organizing interviews with enterprises in the chemical sector, and to Michael Mortimore and Alejandro Vera for their valuable comments.

Introduction

Transnational corporations are the main source of industrial technology in the world, and the most important actors in international technology transfer. Foreign direct investment has traditionally been the main way in which transnational corporations have transferred technology to the developing countries, since this implies the direct and continued ownership of technology. Technology is one of the intangible assets of those enterprises which they refuse to share, since it constitutes one of their main competitive advantages.

Up to the end of the 1970s, technology transfer took place mainly through the establishment of industries located in the host country.

However, the rapid expansion of transnational corporations in the 1960s and 1970s increased international competition among suppliers of technology and enabled the governments of the developing countries to pass restrictive laws limiting the establishment of wholly-owned subsidiaries of transnational corporations. The establishment of joint enterprises, however, was seen as a way of increasing technology transfer while maintaining partial control of the production process.

At the same time, the deterioration in the economic outlook and the more evident instability in most of the developing countries has caused the transnational corporations to change their strategy. Many of them have realized that they can gain satisfactory profits if they offer their tangible and intangible assets for particular investment projects without necessarily owning or financing the latter. The transnational corporations have therefore intensified joint operations and transactions which do not involve contributions to equity; in this way, they continue to receive profits on these assets, while at the same time reducing their exposure to the trade and political risks associated with foreign direct investment.

The wide range of international entrepreneurial activities known as "new forms of investment" includes: i) licensing agreements, ii) franchise agreements, iii) management contracts, iv) marketing contracts, v) technical service contracts, vi) turnkey contracts, and vii) international subcontracting (Oman, 1989). In some cases, these new forms of investment are accompanied by minority participation in the equity of the joint enterprises with local

partners; in other cases, the local enterprise maintains total control of the project.

The developing countries are currently displaying a growing tendency to liberalize their economies, and especially their policies on foreign direct investment, with the aim of attracting more investments of this type in order to cope with the acute balance-of-payments problems which arose in the early 1980s. There are indications, however, that the new forms of investment will continue to gain importance in the developing countries, complemented with foreign direct investment in many cases.

We will analyse here the case of Chile, a country which, unlike other Latin American countries, undertook far-reaching economic reforms in the 1970s which have transformed the Chilean economy into one of the most highly liberalized in the region.

The military coup in that country in late 1973 was followed by the reprivatization of many companies, the lifting of the extensive price controls then in force, and the abolition of innumerable administrative regulations. Later on, measures were taken to promote fiscal reforms and the liberalization of external trade and financial markets. Consequently, by the early 1980s Chile already had an open market economy, with an even tariff of 10%, free interest rates, a relatively liberalized capital market, and, as a result of the severe measures dictated by the authoritarian regime, a disciplined and non-conflictive labour force.

During the most acute period of the external debt crisis, the Chilean economy suffered problems similar to those which hit other Latin American countries so hard. The Chilean economic model was subjected to slight adjustments, but it retained its essential features. Throughout the 1980s, the process of privatization and opening up of the economy to the exterior continued.

Exchange rate devaluation was one of the most important economic policy instruments used after the crisis of the early 1980s. The real devaluation of the exchange rate brought about changes in the relative prices of non-tradeable and internationally tradeable goods, with resources being reassigned to the latter sector. The doubling of the real exchange rate between 1982 and 1988 helped to expand exports from 20.4% of the gross domestic product in 1981 to 28.9% in 1989. This export boom has been described as one of the most positive results of the Chilean

adjustment process; it is therefore interesting to see what role the so-called new forms of investment have had in increasing Chilean exports.

Since 1990, the country has been engaged in a process of transition to political democracy. The current economic authorities have stated that one of the fundamental pillars of their development strategy is the energetic promotion of more and better integration of the Chilean economy into world markets. They therefore maintain that Chile must keep up its free trade policy, and they assign the market the role of allocating resources, while the private sector is responsible for leading the national development process.

In this article, an attempt will be made to determine how important the new forms of investment referred to earlier have become in Chile, and what effects they have had on the development of the country's export capacity; what the economic conditions of the country have been; the interests of foreign and domestic enterprises; the governmental measures taken to encourage partners to engage in a specific form of cooperation, and finally, the measures the various parties involved could adopt in order to strengthen international industrial linkages through these new forms of investment so as to benefit developing countries like Chile.

In order to seek answers to these questions, a series of interviews were held with executives of 32 companies from four sectors of the Chilean economy. In all cases, those who provided the answers were the general manager, the chief of operations, or the chief of development.

In order to ensure that the sample of companies selected was representative of the Chilean economy, the analysis concentrated on four sectors specially defined for this purpose: i) marine products and related industries, ii) agriculture and agroindustry, iii) forestry, lumbering and paper and pulp industries, and iv) chemical industry. These sectors were selected because (if copper is left out of the reckoning) they generate 62% of Chilean exports and because their external sales registered an appreciable increase in the 1980s. The mining sector, which contributes nearly half of the country's exports, was not taken into account in this study because of its very special characteristics.

Section I of this article gives a brief description of the mechanisms used for technology transfer in the country. Section II deals with the external trade

structure of the Chilean economy. The main body of the study (section III) is made up of the data collected and their analysis, and it examines in detail,

sector by sector, the interviews carried out with the various companies. Finally, the main conclusions deriving from this study are given in sector IV.

I

Mechanisms for technology transfer in Chile

A characteristic feature of the Chilean economic model since late 1973 has been the explicit incorporation of foreign direct investment into the development process.

This is because foreign direct investment is considered to be an essential complement of the insufficient capital accumulation based on domestic saving, and it is seen as indispensable for achieving a rate of investment which will permit sustained economic growth.

As from 1974, this was reflected in the enactment of new legal rules on foreign capital which have resulted in significant simplification of the regulations previously in force. The new rules, contained in Decree-Law No. 600, provide solid guarantees for foreign investment: basically, they involve the principle of non-discrimination compared with local investors and almost unrestricted access to domestic markets.

With the adoption of the new rules, large amounts of foreign direct investment began to flow into the country, although to begin with they were less than the credits obtained from international banking institutions (ECLAC, 1991a).

In the early 1980s, as a result of the international external debt crisis, there was a marked decline in foreign investment, especially because the lower profitability associated with the risk of non-fulfilment made it less attractive for investors. Despite this decline in absolute terms, however, the importance of foreign direct investment grew considerably compared with the flow of external credit.

This tendency became even more evident as from 1985, when a set of regulations was approved and sanctioned by the Central Bank, grouped together in Chapter XIX of the Compendium of International Exchange Regulations. These rules permitted and promoted the conversion of Chilean external debt paper into equity, and through this means, non-resident foreigners can convert Chilean

external debt paper into local currency for investment in the national economy.

This new mechanism has played a decisive role in the flow of foreign capital into the country since the mid-1980s. According to the Executive Secretary of the Committee on Foreign Investments, however, in the early 1990s investors have been operating much more under Decree-Law No. 600 than under Chapter XIX. The advantages of the first-named law are becoming more and more evident as the external debt paper needed in order to operate under Chapter XIX is disappearing and the Chilean debt paper is rising in value, so that there is little interest in selling it.

With regard to current regulations on the new forms of investment, since 1990 firms have had free access to the exchange market, so that neither they nor natural persons need to make application to the Central Bank in order to obtain foreign exchange. Consequently, in practice the latter body has ceased to have any control over remittances abroad in connection with any of the contractual arrangements between foreign firms and Chilean enterprises.¹

Payments in respect of licenses and other charges connected with industrial property are subject to Chilean tax legislation, just as any natural or juridical person resident or domiciled abroad must pay tax on income generated in Chile. The legislation establishes a flat rate of 40% on total payments for the use of trade marks, patents, technical assistance and other similar contracts, and persons or enterprises must retain and deduct these taxes when paying the royalties. As the rate of tax is calculated on the net value of the royalty (that is to say, including the value added tax), it currently amounts to 67%.

¹ For an analysis of the regulations in force before 1990, see CINDA, 1989.

Little use has been made of industrial subcontracting in Chile. There are no regulations on this matter, and only a few isolated cases are on record, in the clothing industry.

The foregoing analysis shows that the Chilean legislation is extremely open and flexible with regard to the different mechanisms used for technology transfer. The present development model gives export activities the role of acting as the motive force for economic growth, and this has led to the

application of policies designed to facilitate the access of this sector to the most modern technologies available in the world. Consequently, the present regulations, both on foreign direct investment and on other forms of technology transfer, emphasize the provision of guarantees and other incentives rather than the application of controls. This means, among other things, that national firms have extensive facilities for directly acquiring on international markets the technology they require.

II

Structure and evolution of Chilean exports

Ten years ago, it could be said that Chile was a country that was absolutely dependent on sales of its main export product: copper. Today, however, although Chile continues to be basically dependent on this metal, the tendencies observed in the 1980s give grounds for expecting greater diversification of the country's exports in the future.

Although in the last years of the 1980s the share of copper in total Chilean exports increased (from 41.2% in 1987 to 47.9% in 1988 and 50.2% in 1989), this was due fundamentally to rises in the price of this metal on international markets rather than to increases in the amount exported. In fact, the price of copper rose from an average of 62 US cents per pound in 1986 to US\$1.29 per pound in 1989.

There can be no doubt of the growth in Chilean exports (figure 1). In 1983-1989 they represented an average of 27.1% of the country's gross domestic product, compared with only 22.2% in 1977-1983 (figure 2). As already noted, this significant change has taken place within an economic scheme which gives priority to the open market economy.

Statistics on Chilean exports reveal that the four sectors of economic activity covered by the present study generate 32% of Chile's exports and over 60% of its income from non-copper exports (figure 3).

Analysis of the evolution of the different types of goods exported shows that non-copper exports account for an increasing proportion of total Chilean export income. This trend will be further accentuated as the added value of export products rises. Large-scale copper mining continues to be the main source of foreign exchange for Chile, and will probably

remain so in the future, because of the enormous comparative advantages which Chile has in this type of production. However, exports of agricultural products and marine products trebled in the 1980s, while industrial exports (mainly fish meal, wood pulp, paper and chemical products) more than doubled over the period 1984-1989.

In order to make possible this export growth, the country has had to strengthen its road and port infrastructure so as to provide smooth and efficient outlet channels for meeting its external trade commitments. This increase in infrastructural investments has enabled the country to export fresh products (fruit, fish, seafood, flowers, etc.) under the high quality conditions demanded by external markets.

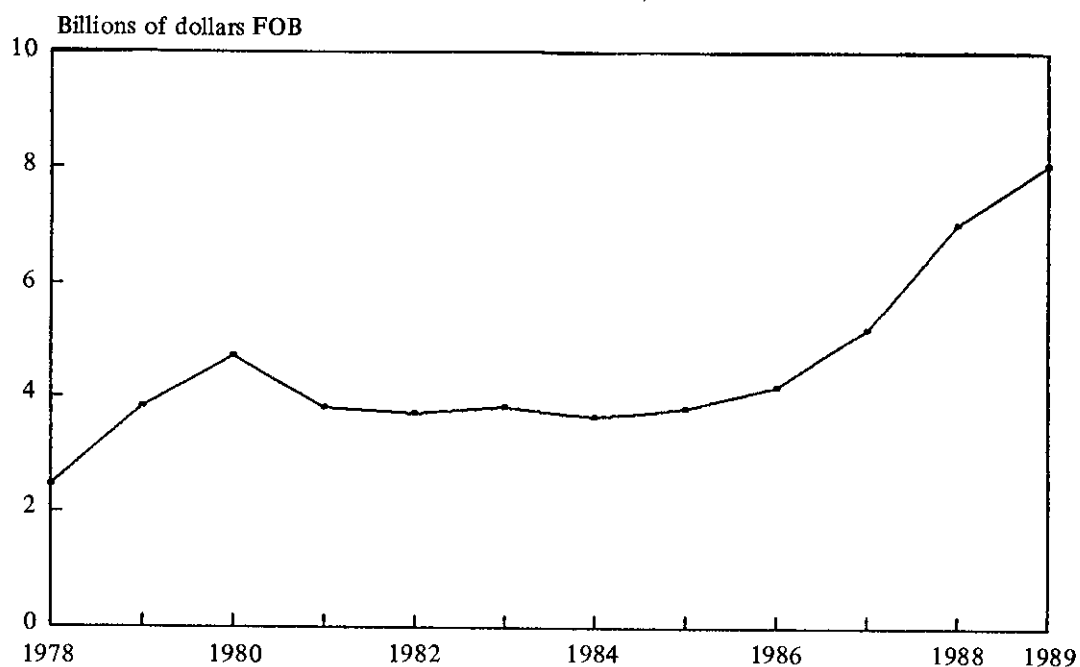
Each of the sectors defined earlier for the purpose of this study will now be analysed in detail.

1. *Marine products and related industries*

In the early 1980s, this activity registered important growth which has continued throughout these years. Thus, its average share in total Chilean exports came to 11.8% in period 1982-1988, and the fluctuations in this share have not exceeded one percentage point.

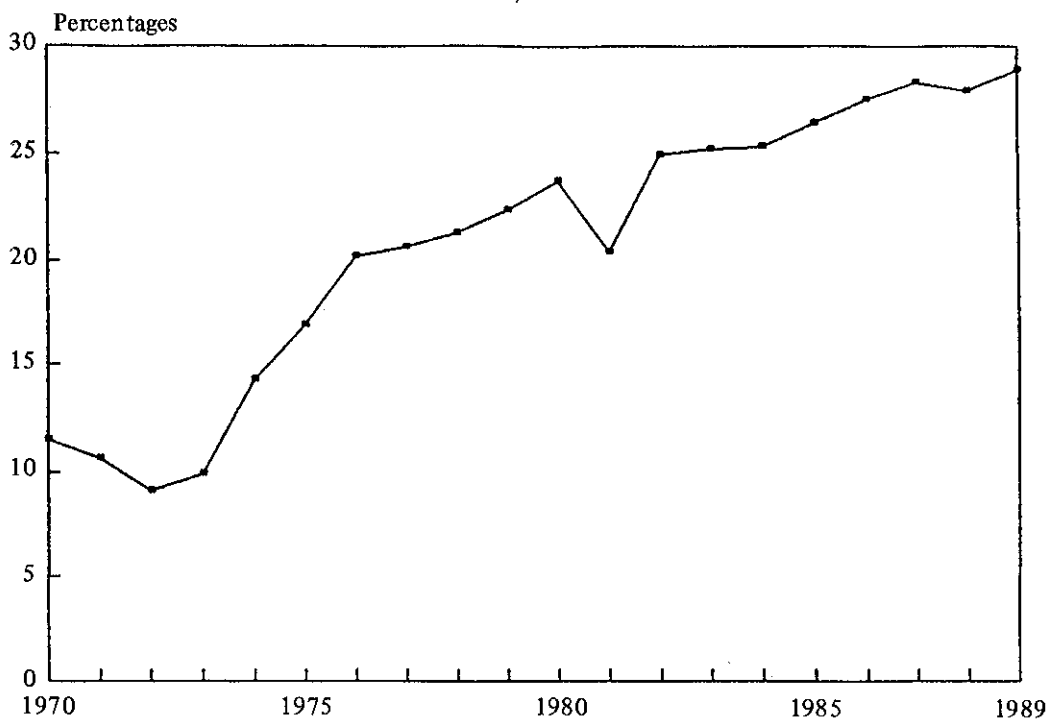
The main raw material used in Chilean fishery production is pelagic fish, which account for around 93% of total landings. In addition, fishery production uses demersal fish, crustaceans, molluscs, echinoderms and benthonic macroalgae.

Figure 1
CHILE: TOTAL EXPORTS, 1978-1989



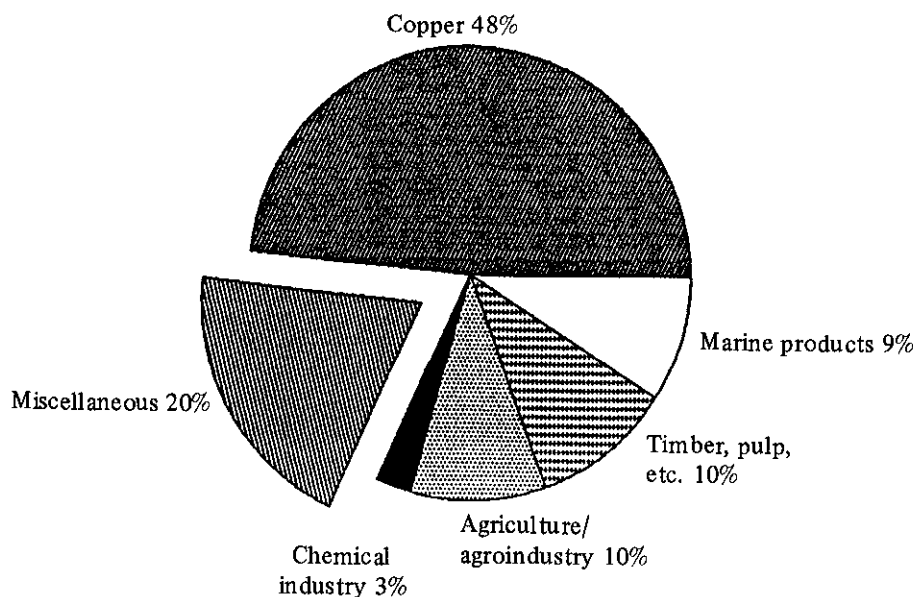
Source: Central Bank of Chile.

Figure 2
CHILE: TOTAL EXPORTS, AS A PERCENTAGE OF GDP



Source: Central Bank of Chile.

Figure 3
CHILE: COMPOSITION OF EXPORTS, 1988



Source: Central Bank of Chile

The fish meal and fish oil industry has been the most important activity in this sector to date (figure 4). This is because, from a private point of view, it is more profitable than production for direct human consumption, such as tinned and frozen products. In addition, efforts can be concentrated mainly on the production stage, since fish meal and fish oil are substantially basic commodities which do not need great marketing efforts.

If such variables as employment generation capacity and linkages of the fisheries industry with the rest of the economy are taken into account, however, it may be concluded that the current production structure of the sector should be substantially modified. These changes call for sustained technological efforts in order to strengthen production for direct human consumption.

Fish farming (salmon breeding and cultivation of algae), the export of chilled fresh fish, and canned fish production have latterly become more important, although they are not yet really significant, in total fishery activities. As already noted, in order to increase exports of these products, substantial changes must be made. On the one hand, it is necessary to

improve production techniques in order to meet the quality standards imposed in external markets. On the other hand, exports of these products require substantial marketing efforts. Development of the canning industry is particularly important from a strategic point of view, because of its close linkages with part of the Chilean metal products and machinery industry.

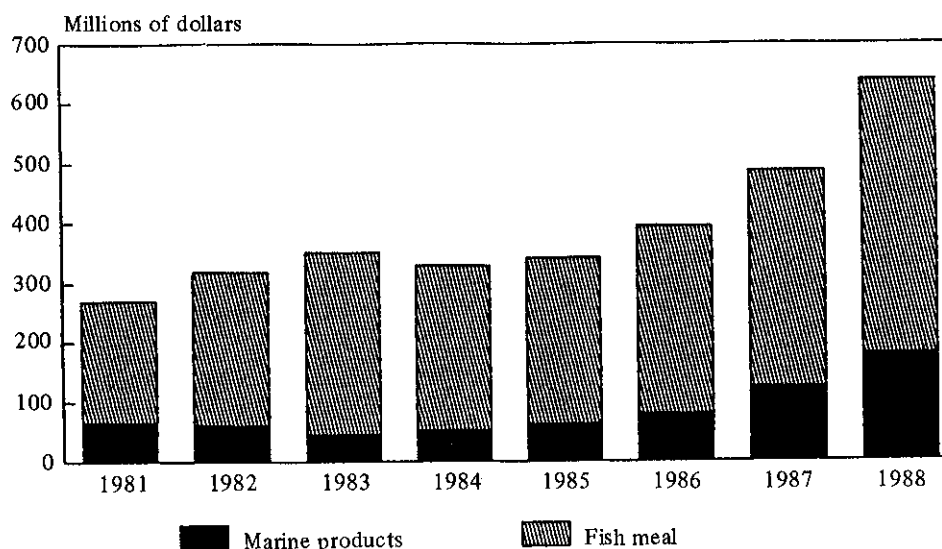
The problems faced by this sector are due mainly to the variability of the availability of fishery resources along the Chilean coasts. Thus, in 1990 pelagic fish concentrated more along the Peruvian coast than the Chilean one. This was reflected in increased fishing costs and reduced profit margins.

Finally, aquiculture is an activity of higher added value which allows for increased participation by the processing industry in the domestic market. It is limited by the lack of research on the feeding and reproduction habits of the species involved.

2. Agriculture and agroindustry

The export boom registered by Chile as from the second half of the 1980s was reflected in a very special

Figure 4
CHILE: EXPORTS OF MARINE PRODUCTS AND
RELATED INDUSTRIES, 1981-1988



Source: Central Bank of Chile

way in this sector. Thus, its average participation in the total exports of the country rose from 7.4% in the period 1980-1983 to 13% in the period 1984-1988. This increase of over 75% was the greatest and fastest registered by any sector of the Chilean economy in that decade.

Within the agricultural sector, fruit-growing was one of the activities which developed most rapidly in this period. Whereas in 1975 and 1980 income from fresh fruit exports accounted for 63.3% and 69.1% respectively of total agricultural sector export income, by 1985 this share had risen to 84.3% (figure 5). This increase was due mainly to a 16% rise in physical shipments between 1979 and 1985, since over the same period real prices only rose by 1.9%.

Fresh fruit exports first began to assume importance in the 1960s, but they only definitively became an important source of foreign exchange in the 1980s. This delay is explained mainly by the lack of suitable storage and transport facilities, as well as the difficulties in controlling certain pests and post-harvesting diseases.

The fruit-growing industry is very sensitive to the restrictions imposed by the recipient countries on imports of Chilean fruit. This is due, no doubt, to the relatively low level of diversification of the recipient markets abroad (although this has been increasing in recent years) and to the fact that over 80% of the

income from fresh fruit exports comes from sales of grapes and apples.

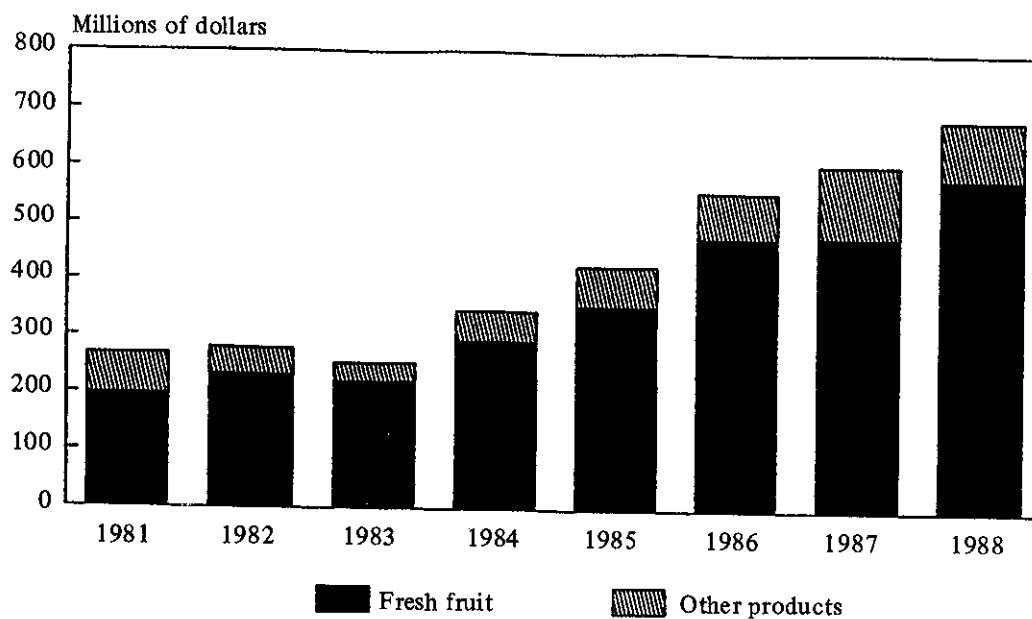
In spite of the rapid development of this activity, the products exported are generally of quite a low level of processing, so that their promotional effect on Chilean manufacturing is only limited. The vegetable and fruit exporting sector is mainly linked with the export packaging industry, especially the branches using paper and wood.

3. Forestry, lumbering and paper and pulp industries

The growth of exports by this sector speeded up in the last three years of the 1980s. Chile's natural advantages hold out expectations of an even more promising future for this sector of export activity. The higher income from sectoral exports in the last years of the decade was due mainly to the increase in exports of timber (figure 6).

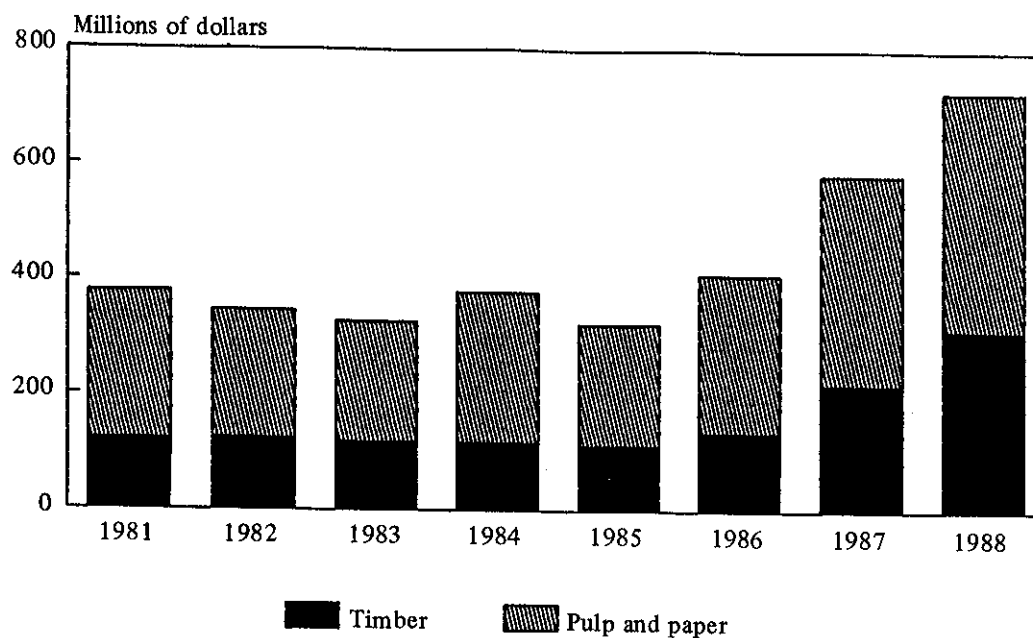
Chile's forestry resources consist mainly of Monterey Pine (*Pinus Radiata* D. Don), which originated in California. This species has adapted so successfully in Chile that it now registers growth rates much higher than those observed in its region of origin. Chile has over a million hectares planted with this species, most of them consisting of very young trees, so that there are enormous future opportunities of expansion for industries in the sector.

Figure 5
CHILE: AGRICULTURAL AND AGROINDUSTRIAL EXPORTS, 1981-1988



Source: Central Bank of Chile.

Figure 6
CHILE: EXPORTS OF TIMBER, PULP AND PAPER, 1981-1988



Source: Central Bank of Chile.

These industries display quite a high degree of vertical integration, extending from forestry and forest management to the use of the wood in the many branches of the paper industry.

In recent years, thanks to skilful management of forest resources in terms of pruning and thinning, the enterprises in this sector have increased the possibilities of producing goods of higher added value.

4. The chemical industry

The chemicals sector covers industries producing intermediate and final chemical products mainly for manufacturing, mining and the agricultural, health and public sectors. It corresponds to Division 35 of the International Standard Industrial Classification of All Economic Activities (ISIC) and includes the following major groups:

- 351 Manufacture of industrial chemicals
- 352 Manufacture of other chemical products
- 353 Petroleum refineries
- 354 Manufacture of miscellaneous products of petroleum and coal
- 355 Manufacture of rubber products
- 356 Manufacture of plastic products not elsewhere classified

The main exports by this sector are of inorganic chemicals (lithium carbonate, molybdenum oxide, saltpetre, iodine), organic chemicals and plastic

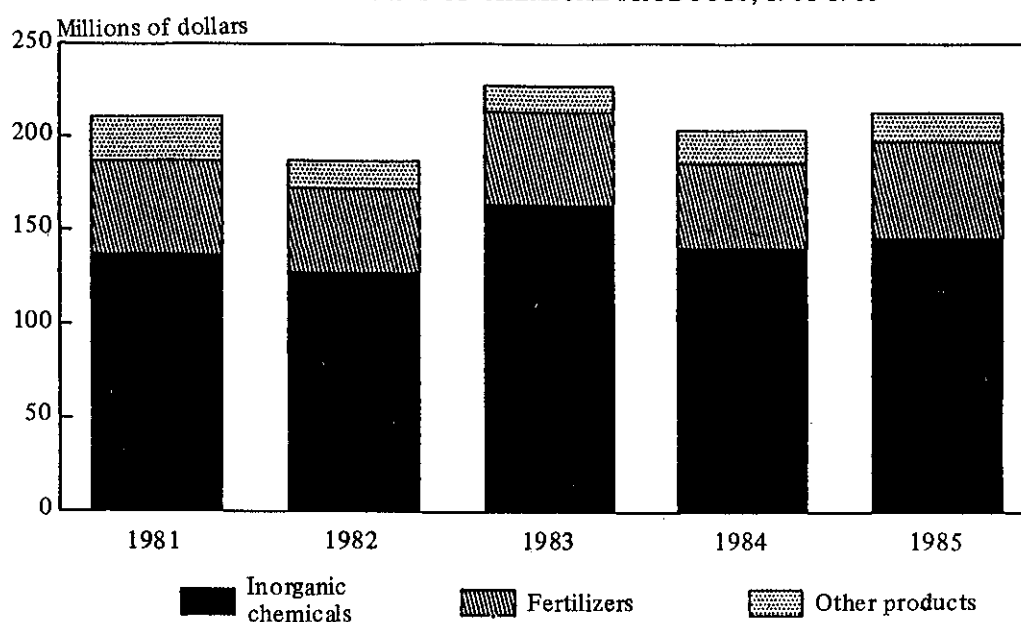
products. These exports have grown steadily since 1974. Some 95% of them are accounted for by industrial chemicals, but this group comes third in importance in the chemical sector when measured in terms of the gross value of production. This group (351) is known as the industrial chemicals industry, and attention will be centered on it in this article in view of its importance in Chilean foreign trade.

The main common feature of enterprises in the chemical industry is that their essential production processes are based on chemical reactions carried out at the industrial level. Most of the products of this industry are intermediate goods, so that it is of great importance for the growth of the rest of the economy.

The main clients of the chemical industry are manufacturing (especially the chemical industry itself), agriculture and mining. The export market is of considerable interest to this industry, and there are enterprises which are heavily dependent on it and indeed are organized as a function of such trade. The bulk of exports consists of inorganic chemicals (figure 7).

On the domestic market, chemical firms tend to have few competitors within the country, and in some cases they are the only producers. The great majority of industrial chemicals produced, however, have to compete with imported chemicals. Such competition is based generally on the price/quality ratio of the goods.

Figure 7
CHILE: EXPORTS OF CHEMICAL PRODUCTS, 1981-1985



Source: Chilean Development Corporation (CORFO), 1987.

III

Results of the study: analysis and interviews

In this section, we will examine the results of the study. After some methodological considerations,² we shall analyse the relationship between foreign direct investment and exports in the Chilean economy and summarize the results of the interviews held with the companies forming part of the selected sample.

1. Methodological considerations

For this study, a group of the most prominent exporters in the country was selected, with a view to finding out what type of international linkage (new forms of investment) they used, if any.

Consequently, a questionnaire was designed (Mizala, 1991) in order to examine the importance of contractual agreements between enterprises in industrialized countries and their local opposite numbers within the context of Chilean exports.

On the basis of Central Bank data on total exports and a classification of Chilean exporters, a representative sample was prepared, consisting of 32 firms belonging to four sectors defined for the purposes of the study. These sectors were: i) marine products and related industries; ii) agriculture and agroindustry (especially fruit-growing); iii) forestry, lumbering and paper and pulp industries, and iv) chemical industry. These sectors generate 62% of Chile's non-copper exports. This form of aggregation was selected because in each of the sectors most of the enterprises are vertically integrated.

In the selection process, factors taken into account were the total volume of exports and the most important exporters in each sector, which are also the biggest companies in their respective sectors. A set of small companies, amounting to 30% of the sample (two companies for each sector) was also selected as a control group. This control group served to compare the conduct of small and large enterprises oriented towards external markets, in terms of the degree of use made of international linkages and the types of mechanisms employed.

The enterprises forming part of the control group answered the same questionnaire as that submitted to the large companies.

With regard to the representativeness of the sample of enterprises selected, measured by their weight in the total exports of each sector, in the case of the marine products and related industries sector the sample of 10 companies generates 45% of total exports; in the agricultural and agroindustrial sector the sample of nine enterprises generates 64% of total exports; in the forestry, lumbering and paper and pulp sector the eight enterprises selected generate 68% of total exports, and in the chemical industry the sample of five enterprises accounts for 73% of total exports.

2. Foreign direct investment and exports

In this section, we shall analyse the relationship observed between foreign direct investment and exports. For this purpose, we shall use the classification of the main Chilean exporters made by the Central Bank of Chile and data on the participation of foreign capital in these export enterprises, provided by the Joint ECLAC/CTC Unit on Transnational Corporations.

The first part of the analysis of this relationship seeks to determine how much foreign-owned enterprises increased their share of Chilean exports during the period in which the latter registered substantial growth (1986-1989). In order to do this, information was sought on the share of enterprises with foreign capital in the total exports of each of the main export sectors. As the information on the participation of foreign capital in the enterprises operating in the country is rather incomplete, calculations were made for two groups of companies: those with majority foreign ownership, and those with some degree of participation by foreign capital.

The share of enterprises with majority foreign ownership in total sectoral exports grew most in the forestry, lumbering and paper and pulp sector (from 16.4% in 1986 to 25.1% in 1989) (table 1). In the rest of the sectors analysed, the increases were only 2% to 3%.

² For more details in this respect, see Mizala, 1991.

Table 1

**CHILE: EXPORTS BY FIRMS WITH FOREIGN EQUITY PARTICIPATION, AS A
PROPORTION OF TOTAL EXPORTS OF EACH SECTOR, 1986-1989**
(Percentages)

	1986		1989	
	Firms with majority foreign ownership	Firms with some degree of foreign ownership	Firms with majority foreign ownership	Firms with some degree of foreign ownership
Marine products and related industries	8.5	54.5	11.6	44.8
Agriculture and agroindustry	31.1	-	33.1	-
Forestry, lumbering and paper and pulp industries	16.4	56.2	25.1	53.8
Mining	10.9	-	13.2	-

Source: Central Bank of Chile and Joint ECLAC/CTC Unit on Transnational Corporations.

In contrast, if we look at the group of enterprises with only a certain degree of foreign capital, we see that in the two sectors for which it was possible to obtain information, the share of these enterprises in the total exports of the sector went down. In the case of marine products and related industries the share fell from 55% to 45%, while in forestry, lumbering and paper and pulp industries, it dropped from 56% to 54%.

Table 1 also shows that, except in the agricultural and agroindustrial sector, enterprises with majority foreign ownership only had quite a small share in the total exports of each of these sectors, both in 1986 and in 1989.

This information gives grounds for concluding that, while there has been an increase in the share of enterprises with majority foreign ownership in the external sales of the main Chilean export sectors, their contribution does not explain the substantial increase registered by Chilean exports during the recovery phase, after the adjustment process which followed the external debt crisis.

In order to investigate further the relationship between foreign direct investment and exports, we also made use of information supplied by Rozas (1991), the Foreign Investments Committee, and the Central Bank of Chile on foreign direct investment under Decree-Law No. 600 and Chapter XIX and on exports for the four-year period 1986-1989. The examination covered a total of 75 firms which are the main exporters in the country and have also

received some form of foreign direct investment. Statistical tests were made to find out up to what point the companies which are among the main exporters in the country –according to the classification of Chilean exporters already referred to– have received a significant volume of foreign direct investment. The object was to find out whether or not there is a positive correlation between such investment and the export capacity of the enterprises.

Cross-sectional regressions were then estimated by the ordinary least squares method, both for the sample as a whole and for the mining, agriculture and agroindustry, and marine products and related industries sectors. The forestry, lumbering and paper and pulp sector was not considered because there are few firms in it which are oriented towards external markets and which received foreign direct investment during the period under analysis.

The aim in estimating these regressions was to determine whether or not there is a significant correlation between exports and foreign direct investment, rather than to try to explain the export performance of the enterprises, since a larger-scale econometric analysis would be needed for this latter task.

Table 2 gives the results obtained for the overall sample of enterprises. The partial correlation coefficient between exports and foreign direct investment is positive and statistically significant. However, this result is attributable entirely to a single large enterprise in the mining sector, and if this company is excluded the results change dramatically, for the

partial correlation coefficient now becomes statistically insignificant and the adjusted R2 extremely low, showing that foreign direct investment has no relation to the volume of exports of the enterprises (table 2, column 2). If, however, the *two* main enterprises in the mining sector are excluded from the sample, we see that the partial correlation coefficient again becomes positive and statistically significant, although the adjusted R2 continues to be very low. Consequently, the results obtained must be considered as very shaky and subject to the conduct of the few enterprises which account for an appreciable volume of foreign direct investment. This result is hardly surprising, since it is well known that most of the foreign direct investment during the 1980s went to the mining sector.

Table 2

CHILE: RELATIONSHIP BETWEEN VOLUME OF EXPORTS AND FOREIGN DIRECT INVESTMENT IN A SAMPLE OF EXPORT-ORIENTED FIRMS

	Dependent variable: volume of exports		
	Whole sample of firms	Whole sample less one firm	Whole sample less three firms ^a
Constant	33 181.5 (4.01) ^b	37 225.8 (4.57)	22 405.7 (3.31)
Foreign direct investment	0.42 (9.41)	0.07 (0.45)	1.44 (3.28)
R2	0.54	0.0003	0.12
SE	69 066	67 437	49 561
n	75	74	72

Source: Cross-sectional data series for a sample of export-oriented Chilean firms.

^a The firms excluded were: Minera Disputada Las Condes, Minera Mantos Blancos and Minera Mantos de Oro.

^b Figures in parentheses indicate absolute value of statistics, t.

Table 3 gives the results obtained for each one of the sectors considered. As expected, mining shows a significantly positive partial correlation between exports and foreign direct investment, with an adjusted R2 of 0.61. Something similar occurs in the case of the agriculture and agroindustry sector, which has a significantly positive partial correlation coefficient and a high adjusted R2. This is attributable to

the number of foreign-owned enterprises registered in recent years. Marine products and related industries, however, have a statistically insignificant partial correlation coefficient and a very low adjusted R2.

Table 3

CHILE: RELATIONSHIP BETWEEN VOLUME OF EXPORTS AND FOREIGN DIRECT INVESTMENT IN SOME SPECIFIC SECTORS, 1986-1989

	Dependent variable: volume of exports		
	Mining	Agriculture and agro-industry	Marine products and related industries
Constant	-	-	54 818.6 (3.35)
Foreign direct investment	0.44 (4.02) ^a	4.79 (19.37)	-1.10 (0.55)
R2	0.61	0.95	0.04
SE	172 500	18 931	52 852
n	7	14	19

Source: Table 2.

^a Figures in parentheses indicate absolute value of statistics, t.

Thus, the empirical information presented so far does not allow us to draw any definitive conclusions relating foreign direct investment to the export capacity of national firms. Only in a few particular sectors does foreign direct investment appear to be positively correlated with exports. However, nothing can be asserted at this stage regarding the causality of that relationship, especially since a sector which is also oriented towards external markets (marine products and related industries) does not display any correlation between the volume of its exports and foreign direct investment in it.

There is some supplementary information which can be used to evaluate the relationship between foreign direct investment and exports in the Chilean economy. This information comes from a study carried out by Aninat (1990) with the aim of analysing the medium-term prospects of investment projects for the period 1990-1995. This author analysed the results of a survey or inventory of 442 individual investment projects with a total estimated value of

US\$19.7 billion for the six-year period 1990-1995. In contrast with previous analyses, which had sought to identify the relationship between foreign direct investment and exports on an *ex post* basis, Aninat studied, among other things, the potential incidence of these new projects, under certain assumptions, on export growth rates in the future.

Among the most useful messages emerging from this study is the marked orientation of the projects analysed in it towards the production of internationally tradeable goods. Thus, 262 of these projects are clearly oriented towards external trade. The investments made in export activities amount to US\$10.4 billion, or 53% of the total gross value of the investments. This figure does not include projects basically involving the allocation of resources for infrastructural improvement or support, even though these directly favour subsequent progress in the export of goods.

The types of export products involved in the investment projects included in the survey are: fish meal, canned fish and shellfish, salmon, semi-frozen fish, newsprint, wood pulp, cardboard, wood panels, veneers, round wood, sawn wood, furniture, tomato and apple sauce and pulp, grapes, nectarines, strawberries and raspberries, asparagus, nitrates, boron and potassium salts, iodine, sulphur-based products, copper in its various forms, silver, gold, iron ore pellets, manganese products, ceramics, yachts, fishing vessels, garden tools, spare parts for industrial machinery, tobacco, tourism complexes, telecommunications services, international port services (air and sea) and geological exploration services abroad. The concentration of investment projects on these products is fully in keeping with the specialization scheme of Chilean external trade.

With regard to the ownership of the export projects, it is worth noting that those which are wholly foreign owned represent a little over one-third (35%) of the total sample. A further substantial proportion belong to enterprises with some participation of foreign capital and are being carried out by the Chilean private sector in conjunction with foreign investors.

Aninat quantifies the possible effect of such projects on export growth rates. He carries out various simulations in order to make a tentative calculation of the value of the exports involved, considers the generation of production flows with a life horizon of 15 years, which he applies to all the projects

selected, and assumes constant FOB prices over this period of time. On this basis, he observes that there will be a shift of importance in Chilean exports towards the rest of the world: according to reasonable parameters, in the long term the investment projects will probably generate increases of 20% to 22% per year in the country's current export values.

It may be concluded, then, from this study that foreign direct investment can have a favourable effect on Chile's industrial exports. This is due mainly to the fact that foreign investors channel their resources towards those sectors with a clear orientation towards external markets, that is to say, sectors based on the exploitation of those natural resources where Chile has its biggest comparative advantages.

3. Analysis of the results of the interviews by sectors

In this section, an analysis is made of the results of the interviews of the companies making up the selected sample.³

a) Marine products and related industries

The sample selected for this sector consisted of 10 companies, eight of which operate in the processing industry (fish meal and fish oil), while the export activity of the other two enterprises is concentrated on such products as canned fish and shellfish, chilled and frozen fresh fish, salmon and sea urchins.

Of the eight companies engaged in the production of fish meal and fish oil, six of them are between 23 and 45 years old, while the two newest ones are only 7 and 10 years old, respectively; the newer companies generate a smaller volume of production. The five biggest companies, for their part, generate 85% of the total production of the companies in this sector included in the sample, while the other three account for only 15%.

The output of the processing enterprises is almost all exported, sales on the domestic market being only marginal. The main destinations of the exports of fish meal and fish oil are Germany, Japan, Netherlands, Belgium and the United States, although South American countries have also begun to purchase these products.

³ For a summary of the characteristics of the sample of companies and the main answers to the questionnaire given by the executives who were interviewed, see Mizala, 1991, appendix C.

In this sector, the majority ownership of the companies in the sample (including those which have formed joint enterprises with the participation of foreign capital) is in the hands of national entrepreneurs. Altogether these companies employ rather more than 7 500 people.

Among the mechanisms of international industrial linkage used by the sector, a leading place is occupied by the purchase of capital goods, which seven of the enterprises described as the main means of acquisition of technology. Two enterprises indicated that the formation of joint companies with participation by foreign capital was the most important mechanism used by them. Only one company, engaged in the export of frozen and canned shellfish and salmon, mentioned informal technical assistance agreements for training personnel as a main mechanism. In this case, a Japanese firm which decided to obtain its supplies from the Chilean firm in question laid down as a condition in the purchasing contract the stationing of one of its employees in the Chilean plant in order to ensure fulfilment of sanitary regulations in the handling, processing and packing of the product. The benefits for the Chilean firm in question have been extremely important, since the Japanese representative has become an authentic agent of technology transfer in those parts of the process which are of vital importance for ensuring the quality of the final product demanded on foreign markets.

The technology transfer which takes place through the various industrial cooperation mechanisms in the market for fresh, chilled, frozen and canned fish and shellfish is very different from that which exists in the fish meal and fish oil processing industry, for the technological base which has been built up in the latter industry is much greater, thus permitting the development within the country of many of the capital goods required by the industry. Furthermore, in the fresh, frozen or canned products markets, the quality attained in the handling, processing and packing of the products is of fundamental importance for entering the demanding foreign markets, whereas the differences in quality of the products of the fish meal and oil industry are only reflected in the final price. This means that in the processing industry the necessary technology is incorporated in the capital goods, whereas in the fresh, frozen or canned seafood industry the personnel must be carefully trained to carry out the production processes properly.

Although generally speaking the system of licenses is not used by the companies interviewed, there is one special case. An enterprise related with some other companies in the sample began by using a license from a Norwegian firm to manufacture capital goods for the fisheries industry in Chile. After a while, the Chilean firm formed a joint enterprise with the Norwegian company for the production and marketing of capital goods for the world fisheries industry. During the first one and a half years of operation, the recently formed company had a technical assistance contract with the firm providing the technology. Later on, the new enterprise bought the exclusive rights to the brand of goods from the Norwegian firm, thus becoming the only company producing this highly respected line of equipment in the world. The main benefit for the Norwegian firm was to ensure the sale of its technology to the main world markets, located on the South Pacific coast. The Chilean firm, for its part, had the advantage of lower transport costs and a more comprehensive knowledge of the technological needs of Chilean fishery enterprises.

Technical assistance agreements, of whatever type, are also important for the companies in the fish meal and fish oil processing industry, but the use made of them has only been secondary or complementary to the purchase of capital goods. It should be noted that the technical assistance agreements are carried out in a very informal manner. Indeed, most of the companies do not have contracts but instead visit firms or institutions connected with the fisheries industry abroad and take advantage of visits of foreign suppliers and clients to Chile.

With regard to the origin of the basic technology used in the enterprises, the opinions of those interviewed were divided. Half of them said that the technology came from foreign firms, whereas the other half said that the technology had been designed in Chile, at least at the basic engineering level, and in some parts of the process, even at the level of the detailed engineering. In this connection, mention must be made of the ability of Chilean engineers to adapt the technology incorporated in capital goods acquired abroad, as well as to fabricate complete pieces of equipment with certain parts brought from abroad. The latter group of firms interviewed coincided in stating that development carried out within the company had been the main origin of the basic technology used.

The main reasons stated by the two companies which set up joint enterprises with the participation of foreign capital were the sharing of risks and the transfer of technology. The unanimously stated main reason for using informal technical assistance agreements was the possibility of opening up new export markets for the company by attaining the quality standards demanded abroad.

The main reason for buying capital goods stated by all the firms interviewed is their use as a means of technology transfer.

All the firms in the sector noted that contracts for the acquisition of capital goods include a period of technical assistance for putting them into operation, with further assistance in the event of breakdowns.

The benefits which the companies say they obtained by using these systems of industrial linkage are firstly, improvement of the quality of the product (six firms), –an evident gain in the case of the companies producing fish meal, which have been able to produce special meal of higher protein content and with higher international prices– and secondly, reduction of production costs (six firms). Other benefits mentioned include improvement of the skills and training of staff, expansion of production capacity, and technological updating of production processes.

When consulted on the differences in the use of these systems of industrial linkage in the various stages of the export process,⁴ the companies gave the following answers: there is no difference from one stage to another (five firms); in the stages of collecting information and penetrating markets, the companies are more dependent and the amount of resources spent on the use of these mechanisms is greater (four enterprises); in the stabilization and consolidation stages the enterprises are more dependent and the amount of resources spent on these mechanisms is also greater (one firm). It may be noted that companies in the second group consider technological development within their own companies to be extremely important in the later stages of the export process.

All the companies interviewed consider that the fundamental reason why foreign companies set up these forms of linkage with local companies is that they are trying to open up new markets for the sale of

their technology, mainly through capital goods, but also through technical assistance and the transfer of technological know-how.

The conditions which those interviewed consider to be responsible for the position of their firms as the main exporters in the country are: natural competitive advantages (four firms mentioned these in first place, and five firms in second place) and exchange rate policy (four firms mentioned this in first place and one in second place). Only two firms mentioned access to appropriate technology (in second and third place, respectively). Finally, one firm mentioned the quality of its products, while another considered that the size of its firm was the main reason for its export success.

With regard to the political and economic conditions which make it possible for foreign firms to accept these contractual arrangements, it is considered that the main factor is the legislation in force with regard to foreign capital (five companies), together with the existence of mechanisms for the protection of industrial property (four firms mentioned this, in second place), and the economic stability prevailing in Chile (one firm mentioned this in first place and two firms in second place).

Desirable government measures suggested by the companies are, in order of importance: carrying out a national technological development programme (one company), defining clear rules on the technical specifications of some imported inputs through some controlling body (one company), and changing the additional tax of 40% on the remuneration of foreign specialists (one company). The other companies considered that the present situation is acceptable and they did not have in mind any measures which the government should apply in order to facilitate industrial cooperation with foreign firms.

With regard to possible suggestions to foreign firms for the facilitation of contractual arrangements such as those described, none of the companies felt that foreign firms need to take measures different from those applied at present. Both the Chilean firms and foreign institutions have a very positive attitude in this respect.

b) *Agriculture and agroindustry*

The sample selected for this sector included nine firms, seven of which operate in the export of fresh fruit. They mainly export grapes, stone fruit and apples and pears, with grapes accounting for between

⁴ For a definition of the stages in the export process, see the annex to this article.

50% and 90% of the total production. The other two companies concentrate on the markets for frozen vegetables, fruit pulp, dehydrated fruit, fruit juice, and tomato paste and by-products.

Four of the companies engaged in the export of fresh fruit are less than 10 years old, two of them are 14 years old, and only one of them existed before the economic reforms begun in Chile in the mid-1970s. The remaining companies interviewed are between 12 and 15 years old. In other words, this is a sector in which most of the companies are relatively new and, in contrast with the situation in the fishery sector, the new enterprises have very substantial volumes of production.

Among the companies operating in the export of fresh fruit, the four largest account for 84% of the total production of the enterprises in the sector covered by the sample.

With the exception of one company operating in the fruit pulp and frozen fruit and vegetables market, all of them export more than 65% of their production. This is particularly marked in the sector exporting fresh fruit: in this sector, the companies only sell on the Chilean domestic market fruit which does not meet the quality standards demanded on international markets. The main destinations for fruit exports are the United States and the European countries. Japan, however, is an important market for the company producing tomato paste.

Four of the nine companies interviewed are foreign-owned; one of them has just passed into foreign hands through its purchase by a transnational corporation operating in the area of fresh fruit. Three of the companies are Chilean-owned; one of them has just passed into Chilean hands with the purchase by Chilean investors of the 60% of the equity which belonged to a foreign enterprise. Of the remaining two companies, one is mainly Chilean-owned and the other mainly foreign-owned. A noteworthy fact is that the four firms which are branches of transnational corporations are responsible for 40% of the exports of the sector and are among the biggest exporters in the whole country; the volume of exports of these four firms represents 60% of the total exports of the companies covered by the sample in this sector.

The companies with the highest levels of production employ between 300 and 800 workers on a permanent basis, and those with lower levels of production employ between 22 and 160 workers.

Altogether, the firms covered by the sample give employment to 3 058 persons. These figures do not include the seasonal workers employed at harvest time, when the total number of persons employed increases three or four-fold.

Among the industrial cooperation mechanisms used by this sector, an outstanding place is occupied by the purchase of capital goods from developed countries, mainly the United States and Europe, which is considered to be the main means of acquisition of technology by seven out of the nine companies. One firm stated that the formation of a joint enterprise with foreign capital was the main mechanism used, while another firm (that producing tomato paste and by-products) felt that technical assistance agreements for staff training were the main means of industrial cooperation, followed by the purchase of capital goods.

Eight out of the nine companies interviewed mentioned technical assistance agreements for staff training as the second most important means of industrial cooperation. As in the case of the companies interviewed in the fisheries sector, these agreements are generally of an informal nature, consisting of visits to international fairs, to capital goods suppliers, and to foreign companies producing similar goods.

Visits to companies in developed countries are easy to organize and are very useful for gaining information on the technology currently being used. It is very difficult, however, to obtain information on technologies which are in the development stage. No differences were observed between Chilean and foreign-owned firms with regard to the types of industrial linkage mechanisms used.

Five companies reported that they hired foreign experts to help them adapt imported technology to Chilean conditions. The biggest companies hired these specialists on their own account, but the smaller firms used foreign specialists brought in by the Chile Foundation, an institution whose aim is to promote and transfer to the country the most modern technologies available on the world market.⁵

Licensing has not been used by the companies interviewed, although some varieties of grapes, including the best variety, are patented. Since the payment of royalties would increase their costs, the companies prefer to produce and market other varieties which are not patented.

⁵ For an excellent analysis of the technology transfer work of the Chile Foundation, see Huss, 1991.

With regard to the origin of the basic technology used in the companies, seven of them obtain it mainly from unrelated foreign companies. One company obtains it from its parent company, while another receives it from national research institutes. With regard to a second source of basic technology, opinions were divided: three companies stated that development within their own firms had been important in their basic technology, especially in the adaptation of the technology incorporated in imported capital goods (in addition, some of them carry out the design engineering in Chile and only import the necessary components), while three companies reported that their secondary sources of basic technology were national research centres and foreign universities and research institutes. Finally, one firm reported that its parent company was a secondary source of its basic technology.

The main reason stated by the companies for purchasing capital goods abroad was the impossibility of developing such equipment within the country. In second place, they mentioned the use of these purchases of capital goods as a means of technology transfer. The capital goods acquired by the companies interviewed consist mainly of refrigeration and packing equipment. The four most technologically advanced firms in the sector have controlled atmosphere plants, by means of which they have been able to extend the storage life of apples. This technology has enabled them to export apples at times when they are not produced in the country, thereby gaining access to new external markets.

All the companies except one stated that the contracts for the acquisition of capital goods included a period of technical assistance in the start-up phase, as well as assistance in the event of breakdowns.

The companies which stated that they used technical assistance agreements said that the main reasons for using such contracts were the know-how deriving from them and the need to facilitate access to external markets by complying with their quality standards.

The need for extra capital and the possibility of entering new markets were the main motives stated by the company which set up a joint venture with a foreign firm.

The benefits which the companies reported that they had obtained through these mechanisms

of industrial linkage with developed countries were first of all improvement of the quality of their products (seven companies) and secondly, reduction of production costs (four companies). Other reasons mentioned were the possibility of gaining access to new external markets, raising the level of skills and training of workers, technological up-dating of production processes, and the development of new products.

When the firms were consulted on possible differences in the types of industrial linkages used in the different stages of the export process, the unanimous answer was that there were no such differences. However, eight of the nine companies stated that they depended more on those mechanisms in the stages of stabilization and consolidation of the export process and spent more resources on the use of such arrangements in those phases. The companies argued that as a firm progresses in the export process, the quality requirements of external markets—both for remaining in a market and entering new ones—are increasingly high, which obliges companies to keep up a high technological level. Technology is of fundamental importance for improving product quality and overcoming sanitary barriers. Only one company considered that it was not appropriate to speak of different stages in the export process: as that company was a subsidiary of a big transnational corporation operating in the sector, it was familiar with the export process right from the start and had had a leading position in the market from the very beginning.

Most of the companies interviewed consider that foreign firms adopt these forms of industrial linkage with companies located in Chile because they are interested in opening up new markets for their top-level technology, especially through the sale of capital goods. Only the firm which had set up a joint company with a foreign counterpart mentioned in first place the existence of comparative advantages with regard to natural resources, and in second place the opening up of new markets for the sale of final products, as the reasons why the foreign enterprise had entered into association with it.

The conditions which, in the view of those interviewed, have enabled their companies to be among the main exporters in the country are the following, in order of importance: natural competitive advantages (one firm put this factor in first place of

importance and four other firms in second place); access to appropriate technologies (two companies put this in first place and one in second place), and the macroeconomic policy applied in the country (two companies put this in first place and one in second place). Other reasons mentioned included the quality of the human resources of the enterprise (three firms) and the possibility of access to external credits (one firm).

With regard to the political and economic conditions which make possible the acceptance of these contractual arrangements by the foreign firms, the companies interviewed gave the following answers: the economic stability of the country (two firms put this in first place and five in second place); the current legislation on foreign capital (two firms put this in first place and two in second place), and the macroeconomic policy of the country (four firms mentioned this in first place and two in second place).

The government measures suggested by the firms for facilitating these contractual arrangements with foreign firms are: maintaining clear and stable policies (four firms); providing companies operating in the country with technical assistance in selecting, acquiring, adapting and assimilating the foreign technology included in the contracts (two firms); carrying out a national technological development programme (one firm); changing the additional 40% tax on technical assistance contracts (one firm), and promoting the formation of joint enterprises with the participation of foreign capital (one firm).

When consulted regarding possible suggestions to foreign firms for facilitating contractual arrangements with them, most of the firms stated that there were no difficulties in establishing and operating such arrangements, and that it was therefore not necessary to take any measures in that respect.

c) *Forestry, lumbering and paper and pulp industries*

Eight firms were selected for the sample in this sector. Of these, three centre their operations on forestry (sawnwood, roundwood for lumber and roundwood for pulp); four are engaged in the manufacture or marketing of different types of paper; one concentrates on the manufacture and marketing of raw and bleached pulp, and one enterprise is engaged in the production of knot-free pine wood for the manufacture of mouldings and door and window frames.

Seven of the companies in the sample are at least 70% Chilean owned, and only one firm is 100% foreign owned (since only two years ago).

The three biggest firms in the sample employ between 1 100 and 3 300 workers. Four companies have between 400 and 540 workers, and one has only 30 workers, which makes altogether a total of almost 7 500 employees.

Two of the firms in the sample are over 70 years old, five are between 10 and 30 years old, and one is a little less than 3 years old.

The activities of the firms in the sector are of a varied nature, and the size of their exports depends on the type of products. For example, over 90% of wood pulp and almost 70% of the production of the various types of paper is exported. In the forestry firms, the products with the highest value added are high quality sawnwood and roundwood for lumbering, over 90% of which is exported. On the other hand, not more than 50% of roundwood for pulp, which is of lower quality, is exported. This is because there is quite a high demand for this product on the domestic market from the wood pulp production firms. For its part, the firm which produces knot-free wood, using modern finger jointing technology to join together different pieces of wood, has only achieved sporadic exports, because of short-term financial problems due to lack of investment capital, shortage of working capital, and exhaustion of the firm's possibilities of offering guarantees.

In the paper business, the various markets behave differently. In Chile there are two large producers and two large consumers of paper, thus leading to rather a low level of competition and rivalry in the local market. In the Latin American market, only normal efforts of competition are needed in order to gain access, but in the European markets timeliness and strict fulfilment of other contract conditions are essential. In other words, once the products have been accepted in terms of their price and quality, the exporters must comply strictly with delivery dates and volumes.

In the forestry business, the products are clearly differentiated by quality and by the secondary use made of them. Thus, sawnwood is destined for processing into items of higher added value, while pulping wood is that which is not of sufficiently high quality for sawnwood and is therefore sold to the companies which require it as raw material for wood pulp. There is a high degree of competition, and fulfilment of delivery dates and volumes is essential in order to keep clients.

Of the eight companies interviewed, six stated that the purchase of capital goods abroad had been

the main industrial cooperation mechanism used, and they also mentioned that technical assistance agreements had been of less importance than the purchase of machinery and equipment. The other two firms, however, said that technical assistance agreements were the main mechanism, with purchases of capital goods occupying a somewhat less important place. Only two firms had set up joint enterprises with participation of foreign capital in order to share risks and attract new capital. All the firms, however, agreed that the acquisition of capital goods incorporating modern technology, together with the requisite know-how, were essential for achieving success.

In the pulp industry, two Chilean-owned enterprises have carried out two big investment projects by forming joint enterprises with foreign capital. The main reasons given by the local enterprises for their association with foreign firms are the need for new capital and the possibility of sharing risks. For their part, foreign firms have been interested in associating themselves with Chilean firms because of the important comparative advantages which Chile enjoys in wood pulp production, and the possibility of sharing investment risks.

According to five of the companies consulted, the basic technology used comes mainly from unrelated foreign firms. Two other firms mentioned Chilean enterprises as the source of the technology, and only one firm reported that the technology had been developed within the firm itself.

According to all the companies interviewed, the technical impossibility of manufacturing the necessary capital goods in Chile is the main reason for buying them abroad. The six biggest firms, together with one of the smallest, stated that contracts for the purchase of capital goods include technical assistance for the start-up period, together with subsequent assistance in the event of breakdowns.

With regard to their reasons for entering into technical assistance agreements, four firms stated that what interested them most was the transfer of know-how, since this is not acquired merely by purchasing capital goods, and developing it in Chile would be a costly and lengthy process. Two firms stated that they signed technical assistance agreements with the final objective of gaining access to new markets through the contacts made and the higher product quality thus attained.

The main benefits obtained from these contractual arrangements, according to five of the firms, have been the expansion of their production capacity

and the improvement of product quality. Other benefits mentioned include reduction of costs, updating of technology, and the incorporation of new products or lines of products.

With regard to the stages in the export process, five companies stated that the information and penetration stages were those which depend most on this type of mechanism. In the view of four companies, the information and penetration stages were likewise those which required most resources, while three firms considered that the highest level of spending on these mechanisms took place in the later stages of the export process, that is to say, those of stabilization and consolidation of markets.

Five of the seven companies interviewed considered that the main reason why foreign firms engage in these mechanisms is to open up new markets for the sale of their technology. The other two firms considered that foreign companies are interested in the comparative advantages that Chile enjoys with regard to natural resources. Only one of them considered that the basic motivation of the foreign firms is to gain access to raw materials for their own processes.

When the enterprises were consulted regarding the conditions which had enabled them to be among the main exporters in the country, they said that this was due to the existence of comparative advantages in the area of natural resources (three companies mentioned this in first place, and two firms in second place). Other firms attribute the success of their export activities to the macroeconomic conditions existing in the country (two firms put this in first place and two in second place). Finally, several firms indicated that access to suitable technologies had helped them to gain success in exporting (one firm put this in second place and two in third place).

According to four out of the five companies which answered the question on the conditions which have most favoured these contractual arrangements, economic stability and, in second place, political stability were the most important factors in this respect. In third place, they mentioned the prevailing macroeconomic policy.

With regard to measures to facilitate industrial linkages with firms in developed countries, the companies interviewed felt that the government could take measures to attract external credits for the purchase of capital goods (two firms), provide technical assistance in selecting, acquiring, adapting and assimilating the technology covered by such

contractual arrangements with foreign firms (one firm), and implement a suitable policy of protection of industrial property (one firm). Most of the companies considered that generally speaking both the foreign firms and the prevailing government policies offer ample facilities for making such contractual arrangements.

d) *Chemical industry*

The sample selected for this sector consisted of five companies.⁶ One of them generates 66% of Chilean exports in this sector, while all the others together only account for 7%. These latter firms are engaged in the production of chemicals for industrial use: iodine, sodium nitrate, potassium nitrate, low-density polyethylene and resins, pentaerythritol, sodium formate, formic acid, sodium bicarbonate, ulexite, boric acid, paraffin waxes, cuprous chloride, cupric oxide, etc. The exports of the company responsible for the major part of external sales are based on natural resources: mainly iodine and sodium nitrate. The companies interviewed are between 20 and 50 years old. The biggest of them provides employment for 4,000 people, while the remaining firms employ between 70 and 500 persons each.

Only two of the companies export rather more than 70% of their production (i.e., the biggest firm and one of the small ones), while the remainder export less than 33%. The main purchasers of their products are the United States, Europe, Brazil, and other Latin American countries.

Four of the companies in the sample are the property of Chilean private entrepreneurs; one of them has set up a joint company with Argentine capital. Only one firm is of majority foreign ownership: it was formed through the association of a Chilean public enterprise (the supplier of the raw material) with a transnational corporation.

The chemical industry in Chile does not have competitive advantages in terms of natural resources or labour compared with other countries. Consequently, process efficiency and a secure supply of raw materials are of fundamental importance in order to be able to compete in the demanding external markets. The world level of technological development in this industry is so high, and the

volumes of production of the Chilean chemical industry are so small compared with foreign firms, that research and development programmes such as are carried out in the big transnational corporations are not feasible. The enterprises in this sector are therefore more dependent on modern foreign technologies than the other sectors studied.

It should be noted that many of the chemical processes used do not require any licenses, since the chemical reactions employed are well known to all. The main thing in these cases is the degree of efficiency of the production process and the availability and secure supply of raw materials. This is so in the case of the production of methanol from natural gas, for example.

Three companies in the sample have set up joint enterprises with foreign capital as a main means of transferring technology, while one company mentioned that it paid licenses for processes and products for this purpose. All the companies in the sample buy capital goods from developed countries, but this is only of secondary importance in this respect. No major differences are observed between the industrial linkage mechanisms used by the big firms and the small ones.

The companies which have set up joint enterprises with the participation of foreign capital have done so in order to secure the transfer of technology, although one also did this in order to share business risks.

Licenses and capital goods have been acquired mainly because of the impossibility or excessively high cost of developing such goods in Chile. The contracts for the purchase of capital goods do not include technical assistance, because the companies have sufficiently highly skilled personnel in order to install and repair the equipment. Like the other companies interviewed in this study, those in the chemical sector send their technicians abroad to receive training in new technologies, and as mentioned earlier, this is done in quite an informal manner, mainly through the companies' relations and contacts with foreign firms.

The benefits which the companies say they have obtained through these industrial linkage mechanisms are: incorporation of new products or product lines (two companies mentioned this in first place); lower production costs (one company mentioned this in first place and two firms in second place), and

⁶ Cape Horn Methanol was also selected for the sample, but this was the only firm consulted which refused to answer the questionnaire.

technological updating of production processes (one company mentioned this in first place and another in third place).

Three of the companies in the sample stated that the last two stages in the export process depend more on the use of this type of industrial linkage mechanism and these stages are also those which have involved the heaviest expenditure of resources. The other two companies in the sample said that there were no differences between the various stages.

According to three of the firms in the sample, foreign companies use these industrial linkage mechanisms in order to open up new markets for their final products. Two companies (one in first place and the other in second place) also considered that access to raw materials and inputs was a further reason for this interest by foreign firms.

Access to appropriate technologies (two firms put this in first place) and the availability of licenses (one company put this in first place and another in second place) were considered to be the main

reasons why the companies in the sample were among the biggest exporters in the country.

The macroeconomic conditions which the firms in the sample considered to have made possible the acceptance of these contractual arrangements are: the current legislation on foreign capital (two companies put this in first place), the macroeconomic policy applied in Chile (two companies put this in first place) and economic stability (two firms put this in second place and one in third place). With regard to measures that the government could take to facilitate such contractual arrangements, one company stated that it would be desirable to simplify the administrative procedures needed in order to make such arrangements, while another firm mentioned the desirability of reducing the additional 40% tax on income received by foreigners in Chile.

None of the companies suggested any measures that the foreign firms could take to facilitate these contractual arrangements, since they considered that there were already ample possibilities and facilities in this respect.

IV

Conclusions

The characteristics of the Chilean export process, which is based on the use of natural resources where the country has comparative advantages, mean that in an initial stage the export capacity of local firms does not depend to a major extent on industrial linkages with companies in developed countries. In the near future, however, in order to maintain their position in markets where they are already operating or to penetrate new markets, Chilean firms will have to make use of such international industrial linkages. This is clearly so when the companies must comply with given quality standards in order to enable their products to enter new markets or to consolidate their position in markets where they are already present.

Local firms mostly use two means of industrial cooperation: the acquisition of capital goods from international suppliers unconnected with the companies, and technical assistance of an informal nature, mainly for staff training.

The establishment of companies with participation of foreign capital (joint ventures) is less

frequently used. Association of local firms with foreign companies is due above all to the need to obtain financing for large-scale investments and to share the risks involved in these operations. Consequently, the establishment of such enterprises with participation of foreign capital is not one of the usual ways of obtaining the transfer of technology. The new technologies needed can be acquired on international markets by anyone who requires them, and it is not necessary to enter into association with foreign firms in order to do so. On an *ex post* basis, however, it was noted that in terms of technology transfer, the benefits derived from the functioning of joint ventures with foreign capital are of the greatest importance for the local firms involved.

International industrial subcontracting is not practiced in any of the sectors studied, so it was not possible to study the operation of this mechanism. The main export activities owe their success to the exploitation of the comparative advantages enjoyed

by Chile in natural resources, rather than to the low cost of labour or transport costs, which are among the main reasons why foreign enterprises subcontract production to local firms.

The various sectors studied do not display any substantial differences with regard to the types of industrial linkage mechanisms used. The only exception is in the chemical industry, which, unlike the other sectors, makes some use of licenses for products and processes. This may be due partly to the fact that three of the four sectors analysed base their export capacity on the comparative advantages which exist in terms of natural resources, which is not the case in the chemical industry.

No major differences are to be observed between large and small firms with regard to the types of industrial cooperation (or linkage) mechanisms used.

The main benefits which the companies in the sample have obtained through international industrial cooperation are: improved product quality, which has given them access to new external markets; lower production costs, and increased production capacity. Moreover, the contractual arrangements made with foreign firms have enabled the Chilean companies to update the technology used in their production processes.

The success achieved by the export firms is due mainly to the existence of competitive advantages based on natural resource availability; to the application in Chile of macroeconomic policies favourable to export-led growth (especially the exchange and tariff policies applied), and to the access to appropriate technologies.

The Chilean firms consider that their foreign counterparts make use of such linkage mechanisms mainly because they are interested in opening up new markets for the sale of their technology, mostly through capital goods but also through technical assistance which is reflected in the transfer of know-how.

With regard to the degree of maturity of the enterprises—that is to say, the phase they have reached in the export process—the companies interviewed all agree that there are no differences between the types of industrial linkage mechanisms used in the various phases. The differences lie more in the extent to which such mechanisms are used. The agricultural and agroindustrial

sectors and the chemical industry stated that the stages of stabilization and consolidation (the last ones in the export process) are those which depend most on international industrial cooperation and also those in which the enterprises have invested most resources. This is because the ability to gain access to new markets is closely linked with high product quality, which is achieved through the incorporation of advanced technology.

With the opening up of most economies to international trade, tariff barriers have ceased to be the main hindrance to trade. The barriers raised by the countries are now increasingly based on demands with regard to quality and requirements of a technical nature (sanitary barriers, for example). This is clearly visible in the case of Chilean fruit producers and exporters, who began by exporting all qualities of fruit, but must now meet rigorous standards with regard to colour and weight and must subject their products to cooling processes to ensure their durability and quality. Because of these requirements, the exporters have had to incorporate specialized high-technology machinery, modern refrigeration equipment, and even controlled atmosphere plants which enable them to increase the durability of the fruit considerably and to ensure a product of homogeneous quality. Something similar has taken place in the chemical sector.

A different situation is observed in the marine products and related industries sector, especially with regard to the production of fish meal. The companies in this sector state that the stages which most require international industrial linkages and absorb the biggest resources are the first two stages, that is to say, information and market penetration. As noted in the previous section, the companies operating in this sector decided to set up a joint enterprise with a Norwegian firm to manufacture the main capital goods required by the fisheries industry in Chile. In the first stage, they were highly dependent on foreign technology, but with the establishment of this joint enterprise their access to technology is just as rapid as if it were locally developed. Moreover, fish meal is a basic commodity whose entry into international markets involves fewer difficulties.

In the forestry, lumbering and paper and pulp industries sector it is not clear which stage involves most dependence on industrial linkages.

The answers given by the companies interviewed did not allow any definitive conclusion to be reached in this respect.

In general, the companies interviewed said that they had not had any problems of a political or institutional nature in making use of the existing industrial linkage mechanisms. In view of the openness of the Chilean economy and the free-market system existing in it, any company which so desires can have access to imported capital goods and can enter into association with foreign firms, set up a joint enterprise, or establish technical assistance agreements with overseas institutions or firms.

In the case of the small firms, however, shortage of capital and financing make it difficult or impossible to take advantage of these conditions. Consequently, policies to promote this sector should be aimed fundamentally at solving the financing problems which exist. There are at least two measures which should be taken in this respect. First of all, technical assistance agreements should be signed at the level of institutions grouping together companies in one or more entire sectors: this would make it possible to assemble resources in order to bring in foreign experts who could divide up their time among the different companies. Institutions exist in Chile which are capable of carrying out actions of this type. They could even be given financial support by the government in order to carry out these programmes. Secondly, it would be desirable to promote the use of existing risk capital to finance the purchase of imported capital goods needed by the smaller companies. As noted in the analysis of the interviews, many of the capital goods needed are of foreign origin and their possession is an essential requirement for gaining access to modern technologies which will enable the companies to compete effectively on international markets.

It would undoubtedly be interesting to extend this study to other sectors of the Chilean economy. According to the analysis carried out here, the export capacity of three of the four sectors studied is based mainly on the exploitation of natural comparative advantages: that is to say, these sectors have very special characteristics. Indeed, the chemical industry displays somewhat different results, due essentially to the fact that it does not

enjoy advantages of this type. A study covering other sectors of the economy would give a broader view of the effects that international industrial linkages have had on Chilean exports.

Although this study only takes account of the sectors which register the highest levels of participation in the country's exports, some observations are called for on certain aspects connected with the prospects and potential of international industrial cooperation agreements as a means for promoting the sale of Chilean products on international markets.

Chilean firms whose activities are oriented towards exports will probably need to make increasing use of such agreements with companies in the industrialized countries, since the penetration of new markets demands products with a high technological content. This is because most countries, including those which have reduced their tariff barriers, have replaced them with non-tariff barriers (higher quality standards and strict regulations on health, safety and ecological aspects, etc.). Contractual agreements between local firms and their foreign counterparts permit the former to gain access to international channels for marketing their products.

Nevertheless, there are a number of difficulties that national firms must take into account when they seek to enter into agreements of this nature with companies from developed countries.

Firstly, it will probably be easier for Chilean companies to conclude agreements of this type with foreign firms when they involve projects that use relatively stable or mature technologies. In contrast, there are indications that they will find it more difficult to enter into associations with foreign firms when their aim is to gain access to spearhead technologies. The explanation for this is that foreign firms are more willing to share ownership and control when the technology involved in a given project is already quite widespread and therefore does not represent an essential asset for them. The analysis made in this study shows that Chilean firms do not encounter any restrictions on the procurement of the technologies which are already available on the market; consequently, in this case there are no clear advantages in associating themselves with foreign firms.

Secondly, while these contractual agreements offer Chilean companies broader potential advantages than those given by foreign direct investment, at the same time they involve much greater risks. Among the advantages, the biggest is that the local firm is more closely involved in the process of capital formation and has a bigger share in the profits derived from the investment. In most agreements of this type, however, the local firm assumes all or most of the risk associated with the investment projects, and the firms from the industrialized countries do not show much interest in the coherence of the initial investment decisions, in contrast with what occurs when they have equity participation in the local company.

Thirdly, these contractual agreements oblige the local firm to obtain its capital from other sources. This creates financing problems, especially for small firms, which have always found

it difficult to gain access to the capital market. This aspect was indeed mentioned by some of the representatives of small firms interviewed during the study.

Finally, government policies can play a significant role in cases where the agreements do not include equity participation. The authorities should promote contractual agreements between local and foreign firms in those sectors where the country has comparative advantages which are sustainable in the long term. Moreover, it would be advisable to select some specific international industrial linkage mechanisms in order to promote the establishment of a home-grown technological base which would permit the future incorporation of larger-scale technological innovations and thus gradually reduce the technological dependence of the country.

Annex

STAGES IN THE EXPORT PROCESS

1. *Information:*

- Contacts with potential buyers.
- Determination of the needs of potential buyers.
- Studies within the company: technical investigations (technological feasibility as regards quality, quantity, etc.) and economic studies (feasibility of delivery dates, credits, etc.)
- Investments needed to adapt the company's technology.
- Prototypes, samples, etc.

2. *Penetration:*

- Initial exports and their respective quality certification.
- Concentration of efforts on lines of production, with assignment of functions; search for secure supplies of inputs in order to be able to meet the requirements.
- Growth of exports, but not yet in accordance with an orderly plan.
- Search for smooth and flexible marketing channels.

3. *Stabilization:*

- Exports now on a more or less regular basis, with some adjustments in the production technology.
- Concern to optimize the production process (balancing lines, eliminating bottlenecks, effecting time studies, etc.).
- Stabilization of distribution channels.
- Security of supply of raw materials.
- Initiation of a search for new markets for products.

4. *Consolidation and expansion:*

- Growing exports aimed at increasing the market share.
- Penetration of new markets.
- Only a limited number of innovations needed in the production process.
- Increased bargaining power *vis-à-vis* intermediaries.

Bibliography

- Aninat, Eduardo (1990): "Investment opportunities in Chile: results from a survey of projects 1990-95", paper presented at the seminar on investment opportunities in Chile, Santiago, Chile, March, *mimeo*.
- ECLAC (Economic Commission for Latin America and the Caribbean) (1991a): *Inversión extranjera y empresas transnacionales en la economía de Chile (1974-1989). El papel del capital extranjero y la estrategia nacional de desarrollo*, "Estudios e informes de la CEPAL" series, No. 86 (LC/G. 1678-P), Santiago, Chile (in the press).
- (1991b): *Inversión extranjera y empresas transnacionales en la economía de Chile (1984-1989). Proyectos de inversión y estrategias de las empresas transnacionales*, "Estudios e informes de la CEPAL" series, No. 85 (LC/G. 1677), Santiago, Chile (in the press).
- CINDA (1989): *Contratación de tecnología*, Manuales de investigación y desarrollo, No. 9, Santiago, Chile.
- CORFO (1987): *Diagnóstico del sector químico*, Santiago, Chile.
- Huss, Torben (1991): "Transfer of technology: the case of the Chile Foundation", *CEPAL Review*, No. 43 (LC/G.1654-P), Santiago, Chile, April.
- Mizala, Alejandra (1991): "Cooperación industrial entre países desarrollados y en desarrollo: un estudio de caso en Chile", Santiago, Chile, *mimeo*.
- Oman, Charles (1989): *New Forms of Investment in Developing Country Industries: Mining, Petrochemicals, Automobiles, Textiles, Food*, Paris, Organization for Economic Co-operation and Development (OECD).
- República de Chile (1987): *Estatuto de la inversión extranjera*, Decreto Ley No. 600, Santiago, Chile.
- Rozas, Patricio (1991): "Inversión extranjera y empresas transnacionales en la economía de Chile, 1984-1989", Joint ECLAC/CTC Unit on Transnational Corporations, Santiago, Chile, *mimeo*, February.