



INTER-AMERICAN DEVELOPMENT BANK  
BANCO INTERAMERICANO DE DESARROLLO  
LATIN AMERICAN RESEARCH NETWORK  
RED DE CENTROS DE INVESTIGACIÓN  
RESEARCH NETWORK WORKING PAPER #R-552

**THE EMERGENCE OF NEW SUCCESSFUL  
EXPORT ACTIVITIES IN LATIN AMERICA:  
THE CASE OF CHILE**

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FEBRUARY 2009

**Cataloging-in-Publication data provided by the  
Inter-American Development Bank  
Felipe Herrera Library**

Agosin, Manuel.

The emergence of new successful export activities in Latin America : the case of Chile /  
by Manuel R. Agosin, Claudio Bravo-Ortega.

p. cm. (Research Network Working Papers ; R-552)

Includes bibliographical references.

1. Exports--Chile. 2. Wine industry--Chile. 3. Pork industry and trade--Chile. 4. Blueberry  
industry--Chile. I. Bravo-Ortega, Claudio. II. Inter-American Development Bank. Research  
Dept. III. Latin American Research Network. IV. Series.

HF3416.5 .A445 2009  
338.0983 A445-----dc22

©2009

Inter-American Development Bank  
1300 New York Avenue, N.W.

Washington, DC 20577

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## Abstract\*

This paper surveys overall export growth in Chile and focuses on three case studies of the emergence of successful export activities in Chile: wine, pork and blueberries. Each case study discusses how companies, associations, and governments at various levels have addressed market failures and facilitated the provision of public goods necessary for each activity. The case studies additionally profile first movers in each activity and describe the positive externalities they provide to imitators, particularly diffusion of export knowledge. Also included are counterfactual cases of a less successful firm or activity (an unsuccessful wine exporter, other types of berries, and commodity pork production rather than custom cuts, respectively) and a discussion of policy implications.

**Key words:** Exports, Agriculture, Chile

**JEL Classifications:** H41, L26, L65, L84, Q13

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\* This paper was undertaken as part of the Latin American and Caribbean Research Network project “The Emergence of New Successful Export Activities in Latin America.” Department of Economics, Universidad de Chile. The authors are grateful to Isabel Poblete and Alvaro García for excellent research assistance. They are also very grateful to all those people in the firms and business associations who generously shared their time and knowledge, including Eduardo Agosin, Tomás Campos, Miguel Canala-Echeverría, Elena Carretero, Plutarco Dinamarca, Jorge Gutiérrez, Felipe Juillerat, John Luer, Andrés Luna, Marcial Mena, Víctor Moller, Pablo Morandé, Jorge Rozas, Alex Sawadi, and Carlos Serrano. Juan Eduardo Chackiel, of the Central Bank of Chile, kindly provided detailed data on exports at the product level. The authors also benefited from the comments made by participants in the seminars of the Department of Economics and the Central Bank of Chile. Jorge Katz was kind enough to read through a draft of the paper and provided very useful written comments.

## 1. Introduction

The discovery of new export opportunities has been an important trait of economic growth and development in Chile since the mid-1970s (Agosin, 1999; Meller, 1994; and Meller and Sáez, 1995). An additional aspect that makes Chile an interesting case study is that these opportunities have arisen almost entirely in segments of the food and forestry sectors.<sup>1</sup> This marks a clear distinction between Chile and the Asian countries, whose export growth has been driven by the creation of new comparative advantages in the manufacturing sector. In fact, manufacturing has been practically absent from the Chilean process.

Chile is interesting because of the diversity of cases of export growth and the variety of the likely causes for their success. Some important factors that have been identified in the national literature are: trade liberalization; strong exchange rate depreciation following the military coup of 1974; subsidies to specific sectors (especially forestry); the entrepreneurial activity of the state (through a semi-public venture-capital-cum-research and development (R&D) undertaking, Fundación Chile); state-sponsored accumulation of factors of production indispensable for the development of specific sectors (agricultural and forestry sciences); and the encouragement of foreign direct investment (FDI) in specific sectors where the country had undeveloped potential comparative advantage (through debt-equity swaps in the mid to late 1980s, which favored investment in pulp and paper). Exchange rate volatility and longish swings in periods of depreciation (1974-77, 1982-89, and 1997-2003) and appreciation (1977-81, 1991-1997, and 2004 to the present) have also left their mark, not always favorable, on export growth and diversification (Agosin and Ffrench-Davis, 1995; Ffrench-Davis, 1979; Ffrench-Davis and Sáez, 1995).

After a brief review of the importance of non-mineral exports in growth, the paper will concentrate on the exports of three product groups and the factors that have influenced export growth at the sector and firm levels. These products are wine, blueberries, and pork meat. We will also discuss the fruit sector in general, because it is easier to understand the success in exporting blueberries as part of the progressive diversification of fruit exports than if it is treated as a stand-alone case. Wine and pork, by contrast, do not have antecedents the way blueberries do.

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<sup>1</sup> These include wood products, pulp and paper, fruits and vegetables, fishmeal, other ocean products, cultivated salmon, pork meat, poultry, milk products, and wine.

Wine, a product that began to be exported in significant volumes in the mid-1980s, is now a major industry, exporting close to US\$1 billion. Over time, Chilean exporters have travelled the distance from bulk, commodity wine to product differentiation in the segment of “good value for money;” now the effort is to consolidate at least part of the industry in the segment of premium wines, where monopolistic competition is fierce and product differentiation is essential for success.

The second product is blueberries, which emerged as an important export in the mid-1990s. Blueberries are more commodity-like than wine. Chilean exports have gone from nothing in the early 1990s to more than US\$100 million at present. The third product is pork meat. During the course of our preliminary research, we discovered that Chile had become an important exporter of this product. Although it is largely a commodity, export success has come precisely because the main Chilean producer has been able to place its product in a market segment commanding higher prices. Pork meat exports were less than US\$6 million in 1996, and most of these exports went to South American markets, which are less demanding in terms of quality than those of the developed countries. All of the growth since then has been accounted for by exports to non-regional markets, particularly Japan and Korea. The three leading firms, including a Japanese multinational, account for three-quarters of total exports, which now exceed US\$300 million.

The importance of these three products in non-copper exports is shown in Figure 1. Starting from negligible (pork, blueberries) or very small amounts (wine), all three have exhibited strong gains over the 1990-2005 period, although wine has seen its share decline during the current decade. Although this may indicate that the exports of other products have simply expanded more rapidly, it may also signal the need for innovation in order to continue to expand at the torrid rates of the 1990s. Interviews with exporters revealed that the industry may indeed be at that kind of crossroad. (See the Annex for a list of firms and individuals interviewed.)

In the analysis of these three products, we will focus on the following questions:

- (1) What led the pioneer to enter the industry?
- (2) Was the basic factor driving new exports the effort to discover costs or the discovery of demand?
- (3) How did export production diffuse from the pioneer to followers?

- (4) Did followers cause prices to decline in destination markets, thus dissipating the rents garnered by the leaders?
- (5) Was leadership in exporting associated with foreign investors who have specific product knowledge related to technology, marketing requirements, or access to markets? Or were foreign investors followers rather than leaders?
- (6) What was the role of the state in fostering export diversification? With regard to state support:
  - (a) Did the state deal at all with the fact that the social returns to pioneers may have been superior to their private returns?
  - (b) Did the state provide the public goods necessary for export discovery and consolidation? These include infrastructure, market opening through the negotiation of free trade agreements, country image, and, in the case of food exports, the protection of the country's animal and phytosanitary assets. Quality control also fits in this category. Poor quality exports by one producer will have negative externalities on other Chilean exporters.
  - (c) There are other private services that are subject to returns to scale that require their centralized provision if costs are to be low enough for individual producers to have access to them. This refers to information and technical assistance in meeting sanitary and phytosanitary norms (SPN) in importing markets, generic export promotion for certain kinds of Chilean products, and support for technology adoption, diffusion, or innovation. In the absence of a centralized effort to provide such services, individual firms will find it difficult or not impossible to export.<sup>2</sup>
  - (d) Was there an effort to solve the coordination problem when key non-traded inputs were necessary to make exports possible? This refers in particular to human resources and the availability of credit for innovators.
- (7) If the state did not perform these tasks, did other institutions do so, for example, business associations?

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<sup>2</sup> The exceptions are, of course, firms whose exports are large enough to justify the sunk costs involved.

## **2. Exports and Growth in Chile**

### ***2.1 The Analytics of Export-led Growth***

Most approaches to economic growth and development do not distinguish between exports and non-exporting production. In practically all growth models, be they neo-Keynesian, neoclassical, or of the endogenous growth variety, the central variables explaining growth are the investment rate and technological progress. Those who advocate a key role for exports have an empirical problem: because exports are part of gross domestic product (GDP), and sometimes a rather large part, rapid increases in exports have an automatic impact on the rate of growth of GDP, without there being any particular causal relationship involved.

Is there, however, something special about exports? If there were indigenous sources of productivity growth, probably not. But this is not the case in small, open, and industrially backward economies, where export growth and diversification are important for two reasons. First, in the absence of home-grown sources of technological change, domestic markets are small and unable to support, from the demand side, a sustained increase in GDP. Without technical change, any growth impulse that has its origin in domestic demand must have a tendency to exhaust itself, the sooner the smaller the economy. Activities with significant economies of scales are limited by the size of the domestic market. By contrast, for a small country, international markets are very large, and, usually, do not present constraints to growth from the demand side.

The second reason for small and backward economies to be unable to experience fast growth without being oriented toward export markets is that a large part of these economies' technical change is embodied in capital equipment imported from the advanced countries. And rapidly growing imports of new machinery are unsustainable in the long run without vigorous export growth, which in turn is difficult without diversification of the export basket.

If exports are indeed special, successful growth performance might require policies that stimulate the increase and diversification of exports. It would become important to support the growth process through policies that correct market failures impeding export diversification; also, given that developing countries are far from the technological frontier, under some circumstances policy might need to be oriented to the support of "infant exporting sectors."

A recent literature has found that export diversification is a powerful contributor to growth. One of the authors of this paper finds that export diversification has considerable explanatory power in a cross-country empirical model of per capita income growth (Agosin, 2007). Other recent

studies have found that countries that export products that are normally exported by countries with greater income per capita tend to grow more rapidly (Rodrik, 2006; Hausmann, Hwang, and Rodrik, 2006). New exports have important externalities: they reveal costs (Hausmann and Rodrik, 2003) or demand (Vettas, 2000) *within* a particular sector; and they also allow *other* sectors with potential comparative advantage to emerge (Hausmann and Rodrik, 2006; Hausmann and Klinger, 2006). This is largely because sectors related to those that are opened by a new exporter tend to use similar public goods or non-tradable inputs.

What is the specific market failure that should prompt policymakers to target new exports? In an influential paper, Hausmann and Rodrik (HR, 2003) link discoveries of new export products and market failures. In their model, factor endowments broadly explain patterns of production; however, the production of individual goods is subject to unknown production technology and experimentation, making profitable activities in particular sectors unknown *a priori*. Once an entrepreneur has discovered a profitable product and its production technology, others can imitate him, free riding on his experimentation costs. In some instances, the entrance of these new entrepreneurs will cause international prices to fall and will drive down the profits of the initial investor. If the pioneer expects this to happen, he will have an additional disincentive to invest in the potential discovery.

Even if prices do not decline as a result of imitation, left to their own devices, private agents will under-invest in new export products, because the high likelihood of imitation where discoveries cannot be patented implies that those who do not make the investment in information can do just as well as those who make the investment. Therefore, there will be an incentive to wait and observe what first movers do and the costs that they effectively discover.

In addition, some producers, particularly small ones that are likely to invest in the gathering of information about export opportunities, may face liquidity constraints. If these investments have social returns that are greater than private ones, relieving the liquidity constraint may have positive impacts on welfare and growth.

Liquidity constraints are one manifestation of the coordination problem. There may be others: the absence of infrastructure, labor skills, processing facilities, or public goods that are sector-specific.

There may be other reasons why there is under-investment in experimentation. Vettas (2000) suggests that one source of uncertainty is that demand is unknown and must be



discovered. In his model, foreign demand is endogenous and depends on past sales. Due to two types of externalities – the firm’s learning and cultivation of the market – the level of entry in the industry tends to be too low. As in the HR model, there are other firms that free ride on the first mover’s investment. This means that the pioneer, while incurring the costs of opening up a new market, is unable to reap all the benefits of her investment.

In the case of Chilean blueberries, as HR’s hypothesis suggests, the basic uncertainty was about technology and costs. The demand was there: prices in the off-season in North America were high, and blueberries from different countries are virtually indistinguishable. In wine and pork, however, Vettas’ hypothesis appears to account for the observed behavior of exports, because the basic uncertainty had to do with whether there would be demand for wine and pork meat such that they could be profitably produced in Chile. Both of these products had a long history of production in Chile, but they were exported in very small volumes and basically to other Latin American countries.

Chilean wine production had to be adapted to international tastes, and the technology used in the major winemaking nations had to be imported in order to meet customer demand in target markets. Once demand was discovered (or created), many producers jumped on the bandwagon, often using the same marketing channels as the pioneers. Because the pioneers were large firms, they did not face liquidity constraints. But the followers were generally smaller niche producers, who were liquidity-constrained in meeting the large sunk costs of gathering information about and penetrating foreign markets. Associations of independent producers, partially fostered by the government, were instrumental in allowing these smaller firms to enter export markets.

With regard to pork, Chilean producers had to learn to produce pork meat to the specifications of consumer tastes in importing countries (Japan and Korea). This was initially accomplished by association with a large Japanese trading company. Diffusion has been much slower than in the case of wine because of the large capital requirements involved.

## ***2.2. Exports and Growth in Chile, 1975 to the Present***

The stylized facts of the growth process in Chile can best be understood by dividing the period since 1960 into three subperiods: (1) 1960-73, marked by import substitution and the dominance of

copper; (2) 1974-89, when pro-market reforms were introduced by the military government; and (3) 1990-2005, the period under democracy and with more pragmatism in economic and social policy.

Since 1974, export growth has led GDP growth (see Table 1 and Figure 2).<sup>3</sup> This was due partly to import liberalization and the attendant real depreciation of the currency, albeit with significant ups and downs (Figure 3). Tariffs were reduced from an average of about 100 percent (with large dispersion) to a flat rate of 10 percent in 1979. All non-tariff measures (quotas, multiple exchange rates for different types of imports, and prior import deposits) were eliminated. Although the common tariff was raised to 35 percent as a consequence of the 1982-83 crisis, it was subsequently lowered gradually but consistently. It now stands at 6 percent; the effective tariff, however, is even lower, perhaps half that figure, owing to the large number of free trade agreements that Chile has entered since the mid-1990s.

Since the early 1970s, the degree of openness of the Chilean economy has increased dramatically (Figure 4). In 1970, exports of goods and services represented about 15 percent of GDP (current prices). This proportion has increased consistently to almost double that proportion at present. Growth in the share of non-mineral exports has also increased significantly. It was less than 15 percent in 1960; it is now more than 50 percent.<sup>4</sup>

Not only have exports grown, they have also diversified: in 1963, Chile had exports in 238 sectors (four-digit SITC level); in 2000, the number of sectors had risen to 494. In a sense, one of the objectives of the trade liberalization policies can be said to have been achieved: exports have effectively replaced import substitution as the engine of growth. In the process, large patches of the manufacturing sector (e.g., textiles, shoes, machine tools) disappeared, but other sectors eventually emerged, mainly oriented toward external markets.

At the product level, we investigated the pattern of export discoveries and deaths over time using Feenstra's standardization of the COMTRADE database, which yields consistent export statistics at the four-digit SITC level for the period 1962-2000.<sup>5</sup> We consider as a discovery in a particular year those exports that, from that time onward, have permanently

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<sup>3</sup> For evidence that in Chile exports cause growth rather than the other way around, see Agosin (1999).

<sup>4</sup> All ratios are expressed in 1996 prices. This makes the annual figures comparable and abstracts from the effects of the huge fluctuations in copper prices.

<sup>5</sup> We tried to use COMTRADE for more recent years, but unfortunately there were incompatibilities in both classifications. See Feenstra et al. (2005).

surpassed a threshold of one million dollars in 2000 prices<sup>6</sup> and that were initially below that threshold. Figure 5 shows the number of discoveries for each year, and the number over each bar represents the average number of years that it took the product to mature, defined as the number of years between the first year the product entered the database<sup>7</sup> and the year in which it surpassed the US\$1 million threshold.

During the 1960s, there were almost no discoveries, whereas, once the liberalization process had been initiated in the second half of the 1970s, and the real exchange rate had experienced a steep depreciation, there was a significant increase in the number of discoveries. Again, during the crisis of the first half of the 1980s, discoveries go back down to nothing. Most of the discoveries are concentrated in the second half of the 1980s and the first half of the 1990s. During this period, the peso suffered an important real depreciation that ended at the beginning of the 1990s. It is interesting that the subsequent appreciation was followed with a lag by a fall in the number of discoveries. These begin to grow again after a new bout of depreciation beginning in 1997.

Table 2 shows the share of non-mining exports accounted for by export discoveries over the period 1960-2000, based on Feenstra's database. The share goes from nothing in the 1960s to 34 percent in 2000, a sizable proportion. Moreover, there appear to be two years during which large jumps took place: one is in 1984, when the share went from 9.6 to 26.2 percent; the other in 1989, with a jump from 24.3 to 30.9 percent. We do not really know why there was a jump in these two years. It could be that discoveries could begin to make a quantitatively important contribution to export earnings only after the economy had settled down following the tumultuous period of the 1970s and early 1980s (trade liberalization, seesaws in economic policy, ending with the banking and balance-of-payments crisis of 1982). The real exchange rate depreciated dramatically after the 1982 crisis and the currency remained weak for the rest of the decade. It is interesting that the contribution of discoveries to non-mineral export earnings pretty much stagnated during the 1990s, when the evolution of the real exchange rate again became unfavorable to exports. Unfortunately, we do not have consistent data for more recent years, but the contribution of discoveries to export earnings may have continued to rise. For example, two

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<sup>6</sup> This is using the U.S. GDP deflator. We modify somewhat the definition of discovery used in Klinger and Lederman (2006) to fit Chilean data and experience.

<sup>7</sup> It should be noted that a commodity group enters the Feenstra database only when it surpasses US\$100,000.

of the three products that we research in detail (blueberries and pork) have experienced their most dynamic behavior during the current decade.

Figure 6 shows the number of products that constituted discoveries at some point in time (for at least two years) and then failed to maintain exports above US\$1 million (in 2000 U.S. dollars) or simply disappeared. Most of the deaths are concentrated during the 1990s and were probably associated with the sustained appreciation of the peso during 1990-97.

In order to study the determinants of discoveries and deaths, we conducted a count data analysis with the data discussed above. Table 3a shows the results of running a Poisson model on two dependent variables: gross and net discoveries. Net discoveries are gross discoveries minus deaths (i.e., exports that surpassed the US\$1 million mark and dipped below it, without ever regaining that level). The real exchange rate (RER) is a significant explanatory variable of the number of gross and net discoveries, and has a positive sign in all specifications. Tariffs, when significant, have a negative sign. This implies that higher tariffs reduce discoveries. Real non-mining export growth (Xgrowth) and real exchange volatility (RERvol, measured as the standard deviation of the real exchange rate within the year) are not significant at standard levels of confidence.

There might be an important lag between the moment in which exports of a discovery start from zero and the moment in which the volume of these exports surpasses the US\$1 million threshold. In order to test for the existence of lagged effects from the exchange rate to export discoveries, we ran the same equations reported in Table 3a but lagged the exchange rate variable five years. In this manner, we attempt to capture partially the initial conditions faced by the entrepreneur at the moment of starting her business. Table 3b reports the results. Once again, the results show that the real exchange rate is a significant variable explaining the number of discoveries.

A second question that arises when studying the pattern of new discoveries is whether they have been important for export growth. Meller et al. (1995) find that the growth of non-mining exports had a positive impact on the growth of the rest of the economy. One of the plausible explanations is the existence of externalities from non-mineral exporting sectors to the rest of the economy. Thus, it is particularly relevant whether discoveries are associated with faster growth of non-mineral exports. Table 4 shows regressions of the impact of discoveries on non-mineral export growth. Regressions 1-4 we include the following explanatory variables, one

at a time: discoveries, cumulative discoveries, net discoveries, and cumulative net discoveries, respectively. Regressions 5-8 control for the effects on non-mineral exports of the real exchange rate and the price of copper.

Regressions 1-4 show that the different measures of discoveries have a positive and significant impact on non-mineral export growth. Once we add the other controls, contemporaneous discoveries and net discoveries are no longer significant, whereas cumulative discoveries and cumulative net discoveries remain significant. Indeed, a 1 percent increase in the number of cumulative discoveries (cumulative net discoveries) increases non-mineral exports by 0.76 percentage points (0.85 percentage points). These effects are stronger than the impact of real exchange rate depreciation on non-mineral export growth. It should be remembered, however, that we have detected an effect that goes from exchange rate depreciation to discoveries. Therefore, the total effect of exchange rate depreciation could be twofold: it may lead to new discoveries and it may encourage additional exports from established exporting sectors.

In short, the real exchange rate (and also tariffs) has significant impacts on the pace of discoveries of new successful exporting sectors and on non-mineral exports generally; discoveries are important contributors to non-mineral exports. In turn, previous work has established the importance of the growth of non-mineral exports for overall economic growth.

### **3. Wine**

#### ***3.1 The Chilean Wine Industry in Historical Perspective***

Winemaking is a traditional economic activity in Chile that goes back to colonial times. However, the kinds of wines produced by Chilean winemakers up to the mid-1980s were not acceptable to consumers in developed countries, and technological change on a large scale was needed for Chilean wines to sell abroad. Although Chile had exported some wine for several decades, wine exports took off only after 1985, when exports were about US\$10 million. As already noted, the most rapid growth began after 1990.

Figure 7 shows the evolution of export values in 2000 U.S. dollars from 1962 to 2005. A relatively steady level of exports has grown slowly since the 1960s and peaks at the beginning of the 1980s, in the midst of a crisis in the industry. After that, exports decline significantly until they begin a remarkable turnaround in the second half of the 1980s and consolidate their upward movement during the 1990s. The rate of growth of exports has slackened considerably during the

current decade, as the industry matures and needs to innovate in order to improve quality, consolidate itself in higher-price segments of the market, and reach new consumers.

Wine prices have been very volatile. With the data in 2000 U.S. dollars and export quantities, we were able to construct a unit value index (Figure 8). During the wine export surge of the 1990s, wine prices faced by Chilean exporters (relative to the U.S. GDP deflator) rose by about 55 percent. Since then, prices have tended to fall, with some recovery since 2003. In the main, prices reflect trends in the world market, of which Chile is a small supplier (about 4 percent of world imports). The rise in prices during the 1990s could have been the result of the successful efforts by Chilean vineyards to position themselves in higher-price segments of the market and to substitute bottled wine with denomination of origin for bulk wine bottled in the importing country.

The main foreign markets for Chilean wine correspond roughly to the geographic distribution of wine consumption. The main destination is the European Union (EU, excluding the United Kingdom), which takes 38 percent of exports, followed by the United Kingdom with 19 percent, and the United States with about 17 percent. Latin America accounts for 7 percent of exports. There was a steady increase in the number of destinations, which peaked in 2003, reaching more than 100 countries.

The climate of Chile's Central Valley, with its cold and rainy winters and hot and dry summers, is ideally suited to wine production. Wine production in Chile also benefits from the country's natural isolation: its western border is the Pacific Ocean, and, to the east, it is protected by the Andean mountain range. This gives Chilean winemaking excellent phytosanitary conditions, avoiding the diseases that can be fatal to vines. For example, during the late 19<sup>th</sup> century, Chile was the only winemaking country in the world free of phylloxera, a plague that decimated the European wine industry.

The art of winemaking in Chile dates back to the sixteenth century. Lore tells us that it was the priest Francisco de Carabantes who brought the first vines to the country in order to produce wine for the celebration of Mass. Due to favorable climate, the cultivation of grapes grew rapidly in the central region of Chile. During the following three centuries, winemaking used rudimentary techniques and Spanish grape varieties. In the middle of the nineteenth century, there was a substantial change, with by the introduction of French varieties. Grapes such

as Cabernet Sauvignon, Merlot, Sauvignon Blanc, etc. were introduced and since then have constituted the bulk of Chilean wine production.

During the nineteenth century, several entrepreneurs, some of them linked to the exploitation of minerals, started growing vines. They developed a reputation in this activity and high social status. These entrepreneurs were also responsible for developing a wide network of irrigation channels that shaped winemaking in the central valleys of Chile.

At the beginning of the twentieth century, the introduction of an alcohol tax discouraged the development of the sector. By 1938, the area planted to vines was frozen by the government; in addition, the authorities prohibited the use of table grapes for winemaking. These regulations caused the industry to stagnate, a situation that lasted until the mid-1970s. During this entire period, there was little or no technical change in the industry, due mainly to the restrictions imposed on the sector by official policy. Import substitution policies and the resulting overvaluation of the peso also contributed to an orientation toward the domestic market and the complete neglect of exporting.

According to Bordeu (1995), as a consequence of the sector's stagnation, the quality and types of wines produced in Chile fell significantly behind the evolution of international demand, which emphasized lighter wines. Exports were largely restricted to markets in which wine quality was not important (e.g., other Latin American countries). The great advantage of Chilean wine was its cost and the absence of serious competition in these markets, which also applied high import duties to wines produced beyond the region.<sup>8</sup> During this period, white wines were oxidized and red wines were aged excessively in large oak barrels, conforming to Chilean tastes but deviating significantly from the lighter wines being demanded in developed countries. These characteristics of supply increased the difficulties faced by Chilean wines to gain access to international markets.

### ***3.2 Innovation and the Export Drive***

In 1974, the law that restricted the planting of vines was derogated, even with the opposition of some winemakers, who argued that the law was needed to discourage alcoholism. In 1979, a modification of the law allowed the production of wine from table grapes and grapes rejected for the export market. These changes allowed producers to renew planting and incorporate new

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<sup>8</sup> Since the early 1960s, Chile has participated in regional trade preference schemes.

technology, even in the face of increasing competition from substitutes such as beer, pisco,<sup>9</sup> and sodas, which had made enormous gains in the market for beverages.

Thus, by the beginning of the 1980s, new vines, planted after 1974, were entering production despite the fact that total area planted had declined. In this manner, the yield per hectare increased by the replacement of old, low-yield vines. Furthermore, the industry went through a process of inverted creative destruction<sup>10</sup> as a consequence of the crisis created by the easing of previous restrictions and the erosion of its position in the domestic beverage market. These developments made producers begin to understand that they had to orient their output to international markets. The sharp real depreciation of the Chilean peso that ensued as trade was rapidly liberalized after 1974 also encouraged producers to look toward export markets.

Led by Viña Cánepa, a traditional Chilean winery, and Miguel Torres, a Spanish firm that set up Chilean production facilities in 1981, one of the early technological changes introduced in the industry was the use of stainless steel vats in place of wooden vats. Almost at the same time, Miguel Torres introduced the use of small (220-liter) oak barrels, already in use nearly everywhere else, to replace the old 4,000-liter “fudres” in which all Chilean red wines were kept. These two innovations revolutionized the industry and raised the quality of Chilean wine, at a time when the industry was redirecting its production to international markets. The exemplary role of the success enjoyed by Viña Miguel Torres in exporting high-quality wine moved other firms to seek to enter the export market.

### *3.2.1 The Stainless Steel Revolution*

In 1980, Viña Cánepa, was the first Chilean-owned vineyard to introduce the use of stainless steel vats, by importing Vallefondri vats from the United States. These vats were very robust, having a thickness of 4-6 mm; today vats are built with better technology and are just 2-3 mm thick. Cánepa bought vats of 50,000, 80,000, 100,000, and 200,000 liters. This huge investment was undertaken at a time when the peso was appreciating in real terms, and the dollar had been fixed at a price of 39 pesos. In what would become the undoing of the firm later, the investment was financed with foreign credit. Don Pepe Cánepa was the son of an Italian immigrant who kept close contact with the wine industry in Italy, from where he had gotten the idea of introducing this kind of vat.

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<sup>9</sup> A high-alcohol liquor made from grapes.

<sup>10</sup> We say “inverted” because the crisis triggered innovation and not the other way around.



Because the vats were bought in parts and pieces, assembly was needed. In 1980, there was no experience in stainless steel welding, so Vallefondri sent an expert to Chile who could train some workers in the task. The firm in charge of the assembly was Marmevit, which had been created by a former production manager of Viña Santa Rita who realized the need for well-trained maintenance teams and equipment suppliers in the industry. Thus, Marmevit learned how to assemble imported vats and carried out the task during 1981. Soon afterward, it started to produce small vats and assisted in the assembly of larger imported vats for other vineyards.

Almost at the same time, Miguel Torres was also importing stainless steel vats, and had the problem that nobody in Chile knew how to assemble them. The firm had to rely on the technical support of the vats' provider, Herpa SA, from Spain, who also trained some Chileans in the assembly work.

By 1983, Marmevit and Herpa workers assembled a new lot of vats for Miguel Torres. Then Marmevit followed with the assembly of vats for Viña Santa Rita during 1986-87 and for other vineyards, such as Concha y Toro. Concha y Toro also began importing Staineker vats by the mid-1980s. During this period, Marmevit started sending workers to train in Spain.

In 1994, Marmevit and Herpa S.A. created a joint venture, Herpa Chile, with the objective of selling Herpa vats, while retaining the assembly work of Marmevit. This joint venture soon fell apart due to management problems, whereas Marmevit kept assembling and importing Herpa equipment on its own. By 1999, Marmevit had decided to import from Spain only the cooling system for the vats, which could not be produced economically in Chile.

The introduction of stainless steel vats, an apparently minor innovation, allowed producers to bring the quality and taste of Chilean wines up to international standards. These vats have some important properties that allow wine to be exported safely from a sanitary point of view. Moreover, in contrast to concrete tanks and large wood barrels, the stainless steel vats do not retain wine residues that can affect the taste and smell of the wines the following season. Finally, steel vats allow the producer to control the temperature of the wine during the process of fermentation, which is fundamental when producing a good quality wine.

At the same time as the stainless steel revolution, there was another important change in the industry: the emergence of the production line in the first half of the 1980s. Before the introduction of the production line, bottling and corking were not standardized; in spite of the fact that all bottles contained three-quarters of a liter, bottles were reutilized and had different

shapes. By the beginning of the 1980s, through business associations, bottle characteristics were made uniform, bottle recycling was eliminated – and with it all the problems of untoward smells that cling to bottles that were used to store other products, including kerosene – and the modern production line became the industry norm.

### 3.2.2 *Other Technical Improvements*

Benavente (2006) has documented the fact that, until the 1990s, most of the industry's innovations were transferred from abroad rather than the result of R&D activities by Chilean firms. Since then, innovation in the Chilean wine industry has evolved along several different lines. The first channel, “learning by looking,” consisted of foreign travel at harvest time by Chilean oenologists and viticulturists to the international centers of winemaking, mainly France and the United States. Indeed, today it is not rare for a young oenologist to make his first vintage in Chile after having participated in a few abroad. Some of the expenses of this travel abroad were originally defrayed by government development agencies.

The second channel was the participation of foreign oenologists in the Chilean harvest season. Some of them were sent to Chile by supermarket chains and distribution channels. In this manner, a direct exchange of experiences was produced between the main actors in wine production, the oenologists. Since then, traditional channels, such as participation in professional congresses, international wine fairs, courses, and seminars, have become routine activities for Chilean winemakers.

As will be discussed below, during the 1990s, there was growing cooperation between Chilean and international winemakers. In addition, since the mid-1990s, there has been remarkable growth in the area planted, to the levels existing at the beginning of the twentieth century. Table 5 shows the evolution of the area planted by type of grape. It can be noted that the area planted to *cepa país* (the most ordinary type of grape) has remained stable, whereas other varieties have grown remarkably: by factors of 50 (cabernet franc), 6 (carmenère), and 4 (cabernet sauvignon).<sup>11</sup>

But technology transfers have not been circumscribed to the vineyard level. To improve fruit quality, wine producers have transferred newly acquired knowledge to grape growers. It is now a common practice that business contracts specify handling procedures, irrigation systems,

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<sup>11</sup> It is interesting to note that carmenère is a variety that disappeared from France during the phylloxera crisis and now is planted only in Chile. Rootstocks had been taken prior to the onslaught of the disease in France.

and performance indicators such as yield per hectare. Wine producers also offer technical assistance in the field. The Chilean Development Corporation (Corporación de Fomento de la Producción, CORFO) has a subsidized technical assistance program for the development of suppliers (Programa de Desarrollo de Proveedores, PDP) that has been used extensively by winemakers to improve the quality of grapes produced by external suppliers.

Some firms have stated that an important factor promoting wine exports from the mid-1980s until the mid-1990s was the recession and the strong depreciation of the peso (resulting from the financial and balance-of-payments crises of 1982-83), which allowed producers to purchase at very low prices land that was suitable for the production of wine. The growth of the industry has also been linked to the discovery and bringing into production of land in new valleys devoted to growing grapes for winemaking (such as Casablanca by Viña Morandé and Apalta by Viña Montes).

Last but not least, a factor explaining the growth of wine production and exports was the evolution of world demand for wine during the 1980s and 1990s. According to Vergara (2001), during the second half of the 1980s, Chilean exports focused on the U.S. market. This market shifted from demanding mainly European products, in which the denomination of origin was fundamental, toward producers that offered varieties utilizing modern production processes (and yielding lighter wines). By the end of the 1980s, Chilean producers intensified their efforts to export to Europe.

### ***3.3 First Mover and Market Leader: Two Different Actors***

#### ***3.3.1 The First Mover***

The Spanish vineyard Miguel Torres was the first mover in starting the new stage of wine exporting activities in Chile. This is both because this firm was the first to introduce new technology and because of its export orientation. Miguel Torres started selling wine in 1870, although the Torres family had been producing wines for about two centuries before then. Today, Miguel Torres is a winemaker with an international reputation known for producing high-quality wines and brandies.

During the 1970s, Miguel Torres, one of the descendants of the original family, went to France to study. While there, he befriended Alejandro Parot, a Chilean who convinced him that the central valley of Chile presented good investment opportunities in the wine industry. It was a

region with the right climate and conditions, was free from phylloxera, and had a longstanding winemaking tradition, albeit one that had remained behind modern production and consumption trends. Thus, in 1979, Miguel Torres made its first investment in Chile, buying the Maquehua farm, comprising 90 hectares suitable for the production of high-quality Merlot and Cabernet Sauvignon. Since then, Miguel Torres has bought four other “fundos” apt for the production of other grape varieties. These investments were fully funded by Miguel Torres from retained earnings. Indeed, an important characteristic of Viña Miguel Torres is that it reinvests 95 percent of its profits and does not rely on outside finance.

Miguel Torres introduced in Chile stainless steel vats together with smaller, 220-liter oak barrels. These changes allowed the firm to produce a wine with international characteristics in Chile. A fundamental element in the launching of Torres’ new products was the presence of a leading oenologist from Spain, a tradition that continues today. This was very important because this oenologist knew the characteristics of international demand and made a Chilean wine to those specifications.

In the first stage, Miguel Torres was oriented to the domestic market, but by the mid-1980s it started to export. In Chile, Torres concentrated on the production of premium quality wines using its brand recognition. The firm did not require a lower-end product for international markets, because it already had one. The output from the Chilean vineyard was marketed abroad through the distribution channels that Miguel Torres already had in its main markets. Thanks to this advantage, Miguel Torres became the first Chilean producer to export premium wines, an initiative that Concha y Toro imitated in 1988.

Thus, from the early to mid-1980s, Chilean firms witnessed the introduction of new winemaking technology, the production of wine of much higher quality, and the success of a foreign firm in exporting high-quality Chilean wine. This natural experiment, a pull factor, and the crisis that afflicted the sector at that time, the push factor, were the main determinants of the transformation of the Chilean wine industry.

We must clarify that there was no government intervention whatsoever in the investment decision and further development of Miguel Torres. Only recently has the firm received government funds to develop irrigation canals and improve the quality of their input providers.

We consider Miguel Torres to be the first mover and pioneer of Chilean wine exports. Although both Miguel Torres and Cánepa introduced the new technologies at about the same

time, it was Miguel Torres that became the reference point for other Chilean winemakers. Miguel Torres succeeded in launching exports and producing a new wine to international specifications for both export and the domestic market, whereas Viña Cánepa got caught up in the financial crisis that affected the Chilean economy in the early 1980s. Moreover, after the death of one its owners, the company suffered from some managerial problems, which led to the vineyard being split into Cánepa and Terramater. Today, Miguel Torres is a leader in the domestic market and its exports reached almost US\$10 million in 2005, whereas Cánepa's businesses have languished, with exports of about US\$5 million in 2005.<sup>12</sup>

### 3.3.2 *The National Leader*

Soon after the first signs of success by Miguel Torres, the larger and traditional Chilean winemakers started redirecting their efforts toward the export market. The most outstanding imitator was Concha y Toro, a winery that had started production in 1883, when it was founded by Marquis Don Melchor de Concha y Toro. The firm went public in 1933; that same year, it shipped its first exports to the Netherlands.

From that time until the second half of the 1980s, the level of exports grew at a slow pace. An important event took place in 1965 with the release of what was then a premium wine: Casillero del Diablo. However, exports did not take off until much later.

The technological renewal of the production process at Concha y Toro was symbolized with the release in 1987 of what is likely to be the best and most famous Chilean wine, the super premium Don Melchor. In 1986, Concha y Toro sent samples of Don Melchor for quality testing to Bordeaux; the feedback was that there was great potential in the wines of the company's Puente Alto vineyard. The firm released the wine the following year.

In 1988, Concha y Toro signed an agreement with one of the largest distribution chains in the United States, Banfi. This led to significant export growth for Concha y Toro and, as Chilean wines gained recognition abroad, for the rest of the industry. During the 1990s, Concha y Toro increased significantly its exports to Europe. Today the vineyard's total exports are about US\$215 million, and the firm's stock market value is close to US\$1,150 million.

With respect to funding, Concha y Toro follows the strategy of reinvesting 60 percent of its profits. In 1994, the company issued ADRs on the New York Stock Exchange, becoming the

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<sup>12</sup> It should be noted that Miguel Torres is an international company and its Chilean operation is a relatively small component of its total business.

first wine producer to be listed through that mechanism. Concha y Toro has also had recourse to credit to finance its growth.

Until recently, Concha y Toro had not received government aid. Today, it makes use of the PDP (supplier development program), and is collaborating in a water management research project funded by the government.

### *3.3.3 Followers*

The number of exporters has grown very rapidly since the mid-1980s. In 1995, the first year for which we have export data at the firm level, there were 62 exporters, whereas in 2005 there were around 330.<sup>13</sup> The growth in the number of firms has been almost linear. In spite of the relatively large market share of Concha y Toro, Chilean wine exports exhibit a relatively low degree of concentration. Even in 1995, the Herfindahl index of export concentration was only 0.074; by 2005, it had fallen to 0.049, a level that is consistent with those found in non-concentrated industries.

There is a large array of firms participating in the industry. Some firms produce a wide variety of brands, some aimed at the low end of the market, others at more sophisticated segments. Santa Rita, Santa Carolina, and Cánepa are in this category. Other firms are small and specialize in wines that can be considered “good value for the money,” up to now the staple of Chilean wine exports (among our interviewees, Morandé, Bouchon, and Viu Manent). Others, also small, are already aiming at the premium niche of the market (Montes).

### *3.4 Foreign Investment and Strategic Marketing Alliances*

Given the natural advantages of Chilean valleys, investors, mainly from the United States and France, have centered their attention on forming joint ventures or investing directly in the country with the objective of exporting. According to the Foreign Investment Committee (the institution dealing with approval and monitoring of foreign investment), the amount invested between 1974 and 1989 did not exceed US\$4 million. Between 1990 and 1994, FDI in the industry was a paltry US\$7.3 million, whereas between 1995 and 2000, it was more than US\$100 million. Between 2000 and 2005, foreign investment was close to US\$33 million (see Figure 9). These figures are consistent with the notion that foreign investors in this industry have been

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<sup>13</sup> From interviews, we gather that the number of exporters in the 1980s was close to 60.

largely followers. With the exception of Miguel Torres, they arrived on the scene after the boom in wine exports had started.

According to Agosin, Pastén, and Vergara (2000), at the beginning of the 1990s, Kendall Jackson (United States) established Viña Calina, followed later by Cuvee Mumm (Canada), Domaine Oriental (France), Canadaigua Brands (United States), and other vineyards.

But there is a second type of foreign investment: joint ventures. These started at the end of the 1980s. Chateau Lafite Rothschild invested together with the Chilean family Eyzaguirre-Echeñique in the Los Vascos vineyard. Together with the Rabat family, Marnier Lapostolle created Casa Lapostolle. Mondavi (United States) and Viña Errázuriz set up Caliterra. Chateau Mouton Rothschild formed an alliance with Concha y Toro and created Viña Almaviva, which produces one of Chile's most expensive super premium wines.

Agosin, Pastén, and Vergara (2000) observe that joint ventures have different objectives for Chilean and foreign vintners. For foreign companies, they are part and parcel of their efforts to diversify into new product varieties in order to obtain some market power in different segments of the market. Chilean firms find that prestige and access to distribution networks are the main reasons why they decide to associate with foreign partners. The benefits for small vineyards also include access to foreign technology and markets.

In many cases, a foreign partnership gives Chilean producers not only distribution channels and market access, but also deeper knowledge about foreign demand. Indeed, frequently the foreign partner or distributor provides information about wine characteristics (color, taste, and bouquet) that is useful to position the product in a particular market segment. This information flow on demand characteristics started in the 1980s, and it continues today.

Some distributors have used an interesting market penetration technique for climbing up the quality ladder. They request from a vineyard a presence in at least two price segments, let us say a low and a high-price wine. In a first stage of market penetration, it might be important to have a "war horse" wine that has an outstanding quality-price ratio, which opens the market and creates a brand image. This seems to be a basic requirement on the side of consumers, before they even try a wine in the more expensive segment.

### ***3.5 The Role of Government Policy***

Policies or programs specifically directed at the wine industry have been rather modest. However, the industry has benefited from generic or functional promotion policies. For example, the sector took advantage of a technology-transfer program directed at the agricultural sector in general; this program was designed to create formal links between producers and government institutions such as INIA (Instituto Nacional de Investigación Agropecuaria; see Benavente, 2006).

After 1990, CORFO initiated the creation of Centers for Business Development (Centros de Desarrollo Empresarial). ChileVid, the consortium of small and medium-size wine producers oriented toward exports, was originally funded through this instrument. The other major consortium, the Chilean Wine Corporation (Asociación de Viñas de Chile, AVC), was also created with support from CORFO. As we shall see, these sector organizations have proven to be extremely important as providers of public goods that are essential for the success of the industry in the long run.

For more than 30 years, the government has had an active export-promotion agency (ProChile). Since the early 1990s, the wine industry has been an important focus of its activities. Although the volume of resources spent has not been very large, ProChile has had an important role in organizing wine tasting events abroad, promoting the image of Chile as a wine exporting country, and providing marketing information to producers. However, a major criticism of the work of ProChile has been its lack of success in establishing a strong and positive association for Chile in the minds of consumers, much as Argentina is associated with tango, good soccer, steak, etc.

CORFO's *Proyectos de Fomento* (PROFO) program in the wine industry, run jointly with AVC and ChileVid, has also had a favorable impact on the sector. PROFOs are associations of independent small and medium-scale producers for various purposes, such as technology transfer and joint foreign marketing. Sunk costs in these activities tend to be very large for small producers, which cannot internalize all of their benefits. The objective of the associations is to overcome this size limitation. According to Benavente (2006), there are 16 PROFO projects under current development in the wine industry.

A recent activity that will probably be important in the future is the sponsorship by CORFO of R&D activities that attempt to bring together business associations and universities



(INNOVA). The basic idea of these associations is the organization of a business firm jointly by universities and business associations for the purpose of conducting research that is directly beneficial to producers. The technological innovations would then be sold to member firms. AVC recently was awarded about US\$3 million for setting up such a firm with two local universities. The total assets of the firm (VINNOVA) amount to about US\$5 million. The activities involved include research on consumer tastes and various ways of improving wines (bouquet, aroma, color, presentation, and market positioning).<sup>14</sup> A similar amount has been awarded to ChileVid, which set up a firm in partnership with three universities. The results of these activities will be shared between these two R&D efforts.

### ***3.6 The Role of Industry Associations***

For the industry, today, it is clear that the wine-country image is fundamental, and that important externalities affect it, either positively or negatively. This has been taken as a lesson from foreign experiences, such as the boycott of French wines due to the nuclear tests in the Mururoa Atol, the French opposition to the Iraq war in the American market, or the poisoning of Austrian wine in the 1990s. Each of these events has had negative consequences for the producers of the affected countries and, at the same time, has been a market penetration opportunity used to good advantage by Chilean producers. In the opinion of some winemakers, the return to democracy in 1990 was a positive image change that had a favorable impact on Chilean wine exports to Europe. If one looks at the export figures, it becomes clear that exports to Europe took off only in the 1990s, although exports to the United States had begun earlier.

In the industry, there is a high level of awareness that the success of one producer has important positive spillovers for others and for the industry as a whole. This has led to more cooperation than competition. For example, it is not rare to see an oenologist from one vineyard consulting or working directly for another one. At the level of producer associations, the quality of marketing (labeling, branding, the art work on the label, names and blurbs used, etc) of individual producers is continuously evaluated and suggestions are made to producers for improvement.

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<sup>14</sup> Interview with Ms. Elena Carretero, Chief Executive of VINNOVA.

The two business associations in the wine industry, AVC and ChileVid, have been extremely important in providing public goods that are indispensable for export success. In addition, they are the main link between government policy and the industry.

The business associations have played an important role in the move of Chilean wine up the quality ladder. They have been involved in relaying to producers key information about the requirements of foreign markets (quality, labeling, types of bottles required, cork specification, and the move toward bottles that are used only once) and organizing the attendance of producers at major wine fairs in the world (trips that have been partially subsidized by ProChile and CORFO programs).<sup>15</sup>

These activities have been transferred almost entirely to a new entity created jointly by AVC and ChileVid, Wines of Chile, which is mainly in charge of marketing the concept of Chilean wine through fairs and other activities, and providing information on foreign markets. Now the efforts of the two business associations have turned toward the technological innovations that are required if the industry is to enter a new and more sophisticated level of development.

#### **4. Fruits and Vegetables**

Fruits and vegetables are particularly interesting because it would seem that, owing to the country's mild Mediterranean climate, Chile should have a comparative advantage in their production. However, the protectionist policies prevalent until the early 1970s (and their effects in appreciating the exchange rate) and the absence of appropriate human capital to develop these sectors prevented them from emerging as important contributors to the country's export basket.

The promotion of sector-specific human capital played a very important role in the discovery of these exports (Escobar and Contreras, 1995). In 1965, the Ford Foundation funded an exchange program between the University of Chile (a public university) and the University of California (Programa Chile-California) designed to allow Chilean professors and students to train in California. The program brought professors from the University of California to carry out research and establish new teaching programs at the University of Chile. Although the program was broad and covered a number of areas, it was used mostly in agricultural sciences, and

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<sup>15</sup> Interview with Mr. Jorge Gutiérrez, Vice President, ChileVid.

particularly in fruticulture.<sup>16</sup> The University of California trained more than 80 Chilean professors and technicians, and there were upward of 300 exchanges of high-level personnel between the two universities. The two campuses of the University of California where most of this activity took place were Davis and Berkeley. The program, which eventually disbursed about US\$10 million, ended in 1978 owing to the changed political environment in Chile and also a shift in Ford's funding priorities.

It should be noted that the Central Valley of Chile and California have many similarities with regard to soil and climate conditions. It had long been thought that fruit production for export could be very profitable, in particular to take advantage of the difference in seasons between the United States and Chile. Thus, the conditions were ripe for a program such as Chile-California to be very successful. Indeed, unwittingly, the program may be the first instance of a new industrial policy oriented toward creating comparative advantage in sectors where the potential for them was particularly high.

#### ***4.1 The Development of the Fruit and Vegetable Cluster***

Fresh and processed fruit and vegetables have played a key role in Chile's efforts to diversify its exports. Export efforts began back in the 1940s; however, one can talk of an export drive only beginning in the mid-1970s. The first two varieties to be exported were apples and grapes. Gradually, other varieties were included in the export mix (peaches, pears, and apricots). The commonality of these products is that they can use the same logistics and installations as the first two products. Thus, in this first stage, economies of scale were developed in these traditional fruit sectors. At the end of the 1980s and beginning of the 1990s, new varieties were introduced that are categorized by exporters as exotic or non-traditional. These include kiwis, strawberries, blueberries, avocados, and others. These varieties require different handling techniques, their own specific industrial installations, and, in some cases, a more delicate transportation process. In addition, an increasing number of firms have entered the markets for processed fruits and vegetables, such as frozen and dehydrated fruit, marmalades, canned fruits and vegetables, juices, and vegetable and fruit seeds.

Several factors explain the country's basic comparative advantage in fruits and vegetables. In the first place, its mild Mediterranean climate makes Chile ideally suited for the

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<sup>16</sup> Some oenologists also trained at the University of California at Davis under this program.

production of temperate climate fruits and vegetables. Second, Chile produces in the off-season in the Northern Hemisphere. Therefore, its output does not compete with that of domestic producers, and it can fetch higher prices. Third, its relatively isolated geography, with its two long natural borders (the Andes mountain range to the east and the Pacific Ocean to the west) endows the country with excellent phytosanitary conditions and allows it to remain free from plagues. Fourth, the length of the country's territory and the many climates along its geography that are suitable to the production of fruit crops allow its producers to supply the same products during a relatively long season. Fifth, the industry as a whole is able to supply different products to the same buyers practically throughout the year. Sixth, through sustained efforts, over time the industry has won a reputation for reliability and high-quality products.

Diversification has occurred in a variety of ways. Some of the multinational and large Chilean traders that purchase fruit from independent producers have branched out from the original variety to new ones. Buyers in export markets, after having had success with one variety, have inquired about others that were in high demand. Producers who are themselves packers and exporters have made trips abroad to explore the markets and have discovered business opportunities in new varieties.<sup>17</sup>

But perhaps most importantly, practically all fruit and vegetable exports – and, indeed, food exports in general – require a common set of public goods. The public good that is most important is meeting the sanitary and phytosanitary requirements of sophisticated importing countries. And, once this is achieved, if they are to continue to have access to foreign markets, Chilean producers must be protected from imported plagues and diseases. These tasks have been undertaken for decades by the Servicio Agrícola Ganadero (SAG), a government agency that works closely with producers and exporters. As we will discuss below, the trade associations in the sector have played an important role in this respect as well.

Some fruit crops can use the same or very similar logistical services: the complex transport and trading arrangements that must be made to take the product from the producer to a consumer who is located thousands of kilometers away. Once in place to export one product, the network of services (cold storage and transport, marketing and relationships with traders and supermarkets, etc.) can be used by exporters of different products.

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<sup>17</sup> Interviews with Miguel Canala-Echeverría, General Manager, ASOEX (Asociación de Exportadores) and Andrés Luna, Sales Manager, Dole Chile.

Today Chile exports about 75 different varieties of fresh fruit. The fruit industry has even spawned an innovation designed to protect the quality of fruit from the time it is packed to the time it reaches supermarkets in faraway destinations. This device, a generator of sulphur dioxide, emits a gas that prevents the packed fruit from developing fungi. There are six Chilean companies manufacturing it, and it is now exported to other fruit exporting countries.

In the fresh fruit segment of the market, exporting firms number more than 550, and more than 90 percent of them are small enterprises. Exporters produce fruit themselves and/or purchase it from some 16,000 producers. Thus, although exports are concentrated in a few major traders, some but not all of which are multinationals (for example, Dole and Del Monte), there exist a diversity of arrangements that allow small firms to participate.

Perhaps the most interesting characteristic of fruit exports is the remarkable diversification that has taken place in recent years in the varieties of fruit and fruit products exported. In 1990, only ten products had exports of more than US\$40 million (in 2000 U.S. dollars), whereas this number had grown to 23 products by 2005. In addition, there are other varieties with much smaller export volumes that show great promise and have had an explosive rate of growth. In fact, the most rapidly growing exports in 1990-2005 were those that had small export volumes or were not exported at all in 1990. It is estimated that, currently, fresh fruit production (about 90 percent of which is for export) represents about 1.3 percent of GDP and employs around 450,000 workers, or 7.1 percent of the labor force (ASOEX, 2006).

Of course, there were failures in this sector as well during 1990-2005. This was the case with exports such as canned tomatoes and beans, which had reached export volumes of about US\$10 and US\$50 million, respectively, in 1990 (at 2000 prices), and have now practically disappeared from the export mix. As we will discuss below, fresh strawberries, raspberries, and blackberries have also been practically abandoned by Chilean exporters. However, the successes have far outstripped the failures.

It is interesting to note that export growth in this sector has taken place through the addition of new products to the export basket or by faster export growth in products with relatively modest export values. Splicing together three different data sets,<sup>18</sup> we were able to come up with long export series for Chile's major fruit exports (see Table 6). Although in the

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<sup>18</sup> These are: Feenstra's and COMTRADE, which are available at the four-digit SITC level; and the Central Bank's database, which singles out items of export interest to Chile, regardless of statistical classification.

early 1960s fruit exports were concentrated in grapes, apples, and pears, these varieties have exhibited rather slow export growth since the early 1990s. The star products have been more recent additions to the export basket: kiwis, lemons, oranges and tangerines, avocados, processed fruit (marmalades, jams, juices), and, particularly, blueberries.

The Central Bank has a more complete database for exports from 1990 onward, and one that is especially tailored to Chilean exports. We calculated export growth rates for products whose export value (in 2000 U.S. dollars) was less than US\$10 million in 1990. These products and their export values in 1990 and 2005 are shown in Table 7. The table also shows the date at which an item crossed the US\$1 million mark and became an export discovery, according to the criterion we use in this study. All the products whose exports individually were less than US\$10 million in 1990 recorded a rate of growth of exports of almost 15 percent in 1990-2000, or three times the rate of growth of total exports. Several of these products have become major exports, in particular blueberries and other frozen berries. Altogether, these exports accounted for 22 percent of all exports in 2005.

#### ***4.2 Price Impacts and Dissipation of Rents from Early Entrants***

Did the entry of new exporters from Chile dissipate the rents obtained by first movers from learning the business of exporting? We estimated the price change for each exported product (or group of products in some cases) relative to the U.S. GDP deflator by comparing the change in value in 2000 U.S. dollars with the change in volume between 1990 and 2005 (Figure 10). The change in price has as often a positive sign as it does a negative one. In some cases, it seems that price increases in international markets may have encouraged entry by Chilean exporters. This seems to have been the case for blueberries, canned and frozen fruit, tangerines, oranges, lemons, and seeds. In none of these products are Chilean exports important enough on the world market to affect price.

This suggests that the direction of relative price change could have gone either way and that competition from new Chilean entrants was probably not the most important factor. Only in the largest export varieties (grapes and apples) do Chilean exporters have any significant market power. In the case of grapes, Chilean grapes account for about 75 percent of U.S. imports (all of which are out-of-season). For apples, this percentage is around 30 percent. For blueberries, in 2004 Chilean exports to the United States represented one-third of total U.S. imports, most of the

rest being imported from Canada and Argentina. However, during the off season in North America, Chile and Argentina account for almost all U.S. imports,<sup>19</sup> with Chilean products accounting for about two-thirds of total imports. As stated by some of the executives interviewed for this study, in the fruit industry in general, competition takes place more between Chilean exporters and those from other countries in the market (South Africa, Australia, and New Zealand) than among Chilean exporters.

There have been, of course, some cases of falling prices owing to the exuberance of Chilean exporters. Perhaps the most dramatic is kiwis. Between 1985 and 1993, the entry of Chilean exporters caused a huge decline in relative prices: the price of kiwis deflated by the U.S. GDP deflator fell by about 85 percent. The Chilean industry recovered only after 1997, and has continued to grow strongly since then, partly at the expense of producers from higher-cost countries. In the case of avocados, there have also been precipitous price declines, although these are unlikely to have been caused by Chilean producers, because their exports represent a relatively small percentage of world consumption, Mexico being the largest producer.

#### ***4.3 The Provision of Public and Semi-public Goods: Government and Business Associations***

According to industry representatives, the government has played four basic roles in promoting the cluster. Pride of place is taken by the Agriculture and Livestock Service (Servicio Agrícola Ganadero, SAG), a branch of the Ministry of Agriculture in charge of sanitary and phytosanitary norms (SPN). Protecting Chile's naturally sound phytosanitary conditions has been a permanent concern of this agency, and this has played a major role in the development of Chilean food exports. SAG also disseminates information on best agronomical practices, ensuring that SPN norms in importing countries are met by individual producers, issuing SPN certificates for export to major markets, and negotiating agreements in this area with importing countries.

A second government action in providing a key public good has been the negotiation of free trade agreements with practically all importing countries: the United States, the European Union, Korea, China, Mexico, most Latin American countries, and, most recently, Japan. Chile is one of the countries that has negotiated the most free trade agreements. Practically all the executives interviewed began by stating that these diplomatic successes had been a key factor behind the growth of fruit exports.

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<sup>19</sup> This information was provided by Felipe Julleriat, Marketing Director, Vital Berry.

Third, in recent years, there has been a great deal of attention to R&D, and several government agencies have become involved in this task. As in the case of wine, the INNOVA program provides funds on a competitive basis to consortia of business associations and universities for technological innovations. The Exporters' Association (ASOEX) is participating in one of these projects through a special business unit, with the objective of developing new varieties of fruit through the application of vegetable genomics and other biotechnological advances.

The fourth area of government involvement has been export promotion, through ProChile's campaign to create a "country image" and the dissemination of commercial information. Several of the individuals interviewed mentioned participation in fruit fairs abroad as being of particular importance. ProChile personnel work closely with industry executives and business associations in organizing participation in these fairs.

Despite these undoubtedly beneficial actions, what strikes the observer is the relatively modest role of the state in the development of the industry. Besides the efforts mentioned above, there has not been a great deal of deliberate industrial policy toward the sector. This may now be changing as the emphasis shifts from producing commodity-like crops to genetic engineering, which requires R&D as a basic input.

The most insistent complaints of the business people interviewed had to do with the uncompetitive level of the exchange rate (which has appreciated substantially in the past two years as copper prices and export volumes have soared). Given the huge importance this activity has for exporters, most of those interviewed, while praising SAG, complained that the volume of resources allocated to the institution was too small and that SAG was too slow in granting its permissions and certifications.

In the case of fruit, as in that of wine, business associations, and in particular ASOEX, have provided important public goods to exporters, which would have been very difficult to finance by individual firms. In addition to its role in R&D, ASOEX has provided the sanitary certifications and quality control procedures that are required by importing countries. There is a bewildering array of regulations in the major importing markets that have to be met in order to be able to sell in them. ASOEX has developed a norm of good agricultural practices, ChileGAP, based on the European Union's (EUREPGAP). It has obtained recognition for these norms from European supermarkets, and now it is enough for Chilean exporters to meet Chilean quality



norms to be acceptable by European Union importers. It should be noted that the industry is moving rapidly toward the elimination of intermediaries, and fruit is tending to be imported directly by supermarket chains, thus giving supermarkets a much larger role in the importing decision.

Along the same lines, ASOEX negotiated with the United States to have Chilean fruit inspected by the U.S. Department of Agriculture before it leaves Chilean ports. For this service, it charges its members a fee to defray costs.

## **5. Blueberries**

Berries, and particularly blueberries, are one of the success stories of Chilean exports in the period since 1990 (see Figure 11). Berries were not an important export item in the early 1990s. In fact, of total non-copper exports of US\$4.2 billion, berries accounted for about US\$25 million in 1990, with blueberries not even reaching US\$200,000. Fresh and principally frozen raspberries and blackberries began to be exported in 1982, but the explosive growth in berry exports took place after the mid-1990s. Although berry exports in general have grown rapidly since then, blueberries have exhibited one of the fastest growth rates among all fruit and vegetable exports; indeed, among all Chilean export products. By 2005, blueberries had become the fifth largest fruit export in value terms. The rate of growth in the value of exports of blueberries (deflated by the U.S. GDP deflator) was more than 40 percent per annum between 1990 and 2005. In 1993, blueberry exports surpassed the US\$1 million mark (in nominal terms). In 2005, blueberry exports were US\$95.3 million. Whereas in 1995 there were only two exporters, only one of which exported more than US\$1 million, in 2005, 59 firms exported blueberries, of which 11 exported values greater than US\$1 million.

### ***5.1 Why Did Chilean Producers Begin to Export Blueberries?***

Blueberries are not consumed in Chile. Therefore, from the beginning, production aimed at the export market, particularly that of the United States. The United States is the main export market for the three exporters interviewed, Vital Berry, Hortifruit, and Driscolls. They also export to Europe and Asia. Vital Berry and Hortifruit are Chilean firms; the former is owned by five partners who are also growers, the latter is a family firm with important interests abroad. Driscolls is a major multinational in berry trading.

The principal advantages of Chilean blueberries are those of Chilean fruit in general: off-season production, high-quality fruit, climate conditions favorable to blueberry cultivation, and good phytosanitary conditions. Hortifruit and Vital Berry began exporting raspberries in the early 1980s and were able to use to good advantage what they had learned when they decided to switch to blueberries.

Blueberries arrived to Chile in 1979 through a government initiative carried out by the INIA (National Institute for Agricultural Research). The government wanted to extend the development of agriculture south in the the Central Valley to climates that were colder and more humid than those of the traditional agricultural zones of the country. For this purpose, INIA tested the adaptation of blueberries, sarsaparrilla, and redcurrants, among others, to the country's climate and soil. About 20 plants of 12 varieties each were planted. The results indicated that blueberries adapted well to the soil and climate of Regions IX and X (in the southern part of the Central Valley). During the period that followed, INIA developed micropropagation techniques, trained researchers in the production of blueberries, and provided technical assistance to potential users of its research. All these activities were fundamental in the subsequent development of the industry.

Commercial blueberry production was initiated by Fundación Chile and private partners in the blueberry-producing region in 1985.<sup>20</sup> Fundación Chile and its partners set up a private firm (Berries La Unión) to experiment with the planting and production of blueberries. In this task, Fundación Chile was able to draw on the information gathered by INIA, and utilized its experience. The country was just emerging from the banking and balance-of-payments crisis of 1982-83, and Fundación Chile was prospecting for new exports that could be produced profitably in a particularly depressed geographic area (Regions IX and X). There were other experimental efforts in blueberries at the time, by Universidad Austral, in Valdivia, now one of the major blueberry production centers (Region X), and by UTC, a fruit exporter. What these efforts revealed to other, potential entrants was that high-quality blueberry production could be undertaken in Chile to meet out-of-season demand in the U.S. market at very profitable prices.

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<sup>20</sup> Fundación Chile is a venture-capital-cum-innovation firm with 50 percent government ownership and operated as a profit-making enterprise. In the early 1980s, it was responsible for the introduction to Chile of cultivated salmon production and exports, perhaps the greatest success in new export production in Chile over the past decades. It should be noted that Chile is now the second largest exporter of salmon in the world, behind Norway.

In 1992, after production proved to be successful, Fundación Chile sold its participation. Nonetheless, the entirely private firm that emerged from that venture went bankrupt owing to poor management decisions, and its assets were sold to a producer that sells its output of blueberries to one of the medium-size exporters, Sun Belle Berries.<sup>21</sup>

The rapid growth of blueberry production was the result of investments made by other firms, in particular the two market leaders, Vital Berry and Hortifruit, which began exporting blueberries in large quantities toward the mid-1990s. These firms have the business savvy that Berries La Unión lacked.

### ***5.2 First Movers and Followers***

Vital Berry is the product of an association of five exporters of raspberries, who founded the firm in 1989 with the objective of ensuring the availability of raspberries for the U.S. market. The first partner to produce and export blueberries in 1994 was Ignacio del Río, who settled in the Temuco area (in Region IX), where the weather is cool and winters are rainy, after making a trip to the United States to explore the market for blueberries. Del Río had some contacts with INIA and learned about blueberries from them. Although we do not know for sure, the experience of Fundación Chile with Berries La Unión was probably common knowledge among producers of small fruit crops in Chile. Now, practically all of Vital Berry's fresh berry exports are blueberries.

The second largest exporter, Hortifruit, is a family-held firm. It also started out exporting raspberries in 1982, and during the the late 1980s turned to blueberries, which now represent about 80 percent of its exports. Hortifruit started planting blueberries in 1985-87.

In fact, exports of fresh strawberries, raspberries, and blackberries have tended to decline and be replaced by blueberries. The main difficulty for Chilean producers is the distance to consumer markets and the high attendant transport costs. In the case of raspberries, the delicate post-harvest process makes maritime transport non-viable, and air freight costs are much higher than for competitors that are much closer to the consumer markets, such as those in Mexico. Blackberries grow well in many climates, and Mexican producers, again, are much closer to the market. They have completely displaced Chilean exporters from the U.S. market. Strawberries are highly perishable, a fact that makes distance an important stumbling block to their export

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<sup>21</sup> Information provided by Plutarco Dinamarca, consultant on berries for Fundación Chile in the 1980s.

from Chile. Fresh blueberries, by contrast, are sturdier and require special climate and soil conditions that are met in certain regions of Chile (and Argentina) but not in Mexico. In the case of frozen berries, of course, the situation is quite different, because they do not require special handling. In these products, Chile has remained highly competitive. Figure 12 shows the remarkable difference in the export performance of fresh and frozen strawberries.

The major exporters of blueberries are Vital Berry, Hortifruit, Agroberries, Vitafoods, Driscolls, and Comercial Frutícola. All of these firms export more than US\$5 million each and, together, the value of their exports represents 85 percent of all blueberry exports from Chile. There are 51 other, smaller blueberry exporters identified in ProChile's database by exporting firm. The largest exporters produce their own blueberries but also purchase significant quantities from independent producers. Hortifruit claims that it sells plants to its suppliers at preferential prices, but there does not seem to have been any effort to develop a customer base for plants, such as was the case with the pioneer blueberry exporter in Argentina (see Sánchez, Rozemberg, Butler, and Ruffo, 2008, prepared for this project). Exports are still dominated by the largest companies in the sector.

How did the production of blueberries for export disseminate from Vital Berry and Hortifruit to other exporters? According to the executive interviewed, information is readily available and there are no impediments to entering the market, other than the fact that a large initial investment is required (he estimated it to be about US\$80,000 per hectare). However, the owner of Hortifruit claims that the firm lost highly qualified workers, both in the exporting and production fields, to other newcomers to the export business.

A key input is, of course, finance. Vital Berry faced severe financing constraints in the beginning, which were overcome through advances from the trading firms that bought their products in the United States. The government did not provide any assistance to relax these financial constraints.

The executives interviewed did not think that prices had declined owing to the rapid growth of Chilean exports, although one of them warned that the market would not be able to absorb at current prices the large increases in Chilean exports that can be foreseen in the next few years. As shown in Figure 13, unit values (in 2000 prices) have held steady, in spite of the surge in U.S. imports from Chile and Argentina. Prices have in fact already declined from their

highs in 2000, but they are still considerably above their levels in the early 1990s; and they are judged to be very profitable by exporters.

### ***5.3 The Importance of the Marketing Connection***

Both Hortifruit and Vital Berry invest in other producing countries. Both firms produce in Argentina, which allows them to complement their supply of produce from Chile at a later time in the season, when the Chilean crop has already been exported and Argentine production is coming on stream. Hortifruit is also a large producer of blackberries in Mexico. Both firms have joint ventures in the United States, Hortifruit through a company in which it has one-third ownership,<sup>22</sup> and Vital Berry with a large marketing firm. In the United States, both firms sell exclusively through their joint ventures. In Europe and the United Kingdom, Vital Berry channels all of its sales through specialized traders.

Driscolls is a multinational firm from the United States and one of the largest marketers of berries in the world. It used to purchase blueberries from a Chilean firm (SRI); it bought SRI a year ago and set up a subsidiary in Chile. It should be noted that SRI was one of the pioneers in the exports of Chilean blueberries in the early 1990s, together with Vital Berry and Hortifruit. SRI had begun in the fruit export business exporting “large” fruit (grapes and nectarines) to Brazil, Argentina, and Mexico. The problems experienced by Mexico and Argentina after the December 1994 financial crisis led SRI to attempt to diversify to other fruits and markets. Thus, it started to sell blueberries in the United States through a contact the owner had made with Driscolls. Now Driscolls is mainly an exporter of blueberries produced by others. It purchases about 70 percent of the blueberries it exports, through long-term contracts with producers, to whom it gives technical assistance in production and quality requirements in various markets (mainly the United States and Europe). Driscolls has brought in its own technical staff from abroad for these purposes.

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<sup>22</sup> The company is called Global Berry Farms. Its partners, besides Hortifruit, are the Michigan Blueberry Growers Association (MBGA), a large marketing cooperative representing 25 to 30 percent of North America’s cultivated blueberries, and Naturipe Berry Growers, a California marketing cooperative that represents 8 to 10 percent of California’s fresh strawberry sales. Prior to the founding of this joint venture, Hortifruit had a marketing contract with MBGA dating back to 1991.

#### ***5.4 The Role of the Government, Now and in the Next Stage***

All of these relatively large exporters have worked closely with independent producers in order to meet their export objectives. This has involved technological assistance, quality control, and help meeting SPN. In the latter, SAG, again, has played an important role. In addition, all firms have used CORFO's program of supplier development (PDP).

The major blueberry producers are likely to welcome the importance that CORFO attaches to R&D. The larger exporters have begun to stress the need to carry out more R&D to differentiate their products and improve quality (taste, juiciness, color, size, etc). In fact, Vital Berry has begun investing in R&D. These investments are oriented not only to blueberries, but also to other varieties that are not yet exported in large quantities because of technical reasons or because Chile has not yet subscribed SPN protocols in these crops with the importing countries. Thus, Vital Berry is actively researching the technical requirements for exporting persimmons, kakis, and figs, for which purpose it has an agreement with a university in the United States to undertake research leading to the export of these new products. The executive interviewed claimed that what had been learned exporting blueberries, including contacts and logistic chains, would be very useful in any incursion into the markets for other products.

Hortifruit is already diversifying into other products, such as figs and asparagus. In addition, it has diversified locations to make use of the comparative advantages of different countries in the production of different products.

## **6. Pork Meat**

### ***6.1 A New Star Is Born***

Pork meat is an even more recent export discovery than blueberries, and perhaps an even more successful one. There had been some exports of this product since the late 1980s to the less demanding Latin American markets. In 1997, exports took off, going from US\$6.6 million (in 2000 U.S. dollars) to US\$26.5 million. In 1996-2005, exports grew at a rate of 51.1 percent per year. Exports today are US\$272.3 million (2000 dollars; US\$305.6 million in current dollars). Figure 14 shows this remarkable growth.

Pork shares some of the advantages of Chilean fruit in the international market. Chile's geographic location between the Pacific Ocean, the Andes, the Atacama Desert, and the South Pole have prevented the introduction of most exotic swine diseases. The only three that have

been detected (FMD, Newcastle, and Swine Fever) have been eradicated. Benign climate conditions (low humidity and rainfall, and moderate temperatures ranging from 30 to 90 degrees Fahrenheit) favor swine reproduction and productive efficiency, and reduce energy costs. One big disadvantage of pork production and exports is the relatively capital-intensive nature of any successful operation, which means that there are entry barriers that prevent rapid spread of the export discovery.

## ***6.2 Market Structure***

Exports outside Latin America began when Nippon Meat, the subsidiary of a Japanese multinational in the food business, began exporting frozen pork meat to the Japanese market. Nippon Meat arrived in Chile with the intention of exporting sea urchins. Although it is still in that business, pork exports are now its chief business in Chile. Nippon Meat started prospecting for suppliers of pork for the Japanese market in the mid-1990s, when foot and mouth disease hit Taiwan and Denmark, the two main suppliers of pork meat to Japan. The company found that Agrosuper, a diversified producer of food products, and other firms already exported pork to Latin American markets. The first export to Japan, by Nippon Meat, which purchased the product from Agrosuper, took place in 1997. The advantage of Nippon Meat is its marketing channels in Japan and its knowledge of the Japanese language and culture, which are barriers for Chilean firms. The advantage of producing in Chile is that the country has excellent phytosanitary conditions, such as being free of foot and mouth disease. The executive interviewed said that SAG certification had made an important contribution, because it had gained recognition from the Japanese authorities. European destinations are now appearing attractive, but the European Union requires its own certification, and Chile has only three plants that are certified by the EU.

Nippon Meat does not produce pork meat. It has a supply contract for export to the Japanese market with Agrosuper. All of its exports from Chile are purchased from Agrosuper. Originally, it also sourced pork from FRIOSSA (Frigorífico O'Higgins S.A.). FRIOSSA withdrew from this tripartite agreement in 2001, seeking to sell its product through traders rather than through Nippon Meat. The intention of the agreement was to create a brand that could differentiate the product and be adapted to the tastes of Japanese consumers. In this, the relationship between Agrosuper and Nippon Meat has been extremely successful. Between the

two of them, they export almost US\$200 million, while FRIOSA's exports have remained below US\$35 million.

Agrosuper is a very interesting company. It is family held and now its sales, within Chile and for export, are worth about US\$1,200 million. It started out as a producer of eggs in 1955, later branching out to chickens and chicken meat. It created a brand name (Super Pollo) that has wide recognition in Chile. Later, through greenfield investments and acquisitions, it diversified into fresh and processed fruits, turkey meat, salmon, wine, pork, sausages and hams, and, very recently, olive oil (a new export product, with an excellent chance of becoming an export discovery). It is a vertically integrated firm producing feed, raising hogs, and processing them into pork meat. This helps to ensure the quality of the pork produced, which is tailored specifically to individual consuming markets. In the case of Japan, with the assistance of Nippon Meat, they developed a brand that was suited to the demands of Japanese consumers (Japan Andes Export), which has similar characteristics to the pork that is consumed in Japan. In order to achieve this, Agrosuper practiced genetic engineering with the objective of obtaining products that would sell in the demanding Japanese market (in terms of taste, juiciness, color, and consistency). In Japan, Agrosuper's exports (through Nippon Meat) now represent 3 percent of imports.

Likewise, in Korea, the second largest market for Agrosuper's pork exports, Agrosuper's share of imports is now 15 percent, exceeding that of U.S. producers, which are a traditional source of imported pork. Its success is due to its diligence in producing a product that is tailored to the demands of Korean consumers. Agrosuper sells to three large importers exclusively and has developed a specific product for each importer. It emphasizes long-term relationships with importers. The executives interviewed claimed that Korean consumers were unable to tell the difference between domestically produced pork and Agrosuper's product. This allowed the latter to be considered "Korean" and to fetch higher prices than other imported pork. For U.S. and European exporters, the Korean market is treated as a residual, and they do not tailor their products to the market or have exclusive sales arrangements with importers. This has given Agrosuper's products an edge: not only are its costs lower, but its products fetch higher prices at the wholesale level.

Agrosuper uses the latest technology in the whole chain of production. It does R&D at the level of breeding, but in the processing operation it uses imported technology. It does not



appear to have a financing constraint. This may be due to the fact that it is a conglomerate and applies profits from one product to fund investments in others. Its executives claim that the firm does not lose personnel to competing firms, because it pays above-market wages and working conditions are such that workers are highly motivated to remain with the firm.

Another source of strength is the fact that Agrosuper has developed its own international marketing network, opening offices in Tokyo, Atlanta, Mexico City, London, and Milan. These offices are in charge of the marketing aspects of exports, including product development to suit the demands of local consumers. The Tokyo office handles marketing in Korea and other parts of Asia.

There are other Chilean exports of pork meat, but they are much smaller. Nippon Meat and Agrosuper account for about two-thirds of Chilean exports.<sup>23</sup> Other exporters do not produce all of the hogs they process and must rely on other producers, without being able to control the quality of the product. They rely on traders in the destination markets for their exports.

Agrosuper executives claim that it is difficult to replicate the firm's model, because it requires the development of vertically integrated production, something that is highly unlikely for domestic firms, given the capital requirements of such an operation. They suspect that the only competition could come from foreign investors with financial clout who might discover the very favorable conditions of producing pork meat in Chile. In fact, expansion of pork exports looks likely to come mainly from Agrosuper itself. Plans are well-advanced to invest in an integrated hog farm-cum-processing operation in the northern end of the Central Valley (Huasco), at a cost of US\$500 million. In addition, the company will build a special feed facility specifically for this operation. This area presents excellent phytosanitary conditions, it is close to a major port, and land and labor are cheap. As a result of this investment, Agrosuper's pork exports are planned to double by 2010.

Nonetheless, other smaller producers have also been able to export pork. One such firm is Agrícola Industrial Lo Valledor, which began exporting pork in 2000 with a very small volume (less than US\$150,000) and now surpasses US\$20 million. Lo Valledor is a large beef producer for the Chilean market. It has exported beef since the mid-1990s. It started in the pork export business as a result of inquiries from its buyers of beef. In fact, it started producing pork for export markets and then diversified to the domestic market. Pork exports have received a big

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<sup>23</sup> Since all of Nippon Meat's exports are purchased from Agrosuper, they should be considered Agrosuper exports.

boost from Japanese (Mitsui) and Korean traders that have come looking for pork suppliers, partially as a result of the successes of the Nippon Meat-Agrosuper partnership. They do not produce all of the hogs they slaughter and must buy supplies from independent producers. They claim to make efforts to meet the quality requirements of Japanese and Korean customers. However, the fact that they do not have hog-raising facilities is an impediment to the total quality control exercised by Agrosuper. SAG inspectors work inside their plants to ensure they meet SPNs in their major markets.

### ***6.3 The Role of Government***

The government has played a marginal role in the development of pork exports. Perhaps the largest contribution comes from the quality-control and phytosanitary preservation activities of SAG. But even this is contested by Agrosuper executives, who claim that SAG is woefully understaffed and that the company has had to defray most of the costs of supervising quality norms that must be met to export to different markets.

In the future, the recently negotiated free trade agreements with major importers could provide the necessary space for a major increase in exports. In the case of Korea, the free trade agreement (FTA) went into effect in April 2004. Korea has a tariff of 25 percent on pork imports. As a consequence of the FTA, it was immediately reduced to 20 percent and will continue to decline annually in a linear fashion, reaching complete free trade in 2014. China is a potentially huge market for Chilean pork, and in 2005 Chile and China signed an FTA, that went into effect on January 1, 2006. Pork imports are affected by tariffs that range between 12 and 20 percent. The treaty calls for a linear reduction in all tariffs on these products in five to ten years, depending on the product line. Negotiations of an FTA with Japan were expected to be concluded in November 2006; given the sensitivity of pork for Japan, imports of this product have not been negotiated and are unlikely to be liberalized very significantly. Japan has a system of domestic price supports for pork, implemented with a variable tariff. Even so, Chilean exports to that market have soared.

The role of the trade association ASPROCER (Asociación de Productores de Cerdo) is very incipient. It has worked mainly in disseminating information on the quality requirements of different export markets. Given the dominance of one company, it is really Agrosuper that

supports ASPROCER rather than the other way around. Agrosuper executives claim that ASPROCER is mainly a medium of communication with the government.

## **7. Export Discoveries, Diffusion, and Policy**

### ***7.1 The Emergence of New Export Activities***

The three export discoveries we have described (wine; fruit, with an emphasis on blueberries; and pork) have been in the food sector. Although not by design, many new exports have arisen in these industries. Climate and land resources – in short, comparative advantage – in Chile is undoubtedly in this sector.

Why did these products not develop earlier? Wine, fruit, and pork have long been produced for the domestic market, but not with the quality that would have permitted significant exports. Only after the opening of the economy – with falling tariffs, which made producers look at export markets, and the availability of foreign exchange with which to import capital equipment suitable for export production – did large volumes of exports become a possibility. The exchange rate depreciation that followed the opening up to trade also helped to orient producers to foreign markets. Still, there were many obstacles to be surmounted. The major one was producing products that were of the quality demanded in foreign markets. In two fruit varieties (apples and grapes), this was achieved earlier than in other products. But the logistics of exporting these varieties and the building up of the public goods that were specific to the food industry proved crucial for the spread of food exports to other products.

### ***7.2 Foreign and Domestic First Movers***

Foreign investment has played a major role in the activities of the pioneer in both the wine and the pork stories. In wine, it was the arrival of Miguel Torres and the company's introduction of steel vats and small oak barrels that made it possible for a Chilean winery to produce products to European and U.S. consumer specifications. In the case of pork, a foreign trader, Nippon Meat, played a large role in the modernization of the industry in the mid-1990s. Its association with Agrosuper was essential for kick-starting the expansion of Chilean pork exports.

The case of blueberries is somewhat different. There were no foreign first movers. An initial effort (Berries La Unión) failed, but for reasons other than the suitability of Chile as a location for blueberry production. This experience seems to have encouraged others to try again.

The leaders, Hortifruit and Vital Berry, were extremely successful and now have operating facilities in Argentina and their own marketing arrangements in the United States.

### ***7.3 Diffusion***

In the wine industry, the followers learned basically by looking and taking cognizance of the new methods imported by Miguel Torres. The crisis of the domestic-oriented Chilean wine industry in the early 1980s, together with the huge depreciation of the exchange rate following the balance of payments crisis of 1982, were certainly persuasive as to the advantages of exporting. Some of the followers, particularly Concha y Toro, the leading winery in Chile today, far surpassed the export volumes of Miguel Torres, whose production is now concentrated on serving the domestic market. To put it in a nutshell, Miguel Torres occupies number 24 on the list of exporters. Its exports are less than US\$10 million, compared with Concha y Toro's exports of about of US\$215 million.

How did diffusion take place? We have already mentioned "learning by looking." In addition, some oenologists who had trained with traditional wineries decided to try the new methods and started their own businesses. This was the case of Aurelio Montes, who was the chief oenologist for San Pedro, a traditional firm. With three partners, he started Montes, devoted to the production of premium wines for export. The firm now has production in Chile and Argentina and is starting a joint venture in California. Other first class eonologists hired out their services to start-up firms. This was the case of Viu Manent, a boutique producer of fine wines, which received technical assistance from Aurelio Montes.

Foreign investors were also present in the diffusion process. Once Chilean wines had established a reputation abroad, several large firms with strong international reputations came calling.<sup>24</sup>

Diffusion has involved not just copying what the leader did but a great deal of innovation by creative oenologists and ingenious marketing experts. Chilean producers were quick in adopting new technologies. They have also experimented with many grape varieties that are not traditional in Chile. They have even rediscovered a variety, carmenere, which had disappeared in Europe during the phylloxera crisis of the nineteenth century. New wineries and new endeavors by established eonologists seen to sprout every day.

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<sup>24</sup> Parenthetically, that is precisely what happened in salmon. Foreign investors arrived *after* Fundación Chile had been successful in demonstrating that salmon cultivation for export was feasible and profitable.

A key element of their success was the creation of a reputation for Chilean wines by the pioneers (not only Miguel Torres, but also Concha y Toro and Los Vascos, a vineyard that is a joint venture between a Chilean winemakers and Chateau Lafite, of France). Thus, the first movers created demand for a Chilean product, an investment from which many others profited.

In the case of blueberries, diffusion was technically easy but economically difficult. The investment cost of setting up an operation for export is large by Chilean standards. Nevertheless, there has been quite a bit of diffusion. There are a large number of smaller exporters and many more producers of blueberries that export through the larger firms. The arrival of a foreign firm, the world's largest trader of blueberries (Driscolls) is indicative that foreign investment may play a role in the future.

More generally, in fruit exports, there is evidence of what we could call "horizontal" diffusion, akin to Hausmann and Klinger's (2006) analysis of firms jumping from producing one product for export markets to others that require the same or similar public goods and non-tradable inputs. That is, the emergence of a new variety seems to lead exporters and producers to attempt to develop yet other products for export markets. Both established firms and newcomers show a keen interest in experimenting with new varieties of fruit exports.

Diffusion has been limited in the pork industry. Most of the followers of the agreement between Nippon Meat and Agrosuper are small and produce a basically different and lower-quality product. Given the high capital intensity of this type of export and the need to have vertically integrated production facilities to produce the kind of product demanded by consumers, it seems that the expansion of exports, which could be very strong, will come basically from established producers or foreign entrants. Very recently, the Perez Companc holding (one of Argentina's largest business groups) purchased Friosa, the firm that pulled out of the agreement with Nippon Meat. This may be a harbinger of a large capital injection, leading to much larger exports. Thus, the first mover, Agrosuper, may, perhaps, soon be followed by at least one large follower. In addition, the successses enjoyed by Agrosuper have encouraged other meatpackers to try to sell through traders in pretty much the same markets (Japan, Korea, and other Asian countries). Traders themselves have appeared looking for supplies.

#### 7.4 Counterfactuals

All three products present interesting counterfactuals. In the wine industry, Cánepa failed to take off because it got caught up in the financial crisis of 1982. It had financed its technology investments with dollar-denominated credits at the fixed exchange rate prevailing between 1979 and 1982; the depreciation of the currency as a result of the crisis almost caused the firm to go bankrupt. And, while it exported part of its production, the largest share was for sale in the domestic market. By contrast, Miguel Torres is an extremely conservative company, financing all of its investments through retained earnings. Moreover, it has the very broad financial shoulders of its Spanish parent company. Concha y Toro, too, is loathe to take on debt. These latter companies, particularly Concha y Toro, were extremely successful and widely emulated.

In other words, in an emerging-market setting, there are macroeconomic risks that must be addressed. Those who do so tend to survive and even prosper; those who do not, fall on hard times.

In berries, the original push to export fresh strawberries, raspberries, and blackberries did not pan out. Due to their delicate nature, these products must be exported by air. Chile is very far from consumer markets, and Mexico is right next to the United States. In addition, these products do not require the special climatological conditions of blueberries, and can be grown in other climates.

In pork, experience showed that producing a commodity-like product is much less profitable than working to the specification of clients. However, this latter option is much more demanding, requiring vertically integrated production and financial clout that is not available to many firms.

What these experiences appear to tell us is that *discovery of comparative advantage* (fresh blueberries and frozen berries, rather than fresh raspberries or blackberries), the *creation of demand* (varietal and premium wines from the specific Chilean *terroir*), and the *adaptation to existing customer demand* of products with cost advantages (pork) are key to success. Those firms that produce generic products without worrying about demand conditions or creating demand for a niche product will do much worse or will wind up going out of business.

## ***7.5 The Role of Government***

### ***7.5.1 The Bad News First***

Government has played a relatively modest role in the emergence of these new exports. There is little evidence of a deliberate policy to promote particular sectors or even new exports in general. In fact, the official stance of policymakers has been one of complete neutrality. To their own peril, Chilean policymakers certainly do not subscribe to the view that they are “doomed to choose.” Subsidization of new sectors has been almost totally absent since the military coup, and these policies have largely been continued by the democratic governments in power since 1990.<sup>25</sup>

Policymakers have been skimpy even in the realm of horizontal policies that preserve neutrality at the sector level. Perhaps the exception has been the fostering of R&D at the enterprise level through a series of funds that are open for bidding by consortia of firms and universities from any sector. However, R&D remains a weak link in the competitiveness of Chilean enterprises. The new emphasis on profitable R&D undertakings between business associations and universities in already successful industries may yield better results than throwing money at any project that can win a bidding contest.

One of the main complaints of the firms interviewed, especially the medium-size and small ones, refers to the scarcity of financing for investment and working capital. In fact, the most successful firms among those interviewed were those that had developed over time strong financial clout and did not need to seek financing from the market for their investment plans. This was the case of Agrosuper and Concha y Toro, firms that finance investments exclusively or largely out of reinvested earnings. In addition, Agrosuper is a food conglomerate, which enables it to have an internal capital market. Others, such as Miguel Torres and Driscolls, are multinationals with access to financing beyond the confines of the Chilean financial market. The relatively slow rate of diffusion perhaps has something to do with the overly prudent approach of policymakers to the finance issue. Chilean development agencies do not seem to have yet solved the riddle of how to provide financing for new ventures without incurring the moral hazards that such activities may engender.

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<sup>25</sup> Of course, the major, and glaring, exceptions have been the forestry sector, which received a large helping hand from the government in the mid-1970s (see Agosin, 1999; and Rossi, 1995); and the debt-equity swaps of the 1985-89 period, which were used, deliberately or unwittingly, to subsidize investment in some sectors, including pulp and paper (but also in finance). By and large, these interventions went in the direction that comparative advantage considerations would have suggested.

### *7.5.2 Programa Chile California: An Inadvertent Paradigm?*

Programa Chile California shows the importance of the transfer of skills and existing foreign technologies. It is difficult to think of a more successful program from the point of view of social profitability. With a mere US\$10 million grant from the Ford Foundation to the University of Chile, an entire export industry was given an indispensable boost. Could the industry have developed without the program? Of course, we will never find out. It is probable that it might have, but at a much slower pace. This experience should have demonstration effects, and, up to now, they have been scant indeed. The next step in the development of Chilean food exports, and perhaps in the exports of many other products, is biotechnology research. Why not take a page from Programa Chile California? A foreign foundation is no longer needed to finance a training program abroad and the import of such skills and knowledge from leading countries in the world.

### *7.5.3 Fundación Chile: An Export Discovery Engine?*

In the past, the process of export discovery has had an important boost from the activities of Fundación Chile, a semi-public institution whose main job is to research potentially profitable technologies and products that are new to the Chilean economy, adapt them to Chilean conditions, start up production, and then sell the resulting concerns to the private sector. Although its capital came originally from a settlement between IT&T and the military government for the expropriation of the Chilean telephone company, whereby each party contributed 50 percent of its capital, it has been profitable over the years. It is precisely the kind of institution that would fill the need to foster discoveries, in the sense of Hausmann and Rodrik (2003). Its activities straddle the fence of technology inventor/adaptor and venture capital firm. In both these activities, markets fail or are non-existent in developing economies in general and also in Chile (in spite of its relatively developed capital markets). As already noted, R&D is a weak spot in the Chilean private sector; and the venture capital industry is in its infancy.

Fundación Chile's major success was the salmon industry, which it started in the early 1980s by adapting Norwegian technology to the cultivation of salmon in the Southern lake district. It later sold a successful enterprise to Nippon Suisan, one of the largest food traders in the world. Now Chile is the second largest exporter of salmon, with exports well over US\$1.5 billion.



Fundación Chile has been marginally present in the wine industry through efforts to develop certain specific varieties and new wine-growing areas in the south of the Central Valley, where it was not believed that wine production would be successful. As we have already recounted, in blueberries, Fundación Chile played an initially important role in setting up a viable export concern. This was a genuine discovery, in the sense that it showed that blueberries for the out-of-season U.S. market could be profitably produced in Chile. Never mind that the initial effort eventually went bankrupt. The two largest followers, Hortifruit and Vital Berry, which were really the leaders of the successful stage in the export of blueberries, had a lot to learn from the initial attempt. Of course, there is no major secret in producing blueberries, but this is the main characteristic of export discoveries in a developing country context: the successful adaptation of production to local conditions or the introduction of a non-patentable technology that is in use elsewhere.

Fundación Chile is a true institutional innovation. If Chile is to intensify its export discovery process, it needs to be strengthened, made more independent of the government, and coaxed to become a true and more aggressive venture capital firm, with all the risks that this entails. Its successes of the past suggest that it can play an important role in encouraging export discoveries. In a regional context, it deserves to be studied carefully to ascertain what parts of its experience are transferrable to other settings.

#### *7.5.4 The Provision of Industry-specific Public Goods*

Where the Chilean public sector has excelled, and indeed concentrated most of its industrial policy, has been in the provision of sector-specific public goods or in the provision of services with large sunk costs that would not have been affordable by most producers, with the probable exception of a handful of the largest ones. Several agencies have been involved in this effort. These activities and their usefulness for the three sectors we have examined here are shown in Table 8.

Undoubtedly, the major contribution to the development of new food exports has been the strong – although not as strong as many interviewees would have desired – support received from SAG (Servicio Agrícola Ganadero). The activities of this institution in the sanitary and phytosanitary area represent the major public good for Chilean exporters of food products. However, more financial and technical resources will be required if SAG is to play this role in a

food export sector that is several times its current size. The interesting thing about SAG is its economies of scale and scope: once established, its services can be useful to an entire industry and, indeed, to a whole sector.

SAG's activities have been complemented by business associations, which have been extremely active in assisting producers to meet quality requirements in foreign markets, reaching quality agreements with major buyers, and even developing quality norms that are acceptable abroad. This is something that, obviously, individual producers are unable to do – owing to the huge sunk costs of the activity – but which an association can more easily undertake. The government has also played a hand in supporting, through CORFO, the setting up of these associations. This has been particularly the case in wine.

Research in agriculture and the adaptation of foreign technologies have been other areas where government agencies have been active. Mention has already been made of Fundación Chile's activities. In the agricultural field, INIA (Instituto Nacional de Investigación Agropecuaria) has also had a leading role. INIA and Fundación Chile both played a role in bringing blueberry production and exports to Chile. Given the fact that most agricultural producers are small and unable to carry out R&D, INIA should be strengthened with an injection not only of funds but also of qualified scientists and technicians.

As food export industries mature, the emphasis has naturally switched from adapting foreign technologies to developing new technologies to enhance their international competitiveness. The recent program (INNOVA) to foster R&D by encouraging business associations to work with universities has already been mentioned. In our products, there are three such projects. It is, of course, too early to evaluate the impact of these programs on exports, because they have been launched very recently.

The negotiation of free trade agreements with practically all of Chile's trading partners is clearly another example of the provision of public services needed by new exports.

Several of CORFO's development instruments have played a role in permitting the emergence of these new exports. For example, PROFOs (Proyectos de Fomento) have allowed smaller producers to band together and reach sufficient scale to finance the sunk costs involved in exporting. Small wineries have made use of this instrument. Another CORFO instrument, PDP (Programa de Desarrollo de Proveedores) has been important in helping suppliers of exporters of blueberries and pork to meet the quality standards demanded in importing countries. However,

even here, the larger firms (Vital Berry and Driscolls, for example) claim that they undertake a good part of this activity themselves.

ProChile has been of assistance to new exports by organizing tours abroad and participating in food and wine fairs in major importing countries. Some of these activities are done in conjunction with producer associations such as ASOEX and Wines of Chile. And the generic campaigns to associate the name “Chile” with good food and wine products are considered to have had a positive impact. However, some exporters claimed that the scope of these efforts has been too small.

#### *7.5.5 The Exchange Rate: An Inconclusive Debate*

The volatility of the real exchange rate has had a clearly negative impact on exports. The sharp appreciation since mid-2003 was quoted as being a very negative factor by practically all the executives interviewed.<sup>26</sup> The number of export discoveries is indeed encouraged by a competitive exchange rate. At present, record-high levels of copper prices and export volumes are influencing the exchange rate. Wine exports are already being hit. As is evident from the figures shown above, the rate of expansion in these exports has slowed considerably. Several smaller wineries have gone out of business, and there has been consolidation in the industry.

In addition to the current squeeze on new exporters on account of exchange rate appreciation, the problem of the exchange rate goes further. History tells us that Chile is one of the countries with the highest degrees of real exchange rate volatility in the world. Not only is the exchange rate volatile, but its swings have a great deal of persistence. By introducing noise in the investment decision in exportables, this volatility may be as adverse a factor as overvaluation.

Some may argue that exchange rate variability is not a problem, because the exports that disappear with appreciation will reappear when the exchange rate depreciates again. This view ignores that, as in any investment decision, investment for exports has sunk costs, and that these are not likely to be undertaken when the degree of uncertainty is as large as the one that arises from large and unexpected exchange rate fluctuations that may last for a long time.

The development of new exports was a deliberate and explicitly announced objective only during the period from 1984 to 1997. Such considerations have disappeared from the

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<sup>26</sup> A notable exception was Agrosuper's. This company imports the inputs for its feed production and, thus, the negative impact of appreciation on exports is somewhat dampened.

pronouncements of policymakers in more recent years. During the 1990s, there was a lot of talk among policymakers and informed observers that Chile needed to enter a “second stage of export development” (allegedly toward manufacturing); it was thought that the first stage had been accomplished during the 1970s and 1980s. That was a period that had seen the appearance of “easy” new export products, which did not require large investments in technology or knowledge and that hewed close to the country’s comparative advantage. The maintenance of an exchange rate that was favorable to exports was viewed as an important component of an export-oriented development strategy. Even so, with the instruments used, it proved impossible to prevent a significant appreciation in the real exchange rate during the 1990s (up to 1997), because capital inflows were extremely large.<sup>27</sup>

Over time, the monetary authorities have wavered between a “productivist” view of the exchange rate and a more conventional, “financialist” view. The first view emphasizes the use of the exchange rate to assist structural change, basically toward new exports. Nowadays, the slogan is “Chile, a world food power.” Of course, this new catchphrase could well go the way of the “second stage of export development,” if nothing is done to lend greater stability to the real exchange rate, and keep it in a range that renders profitable investment in new tradables. Those who adhere to the financialist view, who are the most vociferous and numerous, appear to believe that the real exchange rate is not susceptible to being affected by the authorities, as it depends on fundamentals over which policy has no control.<sup>28</sup> The current conventional wisdom is that the best exchange rate regime is a free float, which allows the monetary authorities to adopt an “inflation targeting” approach to monetary policy. A more pragmatic approach, balancing the need to control inflation with that of encouraging structural change, seems to be called for in an economy that is still struggling to modernize its production structure and market institutions.

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<sup>27</sup> There has been an inconclusive debate as to whether the unremunerated reserve requirements imposed on financial investors during the 1990s proved ineffectual in containing capital inflows. Some claim they were not effective, citing the slide in the real dollar price. Others suggest that they should have been stiffened in the presence of huge capital inflows. In the event, these capital inflows dropped dramatically with the sudden stop of 1998-99, as the country experienced contagion from the Russian crisis.

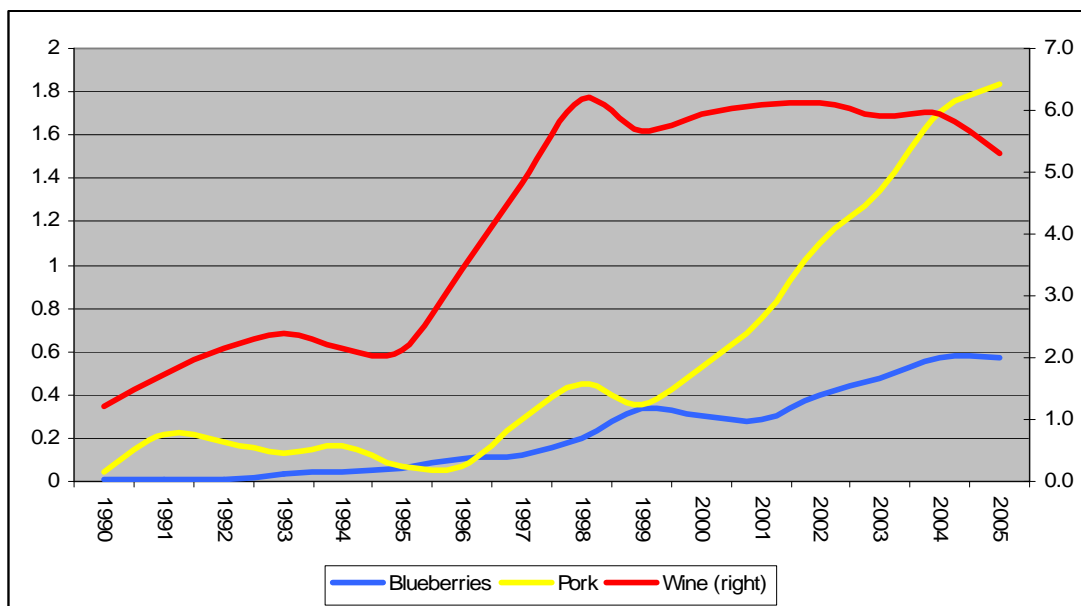
<sup>28</sup> The debate is largely semantic, because changing the nominal exchange rate is ineffectual in affecting the real exchange rate. But the authorities can affect fundamentals by, for example, using time-varying capital controls, or, in current circumstances, dampening exchange rate appreciation by investing abroad the large increase in copper profits of the state-owned mining giant, CODELCO, or even a good part of the huge budget surplus expected in 2006 (about 8 percent of GDP) and 2007.

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**Figure 1.**  
**Wine, Pork Meat, and Blueberries: Share of Non-copper Exports, 1990-2005**  
 (Percent)



Source: Authors' calculations, based on data from the Central Bank of Chile.

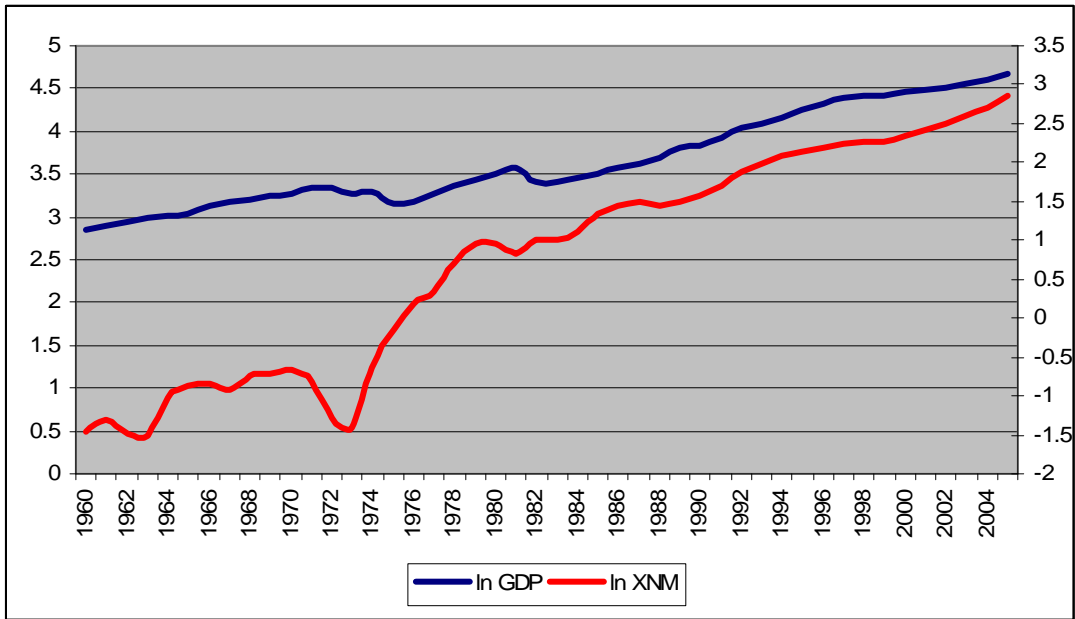
**Table 1.**  
**Growth and Export Performance, 1960-2005**  
 (Average annual growth rates, in percent)

	1960-73	1974-89	1990-2005
Rate of growth of GDP	3.4	3.3	5.6
Rate of growth of total real exports	3.2	9.2	7.9
Rate of growth of non-mineral real exports	0.4	14.2	8.9
Gross fixed investment (% of GDP)	22.3	18.2	24.9

Note: GDP and export data are in 1996 prices.

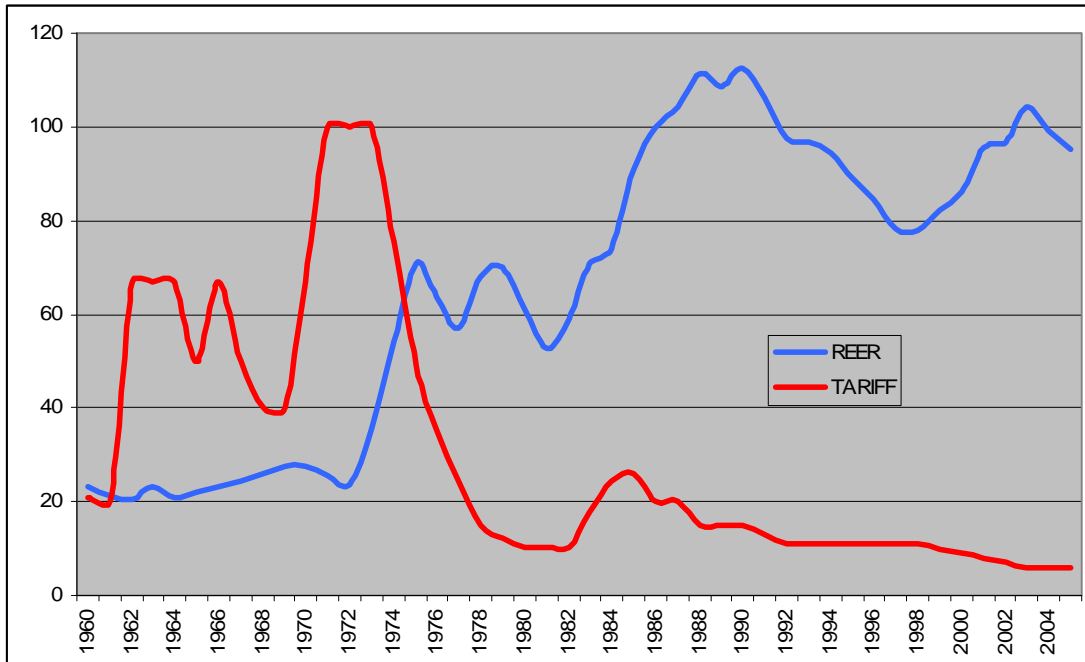
Source: Authors' calculations, based on data from the Central Bank of Chile.

**Figure 2.**  
**Non-mineral Exports and GDP, 1960-2005**  
 (Natural logs of billions of 1996 US dollars)



Source: Authors' calculations, based on data from the Central Bank of Chile.

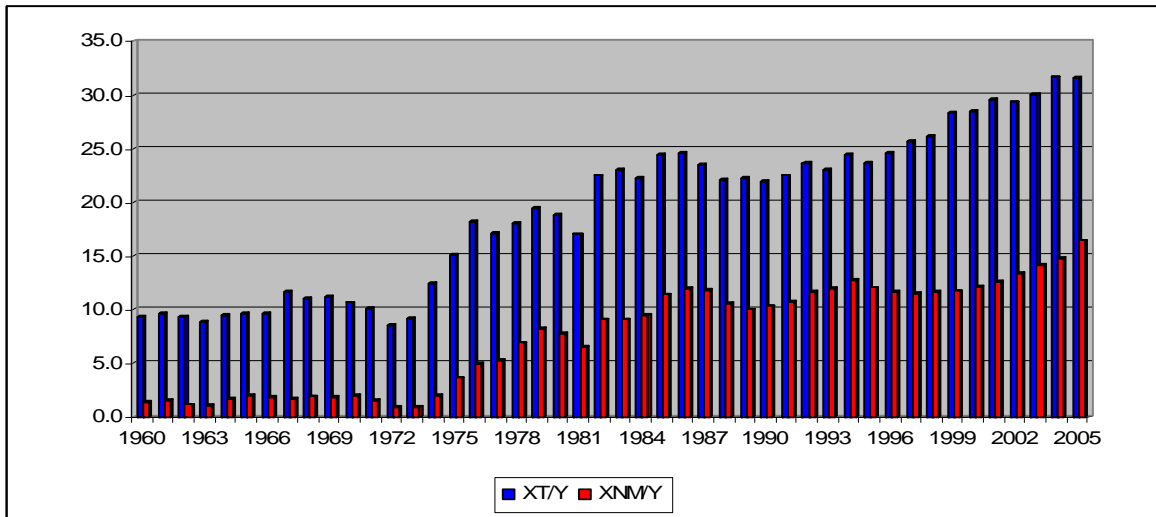
**Figure 3.**  
**Real Effective Exchange Rate and Average Tariff, 1960-2005**



Source: Authors' calculations, based on data from the Central Bank of Chile.

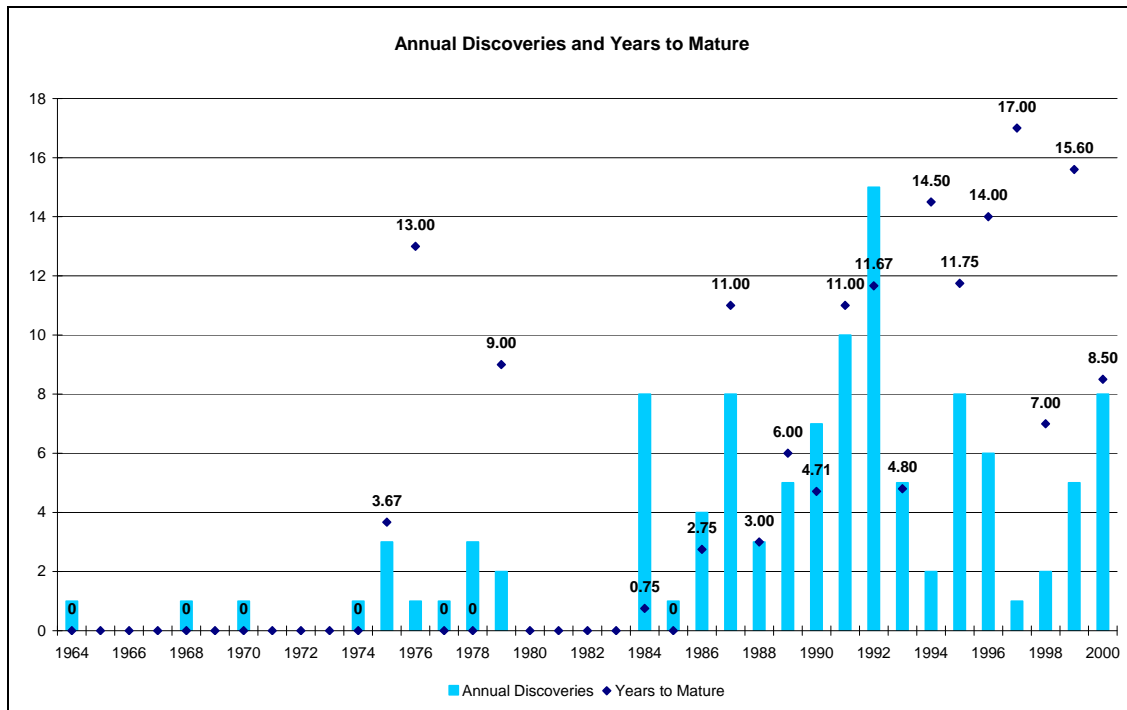


**Figure 4.**  
**Share in GDP of Exports of Goods and Services and Non-mineral Exports, 1960-2005**  
 (Percent; original data in 1996 prices)



Source: Authors' calculations, based on data from the Central Bank of Chile.

**Figure 5.**  
**Number of Export Discoveries and Average Number of Years to Maturation**



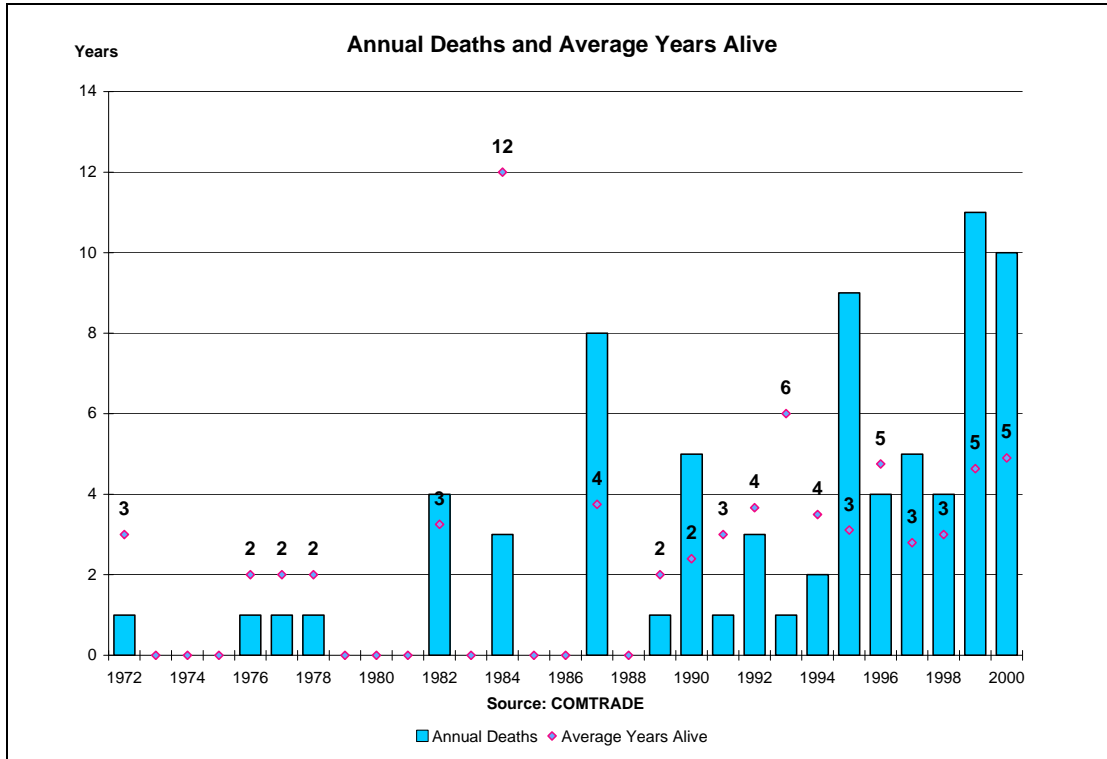
Source: COMTRADE, by way of the Feenstra database.

**Table 2.**  
**Value of Export Discoveries and Share of Discoveries in Non-mining Exports**  
(Millions of 1995 US dollars)

<b>Year</b>	<b>Discoveries</b>	<b>Non-mining exports</b>	<b>Share of discoveries (percent)</b>
1962	1.6	273	0.6
1963	2.0	274	0.7
1964	4.0	466	0.9
1965	3.7	516	0.7
1966	4.3	546	0.8
1967	2.8	417	0.7
1968	4.8	431	1.1
1969	5.7	465	1.2
1970	12.0	528	2.3
1971	14.3	575	2.5
1972	8.7	385	2.3
1973	13.5	385	3.5
1974	40.7	982	4.1
1975	42.6	1,248	3.4
1976	58.6	1,599	3.7
1977	81.7	1,803	4.5
1978	103.8	2,082	5.0
1979	139.4	3,124	4.5
1980	202.8	3,563	5.7
1981	182.2	2,585	7.1
1982	155.5	2,323	6.7
1983	202.4	2,112	9.6
1984	601.5	2,299	26.2
1985	527.9	2,224	23.7
1986	592.4	2,708	21.9
1987	785.4	3,396	23.1
1988	949.2	3,901	24.3
1989	1,179.3	3,821	30.9
1990	1,425.7	4,214	33.8
1991	1,636.5	4,940	33.1
1992	1,788.4	5,634	31.8
1993	1,734.3	5,443	31.9
1994	2,123.5	6,544	32.5
1995	2,274.0	8,174	27.8
1996	2,550.8	7,930	32.2
1997	2,728.5	8,236	33.1
1998	2,573.1	7,948	32.4
1999	2,625.4	8,170	32.1
2000	3,048.2	8,960	34.0

*Source:* Authors' calculations, based on information from Feenstra's database.

**Figure 6.**  
**Number of Annual Deaths and Average Number of Years Alive, 1962-2000**



Source: COMTRADE, by way of Feenstra database.

**Table 3a.**  
**Determinants of Gross and Net Discoveries, 1962-2000**  
(Poisson model)

	(1) Gross discoveries	(3) Net discoveries	(4) Gross discoveries	(6) Net discoveries
log(RER)	2.387** (0.408)	2.623** (0.550)	2.738** (0.481)	2.868** (0.605)
log(tariff)	-0.198 (0.237)	0.409 (0.305)	-0.617+ (0.357)	0.123 (0.481)
log(RERvol)			0.128+ (0.077)	0.072 (0.098)
log(Xgrowth)			-0.151 (0.598)	-1.297 (0.826)
Constant	-8.665** (2.138)	-12.070** (3.008)	-9.635** (2.285)	-12.602** (3.049)
Observations	37	37	37	37

**Table 3b.**  
**Determinants of Gross and Net Discoveries, 1962-2000**  
(Poisson model)

	(1) Gross discoveries	(3) Net discoveries	(4) Gross discoveries	(6) Net discoveries
log(RER (t-5))	2.009** (0.430)	2.159** (0.610)	2.005** (0.450)	2.260** (0.658)
log(tariff)	0.469 (0.350)	0.897+ (0.474)	0.456 (0.425)	0.812 (0.560)
log(RERvol)			0.002 (0.098)	0.043 (0.131)
log(Xgrowth)			0.307 (0.583)	-0.97 (0.818)
Constant	-8.590** (2.723)	-11.096** (3.851)	-8.571** (2.749)	-11.429** (3.945)
Observations	36	36	36	36

*Notes:*

1. The volumes of non-mineral exports are obtained from the national accounts and converted to constant 1996 U.S. dollars.
2. The real exchange rate is a real effective exchange rate estimated by the Central Bank. The base is 1986.
3. The tariff series is the average unweighted tariff.

*Source:* Authors' calculations.

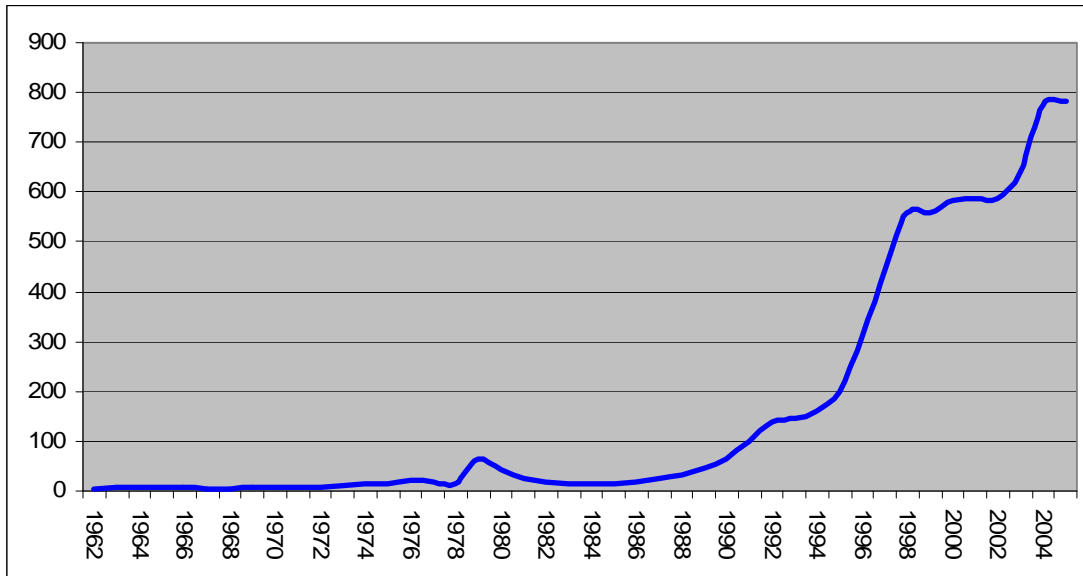
**Table 4.**  
**Impact of Discoveries, Net Discoveries, Cumulative Discoveries, and Cumulative Net Discoveries**  
**on Non-mineral Exports, 1962-2000**  
(Dependent variable: log of volume of non-mineral exports; OLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(discoveries)	0.767** (0.182)				0.224 (0.175)			
log(Cum. Disc.)		0.785** (0.030)				0.759** (0.078)		
log(Net Disc.)			0.924** (0.264)				0.207 (0.223)	
log(Cum. Net Disc.)				0.906** (0.040)				0.850** (0.106)
log(Copper Price)					0.375 (0.532)	0.004 (0.219)	0.271 (0.555)	0.046 (0.249)
log(RER)					1.497** (0.410)	0.081 (0.228)	1.469** (0.405)	0.133 (0.266)
Constant	7.155** (0.256)	5.533** (0.101)	6.888** (0.312)	5.461** (0.118)	1.409 (1.743)	5.273** (0.779)	1.367 (1.702)	5.066** (0.896)
Observations	26	42	17	42	26	42	17	42

*Note:* Standard errors in parentheses.

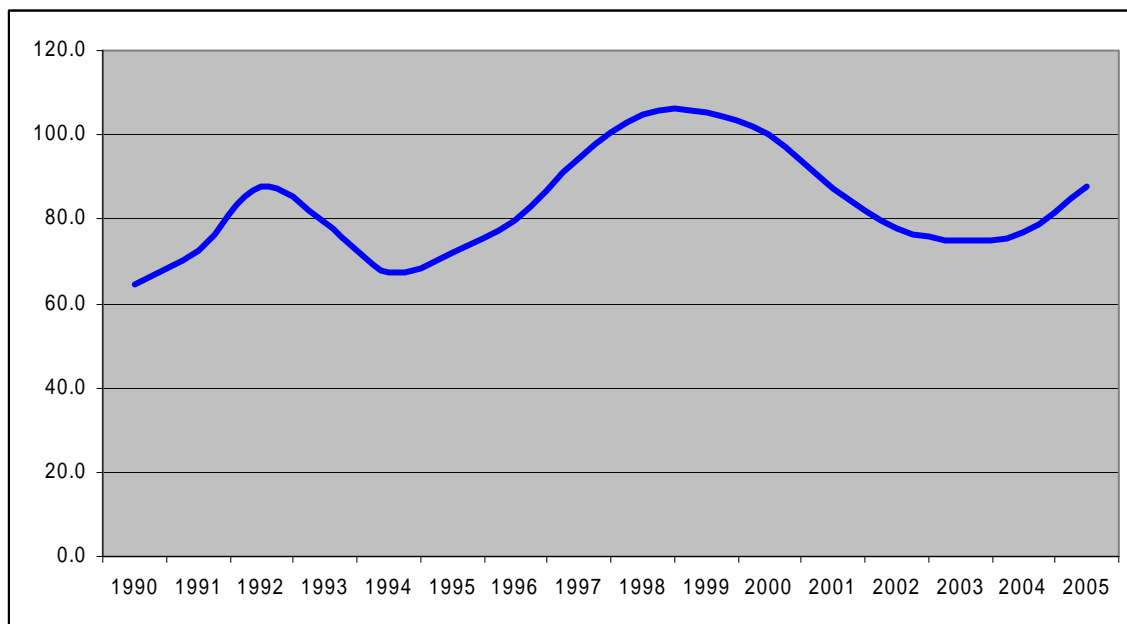
+ significant at 10%; \* significant at 5%; \*\* significant at 1%.

**Figure 7.**  
**Wine Exports, 1960-2005**  
 (Millions of US dollars)



Source: Authors' calculations, based on data from the Central Bank of Chile.

**Figure 8.**  
**Real Unit Value Index for Exported Chilean Wine**  
 (2000=100)



Source: Authors' calculations, based on data from the Central Bank of Chile.

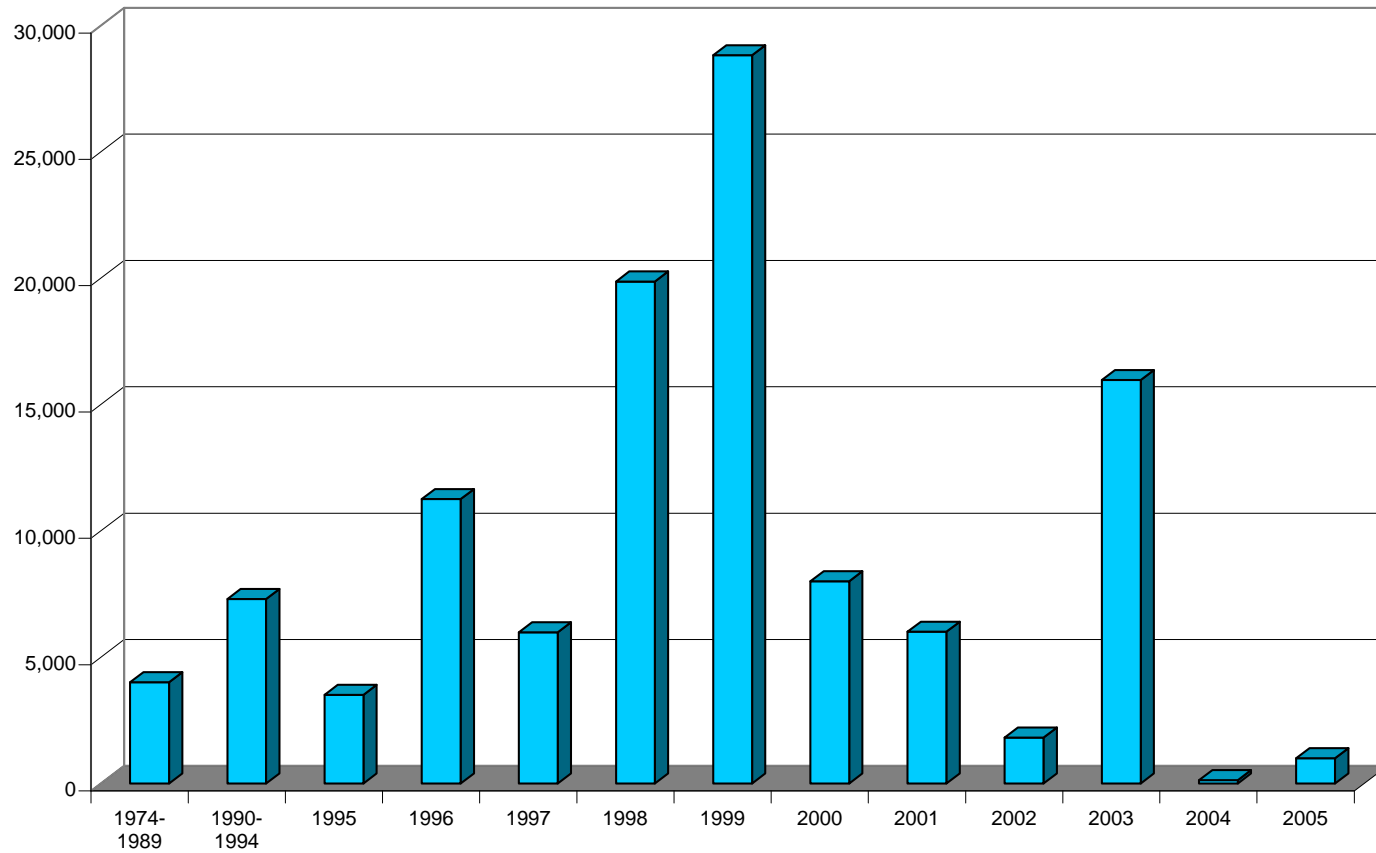
**Table 5.**  
**Hectares Planted to Wine Varietals of Grapes**

<b>Grape</b>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>
<b>Cab. Sauvig.</b>	11,112	12,281	13,094	15,995	21,094	26,172	35,967	38,227	39,261	39,731	40,086
<b>Merlot</b>	2,353	2,704	3,234	5,411	8,414	10,261	12,824	12,887	12,768	12,879	12,942
<b>Chardon-nay</b>	4,150	4,402	4,503	5,563	6,705	6,907	7,672	7,567	7,561	7,565	7,722
<b>Sauvignon Blanc</b>	5,981	6,135	6,172	6,576	6,756	6,564	6,790	6,673	7,041	7,368	7,741
<b>Ch Blanc</b>	103	106	93	98	104	95	76	49	52	51	76
<b>Pinot Noir</b>	138	215	287	411	589	839	1,613	1,450	1,434	1,422	1,440
<b>Riesling</b>	307	296	317	338	348	286	286	286	283	288	293
<b>Semillón</b>	2,708	2,649	2,616	2,427	2,425	2,355	1,892	1,860	1,843	1,821	1,715
<b>País</b>	15,990	15,280	15,280	15,241	15,442	15,457	15,179	15,070	14,949	14,953	14,865
<b>Carmenère</b>				330	1,167	2,306	4,719	5,407	5,805	6,045	6,545
<b>Syrah</b>			19	201	568	1,019	2,039	2,197	2,347	2,468	2,754
<b>Cabernet Franc</b>			17	64	138	316	689	823	869	925	1,056
<b>Others</b>	10,251	10,324	10,371	10,895	11,638	12,780	14,130	14,475	14,356	14,580	14,821
<b>Totals</b>	<b>53,093</b>	<b>54,392</b>	<b>56,003</b>	<b>63,550</b>	<b>75,388</b>	<b>85,357</b>	<b>103,876</b>	<b>106,971</b>	<b>108,569</b>	<b>110,097</b>	<b>112,056</b>

Source: Catastro Vinícola Nacional 2004, SAG.

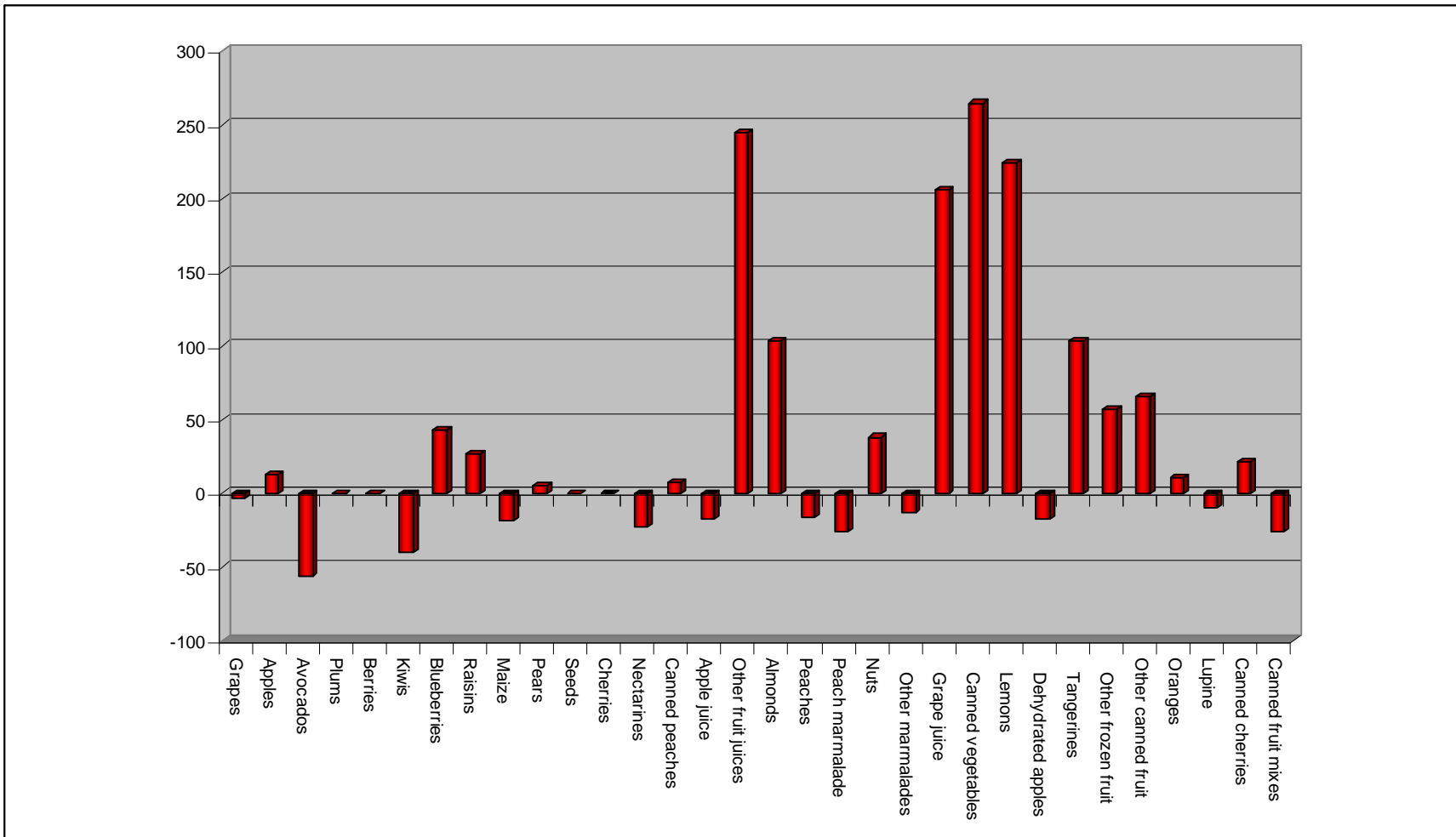
**Figure 9.**  
**Foreign Investment in the Wine Industry**  
(Thousands of current US dollars)

**Foreign Direct Investments in the Wine Industry**



*Source:* Foreign Investment Committee.

**Figure 10.**  
**Fresh and Prepared Fruit Export Unit Value Changes, 1990-2005**  
 (Percentage change)



Source: Authors' calculations, based on data from the Central Bank of Chile.



**Table 6.**  
**Export Values and Growth Rates of Major Fruit Exports, 1962-2005**  
(Millions of US dollars)

	<b>1962</b>	<b>1990</b>	<b>2005</b>	<b>Growth 1963-1990</b>	<b>Growth 1991-2005</b>
Grapes and raisins	7.4	464.0	870.3	15.9	4.3
Apples	5.3	131.7	296.5	12.2	5.6
Pears	7.7	55.8	65.6	7.4	1.1
Nuts and almonds	15.9	22.3	80.1	1.2	8.9
Oranges, tangerines	0.0	0.3	26.3	...	34.7
Lemons	1.2	0.7	19.9	-1.9	25.0
Avocados	0	37.6	150.3	...	9.7
Blueberries	0	0.2	84.5	...	48.2
Other berries	0	30.7	110.6	...	8.9
Kiwis	0	33.9	97.3	...	7.3
Processed fruits	9.8	80.1	329.4	7.8	10.6
<b>Total</b>	<b>47.2</b>	<b>919.0</b>	<b>2,564.2</b>	<b>11.2</b>	<b>4.8</b>

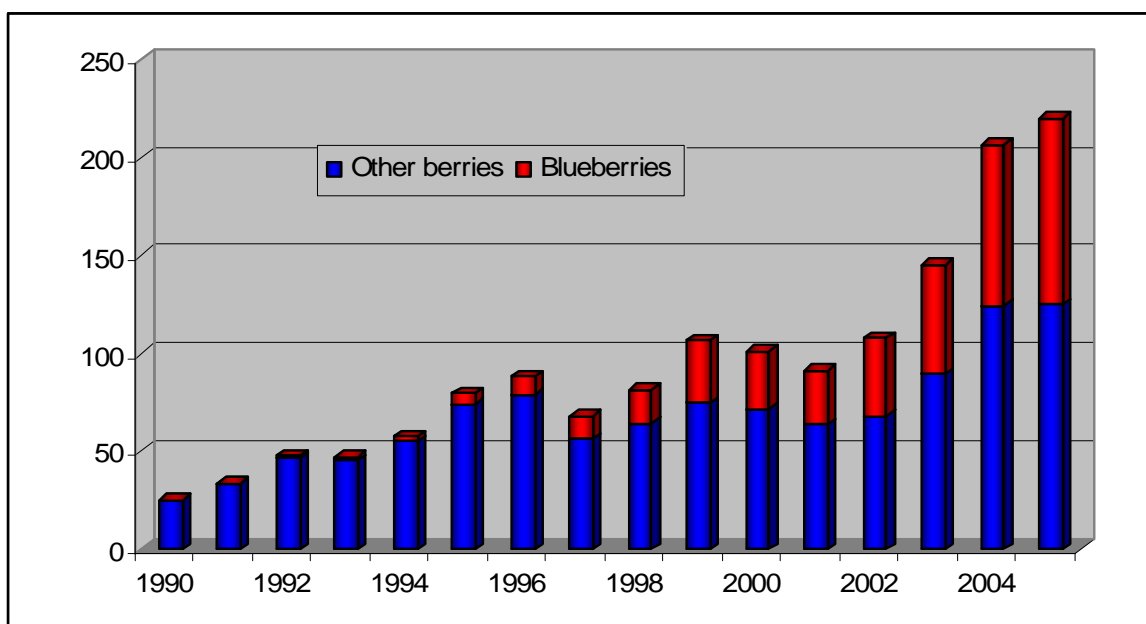
*Source:* Authors' calculations, based on Feenstra's database, COMTRADE, and the Central Bank of Chile trade database.

*Note:* Feenstra's database is available from 1962 through 2000; COMTRADE has data from 1984 through 2004. Both are at the four-digit SITC level. The Central Bank uses its own classification of data, in order to highlight Chile's main export products. Most data are at the five-digit level. The rate of growth for total fruit exports for 1991-2005 was estimated with Central Bank data, which are somewhat higher than in the other two databases. Thus, the Central Bank estimate of total fruit exports for 1990, when converted to 2000 dollars, is US\$1,263 million, which is the figure used in the calculation of the growth rate. The figure for processed fruit exports in 2005 corresponds to 2004 and is taken from COMTRADE. Therefore, the growth rate for processed fruit exports for 1991-2005 corresponds to 1991-2004.

**Table 7.**  
**Exports of Chilean Fruits and Vegetables with Values of Less**  
**than US\$10 million in 1990**  
(Millions of US dollars)

	<b>1990</b>	<b>2005</b>	<b>Growth rate (%)</b>	<b>Year of discovery</b>
Blueberries	0.2	84.5	48.3	1993
Frozen raspberries and redcurrants	8.7	62.4	14.0	
Vegetable seeds	10.2	43.4	10.2	
Other fruit juices	3.3	40.8	18.3	
Shelled almonds	2.6	40.6	20.1	
Peach marmalade and pulp	2.3	28.6	18.3	
Shelled nuts	3.2	28.0	15.5	
Other fruit marmalade and pulp	3.5	23.8	13.7	
Grape juice	2.4	22.0	15.9	
Canned vegetables without vinegar	1.9	21.3	17.7	
Lemons	0.9	19.4	23.2	1993
Tangerines	0.0	16.8	80.5	1996
Other frozen fruit	3.8	16.7	10.3	
Frozen strawberries	2.7	15.4	12.2	
Other canned fruit	2.8	11.9	10.2	
Seeds from herbaceous plants	0.1	9.7	37.5	
Oranges	0.4	9.5	23.7	2000
Lupine	1.7	9.2	12.0	
Melon and watermelon seeds	4.8	9.0	4.3	
Frozen blackberries	3.4	8.9	6.5	
Canned cherries	3.9	8.1	5.1	
Canned fruit mixes	1.4	7.6	11.9	
Other seeds	2.0	5.2	6.6	
Sunflower seed	0.9	4.8	11.5	1992
Oregano	1.7	4.7	6.8	
Chicory	0.0	3.6	40.6	1992
Other canned vegetables	0.2	3.3	20.5	1993
Unshelled almonds	0.5	1.9	9.2	2004
<b>Total</b>	<b>69.5</b>	<b>561.3</b>	<b>14.9</b>	
<b>Total fruit and vegetable exports</b>	<b>1,263.00</b>	<b>2,564.2</b>	<b>4.8</b>	

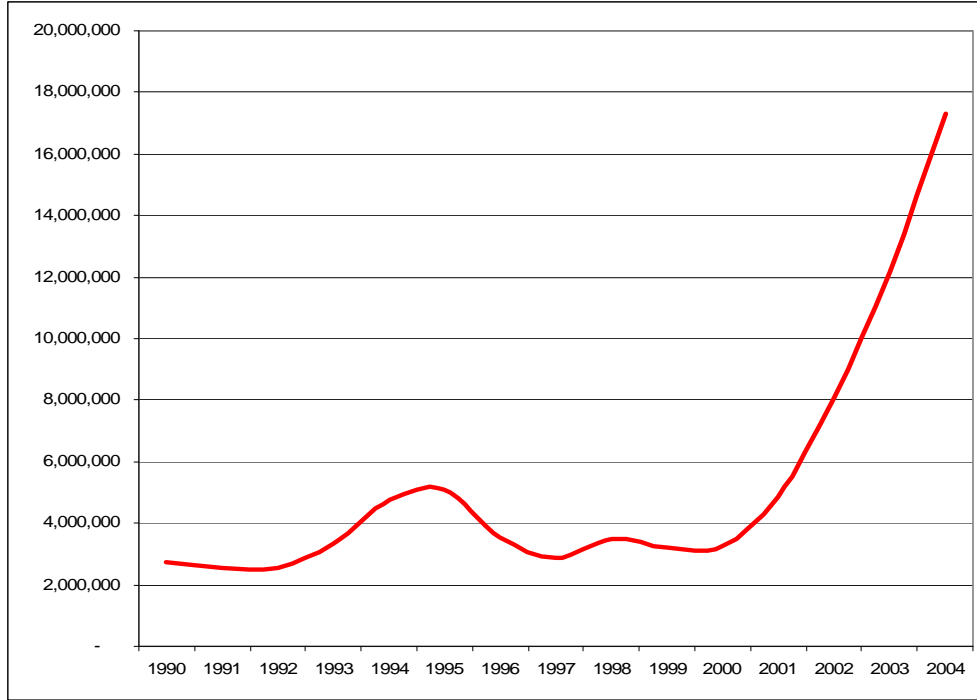
**Figure 11.**  
**Exports of Blueberries and Other Berries, Fresh and Frozen**  
(Million of US dollars)



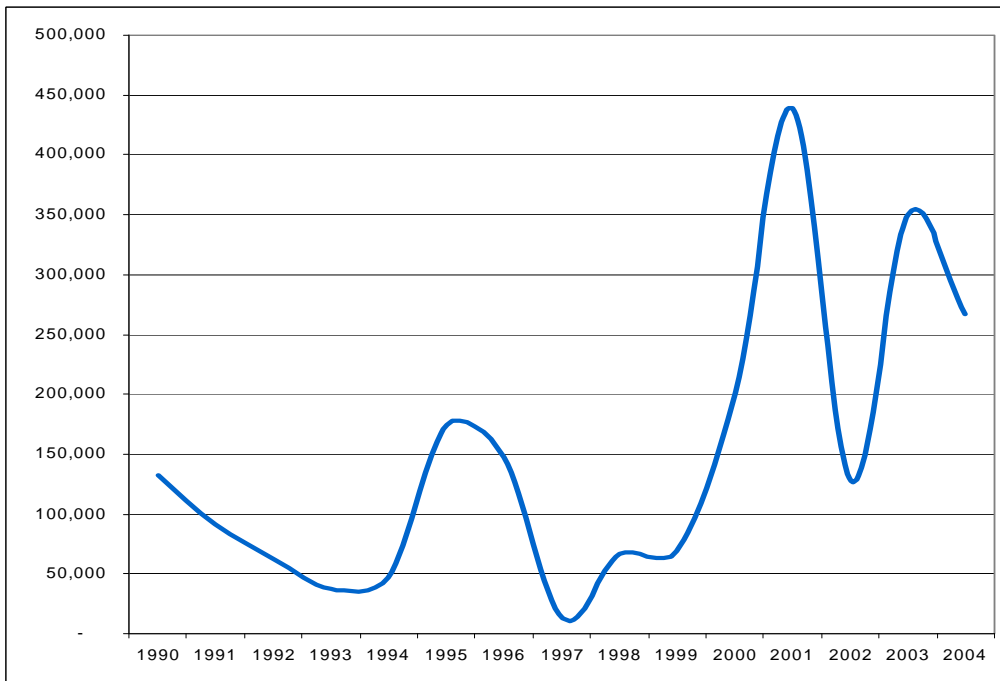
*Source:* Authors' calculations, based on data from the Central Bank of Chile.

**Figure 12.**  
**Exports of Fresh and Frozen Strawberries, 1990-2004**  
 (2000 US dollars)

**Frozen**

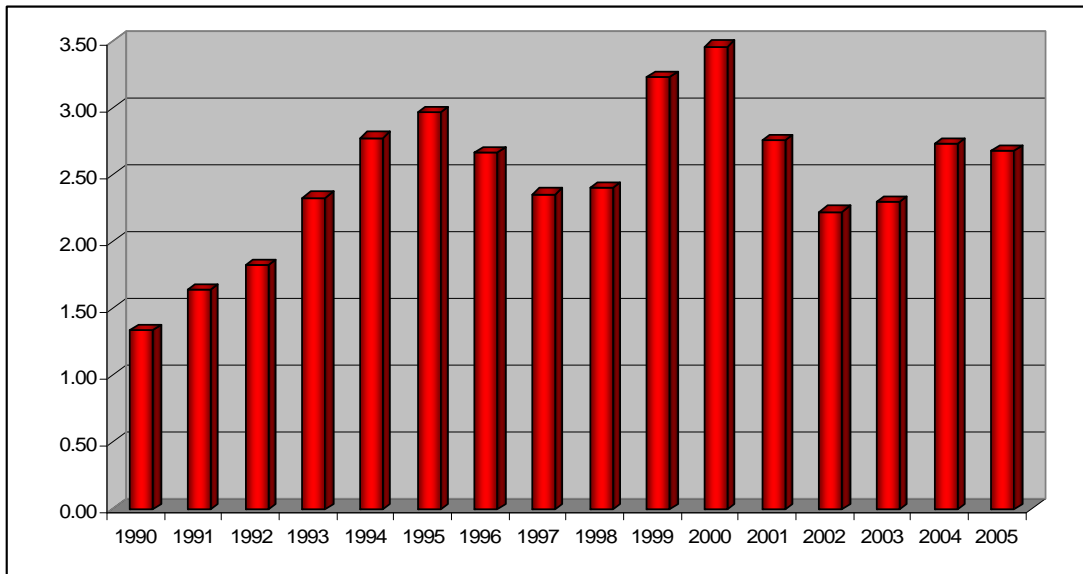


**Fresh**



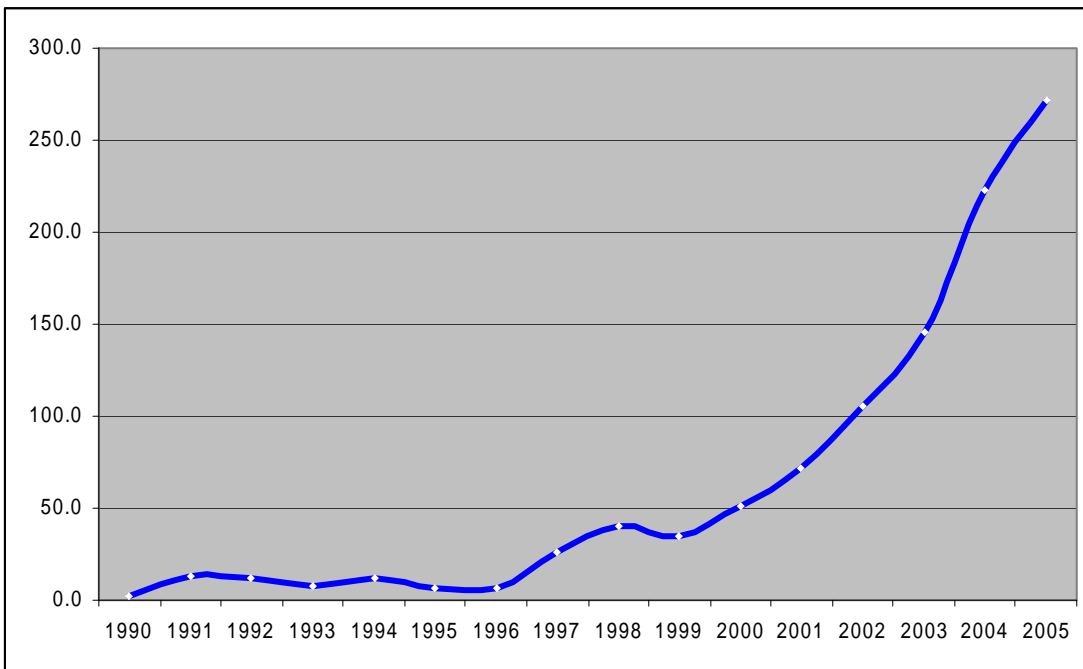
Source: Authors' calculations based on data from the Central Bank of Chile.

**Figure 13.**  
**Unit Value of Chilean Blueberry Exports, 1990-2005**  
 (Unit values in US dollars deflated by the US GDP deflator)



Source: Authors' calculations, based on data from the Central Bank of Chile.

**Figure 14.**  
**Pork Meat Exports, 1990-2005**  
 (Millions of 2000 US\$)



Source: Authors' calculations based on data from the Central Bank of Chile.

**Table 8.**  
**Sector-specific Public and Semi-public Goods Provided by Government or Business Associations**

<b>Public/semi-public good</b>	<b>Agency (Public/Business associations)</b>	<b>Wine</b>	<b>Fruit</b>	<b>Pork</b>
<b>Pure public goods</b>				
Technology investment/ Ag. research	INIA/Fundación Chile	Moderately useful	Very useful in blueberries	<b>Not used</b>
Negotiating FTAS	Ministry of Foreign Affairs	Very useful	Very useful	<b>Very useful</b>
Negotiating sanitary agreements	SAG	Indispensable	Indispensable	<b>Indispensable</b>
Protecting natural assets	SAG	Indispensable	Indispensable	<b>Indispensable</b>
Ensuring quality standards	SAG; and <i>ChileVid, AVC, and ASOEX</i>	<i>ChileVid, AVC</i> – very useful	ASOEX – very useful	<b>Mainly SAG and large private producers – very useful</b>
Promoting country image	ProChile; and <i>ChileVid, AVC, and ASOEX</i>	Very useful	Moderately useful	<b>Not needed – mostly private efforts to ensure quality</b>
Developing food safety standards that are acceptable to major buyers	ASOEX	Not needed	Very useful for penetrating European market	<b>Done privately by large producer</b>
<b>Semi-public goods/Services with economies of scale</b>				
Training/technology transfer	Programa Chile California 1965-78 (Ford Found./U. of Chile/U. California)	Very useful	Indispensable	<b>Not used</b>
Promoting associations of small producers	CORFO: PROFOs	Indispensable for boutique vineyards	Not important	<b>Not important</b>
Promoting business associations	CORFO	Very useful	Not used	<b>Not used</b>
Quality of input suppliers	CORFO: Supplier Development Program	Indispensable	Indispensable	<b>Not important</b>
Attendance at fairs in major markets	ProChile	Very useful	Useful	<b>Not important</b>
Inspections in Chile by USDA	ASOEX	Not needed	Very useful	<b>Not needed</b>
<b>Promoting R&amp;D through joint ventures with universities</b>	<b>CORFO: INNOVA; and <i>ChileVid, AVC, and ASOEX</i></b>	<b>New program used by <i>AVC and ChileVid</i></b>	<b>New program used by <i>ASOEX</i></b>	<b>Not used</b>

**Annex:  
Firms and Individuals Interviewed**

<b>Name of firm/person</b>	<b>Type of firm/Role</b>
<b>Wine</b>	
Concha y Toro	<b>Market leader</b>
Miguel Torres	<b>Technological innovator – large</b>
Cánepa	<b>Technological innovator – medium</b>
Santa Carolina	<b>Large producer for domestic market and exports</b>
J. Bouchon	<b>Small exporter</b>
Viu Manent	<b>Small exporter</b>
Santa Rita	<b>Large producer for domestic market and export</b>
Montes	<b>Medium-size exporter of premium wines</b>
Morandé	<b>Small exporter</b>
Marcial Mena	<b>Wine industry consultant</b>
Jorge Gutiérrez	<b>Vice President, ChileVid</b>
Elena Carretero	<b>Manager of Vinnova</b>
Jacobo Alvarez	<b>Owner of Marmevit.</b>
Luisa Cánepa	<b>Daughter of José Cánepa</b>
<b>Fruit</b>	
Miguel Canala-Echeverría	<b>General Manager, ASOEX</b>
Andrés Luna	<b>Sales Manager, Dole Chile</b>
<b>Blueberries</b>	
Hortifruit	<b>Market leader</b>
Vital Berry	<b>Market leader</b>
Agroberries	<b>Large berry exporter</b>
Driscolls de Chile	<b>Diversified fruit exporter</b>
Plutarco Dinamarca	<b>Consultant, berries, Fundación Chile in 1980s</b>
Alex Sawadi	<b>ProChile berry specialist</b>
Ignacio del Río	<b>Partner of Vital Berry</b>
Carlos Muñoz	<b>Berries expert of the INIA</b>
<b>Pork meat</b>	
Nippon Meat	<b>Foreign trader</b>
Agrosuper	<b>Market leader</b>
Frigorífico O'Higgins (FRIOSA)	<b>Medium-size exporter</b>
<b>Lo Valledor Aasa</b>	<b>Medium-size exporter</b>