Conditions and Determinants of the Internationalization of Latin American Industrial Enterprises

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Abstract

In the last ten years, there has been a marked increase in the number of Latin American companies that offer their products on international markets. The objective of this study is to explore quantitatively the conditions and determinants that have allowed for this international expansion of Latin American industrial enterprises in 2010, using a logit model on a sample of 196,000 companies. Estimates indicate that specific assets such as technological capacity and sectorial characteristics (geographic location and branch of economic activity) are the factors that have had the greatest influence on export performance.

Keywords: Latin America, industrial enterprises, exports, information technology, internationalization, logit model

Acronyms

ECLAC	Economic Commission for Latin American and the Caribbean (Comisión Económica para América Latina y el Caribe)
FDI	Foreign Direct Investment (Inversión extranjera directa)
GDP	Gross Domestic Product (Producto bruto interno)
IMF	International Monetary Fund (Fondo Monetario Internacional)

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NIA   National investment abroad (Inversión nacional en el extranjero)
RIA   Regional investment abroad (Inversión regional en el extranjero)
R&D   Research and Development (Investigación y desarrollo)
SMEs   Small and medium-size enterprises (Pequeñas y medianas empresas)
WB   World Bank (Banco Mundial)

INTRODUCTION

Internationalization is a phenomenon faced by companies in the context of an increasingly globalized and interconnected economy (Lu and Beamish 2001). This process can be a source of gains in competitiveness since it promotes the adoption of new techniques and knowledge, leading to constant improvement in production processes, enabling companies to compete with foreign enterprises (Peters 2004; García 1994).

Current theoretical approaches that discuss why companies internationalize differ from the earliest approaches, such as that of David Ricardo. In the latter, the participation of countries in foreign markets was seen to be a result of their comparative or absolute advantages, which resulted from the accumulation of natural resources or from an historical accident. Today, however, the company is considered to be an active agent that makes decisions in a competitive environment. These decisions are reflected in society as a whole. This approach dates back, first of all, to the thinking of Coase (1937), who argued that companies' decisions to internationalize reflected the fact that the cost of a presence on the market could be avoided or reduced by outsourcing certain transactions such as research, marketing, recruitment, and others. Therefore, the larger the size of the company, the higher the costs of its presence on the market and thus, the greater the incentives to expand and integrate into international markets.

The second approach to this issue is that of Dunning (1973, 1988, 1999), who notes that the company only chooses to internationalize when it can fully exploit its competitive advantages (know-how, location, and quality, etc.) in those markets which it can access by extending its value added chain and its market shares. For this reason, multinational companies always develop specific assets (among others, exclusive access to technology and human capital) that put them in a more competitive position than other companies. However, for Renau (1996), the Dunning model is no more than a progressive derivation of Coase's theory, since the basis of a company's competitive advantages arise out of processes of evolution or its own internal decisions.

The third approach is the Uppsala model (Johanson and Wiedersheim 1975; Johanson and Vahlne 1990), which suggests that internationalization is the result of the company's incremental gains in willingness and goes through four stages: a) occasional exports; b) exports through independent operators; for example, the sale of rights to other companies to sell products abroad (franchises); c) establishment of commercial branches abroad; and d) establishment of productive units abroad. These stages are achieved as the company gains experience in foreign markets (Johanson and Vahlne 1990) at the same time as its size increases.

Amid these theories, the status of Latin American companies emerges as an area of scientific interest, since this region has gone through the internationalization process with great intensity since the previous decade (Wilska and Tourunen 2001). This paper uses a quantitative approach to investigate the conditions and determinants of the internationalization of Latin American industrial enterprises in 2010 - understood as the level of foreign sales they achieved, given their low level of investment in physical capital held abroad. One of the limitations of this research is the implementation of a cross-sectional sample, which prevents the dynamics of internationalization within countries from being observed over time.

This article is organized as follows: the first part describes Latin America's internationalization process during the past decade using data on foreign investment and trade liberalization. The second section explores the theoretical foundations of the internationalization process and its role in today's business competitiveness and then reviews the relevant literature, citing major empirical contributions. The third section describes the methodology and data used, while the results of the estimates made are set out in section four. Finally, the fifth section presents the conclusions.

1. LATIN AMERICA AND ITS RECENT INTERNATIONALIZATION

The process of Latin America's internationalization during the past decade has taken place in the context of strong world economic growth (see Table 1), the highest in twenty years, with an annual average of 5.4% from 2006 to 2010. In the region, an average annual growth of 6% was achieved during the same period, increasing significantly from the 4.9% achieved between 2001 and 2005. According to Reyes (2013), this trend has been sustained by higher commodity prices, which have led to growth in foreign direct investment (FDI) and foreign exchange flows from increased exports.
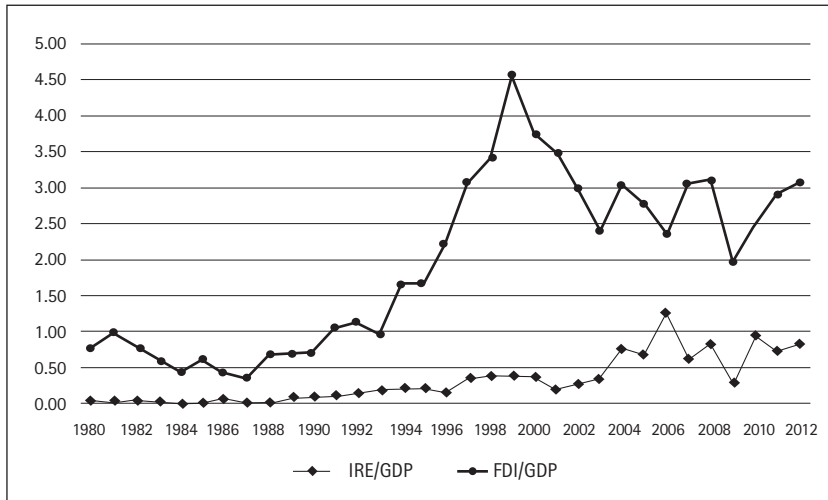
Table 1
GDP growth by five-year periods, 1980–2010 (in percentages; prices in constant 2005 dollars standardized for purchasing power parity)

Economies	1980–1985	1986–1990	1991–1995	1996–2000	2001–2005	2006–2010
World	8.2	7.0	6.7	5.5	6.1	5.4
Developed	8.2	7.0	5.0	5.1	4.6	3.0
Asia	8.2	6.8	10.1	6.1	8.5	8.6
Latin America	6.1	5.1	5.9	4.7	4.9	6.0
Africa	7.4	5.6	3.4	5.4	8.0	7.4

Source: IMF.

Indeed, in the last decade, investment flows from abroad have averaged 3% of regional GDP (Figure 1). However, this trend has not been reciprocated by local investors. Data show that regional investments abroad (RIA) only averaged 0.5% of GDP between 2002 and 2012. The lack of such investments makes Latin America a net recipient of capital flows, unlike Asia, where capital flows in both directions are comparable (Reyes 2013).

Figure 1
Evolution of RIA and FDI to and from Latin America as a percentage of GDP, 1980–2012

Source: ECLAC; compiled by author.

When investment is subdivided by country (see Table 2), it is clear that the countries with the greatest reserves of natural resources are those with the largest amount of FDI and national investment abroad (NIA) accumulated during this period: Brazil, Argentina, Mexico, and Colombia (oil resources), and Chile and Peru (copper). Brazil garnered about 33% of the region's FDI, followed by Mexico (23%), and Chile (12%), results that were achieved thanks to their thriving domestic markets and the availability of natural resources. These countries also generated the highest amounts of NIA (22%, 29%, and 28%, respectively). However, if one wishes to calculate the influence of this investment on the economy of each country, then it is necessary to calculate the proportion of GDP it accounts for. In this respect, the Chilean economy is the most influenced by this process: 7.6% of FDI and 4.4% of NIA during the period 2002-2012. This, together with its institutional stability, has allowed Chile to take advantage of high copper prices, positioning itself as the leading economy in terms of commerce and logistics among all the countries of Latin America.
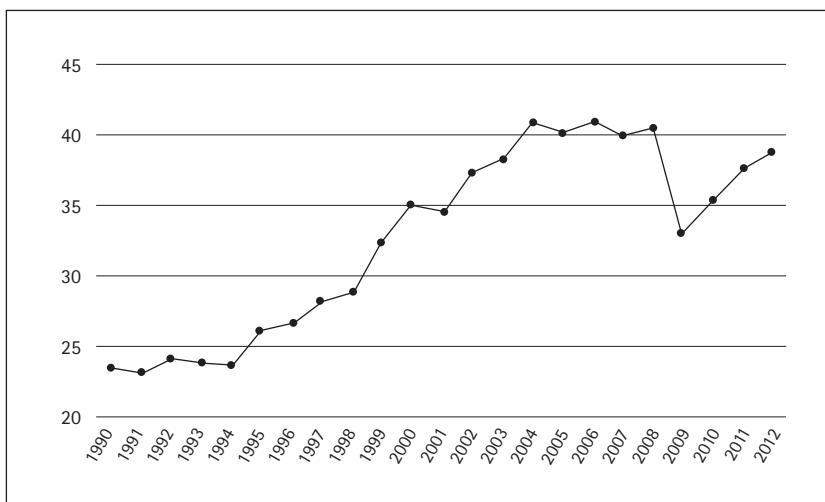
Table 2
NIA generated and FDI captured per country, as a percentage of the regional total and of the GDP of each country, Latin America, 2002–2012

Country	NIA			FDI		
	Amount	%	% GDP	Amount	%	% GDP
Latin America	310,674	100	0.69	1,275,753	100	2.84
Argentina	12,744	4	0.36	82,225	6	2.33
Brazil	68,59	22	0.42	420,036	33	2,56
Chile	86,300	28	4.44	147,312	12	7.59
Colombia	29,680	10	1.19	91,345	7	3.66
Mexico	90,734	29	0.77	295,877	23	2.50
Peru	1,668	1	0.12	58,880	5	4.28
Others	21,089	7	0.29	180,079	14	2.45

Source: ECLAC; compiled by author.

Another indicator that provides an idea of the degree of openness to external trade in the region is the contribution of exports and imports to GDP (see Figure 2 and Table 3). Between 1996 and 2012, this indicator increased from 24% of regional GDP to about 40%, although it weakened temporarily in 2008 because of the international crisis and the resulting drop in demand from the United States and Europe. Among the countries of the region, increased trade liberalization has been a general trend, even in countries with low indicators of openness, such as Argentina, which has doubled the proportion of its trade flows (from 19.7% to 38.8 % of GDP) in the last decade. This process was sustained in part by higher exports of raw materials such as natural gas and soybeans. An equally remarkable example in this respect is Chile, where the percent to GDP has grown from 50.7% between 1990 and 2000 to 69.9% between 2001 and 2012.

Figure 2
Evolution of the relationship between exports and imports as an average cumulative percentage by country, Latin America, 1990–2012

Source: ECLAC; compiled by author.

Table 3
Evolution of the relationship between exports and imports as a percentage of GDP by country, Latin America, 1990–2012

Country	1990–2000 (%)	2001–2012 (%)
Argentina	19.7	38.8
Brasil	16.3	24.8
Chile	50.7	69.9
Colombia	26.4	34.4
Mexico	44.7	57.6
Peru	30.0	45.9
Others	60.1	63.3
Total	32	44

Source: ECLAC; compiled by author.

The dynamics of the types of goods that Latin America has placed on foreign markets can be seen in detail in Table 4, which shows the percentage share of exported primary and industrial products by decades and countries. The participation of most countries has remained constant for each type of product, except for Brazil, whose primary goods represented 54.0% of exports between 2001 and 2012, as opposed to 45.2% during the preceding period (1991-2000).

Table 4
Exports by country and type of product exported, 1991–2012 (average percentages by decade)

Country	1991–2000		2001–2012	
	Primary	Industrial	Primary	Industrial
Latin America	50.7	49.2	51.1	48.8
Argentina	68.5	31.4	69.0	30.9
Brasil	45.2	54.7	54.0	45.9
Chile	85.3	14.6	86.8	13.1
Colombia	68.0	31.9	68.9	31.0
Mexico	26.6	73.3	22.9	77.0
Peru	83.7	16.2	86.0	13.9

Source: ECLAC; compiled by author.

This brief review of the behavior of investment and trade flows to and from Latin America shows a participation and inclusion that is more active, but disproportionately concentrated in countries with abundant natural resources. Within this context, this paper seeks to find the determinants that have driven this trend in the industrial enterprises. The following section presents a theoretical exploration of the issue.

2. DETERMINANTS OF THE INTERNATIONALIZATION OF ENTERPRISES

Numerous studies have analyzed the factors that lead companies to enter international markets (Bilkey 1978; Madsen 1987; Aaby and Slater 1989; Chetty and Hamilton 1993; Zou and Stan 1998; Leonidou *et al.* 2002; Gertner *et al.* 2006; Sousa *et al.* 2008; Horta 2012). However, some authors (Zou *et al.* 1998; Shoham 1998; Lages and Lages 2004) argue that it has not been possible to establish a comprehensive conceptual framework that can isolate the business factors lying behind internationalization. However, there is consensus in the literature that the study of the result of companies' internationalization requires an analysis of both internal and external factors (Horta 2012). The review below

enumerates these factors and simultaneously allows us to formulate the hypotheses that this study seeks to prove through quantitative analysis.

2.1 Internal characteristics

These are the structural aspects of business, for example: size, age, technology, and internal organization, among others. These constitute the different capabilities that enable an organization to compete effectively on international markets (Aaby and Slater 1989; Zou and Stan 1998: Leonidou *et al.* 2002; Voerman 2004).

In the literature, the size of a firm has been positively linked to the phenomenon of exportation (Verwaal and Donkers 2002). According to Aaby and Slater (1989) and Leonidou *et al.* (2002), there are three basic aspects that account for this relationship:

- Possession of more resources: with higher amounts of capital (human and physical), the company can deal with the different phases of internationalization with relative ease.
- The existence of economies of scale: with low unit costs of production, products can be offered at competitive prices in foreign markets. However, this issue can be overcome if the company competes abroad on the basis of quality rather than price (Aaby and Slater 1989; Zou and Stan 1998).
- The ability to take risks in international business: during the first stage, the internationalization of a company may require investment from the capital resources of the company. Should this fail, the damage to the finances of a large company will be minor in comparison to what a small firm would incur. The influence of size as a positive aspect in the outsourcing of business activities is empirically supported (Suarez *et al.* 2002; Horta 2012).

Hypothesis 1

The size of the company is positively correlated with its international presence.

In an approach that concords with the Dunning theory of incremental stages, the length of time that a firm has been exporting or operating has an important influence on its trajectory. The know-how obtained previously ensures that the company can overcome logistical difficulties while establishing distribution channels (Aaby and Slater 1989; Leonidou *et al.* 2002).

Hypothesis 2

There is a positive relationship between the number of years a company has been exporting and its export performance.

The possession of technological capabilities can help increase business competitiveness in foreign markets (Chetty and Hamilton 1993). Such capabilities positively affect the processes of organization, production and marketing, enabling companies to provide higher quality goods or services and optimize their presence in markets (Alonso and Donoso 2000). In addition, these strategies aim to increase customer confidence through their ability to produce quality goods and services, resulting in better positioning on the international market and overcoming technical barriers to exportation.

For example, companies can implement better quality control policies with greater investment in R&D, which leads to more uniform products, thus positively influencing their exports. This aspect has been empirically researched and positively corroborated (Christensen *et al.* 1987; Gemünden 2012; Dhanaraj and Beamish 2003; Louter *et al.* 1991). In this research, investment in technology is often approximated empirically with proxy variables such as licensing and quality certifications.

Hypothesis 3

Investment in technology (adoption of certifications of quality, licenses, and training of workers and possession of ICT) is directly related to the internationalization of enterprises.

2.2 External conditions

Companies operate in macroeconomic, political, legal, and social contexts that affect their operations (Porter 1990; Meyer-Stamer 2005). Despite this, most of the studies on internationalization only take into account the internal variables of firms, although recent studies also consider external ones (Horta 2012). Examples of this include: the characteristics of the internal market where the firm is operating (Bilkey 1978; Zou and Stan 1998), the specific characteristics of the sector (Lages and Lages 2004), and government intervention (Sousa *et al.* 2008). In this vein, an environment that encourages the development of competition, investment, and property rights (Rialp 1997) is required.

Hypothesis 4

If the company is surrounded by positive institutional factors, the probability that it will engage in a process of internationalization will increase.

Sectorial differences associated with the characteristics of the goods produced can affect the performance of external demand and cause variations in companies' levels of internationalization. Also, the geographical location variable may influence the costs that the company must bear, such as those involving logistics and the transport of goods. Being

located in large cities can bring benefits through economies of agglomeration due to the presence of major suppliers of services and infrastructure, which reduces costs and increases the likelihood that the company can distribute its products more easily.

Hypothesis 5

Differences can be found in the level of internationalization and in the economic sector in which the firm operates in relation to its geographical location.

2.3 Review of the literature

Due to the breadth of meaning of the term internationalization, it was necessary to define the object of research. In general, the criteria used to define the internationalization of companies are: the number of foreign subsidiaries (Sambharya 1995; Gomes and Ramaswamy 1999), foreign sales as a ratio of total sales (Geringer *et al.* 2000; Ruigrok and Wagner 2003), list of foreign assets (Sambharya 1995), and total export earnings (Lu and Beamish 2001). However, these criteria vary considerably from one sector to another and from one country to another.

For example, Durán (1987) and Duran and Úbeda (1997) point out that the amounts of FDI are the best proxy variable for this phenomenon and ensure that the increase in these expenses by Spanish firms in the last two decades has had the aim of increasing or maintaining their share of international markets, avoiding saturation of the domestic market, exploiting the technological capabilities they possess, and ensuring the supply of raw materials. However, they highlight that companies also choose the countries in which they establish themselves according to certain objectives: to encourage trade investments in countries with extensive trade connections; to undertake the search for strategic and technological assets in the most developed countries; and to make productive investments in countries with abundant natural resources. López (1997) stresses that investment in the European Union seeks to meet commercial objectives, while in Latin America and Africa, its purposes are productive, especially when investing in the finance and agribusiness sectors.

Galán *et al.* (2000) provide empirical corroboration of the above on the basis of an investigation of 34 industrial and service companies in two provinces in Spain. They confirm, using the Dunning model to extend a linear regression model, that specific intangible technological assets are the key factors for the company's international competitiveness and its scale of investment in FDI: brands, human capital, organizational capacity, the management's entrepreneurial attitude, and experience. This same behavior occurs when the representative proxy variable for internationalization is the level of exports. However, firms likely to make FDI assemble organizational structures that are more complex than those that only export.

Wang *et al.* (2008) consider that a company with more than three foreign subsidiaries can be categorized as internationalized. However, they stress that this is a unique and special case applying to the Taiwanese high-tech industry. Based on this criteria, they use a logit model on a group of 114 firms in 2005 to explore the relationship between the condition of internationalization and corporate governance, R&D expenditures, number of patents, and educational level of the managers. According to the evaluations, all these factors have a positive impact, with the exception of investment in R&D, which had a negative effect on internationalization. The authors explain this relationship by the fact that companies are choosing internal growth strategies with relatively high levels of R&D, in the face of their growth strategy in foreign markets. This finding runs counter to the theory, since the authors conclude that companies with specific assets may be dissuaded from investing abroad.

In other approaches to internationalization, Horta (2012) considered using the logarithm of the company's exports and also chose to build a relative variable: the logarithm of exports per person employed - a kind of productivity per person employed. His analysis of the internal and external factors of companies includes the 210 Uruguayan agribusinesses that exported the most during 2003-2006, for which he uses factorial and logistic models. The author finds that experience is the variable that most contributes to the level of exports, confirming one of the premises of Dunning's gradualist model of export development. However, Horta does not find statistically significant evidence relating firm size and export performance, arguing that evidence in the literature is not unanimous on this point since in a globalized world economy with minimum transportation costs, the size of the organization is no longer likely to be a relevant variable.

Nonetheless, the most common empirical approach relates the ability to internationalize with the export performance of the firm. In an analysis of Peruvian SMEs, Leon (2008) studies how the propensity to export is affected by the internal characteristics of firms using probabilistic models. The author finds that company size, the level of university education attained by the head of that company, and the degree of business experience are the main factors that enable companies to internationalize. López (1997) reaches the same conclusions, finding that the levels of education of workers obtained through internal company training leads to the production of higher quality products, thus increasing the export penetration capacity in the company's foreign market.

Using the same approach, Ayouz and Hervé (2003) seek to establish a link between the decision to export and internal and external factors affecting a company, using a sample of 335 small French food companies. Their statistical model challenges many approaches to the theory, such as the fact that their estimates show a negative relationship between high perceived quality of the product and the fact that a firm exports; also, they did not

find that the human capital of the managers was important. However, internal factors such as the manager's organizational integration and the perishable characteristics of the products manufactured, as well as external factors such as the presence of phytosanitary standards do have a significant impact on export strategy. Among other internal factors, Pla and Cobos (2002) show that the proactive attitude of a company's directors, evidenced through a differentiated marketing strategy, explains its rapid internationalization. Belso (2003) includes the presence of business networks in the model determining export performance, and finds that these have an important active role in the export growth of SMEs that allows them to export indirectly and thereby overcome the high costs that are usually entailed.

In summary, the literature reviewed reveals two overall trends. The first is that the most current empirical studies have focused mainly on companies' internal and external aspects. The second is that the most common approach to internationalization in Latin America is export performance, a result that may be due to the low level of FDI in the region (Horta, 2012).

Given these considerations, this paper seeks to analyze the trend of internationalization among industrial enterprises in Latin America in 2010 in order to understand the determinants that promoted internalization. Below, the methodology employed in the research is discussed, describing the source of the data used and the calculation model that was selected. The results are presented in the last section.

3. METHODOLOGY

3.1   Source of data

This paper used the Enterprise Survey conducted by the World Bank (WB). This is a research project that focuses on formal and informal enterprises in the manufacturing and service sectors that are classified under ISIC codes 15 -37, 45, 50-52, 55, 60-64 and 72 (ISIC Rev. 3.1) and that have five or more employees. This survey has been carried out since early 2000 in order to track business practices in developing countries.

The survey uses data from industrial sectors including the manufacture of: apparel, food, metals and machinery, electronics, chemicals and pharmaceuticals, furniture, non-metallic products, plastics, autos, and other manufacturing industries. Enterprises with 100% government participation in equity are not included. In a few countries, other sectors, such as education or health-related businesses, are also surveyed. Typically, between 1,200 and 1,800 face-to-face interviews are conducted in the largest economies, 360 in medium-sized economies and 150 in smaller economies. The survey is answered by entrepreneurs and

senior managers and, for some questions, the interviewer collects additional information from the enterprises' accountants and human resource managers.

The subjects of this business survey include organizational characteristics, distribution of employees, access to financing, annual sales, costs of inputs and labor, composition of the labor force, corruption, licensing, infrastructure, trade, innovation, technology, corruption, competition, utilization of capacity, land and permits, taxation, informality and governmental relations.

The sampling methodology is a stratified random sample,[1] a method that allows greater levels of accuracy when estimates of statistical measures are performed, resulting in standard errors that are lower than with simple random sampling. Similarly, using stratified samples, the results can be extrapolated to specific populations through the use of sampling weights that expand the probabilities of selecting the variables across the different strata.

The strata chosen for the survey are: firm size, business sector, and geographic region within a country. There are three sizes of firms: 5 to 19 employees (small firms), 20 to 99 (medium firms), and over 100 (large firms). Given that in Latin America most companies are small and medium-sized, this survey oversamples large companies, which tend to be the engines of job creation. To categorize the sectors of activity, retail, and other services play a larger role in the total employment base, value added, and total number of establishments. Finally, within countries, the cities or regions that, together, contain most of the economic activity are chosen. The sample frame of the survey is derived from the universe of eligible companies obtained from each country's statistical office. Sometimes, the main list is obtained from other government agencies such as the tax authorities and those that grant business licenses, and, in other cases, it comes from business associations or marketing databases.

The 2010 survey conducted by the WB in Latin America was used for this study. Information was collected from 264,000 industrial enterprises in 31 Latin American countries: Antigua and Barbuda, Argentina, the Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Ecuador, El Salvador, Granada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, the Dominican Republic, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela. Table 5 shows the distribution by country and size of firm.

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1.   In a simple random sample, all members of the population have the same probability of being selected while in a stratified random sample, all population units are in homogeneous groups and simple random samples are selected within each group.

Table 5
Companies surveyed by the World Bank, by Latin American country and by size, 2010 (percentages)

Country	Company size (%)			Total number
	Small	Medium	Large	
Antigua and Barbuda	73.9	22.5	3.5	284
Argentina	38.8	47.0	14.2	9,530
Bahamas	57.1	33.4	9.5	578
Barbados	67.5	27.2	5.3	1,484
Belize	76.1	22.2	1.7	745
Bolivia	56.0	32.9	11.1	1,892
Brazil	25.1	45.8	29.1	192,029
Chile	27.2	53.6	19.3	3,869
Colombia	44.9	32.1	23.0	8,385
Costa Rica	54.1	29.9	16.1	1,276
Dominica	47.2	37.7	15.1	1,641
Ecuador	52.5	31.8	15.6	1,740
El Salvador	38.3	34.9	26.8	919
Granada	74.0	20.4	5.5	181
Guatemala	51.7	32.0	16.3	1,936
Guyana	38.3	43.6	18.1	287
Honduras	52.1	29.1	18.8	1,267
Jamaica	54.2	40.6	5.2	443
Mexico	69,1	21.2	9.7	23,695
Nicaragua	66.5	24.1	9.4	627
Panama	53.2	35.1	11.7	775
Paraguay	44.4	41.0	14.6	741
Peru	54.2	30.6	15.2	4,458
Dominican Rupublic	75.7	19.8	4.5	202
Saint Kitts and Nevis	61.3	35.7	3.0	266
Saint Lucia	69.7	25.0	5.3	532
Saint Vincent	78.4	19.3	2.3	342
Suriname	49.1	44.9	6.1	263
Trinidad and Tobago	61.2	25.2	13.6	830
Uruguay	62.0	28.6	9.4	1,114
Venezuela	49.6	38.0	12.4	684
Total	33.2	41.9	24.9	263,015

Source: World Bank; compiled by author.

Table 6
External sales as a proportion of total sales, by country and by company size, 2010
(percentages)

Country	Size of the Company (%)			Total
	Small	Medium	Large	
Antigua and Barbuda	25	23	60	26
Argentina	29	44	83	44
Bahamas	19	13	2	15
Barbados	16	31	30	21
Belize	14	30	62	19
Bolivia	13	42	30	25
Brazil	9	13	34	18
Chile	6	17	70	24
Colombia	16	48	88	43
Costa Rica	17	43	78	34
Dominica	15	19	54	22
Ecuador	3	33	48	20
El Salvador	54	76	91	71
Granada	11	35	20	17
Guatemala	13	53	76	36
Guyana	27	35	46	34
Honduras	1	4	57	12
Jamaica	18	26	70	23
Mexico	4	28	63	15
Nicaragua	21	9	81	24
Panama	0	8	33	7
Paraguay	7	24	39	19
Peru	10	34	67	26
Dominican Republic	39	23	11	34
Saint Kitts and Nevis	15	45	25	26
Saint Lucia	15	46	71	26
Saint Vincent	21	24	88	23
Suriname	9	18	6	13
Trinidad and Tobago	23	48	64	35
Uruguay	21	50	79	35
Venezuela	1	7	59	10
Total	10	17	40	21

Source: World Bank; compiled by author.

Using this survey, we determined the method by which the hypotheses presented in the theoretical review would be tested.

3.2 Empirical approach to internationalization

In this paper, the tendency to export is used as a proxy for the internationalization of the company. Horta (2012), Mendoza (2009) and Peters (2004), and other researchers suggest this approach, given the low level of direct investment by Latin American companies abroad. Thus, a brief descriptive approach to the WB Enterprise Survey reflects an average regional propensity to export of about 20% (see Table 6); the Argentine and Colombian economies stand out, with 44% and 43% of the industrial enterprises, respectively, exporting products in 2010, while Panama and Venezuela had levels of 10% or less because their industrial structures have little representation in the total base of their economies' added value and, in the case of Panama, because its business fabric is focused mainly on the retail trade sector (Pinon *et al.* 2012).

By size of company, it can be seen that about 40% of enterprises with more than 100 employees exported in 2010 versus 17% of medium-sized and 10% of small companies. This supports the hypothesis that the extent of a company's resources influences its ability to internationalize. This trend is intensified in countries where the tendency to export is greater, such as Argentina and Colombia, where more than 83% and 88% of large companies, respectively, exported.

By economic sectors (see Table 7), the propensity to export is high in the auto and auto parts industries, with about 47%, regardless of the size of the firm. In fact, 68% of companies with fewer than twenty employees in this sector export, as opposed to 39% of large companies. The sectors with less capacity to sell abroad are garments and textiles: less than 5% and 16% of companies, respectively, exported in 2010. This phenomenon is due to their low international competitiveness in comparison to East Asian economies like China and Vietnam (Calvo 2012; Grana *et al.* 2010).

Table 7
Propensity to export by industry and company size, 2010 (percentages)

Sector	Company Size			Total
	Small	Medum	Large	
Textiles	12	15	26	16
Apparel	2	6	6	5
Food	6	8	59	16
Metals and machinery	16	30	52	35
Electronics	2	17	35	19
Chemical and pharmaceutical	8	7	28	13
Furniture	0	1	92	19
Non-metallic and plastics	11	34	72	32
Autos and auto parts	68	46	39	47
Other manufacturing industries	8	26	55	18
Total	10	17	40	21

Source: World Bank; compiled by author.

But in Latin America, not all companies have the ability to send their exports directly to their customers due to bureaucratic processes, administrative barriers, phytosanitary standards, and the enormous transport costs. Sometimes deliveries abroad are carried out with the help of companies specializing in dispatching goods abroad (i.e., their exports are indirect), which lowers the costs of the process. In this sense, according to Figure 3, about 37% of firms export indirectly, while 63% do so directly. By size, it shows that about 71% of the small firms that export do so indirectly, while in the case of large companies, this percentage decreases to 24%, since they have all the resources at their disposal for the creation and installation of distribution channels and for marketing their products abroad.

Figure 3
Type of indirect and direct export, by company size, Latin America, 2010 (percentages)
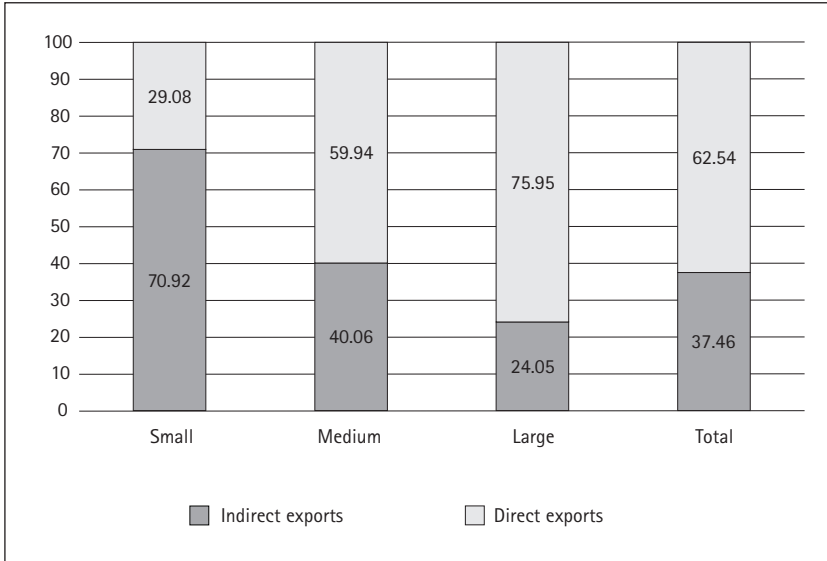
Source: World Bank; compiled by author.

This scenario highlights the importance of the size of industrial firms as a cause of their export performance; however, there is another set of variables, both internal and external to the organization, that explain this phenomenon. The next subsection presents the analysis model for these determinants and the subsequent verification of the hypotheses stated previously.

3.3. Analysis model

The phenomenon analyzed here – the internationalization of companies – is estimated empirically as the ability of a company to export. Statistically, this variable is categorized as 1 when the company has placed its products in foreign markets and 0 if not. When the analysis variables have these characteristics – only two values – they are called dichotomous variables and are studied using discrete choice models.

In general, it is considered that behind the dependent variable in these models, Y , there is an unobservable variable, I, that depends on a set of explanatory variables, X_i, that take on certain values when they have passed a certain threshold, as expressed below.

$$Y_i = \begin{cases} 1 & \text{si } I_i^* > 0 \quad \text{lo que ocurre cuando } X_i\beta + \varepsilon_i > 0 \\ 0 & \text{si } I_i^* < 0 \quad \text{lo que ocurre cuando } X_i\beta + \varepsilon_i < 0, \end{cases}$$

where the assumption about the distribution of ε determines the type of model to be estimated: if a uniform distribution function is assumed, a truncated linear probability model is used; if it is a normal distribution with a mean of 0 and a variance of 1, a probit model will be generated; whereas, if a logistic curve is assumed, it would be a logit model. The hypothesis that the threshold to be surpassed by the latent variable is 0 can be modified by any other value, suggesting that the critical value is that defined by the constant term (Pérez 2005).

Using the first approach, the probabilistic model would be defined (Medina 2003) as follows:

$$P_i = \Pr ob(Y_i = 1) = \Pr ob(I_i^* > 0) = \Pr ob(X_i\beta + \varepsilon_i > 0) = F(X_i\beta)$$

The effectiveness of these models is measured by two indicators: the first is the degree of variance in the dependent variable obtained or predicted by the independent variables, an indicator called R2; the higher it is, the more effective the model is in determining the behavior of the dependent variable and vice versa. The second indicator is the degree of the model's observations that have been correctly classified in the characteristic analyzed; a higher percentage indicates a higher robustness of the model.

In statistical terms, there are different factors regarding the character of the data that must be corrected in order to achieve an optimal calibration of the model, such as the presence of heteroscedasticity, multicollinearity, and serial autocorrelation (Pérez 2005).

3.4 Estimation function

Taking into account the above criteria, this paper proposes the use of the following probability function:

$$Y = f(S, X) \quad Y = \alpha + \beta_i X_i + \varepsilon,$$

where Y is the variable to be explained or the dependent variable categorized dichotomously, so that 1 occurs if the company exported and 0 if not. In turn, β captures the marginal contribution of each one of these factors to the probability of exporting, while ε is the estimation error according to the distribution function of the dependent variable. All these parameters are evaluated with individual significance levels, rejecting the null hypothesis of the parameter of the equation. The latter is explained by a vector that summarizes the characteristic factors of the firm, X, which were selected on the basis of the hypotheses and the indicators defined for them:

Hypothesis 1. The size of the company: number of employees, company sales volume.

Hypothesis 2. Age: how long the company has existed.

Hypothesis 3. Technological capabilities: email capabilities, website and quality certifications; worker training in quality courses.

Hypothesis 4. Institutional factors: the owner's opinion of the judicial system of the country where the company is operating; possession of bank account and access to credit.

Hypothesis 5. Sectorial indicators: sector of activity, country, and size of the city.
Other control variables are also included to improve the model calculation process.

4. RESULTS AND ANALYSIS

After evaluating the database and validating the survey responses, 196,000 firms were selected for analysis, and chi^2 tests were then performed to confirm the type of function with which the dependent variable is distributed; it was found that this occurs through a representation by a logistic curve. In this vein, Table 8 shows the results of the logit model estimates with the coefficients and elasticities (marginal effect) of each of the control (independent) variables regarding the probability of the company's exporting in 2010. In terms of overall fit, the model is acceptable, considering that the statistical value of chi^2 is very significant. In addition, all the variables introduced had levels of significance of 5%, rejecting the null hypothesis that the parameters are equal to 0. In the adjusted R^2, the model explains 53.28% of the variance of the dependent variable that measures export

performance, while the percentage of cases correctly classified in the proposed model reached about 91%. With this verification of the model's robustness, each of the hypotheses proposed in this study are tested, contrasting them with the effect of the independent variables on the probability of the firm's exporting.

For the interpretation of the results, the marginal effect on continuous variables equals the percentage at which the probability of exporting increases, given a 1% change in the independent variable of analysis. For the categorical variables, the marginal effect measures the relative probability compared to a base characteristic. For example, the probability of a medium-sized firm exporting is 5.7% higher than that of a small firm. These parameters also can be used to estimate the absolute probabilities of exporting whether or not a characteristic is evaluated; this perspective is used in most of the corroborations of the hypotheses.

Table 8
Results of estimates, logit model (dependent variable: probability of exporting)

Variable	Characteristic evaluated	Coefficient	Effect (%)	Base characteristic
Constant		– 1.2213	–	
% diversification		– 0.0042	– 0.04	Continuous
% ownership		0.0124	0.11	Continuous
Experience of the manager		– 0.0063	– 0.06	Continuous
Years of operaton of the company		0.0335	0.02	Continuous
Size of the company	20 to 100 employees	– 1.2028	5.1	Less than 20 employees
	over 100 employees	– 1.2381	7.2	
Employee training	No	– 0.7199	– 6.69	Yes
Credit	No	– 1.3364	– 12.32	Yes
Size of the city where the company is located	Over 1 million inhabitants	0.1444	1.40	Country's capital city
	Between 250,000 and 1 million	– 1.0026	– 6.94	
	Between 50,000 and 250.000	– 0.4145	– 3.37	
	Under 50,000	– 0.5150	– 5.77	
Subsidiary	Legally incorporated company	– 0.1938	– 1.86	Yes
Legal status	Private limited liability company	1.3263	7.95	Company listed on stock exchange
	Parthership	1.6533	26.83	
	Limited liability company	0.7653	9.42	
	Other	1.2903	19,00	
Quality certification	No	– 0.9767	– 10.99	Yes
Email	No	– 1.4424	– 7.85	Yes
Web site	No	– 0.4940	– 4.12	Yes

Variable	Characteristic evaluated	Coefficient	Effect (%)	Base characteristic
Sales quintile	Quintile 2	0.3451	2.88	Quintile 1
	Quintile 3	1.7924	24.72	
	Quintile 4	2.0142	25.72	
	Quintile 5	2.9123	38.84	
Technological License	No	– 1.0545	– 13.15	Yes
Impartial judicial system	Disagree	– 0,5982	– 5.28	Strongly disagree
	Agree	0.5495	5.87	
	Strongly agree	0.8572	10.65	
Bank accunt	No	– 0.3943	– 3.14	Yes
Country	Argentina	1.5801	24.61	Antigua and Barbuda
	Barbados	1.8672	32.26	
	Bolivia	0,3693	3.93	
	Colombia	1.7046	27.43	
	Costa Rica	1,0286	13.93	
	El Salvador	4.1681	77.79	
	Guatemala	2.9331	57.82	
	Guyana	2.2065	40.70	
	Honduras	– 1.3133	– 7.31	
	Jamaica	2.0976	37.95	
	Mexico	0.9362	11.92	
	Paraguay	0.6769	8.10	
	Peru	0.8473	10.71	
	Saint Lucia	2.6108	50.63	
	Trinidad y Tobago	2.2330	41.28	
	Uruguay	1.9519	34.23	
Economic sector	Apparel	– 2.7173	– 14.01	Textiles
	Food	– 1.5346	– 10.58	
	Metals and machinery	– 0.7306	– 9.75	
	Electronics	– 4.6229	– 9.76	
	Chemical and pharmaceutical	– 1.9478	– 13.13	
	Furniture	– 1.9478	– 13.32	
	Non-metallic and plastics	– 1.6335	– 9.08	
	Autos and auto parts	3.3027	49.73	
	Other manufacturing industries	– 2.0328	– 10.62	

Notes:

R^2 adjusted = 0.5328

Observations: 196,661

Wald chi^2 (88) = 235,160.98

Prob > chi^2 = 0.0000

Cases correctly classified: 91.56%

Source: World Bank; compiled by author.

In regard to the first and second hypotheses, the estimate confirms that the size and age of the firm are positively correlated with export performance. In absolute terms, by size, companies with fewer than twenty employees are between 5% and 7% less likely to export than medium-size and large companies. With respect to age, each additional year of a firm's operations leads to its export performance increasing by 0.02%. Additionally, simulations were performed on the probability of exporting, relating both factors in order to observe probabilistic paths, as shown in Figure 4. However, a different indicator was used to represent the size of the firm: sales volume, which was distributed by quintiles. The results show significant differences in the export paths of the companies, with large margins during the years of operation among firms in the first quintile and those in the third, fourth, and fifth quintiles – nearly 50%.

Figure 4
Probability of exporting by quintile of company sales, according to years since incorporation, Latin America, 2010 (percentages)
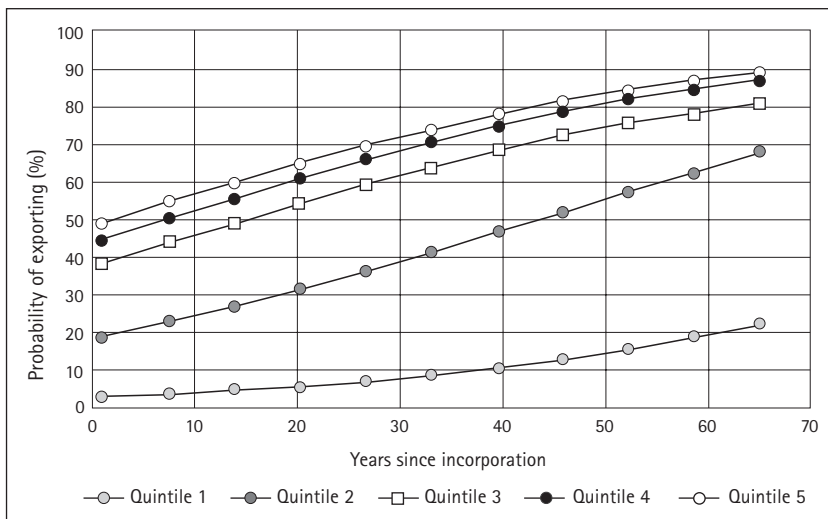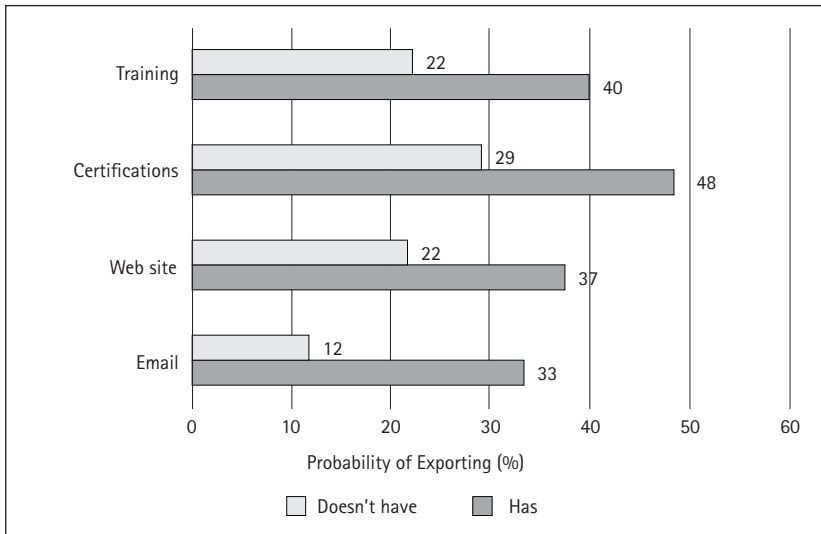

Source: World Bank; compiled by author.

The third hypothesis shows that investment in technology has a great influence on the company's export capacity. Figure 5 shows the absolute probabilities of each component of technological capabilities possessed. Thus, a company with email has 33% more probability of exporting than one that does not; the adoption of quality certifications contributes 48% to the probability of exporting; having a website contributes 37%; and the training of workers, 40%. In terms of joint contributions, this component provides the company a more

advantageous position in international trade, thus confirming that the presence of specific assets is one of the main capacities that firms possess to confront foreign competition.

Figure 5
Probability of exporting by possession of technology components, Latin America, 2010 (percentages)
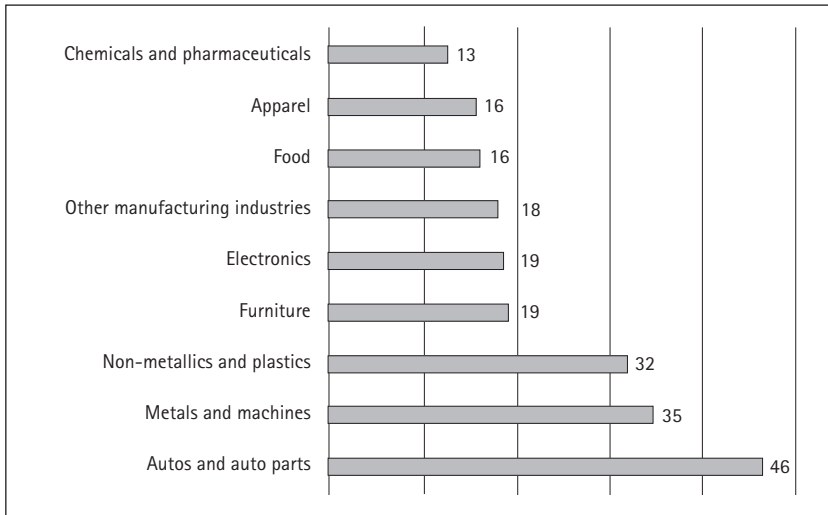

Source: World Bank; compiled by author.

In regard to institutional factors, i.e., the fourth hypothesis, it is evident that access to credit and ownership of a bank account give companies a greater ability to conduct transactions abroad, in addition to helping them when domestic financial resources are scarce. Quantitatively, the effect of these factors is an increase in probability of exporting of 12% and 3%, respectively. With respect to the opinion of business owners regarding the impartiality of the judiciary, those who were satisfied with the judicial system had a 10% increase in export capacity over those who were not satisfied. A biased judicial system increases the implicit transaction costs for companies, making their dealings with suppliers or distributors more difficult (North 1993).

In the case of the fifth hypothesis, regarding external factors, significant differences were also found in the level of internationalization according to the economic sector of the company (Figure 6). The automotive sector shows a remarkable capacity for internationalization: 46% probability of exporting, almost 10 percentage points above the sector with the

second largest capacity, metal and machinery at 35%. Chemicals and pharmaceuticals, apparel, and food were sectors with the lowest levels of internationalization, with 13%, 16%, and 16%, respectively.

Figure 6
Probability of exporting by the economic sector of companies, Latin America, 2010 (percentages)

Source: World Bank; compiled by author.

Finally, companies located in capital cities and cities with more than a million people have between 3% and 6% more probability of exporting than those located in other cities in their countries. According Horta (2012), the explanation of this phenomenon is in economies of scale that companies can take advantage of due to the location of the main distribution services, infrastructure, and the proximity to commercial offices.

3. CONCLUSIONS

The internationalization of companies is a common phenomenon in a globalized society and an important factor in improving their competitiveness, since it allows them to absorb and develop capacities that increase the quality of their goods and production processes. Over the past decade, internationalization has taken place in Latin American economies. This has been reflected in significant growth of FDI and trade flows. However, this growth has been concentrated in economies with large domestic markets (Brazil, Mexico, and

Argentina) and in those that promote investment (Chile and Colombia). Nonetheless, the participation of the productive structure of the region's countries has not been significantly affected by these processes: they continue to export mostly primary products, although industrial goods have gained ground in some countries, especially where the automotive sector plays an important role.

In this context, it should be recognized that it was the companies themselves that were the architects of this process and this paper has sought to quantitatively assess the determinants and conditions of their internationalization by conducting research on industrial firms in 2010. Exploration of the theoretical and empirical framework of the determinants of internationalization permitted the development of various hypotheses about the behavior of companies and relevant internal and external factors. In methodological terms, this led to the design of a probabilistic model to test the hypotheses, using the 2010 WB Enterprise Survey as a data source, and a logistic model as a statistical estimation function for the variable of analysis, which was the company's decision to export. The estimates for nearly 196,000 firms showed results that confirmed each of the hypotheses, with the company's internal factors as the major determinants of decisions to internationalize. Technological capability (possession of email, website, quality certifications, and training of workers in quality control) stands out as a component that creates specific assets for companies, which have a differentiating role in its organizational structure and promotes its introduction into foreign markets. Among external factors, it was found that an institutional framework of legal stability and firms' access to finance enables their greater international integration, although geographical factors and the type of economic sector also have significant influence.

These results should encourage companies in the region to take advantage of the benefits of trade liberalization and increased technological investment in order to ensure their presence in other countries. Also, improving infrastructure and establishing corporate policies that encourage technological innovation by firms may be factors that contribute to a greater internationalization of the industrial sector in foreign markets, thereby promoting productive modernization of Latin America from the primary to the secondary sector, leading to higher levels of employment and economic development for its countries.

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