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INTENSIVE AND EXTENSIVE MARGINS**

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# CHILEAN EXPORT PERFORMANCE: THE ROL OF INTENSIVE AND EXTENSIVE MARGINS

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## Abstract

The paper presents a detailed description of the evolution of non-copper exports in the 1990-2007 period and decomposes its evolution in terms of the intensive and extensive margins. I document a significant export diversification in terms of markets and products. In the product dimension, diversification has occurred both for overall exports but also within the main exporting markets. In addition, the decomposition of exports growth into intensive margin (persistent exports) and extensive margins (new exports) indicates that export growth at the extensive margin contributed significantly to overall non-copper export growth, and particularly in the first half of the period.

## Resumen

Este artículo presenta una descripción detallada de la evolución de las exportaciones de productos no cupríferos durante el período 1990-2007 y descompone su evolución en términos de sus márgenes intensivo y extensivo. Se documenta una significativa diversificación de las exportaciones en términos de mercados y productos. En la dimensión de productos la diversificación ha ocurrido tanto para el conjunto de las exportaciones como también en cada uno de los principales mercados de exportación. Además, la descomposición del crecimiento de las exportaciones en margen intensivo (exportaciones persistentes) y extensivo (nuevas exportaciones) indica que el crecimiento de las exportaciones en el margen extensivo contribuyó significativamente a crecimiento de las exportaciones no cobre, particularmente en la primera mitad del periodo.

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## 1. Introduction

Increasing exports and export diversification have been linked to better economic performance in the aftermath of terms of trade shocks and its resulting adjustments. They have also been connected to productive diversification, sectorial total factor productivity, economic growth, and income levels. There is also a growing recognition of the relevance of new exporting activities in international trade, particularly for developing countries. Despite the Chilean success in foreign markets, little attention has been paid at thoroughly describing and understanding the Chilean exporting performance and different aspects of its export diversification.

In general, exports at the country level can grow in two separate directions. First, countries can export more of the products they are already trading, which is defined in the literature as the *intensive* margin. Second, countries can sell already traded products to new markets, new products to existing markets or new products to new markets. These three constitute the so called *extensive* margin. In order to study Chilean export performance and diversification, this paper presents first, a detailed description of non-copper exports between 1990-2007, analyzing export diversification along several dimensions, including markets, products and industries. Then, it decomposes export growth into its intensive and extensive margins for overall and market-level exports in order to quantify the importance of new markets and products in export performance.<sup>1</sup>

Results indicate a significant a diversification along all dimensions of aggregated exports and a large role of the extensive margin during the entire period. In terms of the market dimension, there has been a systematic increase in the number of markets that non-copper exports reach—from 111 in 1990 to an average of 148 markets after 1998—and at the same time, market concentration to the main exporting countries has declined. In terms of the exporting basket, the number of products in the early 1990s

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<sup>1</sup> The average yearly share of copper-based exports is 45% during this period. Given the high concentration of total exports in copper related products, any analysis of export diversification would be highly distorted by its inclusion. Thus, this paper considers only non-copper exports in its analysis. Using COMTRADE data reported according to the Harmonized System (HS 1988-1992) at the 6-digit level, I excluded all products that included the words “copper” or “molybdenum” in their description. The main two excluded products 740311 “Copper cathodes and sections of cathodes unwrought”, and 260300 “Copper ores and concentrates” account for about 80 percent of overall copper exports during the period. In total, 73 products were eliminated. The full list of excluded products is available upon request.

experienced important growth, and most interestingly, product diversification has occurred with almost all of Chile's significant trade partners. This process of diversification was associated first with a broadening of the exporting basket to Latin American countries, and later with larger, more developed, and more distant partners. As a result of the broadening of the exporting basket, the industry composition has also changed, with the emergence of the animal and animal products industry as the main compositional change.

In terms of growth of exports at the margins, the decomposition of intensive and extensive margin carried out indicates that the extensive margin has played a significant role.<sup>2</sup> Between 1990 and 1999 more than half of total exports growth occurred at the extensive margin, and within these new exports the most important category was trade of new product-market categories followed by new products. Interestingly, growth of new exports remained strong between 1999 and 2007, although it became relatively less important in second half of the period given faster growth in the intensive margin.

The remainder of the paper is organized as follows: section 2 reviews the literature on extensive and intensive margins. Section 3 describes the data and section 4 provides a general overview of recent Chilean export performance and diversification emphasizing the role of the market and product dimension. Section 5 presents a decomposition of intensive and extensive margins and analyzes its evolution. Section 6 discusses the main conclusions.

## **2. Extensive and Intensive Margins of Exports**

Recent literature on export diversification has focused on the role of these margins in order to understand how trade has grown and its determinants. Amurgo-Pacheco and Pierola (2008) find that export growth at the extensive margin is influenced by market size, proximity and the presence of preferential trade agreements. This paper aims to look at how much of the recent Chilean export growth is

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<sup>2</sup> For a review of the literature on the margins of international trade see, among others, Felbermayr and Kohler (2006), Besedes and Prusa (2007), Helpman, Melitz and Rubinstein (2007), and Easterly et al. (2009).

the result of expanding trade of existing goods in comparison to that of expanding into new export goods, i.e., how have the intensive versus extensive margins evolved in Chilean exports.

International trade models differ on the type of margin they use to explain the changes in patterns of trade (Bernard et al, 2007). Neoclassical models *a la* Heckscher-Ohlin are based on the intensive margin. Models inspired in the seminal work of Dornbusch, Fischer and Samuelson (1977) and Krugman (1979) include trade in new goods after changes in policy or structural parameters (e.g. transport costs, tariffs, and real income, among others), and more recent models based on firm heterogeneity are able to display both types of trade.<sup>3</sup>

From the stand point of economic policies, the main difference between export growth in the intensive versus extensive margin is related to export diversification. In particular, the higher the growth of exports in the extensive margin the broader the export basket. A broader export basket reduces the risks of balance of payment crisis and large fluctuations in domestic output after shocks that can negatively affect the performance of the external sector, such as price fluctuations in international markets—if prices of products are not correlated—or output swings in trading partners (Agosin, 2007; Lederman and Maloney 2003).<sup>4</sup> In addition, as shown by Feenstra and Kee (2004), increases in sectorial export variety boost country productivity as the new exporting basket can improve the use and allocative efficiency of the economy. The increases in productivity depend on the elasticity of substitution in production between the different varieties. As they point out, every time there is new variety, the economy becomes more efficient in its use of endowments, and the efficiency increases the more different the varieties are in terms of production.

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<sup>3</sup> In this paper I analyze margins at the country level. Using Chilean plant-level data Alvarez and López (2004 and 2005), Pavnick (2002) and Bergoeing, Micco and Repetto (2005) have shown that consistent with the international literature, Chilean exporters are, among others, larger and more productive, and that there are substantial self-selection in exporting activities, as well as learning-by-exporting and productivity gains due to resource reallocation to more productive plants. For a review of the theoretical literature on firm heterogeneity and international trade see Bernard et al. (2007).

<sup>4</sup> I thank an anonymous referee for pointing out that risk reductions can be achieved not only by increasing the number of products, but that it is also important to consider the structure of the variance-covariance matrix of international prices of those products.

Product variety has also been linked to per capita income levels (Funke and Ruhwedel, 2001), economic development and productive diversification (Klinger and Lederman, 2004 and 2006), and sectorial total factor productivity (Feenstra et al., 1999), thus reinforcing the evidence that outward-oriented trade regimes are good for growth, as they make a greater variety of products and technologies available. Furthermore, and from the perspective of a large country, Hummels and Klenow (2005) indicate that exports growth based solely on the intensive margin can have terms of trade effects, which can be reduced by broadening the exporting base of the country.

Exports diversification in Chile has been partially discussed by Agosin and Bravo-Ortega (2009) and Álvarez and Lemus (2001). The former carried out a case study of three new successful sectors: the wine industry, blueberries and pork meat. Additionally, using data from 1962-2000, they document an important degree of export diversification of non-mineral exports and that new export activities have a significant impact on the volume of non-mineral exports. Álvarez and Lemus (2001) studied diversification with a Gini coefficient for Chilean exports, and they determined structural changes for the 1960-1999 period, finding that during the first half of the 1970s and late 1980s, export concentration decreased. During the 1990s, there was reverse trend towards more concentration, although there is no statistically significant evidence to support a structural change in the diversification trend. However, their study provides evidence that during the 1990s there was a deceleration of export diversification, thus suggesting a reduction in the extensive margin, but without providing conclusive evidence.

Given the growing recognition of the importance of the effects of export diversification on productivity, income, and export performance, and the lack of a detailed study on the margins of Chilean exports, the present study contributes to the literature by analyzing the evolution of the intensive and extensive margin of between 1990 and 2007, using several indicators and measures of export diversification and margins.

### **3. Data**

In order to carry out the analysis of the evolution of extensive and intensive margins on non copper exports I need to have disaggregated, consistent and comparable export data over time. I use COMTRADE data for the period 1990-2007 covering merchandise exports. For the product or industry data I use Chilean export data reported according to the Harmonized System (HS 1988-1992) at the 6-digit level of disaggregation.

Global trade, as well as Chilean exports, started to decline in 2008 as a result of the international distress generated by the financial crisis of 2008. As Freund (2009) has shown, international trade experiences larger swings than output around period of crisis, thus I analyze Chilean exports only until 2007. Also, to avoid problems with the frequency of the export relationships, as trade in some products might naturally have a low frequency (lower than annual), I constructed two-year average exports by product (in constant 1990 US dollars) for some of the series analyzed.<sup>5</sup>

#### **4. General Overview of Chilean Trade**

Chilean total exports during the 1990-2007 period can be decomposed into three different subperiods (see Figure 1). In 1990 nominal exports were \$8.5 billion, and they grew at an annual rate of 13.3 percent between 1990 and 1995, almost doubling during these five years. In 1996, a seven-year period of low exports growth began, in which exports grew only 1.3 percent per year. The last period begins in 2003 until the end of the sample in 2007, when there is an extraordinary increase in total exports with an average annual growth rate of 30.4 percent. In 2003 exports were \$20.1 billion and by 2007 they had more than tripled reaching \$65.7 billion. The main explanation for this unprecedented level and growth of exports is a similar increase in copper exports, which in turn, is mainly explained by a shock in copper prices.

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<sup>5</sup> Series in constant 1990 US dollars were constructed deflating nominal trade figures with the US CPI. An alternative would be to deflate nominal trade with unit values; however, COMTRADE data does not provide unit values for all products. Therefore, in order to analyze export diversification with the largest product data possible, I have used a common deflator for all products.



As Chilean exports are highly concentrated in copper products, in order to analyze export diversification I will concentrate on the evolution of non-copper exports.<sup>6</sup> As can be seen in Figure 1, exports of non-copper products followed a similar pattern as total exports, with high export growth in the first five years (15 percent annually), low export growth between 1996 and 2003 (3 percent) and faster export growth after 2004 (17 percent annually).<sup>7</sup>

Before decomposing Chilean export performance into extensive and intensive margins, I will look in greater detail at the different dimensions that comprise these margins: markets and products. Within the product dimension I will also analyze the evolution in the number and the type of exported products.

### *Market Dimension*

In the market dimension, Figure 2 shows that the number of markets to which Chilean non-copper exports enter has increased systematically, from 111 in 1990 to a maximum of 153.<sup>8</sup> Concentration, measured by a Herfindahl-Hirschman Index (HHI) and the share of trade of the ten most important markets, presents a declining trend (Figure 3). Within the main markets, it is interesting to notice the significant decline in the share of the three traditionally main markets: the EU15 group from 30 percent to 21 percent, the United States from 24 to 21 percent, and Japan from 16 percent to 8 percent.<sup>9</sup> Also, there is an increasing relevance of developing markets for these products, particularly from Latin America which increased its share of all non-copper exports from 19 percent in 1990 to 31 percent in 2007.

The evolution over time of non-copper exports by country in the main exporting markets is described in Figure 4.<sup>10</sup> There are several interesting features arising from this figure. First, consistent with the standard gravity models of trade, the largest volumes of non-copper exports are directed to the largest economies: the EU15 group, the United States, and Japan. The same occurs within Latin American

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<sup>6</sup> In 1990, the share of copper in total exports was 49 percent and followed a declining trend until 2003 when it reached 39 percent. Since then it climbed steadily up to 64 percent of total exports in 2007.

<sup>7</sup> Here we classify as copper exports any exports of copper or molybdenum products. Molybdenum is included as part of copper exports because it is the most important byproduct of copper production. Within the HS 6-digits classification there were 69 copper and 4 molybdenum products.

<sup>8</sup> During the same period the universe of countries included in the data remains constant at 187 countries, thus movements in the number of markets are not driven by the appearance or disappearance of countries.

<sup>9</sup> The EU15 group here refers to the 15 initial members of the European Union.

<sup>10</sup> Main exporting markets are those where exports were larger than US\$95 million in at least one year during the period.

countries, where the largest markets in terms of income (Mexico, Brazil and Argentina) are also the larger export destinations. The role of income as a major determinant of exports is also reinforced by the sustained increase in exports, particularly after 2000, a period in which growth accelerated in most regions of the world, and also by the fact that two of the main declines in exports at the bilateral level—with Argentina and Bolivia—were observed during years of severe economic crisis in those countries. Second, there is an important participation of Latin American countries among the main export partners and, interestingly, within this group there are 4 small countries from Central America.<sup>11</sup> Third, among the countries with the strongest growth, both in terms of volume and speed, are two of Chile's neighboring countries; Argentina and Peru. The last two facts underscore the importance of transaction and trade cost as determinants of trade volumes, which is consistent with the standard trade literature. In particular, they suggest that distance—which has been traditionally used as a proxy for transport costs—might be a significant determinant of export diversification. An alternative explanation is that other transaction costs might presumably be lower for Latin American countries, such as information about consumer preferences, product adaptation, and information gathering, among others.

### ***Product Dimension***

***Number of Products:*** In terms of the product dimension, I study the evolution of the number of products exported using data on Chilean exports classified at the 6-digit level (HS1988-1992). Figure 5 reports the number of products for a group of selected countries.<sup>12</sup> Overall, Chile has exported 4,725 product-categories during this period. In 1990 the number of product-categories was 2,566 and it increased steadily until 1996 when it reached 3,341. Since then, the number has fluctuated around an average of 3,366. The general trend of increasing numbers of products is also present in most of the selected countries. One striking difference, relative to the trends in the market dimension, is that the leading countries in terms of products are not the largest markets. In fact, within this group most countries are developing ones located in Latin America. For instance, the leading market in 1990 was Bolivia with

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<sup>11</sup> In addition, another feature of exports to Latin American countries is that for all countries, except for Brazil and, to a lesser degree Mexico, most exports are non-copper products.

<sup>12</sup> Those with more than 1,850 product-categories traded over the whole period

958 product-categories, followed by the United States (771), Argentina (504), Peru (465), Paraguay (417), Uruguay (373), the United Kingdom (306) and Germany (290). By 2007, countries with the broadest assortment of Chilean products were its three bordering countries: Peru (2,009), Argentina (1,692) and Bolivia (1,661). They were followed by the United States (1,273), Uruguay (1,066), Ecuador (1,053), Brazil (960), Mexico (940), Colombia (939), Venezuela (763) and Paraguay (706).

Also, the evolution of categories exported to the countries with the most products, such as Argentina, Bolivia and Peru, closely follows the one observed at the overall level, with the number of products increasing rapidly during the early 1990s, and later becoming more stable.<sup>13</sup> In contrast, most other partners follow a more parsimonious trajectory that, if anything, tends to quicken its pace in the second half of the period. This suggests that the pattern of export diversification might start with products exported first to neighboring countries, to later expand into more distant and developed markets. This in turn could suggest that if exporting activities have a fixed cost that varies according to distance or information requirements—presumably lower due to transaction costs for these countries—then exports would go first to these markets.

**Types of Products:** In terms of exports by type of products, Figure 6 describes the evolution of the share of exports at the industry level.<sup>14</sup> It shows that the most significant change in non-copper exports is an increasing participation of animals and animal products from 9.2% to 15.9%, as well as a decline in prepared foodstuff, from 17.4% to 13.1%, and vegetable products, from 20.8 percent to 14 percent. The metal and mineral sector had different trajectories. The former experienced a declining share and the latter and slight increase from initial levels. There is also a significant growth of two new industries, machinery and electrical equipment, and plastics and rubbers. Finally, the share of exports of other industries almost doubled, indicating a further diversification of the exporting basket.

The general picture arising from the evolution of Chilean exports is positive. Even within a context of fast growing copper exports, non-copper exports experienced an average growth of 10.4 percent

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<sup>13</sup> The large increase in products exported to these three countries is not due to an increase in products exported exclusively to these destinations.

<sup>14</sup> Industries are defined as HS 2-digit categories.

annually. In terms of market diversification, the country's exports are reaching more than 40 additional markets at the end of the period compared to 1990. The exporting basket experienced a significant growth in the number of products in the early 1990s, and this diversification has occurred with most of Chile's relevant trade partners. Interestingly, it was associated first with a broadening of the exporting basket to Latin American countries and later with larger, more developed, and more distant partners. The pattern of export diversification is consistent with a comparative advantage relative to Latin American countries in manufactures, vegetables, process foodstuff and wood products. These products comprise most of the increase in the number of products to Latin American countries. In turn, the comparative advantage is likely to be arising from a combination of endowment differences, particularly in sector such as wood and vegetables, and technology advantages in manufactured sectors and processed food.

## 5. Decomposing Intensive and Extensive Margins

This section analyzes the evolution of intensive and extensive margins following Amiti and Freund (2007) and Brenton and Newfarmer (2007) decompositions. I explicitly take into account the different contribution of product and market dimensions of the extensive margin to see what fraction is accounted by either margin. At an aggregated country level the product and market dimensions can be decomposed in terms of how systematic exports are conducted, i.e., products and markets can be persistent, new and disappearing. Incorporating the product and markets dimension, total exports can be defined as

$$X_t = \sum_{i=1}^{I_t} \sum_{k=1}^{K_t} x_{iik} , \text{ where } x_{iik} \text{ are exports of product } k \text{ to market } i \text{ in period } t, I_t \text{ is the set of exporting}$$

markets in period  $t$ , and  $K_t$  is the set of products exported in period  $t$ .

Each of these two sets ( $I_t$  and  $K_t$ ) can be decomposed in terms of persistency. The set of partner countries in period  $t$  and  $t-1$  can be defined (with respect to exports in period  $t$ ) as:  $I_t = I_t^P + I_t^N$  and  $I_{t-1} = I_t^P + I_t^D$ . Here  $I_t^P$  is the set of persistent partners (those that received exports in  $t$  and  $t-1$ ),  $I_t^N$  is the set of new partners (exported in  $t$  but not in  $t-1$ ), and  $I_t^D$  is the set of disappearing partners (not

exported in  $t$  but exported in  $t-1$ ). Following the same definition, the set of products in period  $t$  and  $t-1$  can be defined as  $K_t = K_t^P + K_t^N$  and  $K_{t-1} = K_{t-1}^P + K_{t-1}^D$ , where  $K_t^P$  is the set of persistent products,  $K_t^N$  is the set of new products, and  $K_{t-1}^D$  is the set of disappearing products. Using this classification, total

change in exports is:  $\Delta X_t = \sum_{i=1}^{I_t} \sum_{k=1}^{K_t} x_{t,i,k} - \sum_{i=1}^{I_{t-1}} \sum_{k=1}^{K_{t-1}} x_{t-1,i,k}$ , and can be written as:

$$\Delta X_t = \left[ \underbrace{\sum_{i=1}^{I_t^P} \sum_{k=1}^{K_t^P} x_{t,i,k}}_{(1)} - \underbrace{\sum_{i=1}^{I_{t-1}^P} \sum_{k=1}^{K_{t-1}^P} x_{t-1,i,k}}_{(5)} \right] + \left[ \underbrace{\sum_{i=1}^{I_t^P} \sum_{k=1}^{K_t^N} x_{t,i,k}}_{(2)} + \underbrace{\sum_{i=1}^{I_t^N} \sum_{k=1}^{K_t^P} x_{t,i,k}}_{(3)} + \underbrace{\sum_{i=1}^{I_t^N} \sum_{k=1}^{K_t^N} x_{t,i,k}}_{(4)} \right] - \left[ \underbrace{\sum_{i=1}^{I_{t-1}^D} \sum_{k=1}^{K_{t-1}^D} x_{t,i,k}}_{(6)} - \underbrace{\sum_{i=1}^{I_{t-1}^D} \sum_{k=1}^{K_{t-1}^P} x_{t-1,i,k}}_{(7)} - \underbrace{\sum_{i=1}^{I_{t-1}^D} \sum_{k=1}^{K_{t-1}^D} x_{t-1,i,k}}_{(8)} \right] \quad (1)$$

According to equation (1), total change in trade can be decomposed into: exports of persistent products to persistent markets (1), exports of new products to persistent markets (2), exports of persistent products to new markets (3), and exports of new products to new markets (4), in period  $t$ , minus exports of persistent products to persistent markets (5), exports of disappearing products to persistent markets (6), exports of persistent products to disappearing markets (7), and exports of disappearing products to disappearing markets (8), in period  $t-1$ . Thus, the change in exports is decomposed in three parts: first, an intensive margin composed by the change in persistent product-market categories ((1)-(5)). Second, an extensive margin that includes exports of new products, markets or product-market categories ((2)+(3)+(4)). Third, disappearing trade, from disappearing products, markets or product-market categories ((6)+(7)+(8)).

Using data for the 1990-1991, 1998-1999, and 2006-2007 periods, I decomposed the change in total exports between these three periods.<sup>15</sup> Results for the export decomposition (in percentages) of equation

<sup>15</sup> For ease of exposition, and also because some products, such as capital goods, machinery, or equipments among others, may not be traded every year or to every country in every year, and to reduce the impact of product-market

(1) are reported in Table 1 and Figure 7.<sup>16</sup> They indicate that a significant but declining fraction of total export growth is due to extensive margin growth. In the first half (between 1998-1999 and 1990-1991), it contributes with 54 percent of total growth and with 36 percent during the second half. Assuming that there are market-product specific fixed costs of exporting, it could be expected that export growth is a process in which countries first increase their export to existing trading partners to later proceed to open new markets or new products. Surprisingly, however, Chilean data shows most of the growth in the extensive margin is not coming from new products being introduced to existing markets, or from exports of persistent products being sent to a new market, but rather from a combination of new products entering new markets. In turn, the increase in the relevance of the intensive margin in the second half of the period might be both explained by the boom in export prices that was observed after 2003 for non-copper natural resources-based Chilean exports, and to the methodology used to estimate these margins. As the definition of persistency—for products and markets—is relative to a previous period, once a product or market becomes exported, they will be counted as part of the intensive margin in the following period.

A further decomposition of the extensive margin was carried out at the country level. Table 2 reports both margins for Chile's main trade partners.<sup>17</sup> Exports show a large heterogeneity of margins across countries, which are consistent with variations of trade determinants, such as initial levels of trade, income, and trade costs across destinations. It also highlights the significant role of the extensive margin in exports growth over the period. For instance, the three bordering countries have experienced different movements. On the one hand, exports to Argentina and Bolivia in the first half of the period increased through both margins, but during the second half, exports grew only through the extensive margin. The crises experienced by those two countries in the early 2000s contributed to the decline in total exports to Argentina and to a marginal increase for Bolivia, but exports of new products (extensive margin)

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idiosyncratic shocks, I calculated the decomposition of export growth using these 2-year periods which account for the initial, middle and final period. These results are similar to a decomposition conducted on a yearly basis, which is available upon request.

<sup>16</sup> I divide equation (1) by initial exports, leaving every term expressed in percentage change.

<sup>17</sup> When trade margins are estimated at a bilateral level, the market dimension of equation (1) is eliminated, thus leaving only the product dimension. The table also includes disappearing trade within the intensive margin to simplify the exposition.

continued to grow. These movements are consistent with traditional models of trade in which volumes (intensive margin) are determined, among other variables, by income levels and suggest that the extensive margin might be less sensitive to income fluctuations than the intensive margin. On the other hand, Peru—and other Latin American countries such as Mexico, Ecuador, Venezuela and Brazil—followed a different pattern: exports experienced a strong increase in the first period, and they were mainly driven by growth at the extensive margin. In the second part of the period, as the exporting basket broadened, trade started to grow at the intensive margin but growth in the extensive margin remained substantial. The three traditionally larger exports markets—the United States, the EU15 group and Japan—followed somewhat dissimilar patterns, but they share the common characteristic that the extensive margin growth is relatively smaller, which is expected by the initially larger levels of exports and relatively more diversified export basket.

Overall, the decomposition of intensive and extensive margins shows that the extensive margin had a significant role in expanding non-copper exports over the whole period, not only at an aggregate level, but also with most relevant trading partners. It shows a pattern that is consistent with standard models of trade that explain growth at the intensive margin through differences in endowments and income levels, as exports to developed markets experienced some of the largest relative intensive margins. At the same time, the largest relative extensive margin growth with developing countries suggests that transaction and trade costs play a significant role, and that Chile possibly has some technological advantages relative to other developing countries, particularly those in Latin America.

## **6. Concluding Remarks**

This paper reviewed Chilean performance of non-copper exports in the 1990-2007 period, with an emphasis on determining the role of both the intensive and extensive margins in export growth. Within a context of increasing total exports, Chile has experienced important export diversification at different levels. First, the evolution of exports to main exporting markets, along with an increasing number of markets—from 111 in 1990 to about 150 in the 2000s—and a lower market concentration, suggests an

increase in export diversification at the market level. Second, in the product dimension there is an increasing number of product-categories being exported, and most notably, the number of products exported increased with the majority of trading partners, particularly towards Latin American countries. In terms of the margins, more than half of exports growth between 1990 and 1999 occurred at the extensive margin, and within this new trade the most important category was trade of new product-market categories followed by new products. Interestingly, growth of new trade has not diminished even though intensive margin growth accelerated after 1999.

These patterns of export diversification suggest that export diversification of Chilean non-copper exports is consistent with endowment-based theories of trade; in particular those regarding the intensive margins and trade to developed countries. At the same time, the evolution of product diversification and the extensive margin, particularly to Latin American countries, suggest that diversification might be explained by differences in transaction and trade costs, relative income, and technological advantages. Even though this paper does not provide a formal analysis of the main determinants of export diversification in Chile, it points towards avenues of future research that might attempt to quantify the role of factors such as income level, relative income, and transaction and trade costs, along with complementary policy variables such as trade policies or exchange rates regimes.

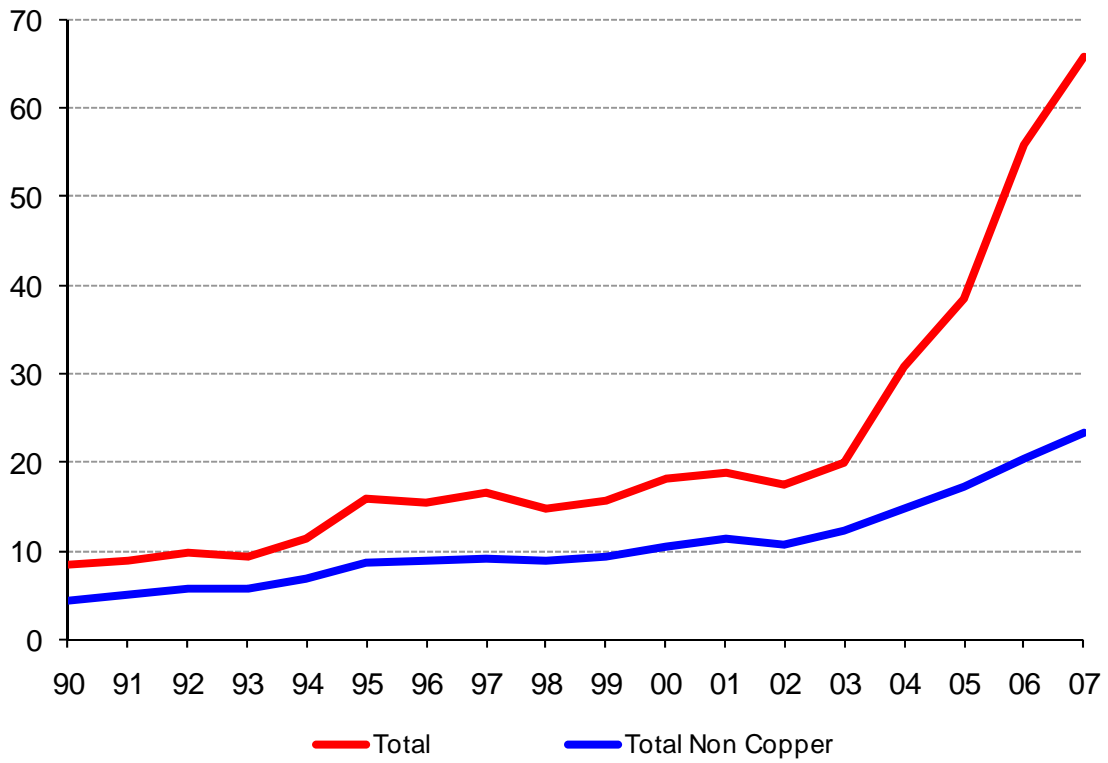


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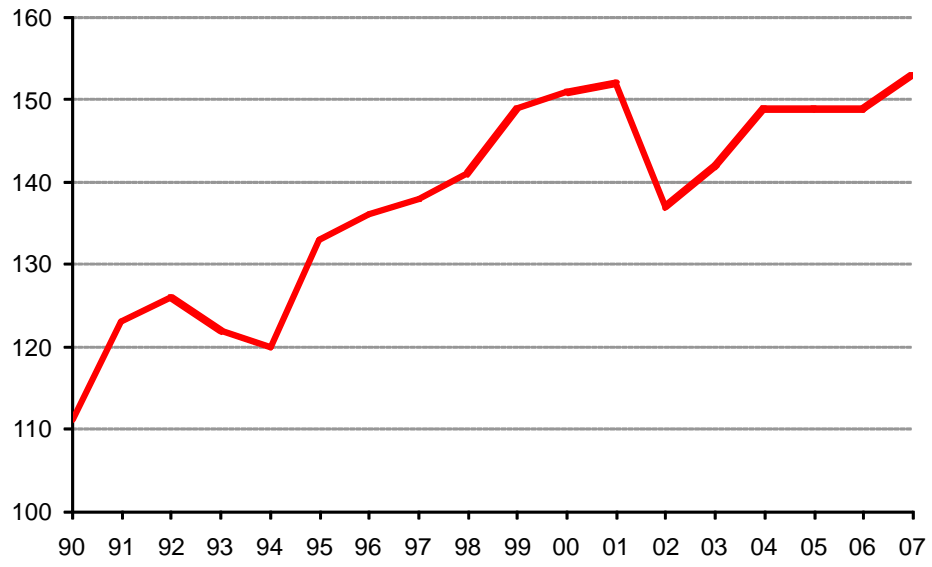
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**Figure 1. Total Exports (US\$ Billions)**



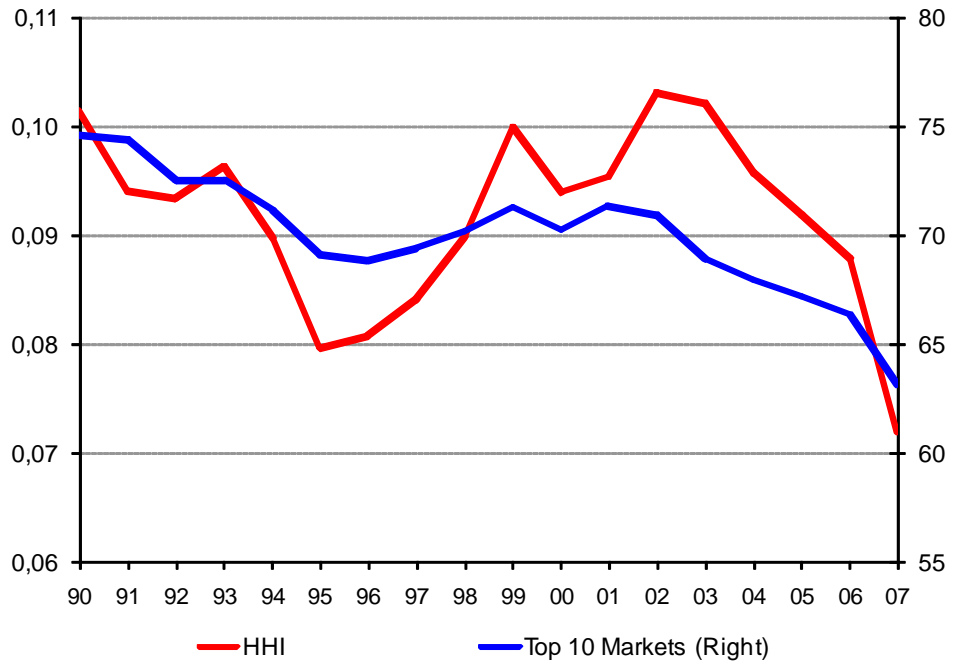
Source: Author's calculations using COMTRADE data.

**Figure 2. Number of Export Markets (1990-2007)**



Source: Author's calculations using COMTRADE data.

**Figure 3. Market Concentration: Herfindahl-Hirschman Index (HHI) and Share of Top Ten Non-Copper Export Markets (1990-2007)**



Source: Author's calculations using COMTRADE data.

**Figure 4. Top Destinations: Non-Copper Exports\* (US\$ Millions, 1990-2007)**



Source: Author's calculations using COMTRADE data.

\*Selected countries with exports larger than US\$95 million in at least one year during 1990-2007.

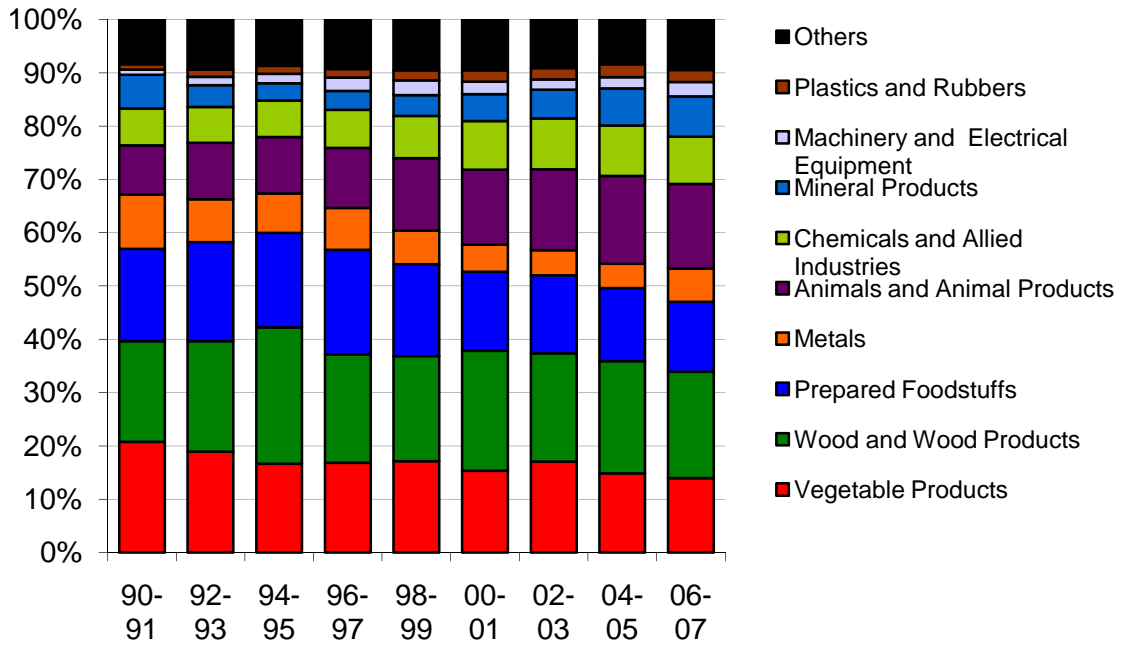
**Figure 5. Top Destinations: Number of Non-Copper Exported Products\* (1990-2007)**



Source: Author's calculations using COMTRADE data.

\*Selected countries are destinations that have received an accumulated number of at least 1,900 different products during the period.

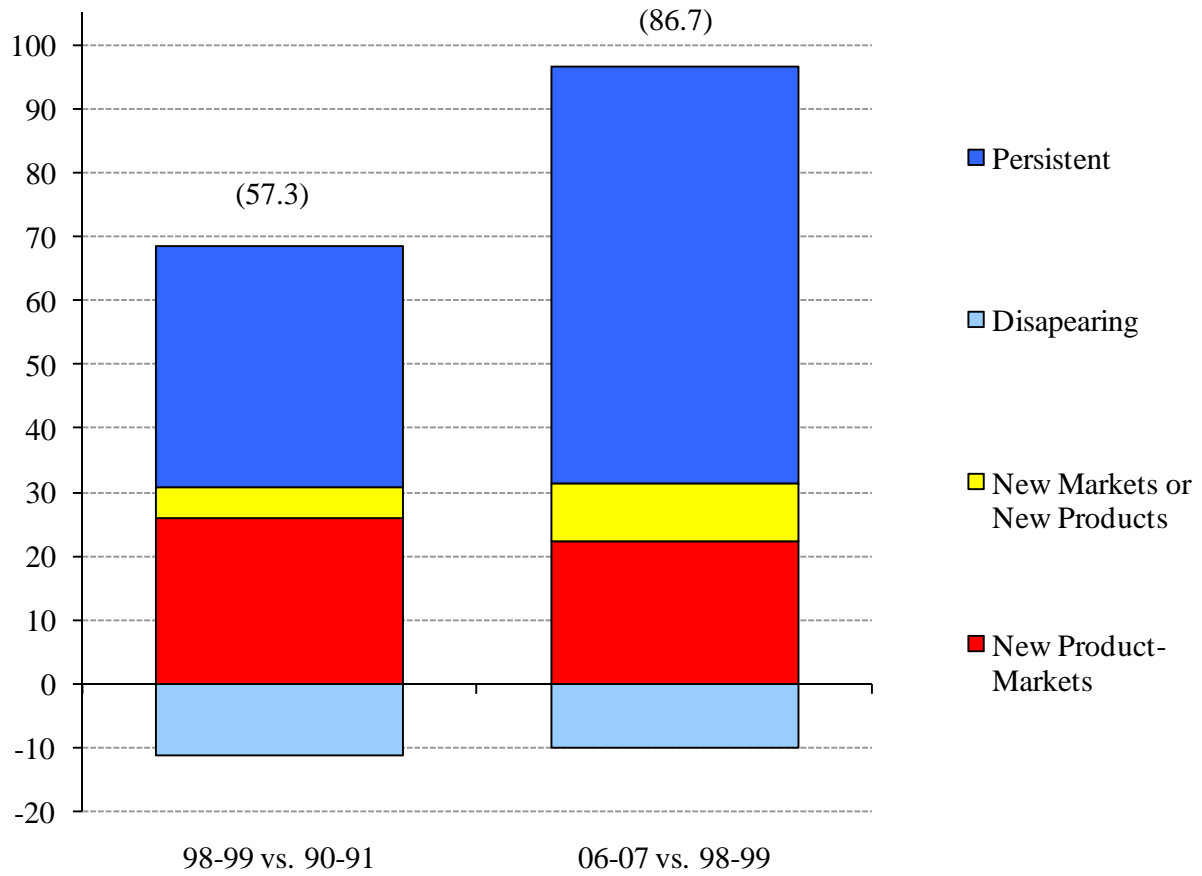
**Figure 6. Non-copper Exports by Industry**



Source: Author's calculations with HS 2-digit categories.



**Figure 7. Decomposition of Non-Copper Export Growth Rate (1990-2007)**



Source: Author's calculations using COMTRADE data. Total export growth in parenthesis.

**Table 1. Decomposition of Non-Copper Export Growth by Type of Trade (% change)**

Period	Total Export Growth	Intensive Margin				Total Intensive Margin	Extensive Margin			Total Extensive Margin
		Persistent (1)-(5)	Disapearing Products (6)	Disapearing Markets (7)	Disapearing Product-Markets (8)		New Products (2)	New Markets (3)	New Product-Markets (4)	
98-99 vs. 90-91	57.3	37.9	-1.3	-0.2	-9.8	26.6	4.1	0.6	26.0	30.7
06-07 vs. 98-99	86.7	65.3	-1.1	-0.1	-8.7	55.4	8.8	0.1	22.5	31.4

Source: Author's calculations using COMTRADE data.

**Table 2. Decomposition of Non-Copper Export Growth by Type of Trade in Selected Countries  
(% change)**

Country	98-99 vs. 90-91			06-07 vs. 98-99		
	Total Export Growth	Total Intensive Margin	Total Extensive Margin	Total Export Growth	Total Intensive Margin	Total Extensive Margin
Argentina	254.1	156.5	97.6	-16.0	-27.8	11.9
Bolivia	87.0	72.2	14.7	7.7	-21.7	29.4
Brazil	44.9	13.9	31.0	47.3	36.4	10.9
Canada	98.5	54.9	43.6	335.1	98.8	236.3
China	191.5	147.3	44.2	302.0	234.8	67.1
Ecuador	158.3	72.0	86.4	125.6	93.8	31.8
EU15	8.3	4.0	4.3	69.5	65.7	3.8
India	82.5	-74.5	156.9	245.7	-11.6	257.3
Japan	41.7	33.4	8.3	14.6	12.5	2.1
Korea	31.2	6.2	25.0	325.1	247.1	78.0
Mexico	281.0	62.1	218.9	272.8	171.9	100.9
Peru	108.3	49.2	59.0	142.9	89.9	53.0
USA	63.3	52.7	10.6	81.4	69.6	11.8
Venezuela	221.2	110.4	110.8	147.2	123.8	23.4
<b>Total</b>	<b>57.3</b>	<b>26.6</b>	<b>30.7</b>	<b>86.7</b>	<b>55.4</b>	<b>31.4</b>

Source: Author's calculations. Intensive margin includes disappearing trade.

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