

# INTERNATIONALIZATION GENERATES QUALITY JOBS AND IMPROVES THE COMPETITIVENESS OF BRAZILIAN FIRMS

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## 1. INTRODUCTION

There is extensive theoretical and empirical literature about the nature of multinational companies as well as the determinants of their performance in specific countries. From a theoretical point of view it is possible to identify two lines of thinking that are especially relevant to this debate.

The first one addresses the so-called behaviorist models. These models are predominant in areas of administration and are cited in Johanson and Vahlne (1977 and 1990). In this field of literature, the internationalization of a firm's production is seen as gradual. Examples are commonly cited of firms that are initially goods producers in a single country and then decide to export to other markets as a second step. The exporting is initially done through commercial agents and later on directly through the company or its commercial representation outside the country. Subsequently, these firms engage in foreign direct investments in the market they initially exported to. According to the gradualist principle, foreign investment can happen sequentially and in various ways such as associating with other companies, licensing, or directly by the company.

The behaviorist approach has been criticized [see Andersen (1993)] because it doesn't explain the internationalization determinants of the firms. Most exporting firms do not internationalize their production. What makes a firm decide to produce overseas? The question is answered by transaction cost theories. These theories have been the basis of the alternative approach to the behaviorist perspective that became known as the eclectic theory of the internationalization of firms [Dunning (1988, 1991 and 1993)].

According to transaction cost theories, a firm's decision on whether to produce through direct investment or to commercialize on the international market in order to supply a given market depends on the specific assets [see Williamson (1985)] of the firm and on the degree of uncertainty that it is subject to. According to Caves (1982), there are reasons to believe that the uncertainties are greater in international transactions, and therefore the market transaction cost<sup>4</sup> must be greater when compared to intra-firm

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<sup>4</sup> Regarding transaction costs, Coase (1937) suggests that the economic activities of individuals are coordinated in two alternative manners: spontaneously through the market price mechanisms or planned hierarchically. Outside the firm, price movements direct the allocation of resources in production, being that the market coordinates inter-firm exchanges. Inside the firm these transactions are eliminated and the entrepreneur – not the market – directs the production and intra-firm transactions. The boundary between a firm and the market is located where the marginal costs of each transaction mode are equaled. A firm tends to expand to a point where the marginal cost of organizing a transaction within the firm equals the marginal cost of an open exchange on the market or the costs of organizing another firm. This balance explains the size of the firm. According to Williamson (1985), the firm emerges when the market fails. The market is imperfect in organizing transactions because economic agents reveal information in a selective and distorted

transaction costs. The firm's risks, rooted in opportunist behavior and the limited rationality of the economic agents, are greater in the international market than in the domestic one.

Therefore, one of the reasons that are especially relevant for a firm to become multinational is the intangible assets<sup>5</sup> of the firm, such as the technological knowledge for producing a cheaper (lower cost) or better (for a given price) product than other competing firms; the capability for differentiating a product; the marketing knowledge related to sales efforts and to establishing a brand with customer loyalty; the implicit organizational knowledge capable of reducing internal transaction costs and increasing decision-making management capacity; the way a firm handles and applies its collective ability; etc.

However, other reasons no less relevant also justify the internationalization of a firm, such as economy of scale in production and distribution, which explains the preference of hierarchy for the international expansion of a firm based on vertical acquisition, which in turn depends on the geographical expansion toward raw material sources. In this case, the profits of vertical integration are results of the technological interdependence between suppliers and buyers in a production chain. A mixed or impure case for internationalization occurs when technological advantages of integration combine with the specific aspect of the asset that refers to the location of the raw material. That is because the stability of supplying raw material at low costs and/or superior quality depends on specific location. Even if one of the total cost components – production cost or transaction cost – doesn't justify integration in and of itself, their integration can be a determinant in terms of reducing the total average cost per unit.

In conclusion, the eclectic theory of the internationalization of firms is based on the argument that in order for a company to become multinational it previously needs to be a leading enterprise in its country of origin that accumulates tangible and intangible assets with high transaction costs on the international market. The accumulation of assets is directly related to the global accumulation of the firm, which is determined by competitive strategies in the industry in which it performs. Because these companies emerge in industries in which the differentiation process of the product is the main way of competing, and they have already strategically worked out a diversification process to guarantee their long-term growth, they have greater product differentiation capabilities and are also more diversified than uni-national firms in countries that host direct foreign investments.

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manner. Market imperfections are caused by the behavior of individuals who, in search of their own interests, are subject to limited rationality and opportunism.

<sup>5</sup> The core business or core competence of firms represents an intangible asset accumulated by the firm and that has the capacity to generate future revenue by diversification. The diversification of a firm is a form of prevention against the restrictions of future demands. Penrose's (1956) argument about production base or specialization area is the central element of this diversification process analysis. A firm can operate in markets in several countries and have only one production base. Each productive activity employs machines, equipment, procedures, knowledge, and raw materials. These elements are called the productive base of the firm. Therefore, the firm has several diversification possibilities and can choose the most profitable one according to the amount of resources involved with diversification. The firm can, from its production base, opt to produce in the foreign market and become a multinational firm instead of diversifying in its own market – that is, to diversify within the same specialization area of the firm by entering new national markets with new products using the same production base; or to expand within the same national market with new products using other kinds of technology; or to enter new national markets with new products using other kinds of technology.

If the multinational firms emerge from specific conditions, they carry the distinct characteristics of their uni-national competitors. These characteristics give origin to the advantages of multinationals over domestic firms in the competition process. According to Dunning (1993) these advantages are key elements for establishing an analytical structure based on the determinants and the impacts of the activities of multinational firms. This analysis suggests that a multinational firm's decision to produce in a particular country would be linked to the conditions that country offers for exploring its competitive advantages. In other words, the investment decision of a multinational firm would depend on location factors and the firm's internal factors.

The theoretical framework of this paper is the eclectic literature on the internationalization of firms. The hypothesis of the paper is that there is a link between technological innovation, the internationalization of Brazilian industrial firms, and the obtaining of price premium in exports. The link exists because technological innovation produces specific assets that enable the internationalization of the firm, which in turn positively contributes to gaining price premium in its exports. There is also the feedback mechanism: internationalization favors innovation and innovation increases the possibility of obtaining price premium among exporters.

More specifically, this article seeks answers to the following questions: How many Brazilian industrial firms made foreign direct investments (DI)? What are the characteristics of Brazilian industrial firms that become internationalized? Does internationalization generate jobs in other countries to the detriment of domestic jobs? Is technological innovation (new products for the market) a factor that influences the internationalization of Brazilian firms? Do internationalized firms obtain positive premium prices compared to the many exporters of the Brazilian industry? Is the internationalization of a firm important for innovating and differentiating products? What are the parameters for a government to support internationalization?

This article is divided in five parts, including this introduction. Part 2 describes the main conclusions of some studies regarding the internationalization of Brazilian firms. Part 3 analyses the characteristics of internationalized Brazilian firms. Part 4 presents the results of econometric exercises that seek to prove the hypothesis of this paper. A synthesis of the main results and their implications for possible government action are presented in part 5.

## **2. THE INTERNATIONALIZATION OF FIRMS IN BRAZIL**

There are not many studies that address the internationalization of Brazilian firms. Dias (1994) studied 22 Brazilian firms that made foreign investments and found evidence that the establishment of foreign subsidiaries is prompted by different reasons, and that these branches offer solutions to technological problems and product specifications in an especially relevant manner. Brasil *et al* (1996) studied 150 companies and found evidence that the need to be near the client, to conquer new markets, and to have access to technology were the top three relevant factors in a firm's decision to make foreign investments. The National Bank of Social and Economic Development (Banco Nacional de Desenvolvimento Econômico e Social – BNDES) (1995) completed a study that involved 30 large national economic groups and found that most foreign branches of Brazilian firms aim to bring the firm closer to the cultural and organizational reality of the

host country and permits the Brazilian firm to have specific assets capable of broadening their performance in the market.

A study by Iglesias and Motta Veiga (2002) is unique among studies regarding the internationalization of firms because it establishes a link between internationalization and export performance. These authors selected a group of exporters with foreign investments and found that about 85% of their foreign branches are involved in trade activities and product distribution. The productive investments, which represented 12% of the sample, were concentrated in textile, chemical, basic metallurgy, and car part sectors. According to the authors, logistics and the need to keep up with consumer market tendencies were the main motivators for promoting investments overseas.

Abrix, Salerno and De Negri (2004 and 2005) demonstrated that the internationalization of a firm focused on technological innovation<sup>6</sup> has a positive effect on export performance because the probability of the firm becoming an exporter is increased by 16% if it makes technological innovations. They also show that there is a direct relationship between scale and export: in the case of increasing returns of scale, the 0.1 increase of the efficiency scale rate would increase the probability of the firm becoming an exporter in the Brazilian industry by 4.2%.

Internationalized companies focused on innovation remunerate labor better, employ people with higher education, and therefore, generate better quality jobs. Besides that, they present a higher percentage of spending on job training relative to revenue, which, in a way, stimulates domestic labor quality. Internationalized firms focused on innovation export more than firms who are not. Therefore, there is evidence that the increase in competitiveness of firms is positively influenced by technological innovation that results from the internationalization process. Opening foreign markets would generate greater expansion and growth potential for the firm and internationalization itself would generate feedback mechanisms of its technological capability.

In conclusion, evidence reveals that the internationalization of Brazilian firms occurs in a variety of ways. The internationalization movement has been more evident in labor-intensive and natural resource-intensive industries in which Brazil has recognizable comparative advantages. There is also evidence that Brazilian firms are internationalized with the purpose of gaining information in order to achieve technological innovation. This type of internationalization positively affects the export performance of the firms.

Although many authors address the internationalization of firms, there are still gaps in Brazilian literature about technological innovation, the internationalization of firms of Brazilian capital, and obtaining price premium in exporting. This paper focuses on this issue and seeks to find elements to help fill in these gaps. The next section will lay out the methodological procedures used in this project, as well as the main descriptive statistics of internationalized Brazilian firms. Specifically, answers are sought for the following questions: How many Brazilian industrial firms make direct investments (DI)? What are the characteristics of Brazilian industrial firms that achieve internationalization?

### **3. CHARACTERISTICS OF INTERNATIONALIZED FIRMS OF BRAZILIAN CAPITAL**

In this paper, firms of Brazilian capital that make foreign investments were identified through the Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE) records,

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<sup>6</sup> That is, firms whose main source of innovation information comes from one of its foreign branches.

which are kept by the Brazilian Central Bank (Banco Central do Brasil – Bacen). These records classify Brazilian capital abroad in eight ways: DIs, portfolios, derivatives, financing, loans, leasing, deposits, and other investments. Loans in inter-company currency are also considered foreign direct investments. This database contains information on each firm regarding the total invested in dollars, the modality, and the country of destination for the years 2001, 2002, and 2003.

The first concern in carrying out the research was to verify the coverage of the database. This concern exists because the record of Brazilian capital abroad is census-based and the many databases used have specific sample criteria. Table 1 presents the value of Brazilian capital abroad in billions of dollars. According to the Brazilian Central Bank (Bacen) data, in 2003 there were US\$ 82.7 billion in capital of Brazilian nationality in other countries. Of this total, direct investments with equity in enterprises above 10% along with inter-company loans totaled US\$ 54.9 billion. Brazil's foreign direct investments are carried out in the most diverse sectors of the economy. The interest of this paper is, however, to map the characteristics of DIs in the industrial sector. For this we opted to verify the amount of DIs made by firms that take part in the sample design of the Annual Industrial Research study (Pesquisa Industrial Annual – PIA) prepared by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística – IBGE). This research has an important characteristic: it contains practically all the industrial firms that have 30 staff or more. It is reasonable to believe that Brazilian firms that invest abroad must be substantial ones and, therefore, their total investments must be very close to what the Brazilian industry actually invests abroad.

Table 1

**BRAZILIAN CAPITAL ABROAD (Capitais Brasileiros no Exterior – CBE)**

(in US\$ billion for 2003)

1	Total Brazilian Capital Abroad		82.7
1.1	Brazilian DI		54.9
1.1a		DI (>10%)	44.8
1.1b		Inter-company loans	10.1
1.2	DI by industrial firms in the Annual Industrial Research (Pesquisa Industrial Annual – PIA) sample		13.7
1.3	DI by industrial firms in the Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) sample		12.6
1.3a		Multinationals	1.60
1.3b		Brazilian with DI (297 firms)	11.0
1.3.b.i		DI Europe	1.32
1.3.b.ii		DI NAFTA	0.28
1.3.b.iii		DI South America	0.41
1.3.b.iv		DI Mercosul	0.95
1.3.b.v		DI other	8.04
1.4	Total for industrial firms with DI only in countries with low tax burden		1.11

Source: Brazilian Institute of Geography and Statistics (IBGE)/Research Administration, Coordination of Industry, Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) 2000. Preparation: Institute of Applied Economics Research (Instituto de Pesquisa Econômica Aplicada – IPEA)/ Sector Studies Board (Diretoria de Estudos Setoriais – DISET) based on the transformation of data obtained at the source and the incorporation of data obtained from Annual Industrial Research (Pesquisa Industrial Annual – PIA)/Brazilian Institute of Geography and Statistics (IBGE), Secretariat of Foreign Commerce (Secretaria de Comércio Exterior – Secex)/Ministry of Development, Industry and Foreign Commerce (Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC), Foreign Capital in Brazil (Capital Estrangeiro no Brasil – CEB) and Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE)/ Brazilian Central Bank (Bacen), ComprasNet [purchasing portal of the federal government]/Ministry of Planning, Budget and Management (Ministério do Planejamento, Orçamento e Gestão – MPOG) and Annual Report of Social Information (Relação Annual de Informações Sociais – Rais)/Ministry of Labor and Employment (Ministério do Trabalho e Emprego – MTE).

The results showed that industrial firms were responsible for US\$ 13.7 billion in DIs.

Cross-referencing the information presented by Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE) with that of the Annual Industrial Research (Pesquisa Industrial Annual – PIA) permits us to attain a credible value of the total DI by firms that produce in the Brazilian industry. For our purposes, however, information is necessary about the characteristics of the companies' technological innovations. The information is found in the Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) report. The sample design of this research is different

from that of the Annual Industrial Research (Pesquisa Industrial Annual – PIA). In Pintec's case companies with 500 or more occupied personnel are part of the sample design, and companies with between 10 and 499 occupied personnel make up only one representative portion of the stratum. The number of companies in PIA's sample design is greater, therefore, than Pintec's. When data from the Brazilian Central Bank (Bacen) was cross-referenced with Pintec's data, it was verified that the companies in Pintec's sample design invested US\$ 12.6 billion abroad. That means that 92% of industrial firms' DIs was being covered in Pintec's sample design. Considering that the central issue of this paper is technological innovation and that Pintec provides ample and satisfactory coverage of the matter, we have opted to use their sample design as our basis.

In collecting information about Brazilian capital abroad, the Brazilian Central Bank (Bacen) works with the term "resident". A resident firm (that produces in the Brazilian industry) can be foreign or national and either one can make DI originating in Brazil. Bacen's census of Foreign Capital in Brazil (Capital Estrangeiro no Brasil – CEB) identifies firms that have more than 50% foreign capital and isolates these companies from others that make DI in Brazil. By cross-referencing this census, 297 industrial firms of Brazilian capital that make DI were identified. The investment supply of these firms in 2003 was US\$ 11 billion.

The DI's destination is relevant because countries, blocs, and their markets present different economic dynamics and standards of competition. Data grouped according to destination shows that the DI worth of Brazilian capital firms that invest in destinations other than the North America Free Trade Agreement (NAFTA), European, South American, and Mercosur countries reaches US\$ 8.04 billion, that is, 63.8% of US\$ 11 billion. A significant part of these investments go through countries with low tax burdens on investments. The DI goes through these countries and is then moved on to countries where the firm's production takes place. Here a methodological problem arises because one of the issues in this paper is to know if the DI is positively correlated with obtaining premium price in exports. In this case, knowing the destination of the DI becomes crucial. The econometric models used did not require knowing the DI worth – only if the firm had made DI or not in a given country. To get around this problem it was assumed that firms that registered DI in one or more countries, as well as in countries with low tax burdens, were there only temporarily – not permanently as the final destination of the investment proper. Only the final destination of these resources would count as a DI registration. By doing this, we would only lose information about industrial firms with DI in countries with low tax burdens. This loss of information counted as 8.8% of the total worth of DI made by Brazilian firms. The loss was considered insignificant in terms of the paper's objective.

The firms were categorized in three groups:

- a) Brazilian firms with DI – firms of mostly (more than 50%) Brazilian capital with DI
- b) Brazilian firms without DI – firms of mostly (more than 50%) Brazilian capital without DI
- c) Multinational firms – firms of mostly (more than 50%) foreign capital that operate in the Brazilian industry.<sup>7</sup>

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<sup>7</sup> For this paper we considered foreign firms in the Brazilian industry as transnational companies.

The characterization of the different types of firms through descriptive statistics took into consideration the participation of each type in the industry, the characteristics of the firms and occupied personnel, and the technological innovation. The results follow below.

### 3.1 Scale and Efficiency of Internationalized Firms

Table 2 presents the participation of firms in the Brazilian industry in selected variables. It is clear that most firms are those of mostly national capital without DI. However, it is worth noting that although they represent 97.4% of industrial firms and using 75.9% of the labor employed in industry, their participation in the total revenue of the Brazilian industry is 42.2%. On average, the data for relative participation of occupied personnel and for revenue indicate that the productivity of Brazilian firms with DI and of multinationals is significantly superior to Brazilian firms without DI. The participation of Brazilian firms without DI decreases even more when export and import indicators are analyzed.

Table 3 presents the average characteristics of firms according to the types analyzed in this paper. Employed staff and revenue indicators show that in Brazilian firms without DI the scale and scale efficiency are less when compared to others. That is indicative that, on average, the productivity of these firms can increase when their production scale grows. The production scale of Brazilian firms with DI is significantly superior to that of other firms, as well as being superior to multinational ones. Despite the significant difference in the production scale, the scale efficiency of Brazilian firms with DI and of multinational firms is not very different, albeit greater in internationalized firms focused on innovation. That means, on one hand, that the potential gain in productivity, which can be obtained by increasing the scale production of these firms, is more limited than in the case of Brazilian firms. On the other hand, the scale efficiency can be an important specific asset for the internationalization of Brazilian firms.

TABLE 2  
**PERCENT PARTICIPATION OF CATEGORIES OF FIRMS IN THE BRAZILIAN INDUSTRY**

Types of firms	Participation in the total industry			
	Number of firms	Employed Staff	Revenue	Exports
Brazilian without DI	97.4	75.9	42.2	25.6
Brazilian with DI	0.4	9.02	25.1	36.5
Multinationals	2.2	15.1	32.7	37.9
Total	100	100	100	100

Source: Brazilian Institute of Geography and Statistics (IBGE)/Research Administration, Coordination of Industry, Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) 2000. Preparation: Institute of Applied Economics Research (Instituto de Pesquisa Econômica Aplicada – IPEA)/ Sector Studies Board (Diretoria de Estudos Setoriais – DISET) based on the transformation of data obtained at the source and the incorporation of data obtained from Annual Industrial Research (Pesquisa Industrial Annual – PIA)/Brazilian Institute of Geography and Statistics (IBGE), Secretariat of Foreign Commerce (Secretaria de Comércio Exterior – Secex)/Ministry of Development, Industry and Foreign Commerce (Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC), Foreign Capital in Brazil (Capital Estrangeiro no Brasil – CEB) and Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE)/Brazilian Central Bank (Bacen), ComprasNet [purchasing portal of the federal government]/Ministry

of Planning, Budget and Management (Ministério do Planejamento, Orçamento e Gestão – MPOG) and Annual Report of Social Information (Relação Annual de Informações Sociais – Rais)/Ministry of Labor and Employment (Ministério do Trabalho e Emprego – MTE).

**TABLE 3**  
**CHARACTERISTICS OF FIRMS IN THE BRAZILIAN INDUSTRY – AVERAGES IN 2000**

Firms	Employed staff (number)	Turnover (in R\$ million)	Scale efficiency <sup>a</sup>	Exports (in US\$ million)
Brazilian without DI	53.9	3.80	0.54	0.17
Brazilian with DI	1,509.9	533.2	0.72	57.8
Multinationals	463.9	128.2	0.77	11.1

Source: Brazilian Institute of Geography and Statistics (IBGE)/Research Administration, Coordination of Industry, Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) 2000. Preparation: Institute of Applied Economics Research (Instituto de Pesquisa Econômica Aplicada – IPEA)/ Sector Studies Board (Diretoria de Estudos Setoriais – DISET) based on the transformation of data obtained at the source and the incorporation of data obtained from Annual Industrial Research (Pesquisa Industrial Annual – PIA)/Brazilian Institute of Geography and Statistics (IBGE), Secretariat of Foreign Commerce (Secretaria de Comércio Exterior – Secex)/Ministry of Development, Industry and Foreign Commerce (Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC), Foreign Capital in Brazil (Capital Estrangeiro no Brasil – CEB) and Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE)/Brazilian Central Bank (Bacen), ComprasNet [purchasing portal of the federal government]/Ministry of Planning, Budget and Management (Ministério do Planejamento, Orçamento e Gestão – MPOG) and Annual Report of Social Information (Relação Annual de Informações Sociais – Rais)/Ministry of Labor and Employment (Ministério do Trabalho e Emprego – MTE).

<sup>a</sup> The scale efficiency measures the difference of firm productivity in relation to the most productive scale of its industry, or in other words, the point where the scale elasticity is equal to the unit. The estimation of scale efficiency was done by De Negri (2003) for 30 sectors of the Brazilian transformation industry using DEA.

The relatively larger scale of Brazilian firms with DI can be due to their sector characteristics. Brazilian firms with DI are present in all divisions of the National Economic Activity Classification (Classificação Nacional de Atividades Econômicas – CNAE) at 2 digits of the Brazilian industry, but large food, textile, cellulose, ironworks, and petrochemical companies end up elevating the scale average of these types of firms. It is worth highlighting that Brazil has greater comparative advantages in intensive labor and natural resource segments, and this endowment represents a specific asset that is being explored by firms in order to achieve internationalization. Direct deposits are clearly done on comparatively large scales and, for Brazil, the capability of a firm to obtain the amount of loans necessary in Brazil or abroad depends on solid guarantees anchored to their production scales. In this way, the scale obtained by firms in industries where Brazil has comparative advantages ends up creating for itself a specific asset capable of surpassing barriers that would prevent Brazilian industrial firms from entering the foreign market.

However, the production scale does not seem to be the specific asset essential to the internationalization of firms focused on technological innovation. In this category of firms, specific assets should be much more centered on taking advantage of technological opportunities within the business group to which the firms belongs. The firm's scale may not be the main asset because a company can use positive externals that are generated by the joining of companies as a complementary technological base. In this way, the technological antenna of the firm abroad absorbs information without needing a DI.

### 3.2 Quality of Employment

There is some fear that internationalizing Brazilian firms can generate employment in other countries to the detriment of jobs on national territory. Table 4 shows employed staff indicators in different types of firms. Brazilian firms with DI and multinational firms can be roughly perceived as remunerating labor better, employing more qualified workers, and increasing employment duration when compared to Brazilian firms without DI. The characteristics of the labor employed in firms are good indications of technological content. Firms that employ workers with higher education have, *a priori*, greater capability of achieving technological innovations. The average employment duration of a worker is a good indication of accumulated learning inside the firm. The remuneration of employed staff in companies with more technological content is greater due to productivity gains that are obtained by more qualified and better-trained labor. Besides that, the firms use salary-efficient mechanisms to guarantee that the more productive workers don't leave their jobs.

TABLE 4  
**CHARACTERISTICS OF OCCUPIED PERSONNEL IN BRAZILIAN INDUSTRIAL FIRMS – AVERAGES IN 2000**

Firms	Wage (R\$/month)	Education (years)	Time of employment (months)
Brazilian	505.60	7.10	37.7
Brazilian with DI	1,318.40	9.13	67.3
Multinationals	1,592.3	9.83	57.2

Source: Brazilian Institute of Geography and Statistics (IBGE)/Research Administration, Coordination of Industry, Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) 2000. Preparation: Institute of Applied Economics Research (Instituto de Pesquisa Econômica Aplicada – IPEA)/ Sector Studies Board (Diretoria de Estudos Setoriais – DISET) based on the transformation of data obtained at the source and the incorporation of data obtained from Annual Industrial Research (Pesquisa Industrial Annual – PIA)/Brazilian Institute of Geography and Statistics (IBGE), Secretariat of Foreign Commerce (Secretaria de Comércio Exterior – Secex)/Ministry of Development, Industry and Foreign Commerce (Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC), Foreign Capital in Brazil (Capital Estrangeiro no Brasil – CEB) and Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE)/Brazilian Central Bank (Bacen), ComprasNet [purchasing portal of the federal government]/Ministry of Planning, Budget and Management (Ministério do Planejamento, Orçamento e Gestão – MPOG) and Annual Report of Social Information (Relação Annual de Informações Sociais – Rais)/Ministry of Labor and Employment (Ministério do Trabalho e Emprego – MTE).

It is plausible, therefore, to believe that Brazilian firms with DI train their workers in a more intense way than the average Brazilian firm, and probably also take advantage of the externals that are generated by the firms' – and consequently its workers' – contact with the international environment. In general, the characteristics of employed staff demonstrate that Brazilian firms that make foreign investments demand more qualified labor and, therefore, are capable of creating better quality job positions. In this way, the fear that foreign investments by Brazilian firms could generate jobs in other countries is counteracted with evidence that these firms generate more stable jobs with better quality.

Besides the superior job positions created by Brazilian firms with DI, it should be emphasized that there is evidence that technological innovation is positively associated to the firm's growth (see chapter 12 of this book). Firms that promote open markets abroad through direct investments would have greater expansion and growth potential, because there is proof that internationalization generates feedback mechanisms of its technological capabilities when company units abroad serve as the firm's window of technology. Therefore, the firm's growth would increase its potential for generating jobs; rendering unjustified the linear argument that DI by Brazilian industrial firms would be generating employment overseas to the detriment of domestic jobs.

In general, the characteristics of employed staff demonstrate that internationalization through DI or focused on technological innovation depends on specific assets related to the technological content of the firm. The internationalization of Brazilian industrial firms depends not only on economic endowment factors, but also on the internal technological attributes of the firm. This conclusion is corroborated by data obtained from the Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) 2000. According to this research, the rate of innovation in the Brazilian industry is 31.5%, in other words, this is the percentage of innovators in the total number of firms in the industry. This rate reaches 70.4% for Brazilian firms with DI and 80.1% for internationalized firms focused on innovation. This is a good indication that technology is a specific asset related to the internationalization of firms of Brazilian capital.

The facts found in this subsection roughly point out that the technological content of Brazilian firms with DI is greater than the non-internationalized ones, which indicates that technology is a specific asset of the Brazilian firm that influences its internationalization. If, according to the characteristics, there is evidence that a firm's technological content is an important specific asset, it should ask itself: is going abroad to achieve technological innovation of a new product for the market a factor that influences the internationalization of Brazilian firms? Do internationalized firms obtain positive premium price compared to the other exporters in the Brazilian industry? The next part is based on these two questions.

#### **4. INNOVATION, INTERNATIONALIZATION, AND PREMIUM PRICE IN EXPORTS**

The main hypothesis of this article is that internationalization is an important link for companies to become firms that innovate and differentiate products. This hypothesis can be divided into two parts. Technological innovation accumulates specific assets inside the firm that determines its internationalization, and the internationalization of firms with greater technological content determines their performance as exporters. The cause and effect relationship of this hypothesis is supported by two consolidated theories. The eclectic theory of internationalization argues that specific assets with elevated transaction costs on the international market determine the firm's internationalization [see Dunning (1993)]. The theories of international trade affirm that technological innovation is one of the firms' export determinants [see Krugman (1986)]. The econometric models that attempt to prove the hypothesis of this paper are explained based on this causal relationship.

In order to verify the first part of the hypothesis, that is, if the internationalization of firms is explained by technological innovation, two probabilistic econometric models were

considered. Two dependent variables were used: a) if a firm is or not a Brazilian firm with DI: b) if it is or not a Brazilian firm with DI or an internationalized Brazilian firm focused on innovation. For explanatory variables the characteristics of the firm and the employed staff were used in this way: a *dummy* for firms that innovate new products for the market, the firm's revenue in millions of Reais, a *dummy* for importers and a *dummy* for exporters, the average education of employed staff in the firm in years, the average employment duration of the worker in the firm in months, and *dummies* for industrial branches of the firm according to divisions in the National Classification of Economic Activities (Classificação Nacional de Atividades Econômicas – CNAE). The results are presented in Table 5.

In the model presented in Table 5, the signs of the variables are according to expectations. The fact that the revenue is positively correlated to the internationalized condition of a firm shows that the production scale of the Brazilian industrial enterprise is one of the determinant factors of the probability of a firm being internationalized. The import and export *dummies* also reveal that firms more focused abroad through international trade have more chances of being internationalized. This would be compatible with the point of view that exposing firms to the international market permits an increase in knowledge capable of being used in the internationalization process. The average qualification of labor variables and the workers' average job permanence variables corroborate the hypothesis that one of the specific assets that Brazilian firms are exploring abroad is their technological capability.

Most significant for the discussion in this chapter is the result indicating that technological innovation of new products for the market is positive and strongly correlated to the condition in which Brazilian industrial firms make DI. It should be taken into account that these results are free from sector effects once the *dummy* variables were placed for each industrial branch of the firm. The *dummies* for each industry fulfill, in part, the role of capturing the effects of the firm generating specific assets that result from Brazilian economy endowment factors, and from the intensive use of those factors by industries. The results show, therefore, that beyond specific assets generated by traditional comparative advantages of a developing country like Brazil, technological innovation generates specific assets for the Brazilian industry firms that are determinants in the internationalization of their production.

TABLE 5  
**EXPLANATORY FACTORS OF THE PROBABILITY OF BRAZILIAN FIRMS  
 INVESTING ABROAD**  
 (*probit* probabilistic model – 2000)

Independent Variables	Dependent variable	
	Brazilian with DI	
	Parameter (standard deviation)	Marginal probability
<i>Dummy</i> for firm that innovates new products for the market	0.213 <sup>***</sup> (0.71)	0.0019
Revenue (R\$ millions)	0.0004 <sup>***</sup> (0.0001)	3.97E-06
<i>Dummy</i> for exporter	0.6 <sup>***</sup> (0.018)	0.0054
<i>Dummy</i> for importer	0.73 <sup>***</sup>	0.0066
Average education of workers (years)	0.097 <sup>***</sup> (0.1)	0.00088
Average job permanence of workers (months)	0.025 <sup>***</sup> (0.0029)	0.00023
Intercepted: -4.17 <sup>***</sup>		
Log <i>Likelihood</i> <sub>1</sub> : -1001.52		
Number: 29.224		
Number of parameters: 34		
Log <i>Likelihood</i> <sub>0</sub> : -		
R <sup>2</sup> : 0.48		
Observation: <i>Dummies</i> for CNAE divisions not addressed.		

Source: Brazilian Institute of Geography and Statistics (IBGE)/Research Administration, Coordination of Industry, Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) 2000. Preparation: Institute of Applied Economics Research (Instituto de Pesquisa Econômica Aplicada – IPEA)/ Sector Studies Board (Diretoria de Estudos Setoriais – DISET) based on the transformation of data obtained at the source and the incorporation of data obtained from Annual Industrial Research (Pesquisa Industrial Annual – PIA)/Brazilian Institute of Geography and Statistics (IBGE), Secretariat of Foreign Commerce (Secretaria de Comércio Exterior – Secex)/Ministry of Development, Industry and Foreign Commerce (Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC), Foreign Capital in Brazil (Capital Estrangeiro no Brasil – CEB) and Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE)/Brazilian Central Bank (Bacen), ComprasNet [purchasing portal of the federal government]/Ministry of Planning, Budget and Management (Ministério do Planejamento, Orçamento e Gestão – MPOG) and Annual Report of Social Information (Relação Annual de Informações Sociais – Rais)/Ministry of Labor and Employment (Ministério do Trabalho e Emprego – MTE).

\*, \*\* and \*\*\* represent significant figures of 10%, 5% and 1% respectively.

In order to verify the second part of the hypothesis, four probabilistic models were considered in which the dependent variable is the condition by which the firm obtains

premium prices on exports<sup>8</sup>, and the independent variables are *dummies* for the types of firms created in this paper and *dummies* for filiations related to the industrial division of the firm (2 digits in CNAE). In the first model the dependent variable was the condition of a firm to obtain price premium in exports for any market, and internationalization of Brazilian firms through DI – also for any market – was considered for the independent variables. Specific markets were considered in the other three models, and in that way the dependent variable was the condition for the firm to obtain price premium for exports to the specific market. In these models the independent variable was the condition for the Brazilian firm to be internationalized through DI for the same market. The specificity of the market was not considered for the transnational firms. Brazilian firms are used as a reference.

The first result of Table 6 that is especially relevant is in the first model. In this model the *dummy* variable for Brazilian firms with DI was not statistically significant enough to explain the probability of the firm being an exporter with premium price. The multinationals have 22.6% more chances of obtaining price premium for exports than non-internationalized Brazilian firms.

The non-significance of the DI for a firm to obtain an additional price on its exports is not contradictory with what could be expected from the Brazilian economy. Technological innovation is one of the specific assets that enable the internationalization of Brazilian firms. It is not, however, the only specific asset of Brazilian industrial firms. The firms accumulate specific assets that are related to a greater endowment of natural resources and labor in the Brazilian economy vis-à-vis other economies. In the most intensive industrial segments of these production factors, the product differentiation capability and firm innovation tends to be less and the specific assets of the firms that end up being accumulated and that determine their internationalization are the production scale and the expertise for producing standardized goods of lower cost and price. Therefore it does not obtain premium prices for exports because it produces – in Brazil and possibly in other countries – standardized products with a relatively lower aggregated value. These results confirm, therefore, an internationalization standard of Brazilian firms. This standard increases the amount of exports, but on average it does not add to exported goods.

The same econometric exercise, when done in American and European markets, generates different results, albeit complementary ones, and gives evidence to a second standard for the international insertion of Brazilian firms. This standard is more typical of firms that innovate and differentiate products. In this case, firms with DI in American and European markets have 17.04% and 14.01% respectively more chances of exporting with premium prices than non-internationalized Brazilian firms.

These results corroborate the hypothesis that exposing Brazilian firms to a more demanding market broadens its possibility of improving its export product. The hypothesis of this paper states that there is a feedback mechanism for internationalization as well as for the achievement of premium price. Exposing Brazilian firms to more demanding markets – both from the consumer's side and the competing firms' side – forces export products to change in the direction of greater differentiation and quality. This happens for both Brazilian firms with DI and for internationalized firms focused on innovation, when compared to non-internationalized Brazilian firms. This analysis is corroborated by the non-significance of the *dummy's* coefficient of Brazilian firms with DI in the model for a less demanding market like Latin America.

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<sup>8</sup> See methodology for premium price calculations in Chapter 17 of this book.

In summary, the greater the price the Brazilian industry is able to charge for its exports, when compared to other exporter's prices, the more effective its insertion into international trade. The results obtained by this paper show that direct investments by Brazilian firms is positively correlated to getting premium price on exports. This result is especially relevant because there is a direct relationship between increasing the aggregate value of the export and the relative premium price among exporters in the same country. Increasing the aggregate value of the export is an important condition for the effective insertion of a country into international trade.

TABLE 6  
**EXPLANATORY FACTORS OF A FIRM'S PROBABILITY OF OBTAINING PREMIUM PRICE BASED ON DIFFERENT SOURCES OF INFORMATION ABROAD FOR TECHNOLOGICAL INNOVATION**  
*(probit probabilistic model – 2000)*

Independent variables	Dependent variable							
	Premium price for exports for any market		Premium price for exports to the United States		Premium price for exports to Europe		Premium price for exports to Latin America	
	Coefficient (standard deviation)	Marginal Probability	Coefficient (standard deviation)	Marginal Probability	Coefficient (standard deviation)	Marginal Probability	Coefficient (standard deviation)	Marginal Probability
<i>Dummy</i> for Brazilian firms with DI	0.0033 (0.0865)	n.s.	0.5962 <sup>***</sup> (0.1551)	0.1740	0.4736 <sup>***</sup> (0.2229)	0.1401	-0.0438 (0.0974)	n.s.
<i>Dummy</i> for transnational firms	0.5924 <sup>***</sup> (0.0462)	0.2266	0.7015 <sup>***</sup> (0.044)	0.2048	0.6940 <sup>***</sup> (0.0433)	0.2031	0.3742 <sup>***</sup> (0.0426)	0.1474
	Intercepted: -0.4025 <sup>***</sup> Log Likelihood <sub>i</sub> : -4680		Intercepted: -1.2791 <sup>***</sup> Log Likelihood <sub>i</sub> : -3756.24		Intercepted: -1.038 <sup>***</sup> Log Likelihood <sub>i</sub> : -3798.35		Intercepted: -0.8226 <sup>***</sup> Log Likelihood <sub>i</sub> : -4834.92	
	Number: 7574 Number of parameters: 31		Number: 7574 Number of parameters: 31		Number: 7574 Number of parameters: 31		Number: 7574 Number of parameters: 31	
	R <sup>2</sup> : 0.07		R <sup>2</sup> : 0.1508		R <sup>2</sup> : 0.0716		R <sup>2</sup> : 0.0745	
	Observation: <i>Dummies</i> for CNAE divisions not addressed.		Observation: <i>Dummies</i> for CNAE divisions not addressed.		Observation: <i>Dummies</i> for CNAE divisions not addressed.		Observation: <i>Dummies</i> for CNAE divisions not addressed.	

Source: Brazilian Institute of Geography and Statistics (IBGE)/Research Administration, Coordination of Industry, Industrial Research of Technological Innovation (Pesquisa Industrial de Inovação Tecnológica – Pintec) 2000. Preparation: Institute of Applied Economics Research (Instituto de Pesquisa Econômica Aplicada – IPEA)/ Sector Studies Board (Diretoria de Estudos Setoriais – DISET) based on the transformation of data obtained at the source and the incorporation of data obtained from Annual Industrial Research (Pesquisa Industrial Annual – PIA)/Brazilian Institute of Geography and Statistics (IBGE), Secretariat of Foreign Commerce (Secretaria de Comércio Exterior – Secex)/Ministry of Development, Industry and Foreign Commerce (Ministério do Desenvolvimento, Indústria e Comércio Exterior – MDIC), Foreign Capital in Brazil (Capital Estrangeiro no Brasil – CEB) and Brazilian Capital Abroad (Capitais Brasileiros no Exterior – CBE)/Brazilian Central Bank (Bacen), ComprasNet [purchasing portal of the federal government]/Ministry of Planning, Budget and Management (Ministério do Planejamento, Orçamento e Gestão – MPOG) and Annual Report of Social Information (Relação Annual de Informações Sociais – Rais)/Ministry of Labor and Employment (Ministério do Trabalho e Emprego – MTE).

\*, \*\*, and \*\*\* represent significant figures of 10%, 5% and 1% respectively.

n.s. = non-significant

Finally, we will highlight the results obtained by Arbix, Salerno, and De Negri (2005). These authors were able to identify that internationalization focused on technological innovation increases the chance of a firm installed in Brazil to gain premium price for its exports in relation to other Brazilian exporters. However, a firm can also be more loosely inserted into an international context, being that there are several paths by which one can obtain the necessary information for technological innovation abroad: participating in events, purchasing information from research centers, contracting a consultant, etc. Are other ways of gaining sources for innovation abroad relevant to obtaining premium price on exports? Is participating in a foreign business group the best or the only way for obtaining premium price for exports? Arbix, Salerno, and De Negri (2005) focused on these questions. According to them, the many sources of information abroad, not including participation in an internationalized business group, are not significant from a statistical point of view, or, in other words, have little importance in gaining premium price on exported goods.

In the models for specific markets, the authors found that in the case of the United States, using foreign supplier and client information for innovation is also positively correlated to obtaining premium price. For Europe, using client information is positively correlated to obtaining premium price. It is reasonable to suppose that firms that achieve technological innovation based on client and supplier information in more demanding markets can better adapt their product to foreign demand, and with that obtain a price differential over firms that do not take this information into consideration. In less demanding markets, or even in markets equally as demanding as the market of the country where the firm is established – which seems to be the case of Brazilian firms that export to the Latin American market – the firms do not need to count on additional information about the destination country of the merchandise in order to innovate. In this way there wouldn't be a relative price differential such as with firms that seek client and supplier information abroad.

To conclude, the results corroborate the hypothesis that internationalization focused on technological innovation is also an especially important step for a firm to export with premium price. Besides that, exposure to international competition increases the thrust of the firm toward products with greater aggregated value.

## **5. SYNOPSIS**

The internationalization of Brazilian firms has been a recurring concern for private sector leaders. A large part of this concern regarding the need for firms to internationalize lies in the assessment that the exporting performance of a country can be positively influenced when its firms establish subsidiaries abroad. If, on one hand, there are potentials that can be fulfilled by improving the exporting performance of firms through internationalization, on the other hand, there is some apprehension that internationalizing Brazilian firms can generate employment in other countries to the detriment of jobs on national territory ("jobs export"). These are the two points at the center of the debate about the internationalization of Brazilian firms addressed in this paper.

The results show that it is not plausible to believe the line of logic that foreign investment by Brazilian firms would generate jobs abroad to the detriment of domestic employment, because Brazilian firms that make investments abroad demand better qualified labor, and therefore have the capability of creating better quality job posts. Besides better

quality job posts generated by Brazilian firms with DI, it should be emphasized that there is evidence that technological innovation is positively related to the firm's growth in Brazil, which increases its potential to generate more jobs.

This article also shows that technological innovation (new product for the market) is an important asset for the internationalization of Brazilian industrial firms through direct investment abroad. Investment abroad, in turn, is positive and strongly related to obtaining premium price on exports. These results prove that internationalization is highly synergetic with the strategy to innovate and differentiate products: internationalization both supplies and is supplied by innovation.

It is widely understood that Brazil needs to increase its placement of goods of greater aggregated value and greater technological content into international trade. This is one of the main concerns of industrial/technological policies and foreign trade policies. In this sense, the relevant parameter for government action aimed at supporting the internationalization of Brazilian firms must be technological innovation. Internationalization related to innovation – besides stimulating the firm's exports – makes the company's insertion into international trade more effective, because it increases the aggregated value of the exported product.

It should be emphasized that technological innovation exhibits revenue that grows in the long-term, is not-quantifiable in static exercises, and is therefore not comparable to short-term costs. However the short-term costs of incentive policies, such as a long-term line of financing to stimulate internationalization, can be relatively reduced if they are focused on technological innovation and restricted by prearranged action with an established criteria of making firms of national capital who already make significant effort to achieve technological innovations broaden their innovation potential by internationalizing.

Therefore, it becomes evident that government action should take into consideration the examples of successful national companies that could be followed by other firms of national capital, especially those that already made significant innovative efforts. It should be emphasized that incentives for internationalization focused on technological innovation need to also be associated to systems that encourage increased private spending on innovative activities in Brazil. Finally, there is room for the government to take steps toward promoting action that seeks information about business opportunities abroad, including supporting the acquisition of technologically based firms, and which can be shared among several public institutions whose objectives are to promote industrial development and business groups interested in becoming internationalized with a focus on innovation.

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