Foreign Direct Investment and Trade: a Study on Selected Brazilian Industries

Abstract

This study aims to investigate if there were evidences that FDI growth improved the Brazilian foreign trade foreign trade in the longer term and if there is a predictable relationship between the FDI strategies that firms select and foreign foreign trade. We applied Moderated Multiple Regressions (MMR) and Generalized Linear Models (GLM) to test the effects of FDI on both export and import equations of eleven Brazilian industries during the period of 1996 – 2009. Our data sources include the Ministry of Development, Industry and Foreign Trade Ministry, Central Bank of Brazil and the Applied Research Institute. Evidences showed that FDI is related with improves in exports in the short run, but not in the long run. In the long run, the positive relationship between FDI and on exports will only occur for industries in which resource-seeking strategies are preponderant and for export oriented industries. We found a positive relationship between imports and FDI in the short run. FDI positive relationship is perceived in import oriented industries and negative relationship between FDI and imports in the long run. Results are important for public and private managers to understand how the host economy can obtain benefits from the presence of FDI. Policy makers can influence the inflows of FDI developing economic, social and political instruments that contribute to the promotion of export oriented ETNs and controlling import oriented ETNs (Hailu, 2010). The improvement and enhancement of studies in this field could support policy decisions related to control or incentives for FDI in Brazil. Evidences showed that FDI inflows may have both positive and negative effects on Brazilian industries' foreign trade. Paper main contribution is just one more step in a long journey seeking a more accurate understanding on the subject. Still remains the need for continuing the research and additional data in this field.

Key-Words: Foreign direct investment inflows; Brazilian Foreign trade; Moderated Multiple Regressions; Generalized Linear Models.

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INTRODUCTION

The internationalization of the Brazilian economy, derived from trade liberalization, privatizations and mergers & acquisitions (M&A) processes, profoundly changed the Brazilian industrial scenario in the recent years (Laplane, Coutinho & Hiratuka, 2003). The deepening of trade relations between nations, the intensive growth of speculative capital flows and competition in global markets are central elements of this process, essentially known as globalization (Curado & Cruz, 2012).

From the 1980's and even the early 1990's, predominated a growing participation of foreign companies in various Brazilian industries (Laplane & Sarti, 1999). From the second half of the 90s, the Brazilian economy went through a period of intensive changes and one of the most important aspects of those changes was the deepening of the internationalization process, especially a significant growth of foreign direct investment (FDI) flows (Laplane & Sarti, 1997)

In the recent years, the Brazilian economy has been a target for foreign investors all over the world and one of the major recipients of FDI inflows. In 2012, 44% of global FDI inflows were hosted by only five countries (OECD, 2013). China attracted the lion's share of FDI global flows (USD 253 billion or 18% of total) followed by the United States (USD 175 billion), Brazil (USD 65 billion), the United Kingdom (USD 63 billion) and France (USD 62 billion) (OECD, 2013). China and Argentina received respectively 11% and 25% more FDI as compared to 2011, while Brazil maintained the same level of FDI inflows (USD 65 billion). India, Russia and South Africa's decreased by more than 15% (OECD, 2013).

FDI is considered an important instrument of economic development since it enables countries to build up physical capital, create employment opportunities, develop productive capacity, develop skills of local labour through transfer of technology and managerial know-how

(Hailu, 2010). Furthermore, it helps countries in integrating the local economy with the global economy, affecting the Balance of Payment (BOP) of the host economies. Especially developing countries (DC's) expect to have negative foreign trades because their exports are unlike to be sufficient to pay for the importation of those raw materials and capitals goods vitals for growth, while official reserves are generally too small to finance a series of deficits (Donnelly, 1987).

For that matter, there isn't yet consensus on whether FDI effects help or hinder economic growth (Cohen, 2007).

> Supporters of international business argue that the efficiency and knowhow of private enterprises allow foreign subsidiaries to play valuable role in accelerating economic growth and raising living standards and workers' skill levels in low-income countries. Critics maintain that venal efforts by foreign companies to maximize profits are so overwhelmingly detrimental to the economic and social fabric of LCDs that MNCs should be tightly regulated if not banned outright. A third assessment is that in some cases, economic and political conditions in a host country are independent variables determining the effects of incoming direct investments. The absence of a clear answer leaves policy makers with mixed signals in deciding how much FDI they should allow or avoid to enter their economies (Cohen, 2007, p. 179).

The increasing flows of FDI received by the Brazilian economy and the consequent increase in the share of foreign-owned enterprises in several Brazilian industries in recent years brings up the debate about the real effects of the actions of those companies, especially the problems that takes place in the balance of payments and the need of trade surpluses (Hiratuka, 2000; 2008). This study aims to contribute to this debate examining if there are evidences of trade benefits from FDI in selected Brazilian industries. Specifically, we analyzed if there were evidences that foreign presence growth in the Brazilian economy improved the foreign trade of Brazilian industries foreign tradein the longer term and if there is a predictable relationship between FDI strategies that firms select and foreign trade.

Our belief is that the “heterogeneity and diversity of FDI effects are not compatible with the generalization that dominate the conventional wisdom about them” (Cohen, 2007, p. 62). Our

arguments are based on the premise that FDI effects are almost impossible to either forecast or measure with exactness (Hailu, 2010, p. 122).

Our findings yields original insights into the complexity of the FDI effects into Brazilian foreign trade and brings into discussion the need of deeper understanding its possible effects (Buckley, Clegg and Wang, 2010, p.192) and the necessity of well defined and structured sectoral policies seeking to attract higher quality FDI that can effectively contribute the competitiveness of Brazilian economy.

The study is presented as follow: Section 2 presents the theory and panorama of FDI in Brazil while Section 3 presents methodology, data and estimation procedure. In section 4, our results and discussions are presented. Section 5 concludes.

THEORETICL BACKGROUND

Foreign direct investment trajectory

The Brazilian economy has attracted a large amount of Foreign Direct Investment (FDI) in the last decade (Baer & Range, 2001). FDI inflows in the Brazilian economy started mainly during the period of 1955 – 1960, when specific governmental programs were created to attracted foreign capital as strategy to industrial development through import-substitution industrialization. Figure 1 shows that from the early postwar years to the end of 1970s, there was a large influx of FDI to the Brazilian economy (Fernandes, 2008; Hiratuka, 2008). Among the factors that justify this abundance in FDI supply were the guidance for economic growth and the consolidation of a non-discriminating foreign capital political regime (Fernandes, 2008).

----------Insert Figure 1 about here----------

In the 1980s, however, the lack of credibility due to non-fulfillment of foreign debt obligations, excessive economic instability and the import substitution model exhaustion ended

the Brazilian economy's long growth cycle and, as consequence, FDI inflows stagnated at low levels (Hiratuka, 2008; Fernandes, 2008; Hiratuka & Sarti, 2011).

FDI in Brazil followed the Latin America movement that, according to Birch and Halton (2001) has witnessed a resurgence in the 1990s after the debt crisis and capital drought of the 1980s. The 1990s was marked by a production denationalization process derived from the changes in the macroeconomic political scenario with trade and investment liberalization, the privatization processes and the success of the inflation stabilization plan, but in a context of relativity macroeconomic instability and external vulnerability increasing (Hiratuka & Sarti, 2011).

Since 1994, FDI inflows grew rapidly attracted by the openness and growth of the domestic market, reaching between 1.2 and 1.4% of GDP in 1996 and 2.7 in 1997 versus an average of 0.5% in the 1980s (Britto, 2003). Until 1995, the industry sector was the major receptor of investments, being displaced by services in 1996s due to governmental privatization programs (Britto, 2003). In the second half of the 1990s, FDI followed its upward trend to reach a record in 2000. (Bacen, 2000; Sarti & Laplane, 2002).

After this period, FDI to the Brazilian economy decreased, following the world's FDI behavior, but also reflecting the inexpressive Brazilian economy growth and the end of privatizations phase that marked the 90s (Bacen, 2013). In 2004, there was a reaction on FDI inflow and a new record surpassed 2000. The new record occurred even without the occurrence privatization operations, reinforcing the significance of the record reached in 2007 (UNCTAD, 2007).

From 2000's predominated a high and growing degree of internationalization of the Brazilian economy with Brazil standing out as a major recipient of FDI among developing countries in the last two decades (Hiratuka & Sarti , 2011). In terms of FDI inflows received by developing countries (DCs) until 2008, Brazil has positioned itself behind Hong Kong, China,

Singapore and Mexico, with a share of 1.9% in global stocks, ahead of other emerging economies also with relative high degree of internationalization as Russia, India, South Africa, Thailand, Chile, South Korea, Malaysia, Indonesia and Argentina (Hiratuka & Sarti, 2011).

However, the flows of FDI became to decline again in 2009. The economic and financial crisis that began in 2007 and deepened in 2008 had a negative impact on FDI flows worldwide (UNCTAD, 2010). From 2008 and 2009 had fallen 42.4%, from U.S. $ 45.1 billion in 2008 to U.S. $ 25.9 billion in 2009. The economic crisis has the main cause that made the direct investment flows decline 39% worldwide in 2009. Brazil has become the country that received the lower volume of investments in 2009 among BRIC's. The lowest drop of percentage of investments was form China (-2.6%), followed by India (-19%) and Russia (-41.1%) (UNCTAD, 2010).

In terms of sectoral distribution, it is important to highlight some recent and significant changes in the composition of FDI' flows received by the Brazilian economy, among them, the fact that in 1995, the industrial sector accounted for almost 67% of FDI' flows in Brazilian economy (Hiratuka & Sarti, 2011). In the second half of the 1990s and early 2000s, FDI was primarily concentrated in the service sector (especially those sectors in which the privatization process was more intense, such as telecommunications, energy and financial services). In 2000, the stock of FDI in the service sector has accounted for 63.2% of the total inflows, surpassing the industry sector (which accounted for 33% of total). Between 2006 and 2008, there was an increase in the investments flows to the agricultural and extractive with 3.6% of the total in 2005 reaching 20% of total between 2006 and 2008 (Hiratuka & Sarti, 2011). The pprotectionist measures and new strategies for energy and food security arising from the international financial crisis started in 2008, in part reflected a slight increase in the industry participation (with 35% of the total) reflecting a relative increasing share of natural resources intensive sectors (such as food,

metallurgy and pulp and paper, rather than as chemical and automotive sectors). On the other hand, the service sector showed a decline in its relative share, with 45% of the total, reflecting the lower contribution of funds for the privatization period (Hiratuka & Sarti, 2011).

The link between FDI and trade: contributions from the literature

FDI inflows have several effects on the host economy and, one major influence is notably on trade. Several studies have considered the effects of FDI on trade flows all over the world. It is not our goal to promote a thorough and exhaustive review in the empirical literature, but to place the present study in relation to a selected set of studies in which contributions are relevant for this research.

Anwar and Nguyen (2011) argument that FDI not only increases the supply of capital in host economies but it can also result in other kind of benefits to local owned enterprises (LOEs) known as spillover effects.

According to Gorg and Greenaway (2004), domestic firms can learn to export from multinationals. The authors arguments are based on the belief that exporting activities involves "fixed costs to establish distribution networks, create transport infrastructure and learn about consumer tastes, regulatory arrangements and so on in overseas markets" (Gorg and Greenaway, 2004, p. 174). Since MNCs generally often possess strong competitive advantages in entering world market they come already armed with such information and exploit it to export from the new host country, domestic firms can learn how to penetrate export markets through collaboration, or more likely imitation. Thus, MNCs may pave the way for local firms to enter the same exports markets, either because they create transport infrastructure or because they disseminate information about foreign markets that can also be used by local firms (Brouthers, Werner & Wilkinson, 1996; Blomstrom, Kokko & Zejan, 2000 Gorg & Greenaway, 2004),

Early studies have argued that, in the presence of trade barriers, FDI and trade can be substitutes while many other studies have found FDI and trade to be complements (Anwar & Nguyen, 2011; Kiran, 2011).

According to Belderbos and Sleuwaegen (1998), there are many reasons why export substitution might be limited or absent.

> […] if the foreign manufacturing plant in country B serves as an export platform to country C, these manufacturing operations are clearly not substituting for exports to country B. Second, local manufacturing may have important demand enhancing effects […]. Transfer of production may in this way be accompanied by increased demand, leading to export growth. […] if the production process can be separated into stages and only assembly activities are transferred abroad, increased demand for locally assembled products leads to increased exports of components, partly offsetting export substitution at the final product level. […] if FDI occurs through the acquisition of a local firm in the foreign country, this may lead to restructuring of the local firm's activities […]. The acquirer could, for example, make use of brand names, distribution networks and exclusive ties with customers to increase its own exports (Belderbos and Sleuwaegen, 1998, p. 602).

Lall and Mohammad (1983) found that FDI performed rather poorly in generating exports in India. Belderbos and Sleuwaegen (1998) found that the relationship between FDI and exports is negative in some industries suggesting that FDI and exports were substitutes. Svensson (1996) has used firm level data for Sweden to estimate the impact of FDI on exports and found a negative linkage between exports and FDI for finished goods and a positive relationship between exports of intermediate goods and FDI.

On the other hand, Clausing (2000), Lipsey and Weiss (1984) and Brainard (1997), using firm level data found FDI and exports to be complementary. Fukasaku et al. (2000) investigated the impact of FDI on trade in Latin America and Southeast Asia and found that the positive relationship between of FDI on trade is stronger in trade oriented economies. Dunning et al. (2001) found for Korea and Taiwan cases that the growth of trade tends to be positively associated with FDI. Buckley, Clegg and Wang (2010), Sun (1999; 2001) and Zhang and Song

(2000) found evidence of positive and significant role for FDI in promoting Chinese exports. Wang, Buckley, Clegg and Kafouros (2010) found that inward FDI "exerted considerable effect on overall Chinese export expansion". Their results comprised both the growth of exports of domestic firms and foreign affiliates. They also found that the impact of inward FDI on Chinese exports was stronger for labour-intensive goods than for capital-intensive goods.

According to Kiran (2011), FDI stimulate exports by accumulating capital to foster export increase, transferring new products and technology for exports and accessing new and profitable markets. However, FDI may have negative effects on trade since it might "replace domestic savings and create a crowding out effect on domestic investments, transfer old dated and inadequate technologies instead of enhancing factor opportunities" (Kiran, 2011, p. 150).

FDI inflows can either have effects on the imports both at the initial investment and operations phases. In the first case, a positive relationship between FDI and imports will occur since MNC affiliates may import equipments, machinery and installation facilities not readily available in the host country that contribute to an increase the imports (Hailu, 2010; Kiran, 2011). In the second case, the effect of FDI on imports will depend on the input and output nature and the existence of productivity spill-over. Thus, if FDI uses local raw material and other local inputs of production, it may not have a significant adverse effect, but, if it uses imported inputs like raw materials, human skills and other intangible assets, it will be positively related to imports (Hailu, 2010).

Many studies were developed in Brazil aiming to assess the effective contribution of FDI to Brazilian growth and development. Laplane and Sarti (1997, 1999) analyzed the contribution of FDI in the Brazilian industry for the retaking of sustained economic growth in the 90s. The authors deny the optimistic hypothesis that FDI would be able to generate higher exportable surpluses allowing trade surpluses. According to the authors, despite the recognized contribution

of FDI in reducing trade imbalances by removing the constraint to growth, increases in FDI leads to increases in capital goods imports. To the authors, the expansion of domestic production capacity is an alternative to imports and the impact of FDI on imports would be negative in principle, however, transitory, since in the maturation phase of the project, it would end the import of equipment and would supply the market with local production, reducing the trade deficit.

Moreira (1999) founds that trade openness has significantly changed the determinants and the way FDI operates in Brazil. According to the author, FDI contributed to intensify the degree of internalization of the Brazilian economy and those foreign companies are indeed larger and more productive on average, than locally owned firms. Their employees appear to be more qualified and their expenditure in advertising is greater than national firms. The author shows that for the period from1995 to 1997, foreign companies had a propensity to export significantly higher in average than domestic enterprises in all analyzed industries, including those capital intensive industries. The result is similar to what Willmore (1986, 1992) found for the 70's, when foreign ownership appears to have a positive impact on Brazilian exports. Moreira (1999) identifies a pro-import bias with foreign firms presenting a higher propensity to import. The author, however, points out that it would be inappropriate to point out this result as arising solely from trade distortions and points out several other reasons for the result, among them market reasons (those linked to efficiency gains), savings related to large-scale purchases or higher quality criteria.

Sarti and Laplane (2002) analyzed the Brazilian production internationalization process in the 1990s and found that this process presented a strong asymmetry between the intense supply increase of imported products and domestic production and non-proportional increase on the share of local production for foreign market. The authors add that, in the Brazilian case, the internationalization process had the domestic market as the main target and, differently from

China case that was selective in terms of industrial policy, Brazil' strategy based on trade and financial openness and FDI' role consisted in covering the current account deficits. The internationalization was characteristically "introverted" when compared to other developing countries, in the sense that it haven't resulted neither in a greater global presence, nor of Brazilian companies or products. In contrast, increased the external liability and the importance of Brazil as a consumer of intermediate goods produced in other countries.

De Negri (2003) analyzed the national and multinational companies in the period from 1996 to 2000 to identify their contribution to the Brazilian trade performance. The results show that multinational companies seem to be more integrated into international trade than locally owned firms. However, comments the author, this larger integration takes the form, essentially, of stronger import activities more than of larger exports. The local subsidiaries seem to be oriented mainly to supply the Brazilian domestic market and neighbor countries, while inputs and equipments needed for local production come mainly from home countries.

Hiratuka (2008) investigated the effects of the FDI boom and the growth of the foreign share in the Brazilian economy. The author arguments that although evidences show that MNCs affiliates operating in Brazil are, in general, more productivity, have more qualified labor force, pay higher wages, are more innovative, and have a higher degree of trade integration, their influence over local owned firms was very limited and, in some cases, even had negative spillover effects, either in productivity or the access to foreign markets.

Fernandes (2008) analyzed the performance of Brazilian exports for the period 1995-2000. The results of this study show that foreign companies strategies are oriented to the industries with low import orientation and targeted for export behavior (such as food and beverages, mining, steel and metallurgy, pulp and paper and smoking). The evidences from the study indicate that industries with higher exporting capacities and higher volumes of trade are those that have

received less FDI' flows. Still, industries with low exports or imports expression and deficit industries have received the higher volume of these investment flows.

RESEARCH AND METHOD

Data and model specification

Our panel database comprehends eleven Brazilian industries during the period of 1996 – 2009. The data sources comprehends sectoral data from Development, Industry and Foreign Trade Ministry, Central Bank of Brazil and Applied Research Institute (IPEA) database. These tree different databases had different industry's classification methodology. So, only industries with the same classification on all databases were chosen to compose the sample. Based on this criterion, we have selected the following Brazilian industries to compose our database: (i) machinery and electrical equipment; (ii) motor vehicles, trailers and semi-trailers; (iii) chemicals, excluded pharmaceuticals; (iv) machinery and mechanical equipment; (v) rubber and plastic products; (vi) refined petroleum products and other fuels; (vii) other non-metallic mineral products; (viii) metal products; (ix) wood products, pulp and paper; (x) food, beverages and tobacco; (xi) textiles, leather and footwear.

In this study, we estimated the behavior relationship between FDI and exports and FDI and imports in Brazil using Moderated Multiple Regression (MMR) and Generalized Linear Models (GLM) analysis of variance. We performed the analysis undertaken in this study using the SAS statistical software, version 8.

To test the impact of FDI in the foreign trade of selected industries we use two equations, one of exports and another of imports. The data definitions and statistical sources used in this study are presented in Table 1.

----------Insert Table 1 about here----------

Based on Wang, Buckley, Clegg and Kafouros (2010) study and other contributions from Dunning's (1981,1986,1988), Kiran (2011) and Stoian (2013) and on the contributions from our theoretical contributions from the literature presented in the previews section, we could outline our export and import equations as function of the flows of foreign direct investment (FDI), gross domestic product (GDP), exchange rate (EXCH), technological intensity (SINT) and the foreign strategy (SEST).

The foreign presence effect is analyzed in an econometric function in which a number of covariates are assumed to have an effect on the dependent variable, one of which is the FDI. Aiming to investigate the effects of FDI on the exports of Brazilian industries we developed our main export function as follows:

$$LogEXP_{it} = \alpha_0 + \beta_1 LogFDI_{it} + \beta_2 LogGDP_{it} + \beta_3 LogEXCH_{it} + \beta_4 SINT_{it} + \beta_5 SEST_{it} + \beta_6 EXP_{it} * FDI_{it} + \beta_7 SEST_{it} * FDI_{it} + \beta_{it} \quad (1)$$

in which EXP is the value of exports industry in industry i at time t; β_1, β_2, β_3, β_4, β_5, β_6 e β_7 are the parameters to be estimated; FDI_{it} is the measure of foreign presence in the industry in industry i at time t; GDP_{it} is the gross domestic product in industry i at time t; $EXCH_{it}$ is the exchange rate in industry i at time t; $SINT_{it}$ is the technological intensity of industry i at time t; $SEST_{it}$ is the foreign strategy in industry i at time t; β_{itc} = the random term error.

To test the effects of FDI on the imports of Brazilian industries we developed our main import function as follows:

$$LogIMP_{it} = \alpha_0 + \beta_1 LogFDI_{it} + \beta_2 LogGDP_{it} + \beta_3 LogEXCH_{it} + \beta_4 SINT_{it} + \beta_5 SEST_{it} + \beta_6 IMP_{it} * FDI_{it} + \beta_7 SEST_{it} * FDI_{it} + \beta_{it} \quad (1)$$

in which IMP is the value of imports industry in industry i at time t; β_1, β_2, β_3, β_4, β_5, β_6 e β_7 are the parameters to be estimated; FDI_{it} is the measure of foreign presence in the industry in industry i at time t; GDP_{it} is the gross domestic product in industry i at time t; $EXCH_{it}$ is the exchange rate

in industry i at time t; $SINT_{it}$ is the technological intensity of industry i at time t; $SEST_{it}$ is the foreign strategy in industry i at time t; β_{itc} = the random term error.

Our particular interest in the coefficient of $LogFDI_{it}$ as it indicates the elasticity of exports and imports to FDI inflows. The use of lagged dependent variables in examining the impact of FDI in exports and imports has long been established (Orr, 1991; Wang, Buckley, Clegg & Kafouros, 2010). In this study we used a lag of three years following the arguments Calegario and Pereira (2013) in a previous study for the effects of FDI on the Brazilian trade. According to the authors, the results from these kind of tests are highly sensitive to the order of lags and an inadequate choice of the lag length would lead to inconsistent model estimates, so that the inferences drawn from them would be likely to be misleading. Then, they used the minimum final prediction error (FPE) criterion proposed by Akaike (1971) to determine the optimal lags in their study. By employing a series of linear regression in the exports and imports equation they found that their our results were really sensitive to the time period and performed a regression using a length lag of three for both equations.

A Moderated Multiple Regression (MMR) involved hierarchical regression to test on both export and import equations: (a) Model 1: the relationship of the primary predictors of interest on the dependent variable; (b) Model 2: the relationship of the primary predictors of interest (as in Model 1) plus interaction variables; and (c) Model 3: the relationship of the primary predictors of interest, interaction variables (as in Model 2) with lag length of three years.

The interaction variables incorporated in the models were: (i) exports (EXP) * foreign presence (FDI) and (ii) foreign strategy (SEST) * foreign presence (FDI) in the export equation. For import equation we used (i) import (IMP) * foreign presence (FDI) and (ii) foreign strategy (SEST) * foreign presence (FDI). Interaction variables are used to demonstrate the effect of a given variable depending on the moderating effect of other.

Before estimating the regressions, we conducted a correlation test in order to verify the relationship degree between variables and if there were problems associated with multicollinearity. The method used to measure the association degree between variables in this study was Pearson correlation coefficient. We used the tolerance (TOL) and variance inflation factor (VIF) as complementary measure to detect multicollinearity.

We verified the autocorrelation presence in error terms through scatter plot of predicted values in relation to waste diversion. According to Gujarati (2006), residuals graphical analysis offers a simple summary to understand a complex problem. They allow a simultaneous examination of individual cases, while showing data behavior as an aggregate. Autocorrelation premise is related to population error terms, which cannot be directly observed. What we usually have are residuals, which are proxies that can provide evidence about autocorrelation in error terms presence (Gujarati, 2006).

Adjustment analysis in Generalized Linerar Models is based on statistical deviance. To do so, we followed the instructions from Allison (2001). In general, the smallest the value of deviations, the better the model fits to the data.

Two other measures commonly used in model adjustment analysis were used in this study: Akaike Information Criterion (AIC) and Schwartz. The statistical AIC is obtained by adding 2k to the deviation, where k represents the number of model parameters (Allison, 2001). The statistical Schwartz is obtained by adding k log n to the deviations (n represents the sample size). In general, when comparing two or more models, the best one is the on that shows the lower values of these statistics.

Due to not all industries presented available data for all years, it became necessary to exclude some observations of the sample. Furthermore, as some continuous variables showed

significant amplitude, we used logarithmic transformation, in order to reduce their amplitudes. Thus, these variables will be incorporated into the analysis in logarithmic form.

FINDINGS

Our database consisted of eleven manufacturing industries analyzed for the period 1996-2006, totaling 154 observations. We initially involved 16 industries to compose the sample, selected based on data availability, suitability and standardization among databases. We excluded from our analyzes those industries in which data was not disclosed for the period 1996-1999 (radio equipment, TV and communication equipment for railway and transport equipment; medical instruments and precision optics, office supplies and computer) and pharmaceutical industry due to the lack of data from 1996 to 2006.

Based on descriptive statistics of the variables, we note that food, beverages and tobacco industry has the highest standard deviation for the volume of exports, followed by metal products; and maquinary and mechanical equipments industries. For imports, the greater dispersion in data was observed for chemicals industry, followed by electrical machinery and equipment; motor vehicles, trailers and semi-trailers.

We also had in our sample the motor vehicles, trailers and semi-trailers industry followed by food, beverages and tobacco standing out as the industries with the highest percentage share of exports in the industry' GDP. In terms of imports, we highlight the chemicals and pharmaceuticals followed by motor vehicles, trailers and semi-trailers as the industries with the highest percentage share of imports in industry' GDP.

With regard to FDI variable, the largest dispersion occurs in metal products industry, followed by food, beverage and tobacco. Still, food, beverages and tobacco industry stands as the one that received the most significant value (maximum) of FDI for the analyzed period. Other

industries stand out in this regard, such as metal products, followed by motor industry vehicles, trailers and semi-trailers.

Before estimating regression models, conducted the analysis of tolerance (TOL) and variance inflation factor (VIF) as measures to detect multicollinearity problems. Our results showed that TOL values were found near value 1 and VIF values below 10, which, according to Gujarati (2006), do not denote collinearity and indicate that the results are reliable.

We verified the autocorrelation presence in error terms through scatter plot of predicted values in relation to waste diversion. Since there was no observed trend pattern from predicted observations related to residuals deviation for the proposed models, we can say that there is no residuals autocorrelation evidence and, therefore, the models are appropriate.

As expected, we found a direct relationship between gross domestic product (GDP) an export (EXP) variables for all analyzed models, indicating that an increase in the GDP variable also explain an increase in the exports. The inclusion of interaction variables in Model 2 and export lagged variable in Model 3 presented convergent results (Table 2).

----------Insert Table 2 about here----------

The evidences for EXCH variable are consistent with the argument presented by Sarti and Laplane (2002, p. 91) that, although the production internationalization path has been strongly influenced by macroeconomic policies orientation, the resulting productive structure does react to relative price signals originated in the exchange rate policy in a flexible way. Changes in relative prices does not have immediate effects on trade performance because trade flows are more influenced by specific characteristics of the world production organization of their sectors and their growth strategies (Laplane & Sarti, 2002, p.91 .)

Technological intensity variable showed that low-intensity industries have higher propensity to export and that trade surpluses are related to factor-seeking strategies. Trade

surpluses may result from factor-seeking strategies since foreign investors seeking specific resources that are not available in the original market (such as natural resources, materials, and cheap labor force, among others raw material) may increase export from the host nation to the home country and other countries (Brouthers, Werner and Wilkinson, 1996).

Our findings indicate that the amount of FDI is significant and positively related to the exports (EXP) of industries, confirming that the inward FDI improves the amount of exports in the industry (Table 3). Theory on FDI suggest that the inward FDI is expected to improve the local trade balance since, after setting up capital machineries, the FDI-financed companies begin to export their products as most of these companies are export-oriented (Hailu, 2010). According to the author, FDI-financed firms may tend to export more than their local counterparts as these firms usually have advantages in international markets, efficiency of distribution channels and ability to adjust to the changing dynamics of international markets.

However, the result is not necessarily consistent with theory that FDI can generate spillover effects to the host economies, since there may be positive spillover effects in some industries, while others present negative effects. To answer this question, we included FDI interaction variables aiming to understand if there are any variation of FDI effect depending on the characteristics of industries.

FDI coefficient in Model 2 became negative and showed that in the short run there is an inverse relation with the dependent variable, exports. The results shows the FDI positive effects will only occur for industries in which resource-seeking strategies are preponderant. According to Brouthers, Werner and Wilkinson (1996), there are two common types of factor-seeking investment. In the first case, raw material is used to produce natural resource products lacking in the home country and will increase exports from the host nation to the home country and to other countries. In the second case, low-cost production-seeking investment strategies takes advantage

of low-cost factors of production in the home country that leads to an ability to export products enabling an increase in the exports and improves in the trade balance.

In the next step we performed a regression using a lag length of three (Model 3) and results showed that only export oriented industries could benefit from FDI in the long run. Blomstrom, Kokko and Zejan (2000), comment that because MNCs often possess strong competitive advantages in entering world market, such as experience and knowledge of international marketing, established international distribution networks, and lobbing power in their home countries, they may pave the way for local firms to enter the same exports markets, either because they create transport infrastructure or because they disseminate information about foreign markets that can also be used by local firms. Regarding trade, it is expected that the transferring ownership of existing facilities does not add directly to an industry's productive capacity and is not likely to lead to an immediate and significant displacement or an expansion of exports (Brouthers, Werner and Wilkinson, 1996).

In import models, we found a direct relationship between gross domestic product (GDP) and the dependent variable for all analyzed models, indicating that an increase in the GDP variable also explain an increase in the imports. Model 2 and 3 presented no variation on significance and direction of signals for this variable (Table 3).

----------Insert Table 3 about here----------

Results indicate that the exchange rate (EXCH) is significant and negatively related to imports, indicating that an increase in the exchange rate (exchange devaluation) causes a reduction in imports, since exchange devaluation makes imports more expensive. So, an increase in the exchange rate variable can also explain the decrease in imports. Significance levels and signal directions were the same in Model 2 and 3.

Technological intensity variable indicated that import growths are related to low-intensity industries and that FDI variable contributed to an increase in imports and the resource-seeking strategy was related to this increase. For the analyzed period, it may have prevailed import-oriented resource-seeking strategies. The positive relationship between imports and FDI in Model 1 confirms our belief that FDI may initially import more equipments, machineries, installation facilities and experts that contribute to imports growth. Thus, "FDI companies have high propensities to import capital and intermediate goods and services that are not readily available in the host country" or because in the host country there is no domestic firms with capacity to produce what those companies need (Hailu, 2010, p.125).

As in export equation, we introduced interaction variable seeking to analyze if there are significative differences between industries and strategies adopted by foreigner investors. Our argument is that FDI can have different effects on different industries. There must be positive spillover effects in some industries, while others present negative effects, as evidenced in export models. The results showed that FDI have negative relationship with the imports of analyzed industries and that FDI positive relationship are perceived in import oriented industries. Our arguments for those results are based on the assumption that if "FDI uses local raw materials and other inputs of production, it may not have significant adverse effect on import", but, "if it relies on imported inputs like raw material, human skill, and other intangibles assets, it affects import positively" (Hailu, 2010, p.125). Thus, the relationship between imports and FDI can be either positive or negative. In the first case, if "output is complementary to other products that are imported, it may encourage import" and "if FDI is concentrated in import substituting industries, then it is expected to affect imports negatively because the goods that were imported earlier would now be produced in the host country by foreign investors" (Hailu, 2010, p.125).

Evidences found in Model 3 show that FDI in Brazil have a negative relationship with imports in the long run. The result can be justified with the argument presented by Hailu (2010) and Brouthers, Werner and Wilkinson (1996) that ETNs, at the initial investment phase, import equipments, machineries, installation facilities and experts that contribute to an increase on the imports but, in the later phases, input nature, productivity spill-over and the type of relationship with other role players in the industry determine the effect of FDI on imports. Thus, if FDI relies on imported inputs (for example raw material, human skill, and intangibles assets), it affects import positively but, if it uses local inputs of production, it may not have significant adverse effect on import.

FINAL CONSIDERATIONS

Evidences in this study showed that FDI is related with improves in exports in the short run. Our arguments are based in the assumption that FDI is expected to improve local foreign trade since most of MNCs are export-oriented due to their advantages in international markets, efficiency of distribution channels and ability to adjust to the changing dynamics of international markets. Our results are convergent with the evidences found by Moreira (1999) for the period 1995-1997, when foreign companies had an average propensity to export significantly higher than domestic enterprises in all analyzed sectors, including those intensive capital industries. The result is also similar with those found by Willmore (1986, 1992) for the 70's, when foreign ownership appeared to have a positive impact on Brazilian exports. However, our results are divergent from evidences presented several studies developed for the Brazilian case, such as by Laplane and Sarti (1997) and Sarti, Laplane (2002) and De Negri (2003). Laplane and Sarti (1997; 1999) analyzed FDI’s contribution to the Brazilian industry in the 90s and found that FDI would be unable to produce exportable surpluses. Sarti and Laplane (2002) and De Negri (2003) also found that the

Brazilian internationalization process has generated intense increases in the supply of imported products without a proportional increase in the share of the local production destined for the export market and, in the Brazilian case, the internationalization process has had as targeted the domestic market.

The result is not necessarily inconsistent since there must be differences across industries. To answer this question, we have included FDI interaction variables aiming to investigate if there are any variations of FDI effects depending on specific characteristics of industries. By including in our model our interaction variables, we found evidences that in the short run, there is an inverse relation between exports and FDI and that the positive relationship between FDI and exports will only occur for (i) industries in which resource-seeking strategies are preponderant and for (ii) export oriented industries. Our results are convergent with evidences presented by Laplane e Sarti (1997) that globalization and trade openness do not appear to have significantly altered the locational advantages structure of Brazilian economy in relation to export, as they're still concentrated in natural resources intensive industries, which attract substantially more resource-seeking investments. According to the authors, in capital goods and consumer durables industries, in which natural advantages are not relevant, the main attraction factor is the domestic market and therefore, in these sectors we cannot count with benefits of "built" advantages that justify the location of enterprises for export. Furthermore, those evidences are convergent with what Wang, Buckley, Clegg and Kafouros (2010) found for the Chinese case. Their evidences show that inward FDI contributed to Chinese export expansion and that the impact of inward FDI on Chinese exports was stronger for labour-intensive industries in which resource-seeking strategies are preponderant. The argument presented by Wang, Buckley, Clegg and Kafouros (2010) for the Chinese case is as well valid to the Brazilian case and states that, while there is in recent years an increasing share of capital-intensive goods in the exports, exports of manufactures still consists

mainly of product with low value-added and low levels of technology (Wang, Buckley, Clegg and Kafouros, 2010, p.280).

Our results are consistent with theory on FDI and show that, in the long run, only export oriented industries could benefit from FDI. Spillover theory arguments that MNCs often possess strong competitive advantages in international markets that can be useful to pave the way for local firms to enter the same exports markets by the creation of both trade infrastructure or information dissemination. Brouthers, Werner and Wilkinson (1996) argument that it is expected that the transferring ownership of existing facilities does not add directly to an industry's productive capacity and is not likely to lead to an immediate and significant displacement or an expansion of exports. Studies points out absorption capacity as an important FDI spillovers determinant factor. The absorption capacity is the ability to recognize the value of a new knowledge, the capacity to assimilate and apply it, based on business purposes (Cohen and Levinthal, 1990). Narula (2002) notes that FDI and operations of MNCs do not generate positive externalities automatically. MNCs may disseminate a large number of externalities that can be easily assimilated or not, depending on LOEs capacity. When MNCs establish a plant overseas or acquires a foreign plant, it does so in the expectation of higher rates of return that could receive if compared to their home country, with an equivalent investment. The largest source of return is the technological advantage, including new management processes and new production methods. Thus, MNCs will not simply undo this benefits sources (Görg & Greenaway, 2004). However, theory suggests that even if a MNC has as main motivation the technology use internationalization, this can spread or "overflow" for firms in the host economy and this effect is known as spillover.

Thus, the evidences confirm that FDI has important spillover contribution to exports of Brazilian industries and that expanding FDI on export oriented industries may contribute to exports promotion and consequently to the foreign trade. This findings also have implications for

policymakers towards the encouragement of inward FDI and the promotion of exports, since it reflects the Brazilian current comparative advantage and signals the potential for development it exports in more capital-intensive industries.

Results showed a positive relationship between imports and FDI in the short run. Our argument was that MNCs may initially import more equipments, machineries, installation facilities and experts that contribute to imports growth. Our result is consistent with Moreira (1999) that identifies a pro-import bias with foreign firms presenting higher propensity to import. It is also convergent with Laplane and Sarti (1997), Hiratuka (2001) and De Negri (2003). Laplane and Sarti (1997) argue that the increase in FDI' inflows leads to an increase in imports of goods capital. Hiratuka (2001) found that multinational companies import more from their countries while De Negri (2003) identified that, although MNCs seem to be more integrated into international trade than locally owned firm, this larger integration takes the form of stronger import activities more than of larger exports.

However, significative differences were found among industries in the short and long run. We found that FDI positive relationship is perceived in import oriented industries and negative relationship between FDI and imports in the long run. Our result can be justified as ETNs will import equipments, machineries, installation facilities and experts in the short run, but, in the later phases, input nature and the relationship with other players in the industry will determine the effect of FDI on imports. Thus, if FDI relies on imported inputs it will affect imports positively but if it is concentrated in import substituting industries, then it is expected to affect imports negatively because the goods that were initially imported may start being produced in the host country by foreign investors. Thus, policy makers decisions should encourage FDIs that are local input–intensive and encourage domestic industries to "engage in production and supply of inputs of productions that would have been imported by MNEs" (Hailu 2010, p.129).

Our results are consistent with those found by Laplane and Sarti (1997) when analyzing FDI' contribution to the Brazilian sustained economic growth retaking in the 90s. The authors found evidences that FDI induces to increases in capital goods imports and that FDI' impact in imports would in principle be negative, however, transitory. Those evidences were justified since investments in the short run contribute to trade deficits, but in the long run, with the maturation phase of the project, it would reduce trade deficits by ending up the imports of equipment and would supply the market with local production.

Based on those arguments, policy instruments should be developed aiming to attract FDI in areas of export promotions while import substitutions should be encouraged. Evidences found in this study indicate the need for greater efforts to understand how FDI strategies interact with the foreign trade of host economies and what benefits can be achieved through public policies. This information will be important for public and private managers understand how the host economy can obtain benefits from the presence of FDI. Policy makers can influence the inflows of FDI developing economic, social and political instruments that contribute to the promotion of export oriented ETNs and controlling import oriented ETNs (Hailu, 2010). The improvement and enhancement of studies in this field could support policy decisions related to control or incentives for FDI in in Brazil. Actors involved in public policies formulation need information that provide institutional instruments subsidies related to foreign capital regulation.

Evidences showed that FDI inflows may have both positive and negative effects on Brazilian industries' foreign trade. Our main purpose in this study is not to identify with either the pro or com schools of thought on the subject, but to share our belief that both sides may have valid points. Given their dynamicity and complexity, FDI phenomena have introduced extraordinary and perhaps revolutionary changes that have profoundly altered the global economy. Our main contribution is not providing a definite explanation on the issue. It is just one more step in a long

journey seeking a more accurate understanding on the subject. Still remains the need for continuing the research and additional data in this field (Cohen, 2007).

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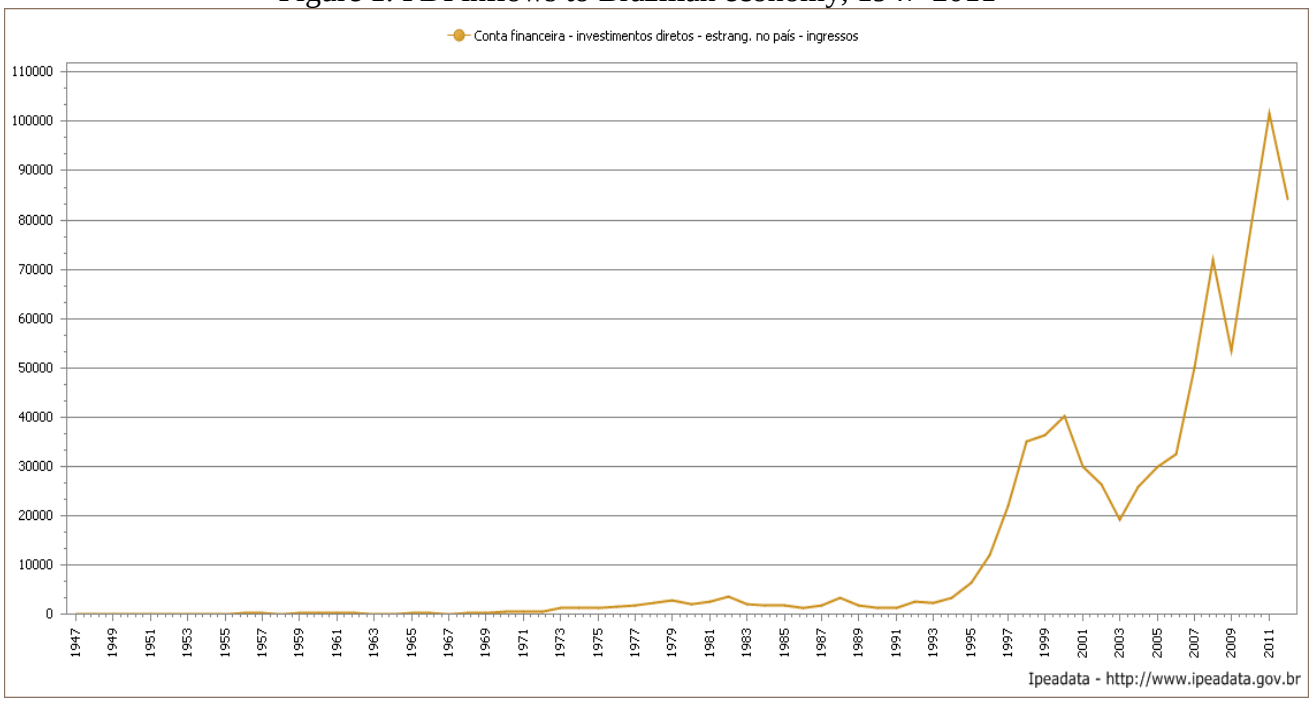
FIGURES

Figure 1. FDI inflows to Brazilian economy, 1947-2011



Source: Central Bank of Brazil, 2013

TABLES

Table 1 Descriptions of the data and the statistical sources

Variables	Description of Data	Source
Dependent		
EXP	Quantum of exports by sector in the log form	Development, Industry and Foreign Trade Ministry
IMP	Quantum of imports by sector in the log form	
Independent		
FDI	Flows of foreign direct investment by sector in the log form	Central Bank of Brazil
GDP	Gross domestic product by sector in the log form	Applied Research Institute (IPEA)
EXCH	Exchange rate in the log form (Brazilian real-dollar)	
SINT	Dummy variable to represent technology intensity: 0 if high intensity, 1 if medium intensity and 2 if low intensity	
SEST	Dummy variable to represent foreign strategies: 0 if the strategy is market seeking and 1 if it is resource seeking	

Table 2 Hierarchical export models

Variables	Model 1	Model 2	Model 3
GDP	0.8517***	0.2176***	0.5622***
EXCH	-0.0433	-0.0492	-0.0459
SINTB	1.0150***	0.3726***	0.8739***
SINTM	0.3519**	0.0228**	0.3237**
FDI	0.2872***	-1.2371***	-0.0008
SEST	0.3793***	-0.6567***	0.4446
EXP*IDE		0.1513***	0.0423***
SET*IDE		0.1695***	-0.0335
R-Square	0.6920	0.9631	0.8018
Deviance	0.4760	0.0576	0.3734
Akaike Information Criteria	12.4760	16.0576	16.3734
Schwartz	14.107	18.232	18.492

Note. *** Significant at 1%, ** significant at 5%, * significant at 10%

Table 4 Hierarchical import models

Variables	Model 1	Model 2	Model 3
GDP	0.8846***	0.1468***	0.6879***
EXCH	-0.3352***	-0.0621***	-0.3101***
SINTB	1.4438***	0.1951***	1.2845***
SINTM	0.7425***	0.1859***	0.7462***
SEST	1.1415***	0.1531	0.6936**
FDI	0.1590***	-1.2336***	-0.0728***
IMP*IDE		0.1588***	0.0271***
SET*IDE		0.0059	0.0479
R-Square	0.658	0.963	0.754
Deviance	0.344	0.037	0.253
Akaike Information Criteria	12,344	16,037	16.253
Schwartz	13.976	18.212	18.372

Note. *** Significant at 1%, ** significant at 5%, * significant at 10%