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**The impact of size of the firm and exchange rate in  
the export propensity of domestic and foreign owned  
firms in a developing country**

**A study of the Brazilian exporters**

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**The impact of size of the firm and exchange rate in the export propensity of domestic and foreign owned firms in a developing country - A study of the Brazilian exporters**

**ABSTRACT**

Integrating the resource based view and theory behind exchange rates, this study analysis the export propensity of domestic and foreign owned Brazilian exporters. Panel data of 214 of the biggest Brazilian firms with years ranging from 2001 to 2010 is used with a fixed effects logistic regression. Results suggest that Size and Real Effective Exchange Rate affect the export propensity of firms differently, depending on the source of ownership of the firm. Size will have a high positive impact on the export propensity of foreign owned Brazilian firms, while the Real Effective Exchange Rate will have a low but positive impact on the export propensity of Brazilian owned firms.

Keywords: (1) Export Propensity; (2) Size; (3) Exchange Rate; (4) Ownership

## **Introduction**

When deciding whether to export or not, firms need to account for a wide set of factors that will affect their decision. Some factors that are believed to be of great importance are the exchange rate (Greenway, Kneller & Zhang, 2010; Ramli et al., 2011) and the size of the firm (Bonnacorsi, 1992; Calof, 1994).

If the exchange rate of the target country is expected to appreciate, managers are more likely to decide in favour of exporting since they could practice more competitive prices abroad or their costs will be comparatively lower (e.g. Bernard & Jensen, 2004). Similarly, with better resources, firms are more likely to export. They will not only have a higher capability to accommodate the exporting costs and risks, but are also more likely to have the competencies and capabilities required to successfully export (i.e. Wagner, 2007).

Many academics have studied the effects of firm resources such as their size, competencies and capabilities or international experience on the export behaviour of firms (Calof, 1994; Johanson & Vahlne, 2009; Gao et al., 2009). But what determines firms' decisions to export? And what role does the exchange rate and the size of the firm have on firms' decisions?

In case of a favourable exchange rate, firms would be induced to perceive exports or FDI as a good investment but, when it becomes less favourable, it may become too costly to maintain exports. The exchange rate can determine the level of profitability of the invested capital and the continuation of exports (Bernard et al., 2009). Although managers, governments and some academic literature say that the exchange rate has an impact on firms' strategies and behaviours, only a few scholars have found evidence of its influence at a micro level (Athukorala & Menon, 1994; Donnelly & Sheely, 1996; Luehrman, 1990), while others did not find statistical evidence (Faff & Marshall, 2005; Solakoglu et al., 2008; Boug & Fagereng, 2010). In a recent study, Xufei & Xiaoxuan (2012) found evidence of a small effect of the

exchange rate on the export propensity of China based firms. They highlighted the fact that very few academics have focused on the effects of the exchange rate using firm level data instead of aggregate data, and that those that did use micro level data, did so by looking at developed countries. They also highlighted that their study had been the first of its type to explore developing country firms (Chinese firms) reactions to exchange rate movements. Therefore there is a need for more studies to understand developing country firms' export propensity, and specifically their reactions to exchange rate movements.

The size of the firm has also received attention by academics (Calof, 1994; Talib et al., 2011). It is said to influence the export propensity of the firm by being related with the capacity to overcome sunk costs, productivity levels, and by being an indicative of firm past success (Bonnacorsi, 1992; Calof, 1994). However, and according to Talib et al. (2011) there are mixed results in the literature that need to be explained and therefore more research is needed.

Even though there are many factors that affect the export propensity of firms (e.g. Bilkey, 1978), and the exchange rate and the size of the firm are two that have received a great deal of attention (Bonnacorsi, 1992; Xufei & Xiaoxuan, 2012), these factors still need more research, especially with developing country firms. In this study we further posit that our understanding of the impact of the exchange rate and size on export decision can be further enhanced by distinguishing between domestic firms with national and foreign ownership. We expect to observe differences in the extent to which these two types of firms consider exchange rate and their resources in the decision to export. In other words, in this study we aim to answer the following three questions: (1) Are there differences between domestic and foreign owned firms export propensity?; (2) Does the exchange rate affect foreign and domestic firms export propensity in a similar way?; and (3) Does size of the firm matter for both domestic and foreign owned firms? By answering these questions, knowledge about the effects of the exchange rate and size of the firm will be extended. This study will therefore extend the existing literature about firm ownership, size and exchange

rate effects on the export propensity of firms by analyzing Brazilian exporters. Results will provide managers of firms that intend to or are already exporters from Brazil with insights about the exporter behaviour of firms in Brazil, as well as to help completing the existing literature with an empirical study of developing country firms.

To do this, we use panel data of the biggest Brazilian firms and trade partners, extracted from three different databases (*Revista Exame* biggest Brazilian firms ranking, *The World Bank* and *The Heritage Foundation*), covering the years 2001 to 2010. To test our hypotheses we use logistic regression models with year fixed effects, whereas our dependent variable is export propensity and our independent variables are Real Effective Exchange Rate (REER) and firm size (number of employees).

Our findings suggest that foreign owned firms' size is an important factor to define their export propensity, while domestic firms' size does not have an impact on the export propensity of exporters. In addition, the exchange rate has no significant effect on the export propensity of foreign firms, while it has a small and positive effect on the export propensity of domestic firms.

#### Literature review and hypothesesOwnership

Ownership of the firm is one factor that shows evidence of affecting the export propensity of firms (Rojec et al, 2004; Gao et al., 2009). Domestic and foreign owned firms are expected to have different characteristics and behaviours when elaborating and executing strategies.

Foreign owned firms, either exporters or not, are subject to advantages and disadvantages that domestic firms are not expected to have. These advantages and disadvantages of foreign direct investors have been studied by many academics (e.g. Abdel-Malek, 1974). The cultural differences, the different institutions of the host country, the liability of foreigners and outsidership (Wu et al., 2007; Johanson & Vahlne, 2009)

are some of the factors that were found to be disadvantages on firms' decisions and strategies, including foreign firm export propensity.

However, foreign firms can also have advantages against domestic firms. Gao et al. (2009) say that ownership affects exports because of the different objectives that foreign and domestic firms have. Focusing on the marketing strategy of exports from China, they relate the Resource, Industry and Institutional based view to conclude that the export propensity is mainly affected by the resources of the firm, such as the capabilities, competencies and experience of managers, while export intensity is mainly influenced by the institutions of the country. Moreover, foreign firms are found to invest with the objectives of seeking resources, production efficiency or to expand to other markets in the region (see also Luo & Park, 2001). Foreign firms seem to also have other advantages when compared to domestic ones, such as an enhanced technology transfer that increases productivity (Rojec et al., 2004), better marketing skills and access to information provided by parent firm resources (Torre, 1974). Torre, 1974, also argues that the access to information, knowledge and expertise about international marketing opportunities is more easily available to foreign firms than to domestic ones.

### Firm Size

Earlier research showed that firms' size measured as the number of employees or sales volume (Bernard et al., 1993; Dhanaraj & Beamish, 2003) is a reliable proxy for the firms' resources: financial, management, research and development, and marketing. As such, a bigger firm size has often been discussed as an important determinant of firms' competitiveness (Ali & Camp, 1996) susceptible of influencing firms' export decision and behaviour (Bonaccorsi, 1992; Calof, 1994; Abdul-Talib et al., 2011). However, the relationship between the firm size and decision to export has received mixed results (Leonidou & Katsikeas, 1996). Some studies found that the firm size has a negative effect on export propensity (Bilkey

& Tesar, 1977; Burton & Schlegelmilch, 1987), others showed no influence (Reid, 1981; Abdul-Talib et al., 2011), while some found positive impact (Cavus & Nevin, 1981; Reid, 1985; Bonaccorsi, 1992; Calof, 1994).

Bonaccorsi (1992) analysed Italian firms export propensity and intensity to explore propositions taken from five literature review articles (see Bonaccorsi, 1992, p. 4). She concludes that although firm size positively affects export propensity, it does not affect firm export intensity. Following Bonaccorsi (1992), Calof (1994) explored firm size effect on the export behaviour of Canadian firms. His findings suggest that firm size is positively related to all dimensions of export behaviour (Intensity, Propensity, stage in internationalization process and characteristics of target countries). However, firm size showed positive results on the export propensity only for the group of small and for the group of big firms' export propensity, leaving the group of medium sized firms with no significant effects. Calof concludes that a small size is not a barrier to exporting since export is practiced by both very small and very big firms, pointing to the increasing trend of the "born global" firms that internationalize within the first three years of operations. Yet when examining export entry and exit of German firms, Bernard & Wagner (1998, P.4) find that larger firms are more likely to become exporters because of their greater shares of skilled workers. When studying United States manufacturing firms, Bernard and Jensen (2004) find that entry costs and plant characteristics are very important factors that increase the probability to export. These entry costs are usually called sunk costs and are the costs that firms need to incur in order to start or maintaining exporting, such as the adaptation of the product, the understanding of the legal requirements, logistic costs, and others aspects (Das et al., 2007). Sunk costs will deter firms from entering the export market or keep them exporting because of the high costs associated with starting to export (Roberts & Tybout, 1997; Wagner 2007; Wagner, 2008). These high costs will be more easily overcome by bigger firms (Hultman, Katsikeas, & Robson, 2011), since besides having better resources available (Ali & Camp, 1996), they are

also able to commit more resources to exporting without compromising other markets. Smaller firms will find it harder to start exporting because a bigger share of the firms' resources will have to be committed, which will put a higher risk on the operations (Hultman, Katsikeas, & Robson, 2011) and a lack of focus on their local market (Calof, 1994). Firms that export are able to sell at the local market, but those that do not export may not be productive and efficient enough to sell to external markets. Because exporters need to be more productive in order to be able to accommodate the extra costs and still be competitive in the export market (Bernard et al., 1993). Besides plant characteristics and size, Roberts and Tybout (1997) also conclude that Colombian firms' export propensity is affected by the age of the firm and its ownership structure. When analysing data over Colombian firms, Das et al. (2007) say that larger producers have advantages when starting to export because they are expected to have lower average entry costs, that are possible due to the higher level of existing contacts, distribution channels and larger front offices.

One difference between smaller and bigger firms is their ability to overcome the sunk costs associated with exporting (Hultman, Katsikeas, & Robson, 2011). Even if the risk of failure would be similar to small and big firms, smaller firms' investments cannot be as high as big firm investments because they do not have the resources, and when a big firm decision to export may represent only a small fraction of its total assets, a similar investment by a small firm could represent a bigger fraction of its total assets, which would likely deflect them from exporting (Budden, Cope, Yu Hsing, & Susan M. L., 2010). Moreover, bigger firms also have higher capability to innovate and adapt products to target markets, doing heavy marketing research studies to understand the consumer behaviour (Timmor & Zif, 2005) that will enhance information and information over target markets. Therefore, bigger firms are expected to have greater resources which enable them to endeavour in new businesses or pursue internationalization strategies more easily (Calof, 1994).



With the higher financial power, and most likely also higher innovatory capacity and competencies to do business, bigger firms will have advantages against smaller ones. When there is an opportunity to start exporting, such advantages can be productivity levels (Wagner, 2006) or capability to take risks, which smaller firms cannot take because of the less available resources. Ability to decrease distributor opportunism by imposing its resources and fear of retaliation, higher capacity production and scale economies' opportunities to serve more markets are also factors that can be influenced by firm size that were explored by previous literature (Bonnacorsi, 1992; Calof, 1994). However, one needs to make a distinction between other firm characteristics such as who has the firm ownership (Rojec et al., 2004; Williams, 2011; Gao et al., 2009), which will help enlighten what drives managers of domestic and foreign firms on their export decisions.

As explained before in the literature review section, foreign owned firms can have different advantages and disadvantages, as well as different objectives to be exporting when compared to domestic firms. A factor that can be expected to influence both foreign and domestic owned firms is their size. Therefore, differences between domestic and foreign owned firms size may come to explain some of the mixed results found in the literature.

Foreign owned firms are expected to have managers with a higher international experience and a more global mind-set of managers, as well as more competencies and knowledge about doing business in external markets (Williams, 2011). Bigger foreign owned firms should have higher numbers of managers with international experience, as well as more skilled workers (Bernard & Wagner, 1998; Williams, 2011) or more pressure from the parent firm to internationalize if it is the strategy the firm is following (Estrin et al., 2008). Also, with manufacturing firms, sunk costs of new plants can be very high and firms will be expected to export to other countries, exploring local market resources and advantages, integrating global logistic chains (Estrin et al., 2008). Due to productivity effects, global logistic chain advantages, and sunk

costs advantages, foreign owned firms export propensity is expected to increase more than domestic firms export propensity when firm size increases.

**H1: Firm's size will have a stronger positive impact on export propensity of Brazilian firms with foreign than domestic ownership**

Exchange rate

Economists usually try to predict what the exchange rates will be and its economic effects on foreign direct investments, net exports, home industries competitiveness, GDP, consumer prices and inflation. At the same time, firms try to reduce financial and operational risks due to exchange rate fluctuations (e.g. home currency appreciation or depreciation) (Géczy, Minton & Schrand, 1997).

In 2010, Boug & Fagereng undertake a meta-analysis of studies that analyzed impact of exchange rate on exports. They found evidence, in earlier research, of positive, negative and non-significant effects. The reasons they present for this mixture of results are empirical issues such as the measure of exchange rate, the sample period and data frequency, and the countries of origin and destination (see also Mckenzie, 1999). Greenway, Kneller & Zhang, 2010, find mixed effects of the exchange rate on exports. They conclude that exports will be affected depending on the industry, the size of the firm and the importance of exports for the firm, with the level of imported goods, such as intermediate products, taken as an important factor of export behaviour.

Until now, most studies about the effects of exchange rates on the export propensity of firms have used aggregated macro data, with few using firm level data and even fewer exploring exports from developing countries (Xufei & Xiaoxuan, 2012). Company level studies about the effects of the exchange rate have focused on price of the exporting goods and the exchange rate pass-through (Athukorala & Menon, 1994), on firm performance (Boug & Fagereng, 2010) and on the sunk costs of exporting (Das, Roberts &

Tybout 2007). In a 1985 survey done by Bauerschmidt, Sullivan & Gillespie to 363 strategic business units in the US paper industry, the exchange rate was found to be the most important export barrier, with the export costs coming in second (45% vs. 22% of managers considered it to be extremely important barriers).

A devaluation of the exchange rate is expected to increase both the export propensity and the volumes of goods exported, while an appreciation will do the opposite (Dixit, 1989; Baldwin & Krugman, 1989; Bernard & Wagner, 2001). A devaluation of the exchange rate will present lower entry costs and, therefore, firms that did not previously perceive exporting as a viable option may start exporting (Bernard & Jensen, 2004). However, it is important that firms get experience with exporting and become more productive, so that when and if the exchange rate appreciates, firms are able to maintain their exports (Roberts & Tybout, 1997; Bernard & Jensen, 2004).

Bernard & Wagner (2001) studied the decisions to export of German firms. They find that besides firms' adjusting their output in response to exchange rate changes, appreciations of the exchange rate decrease the rate of entry in the export market and increase the rate of exit of exporting firms. On the contrary, depreciations of the exchange rate decrease the rate of exit and increase the rate of entry in the export markets.

Exploring the reasons for the United States export boom between 1987 and 1992, Bernard & Jensen (2004) conclude that one of the dominant sources of the export boom was the depreciation of the exchange rate. Their findings suggest that, a reason for this effect of the depreciated exchange rates on exports, is that a depreciated exchange rate leads to a decrease of the sunk costs that firms need to incur in order to start exporting, which consequently increases their probability to be exporters (see also Bernard et al, 2009; Xufei & Xiaoxuan, 2012). Das et al. (2007) come to the same conclusions when analyzing data over Colombian firms. They go further saying that firms' decision to export when faced with the exchange rate

and sunk costs is also affected by the uncertainty about future profits. Also, they suggest that government policies that improve margins and productivity are better to promote exports than those that lower export barriers, such as exchange rate depreciations.

Some firms are more dependent on exports than others, depending on country and industry they operate in, firm characteristics or internationalization level (e.g. Bonnacorsi, 1992). It is therefore important to study firms' export behaviours with exchange rate changes and firm characteristics, such as who owns the firm or what is the level of resources available to invest in exporting.

Miller & Reuer (1998) analysed the "Firm strategy and Economic Exposure to Foreign Exchange rate movements". Economic exposure is a measure used to capture the risks firms are subject to when doing business, as the exchange rate variation risk. It is a commonly used term in the literature and seems to have influence both in international trade and foreign direct investments (Miller & Reuer, 1998; Braum, Brunner & Himmel, 2000; Faff & Marshall, 2005). Miller & Reuer (1998), analyse differences between industry structures and different strategies of firms, finding differences in strategies and behaviours between industries and even between firms within industries. They also use country of destiny specific bilateral exchange rates to measure the economic exposure of exporting firms. When analysing German firms' exposure to exchange rates, Glaum et al., 2000, find that their results differ over time, being influenced by economic or political factors, which may affect the economic exposure of German firms to exchange rate movements. Despite the risk that too much exposure may have, firms have financial products and strategies that moderate their exposure, such as hedging, options, or swaps (Huston & Stevenson, 2010; Géczy et al., 1997).

Similar to the size of the firm, sunk costs that a firm is able to incur are also affected by the exchange rate movements (Bernard & Jensen, 2004). Depreciations of the exchange rate will increase the export propensity of firms because it is expected to lower the required investments, while the opposite will happen

with appreciations of the exchange rate (Bernard & Wagner, 2001). However, foreign and domestic firms should not be expected to behave similarly when the exchange rate changes. Since they are already international firms, foreign firms have experience in international markets and trade and should therefore have lower sunk costs to export than domestic firms.

The exchange rate is also theorized to influence the margins of both foreign and domestic owned firms. However, previous literature has concluded that foreign owned firms are generally more productive than domestic owned (Wagner, 2007), which means that domestic firms tend to have a lower margin when they are exporters than foreign firms, since besides sunk costs, other variable costs are expected to increase as well when a firm exports (Bernard & Jensen, 2004). Therefore, less productive firms will find that it will not be profitable to export under certain exchange rates levels (Bernard & Jensen, 2004), which makes domestic owned firms export propensity more likely to change than foreign firms with movements in the exchange rates.

Finally, foreign owned firms can be expected to be present in more than one market and have a global strategy of production (Estrin et al., 2008). They can be a part of global logistic chain that besides having a well-defined strategy of trade with different countries, will also have an exposure to several exchange rates (He & Ng 1998). The fact that foreign firms are in more than one country and are therefore already exposed to exchange rate movements makes the firm more likely to make a higher use of financial instruments to reduce exposure to the exchange rates (He & Ng, 1998). Also, these firms probably had already defined their strategy before entering the Brazilian market, with decisions to export being independent of the exchange rate movements, with only very big shocks being able to change their export propensity (Bernard & Jensen, 2004). Even though domestic firms can also be multinational firms, this is not generally likely to happen with domestic firms, which makes the export propensity to change more for domestic than for foreign firms when facing exchange rate movements.

**H2: Exchange rate fluctuations will have a higher positive impact on the export propensity of Brazilian firms with domestic than foreign ownership**

**Method**

Variables

Dependent variable

**Export Propensity** – Indicates if the firm exported or not to each country during each year. It takes the value 1 when an export happened and 0 when an export did not happen, independently of the value of the export. By using this variable the probabilities of start and stopping to export will be highlighted, which is the objective of this study to evaluate. Estrin et al., (2008), Shih & Wickramasekera (2011) and Gao et al. (2009) are examples of articles that use export propensity to test the exporting behaviour of firms. The data about firms' exports is provided by the *Ministry of Development, Industry and Foreign Trade* (MDIC).

Independent variables

**Size** – This is a widely used control variable in the literature. It controls for firm size using the numbers of employees (Dhanaraj & Beamish, 2003). For this study, firm size is between 1000 and 5000 not only to eliminate holdings with very few employees, but also to eliminate outliers such as Petrobras that have an abnormal size of sales, exports and employees. Also, due to differences in country of firm size, the variable used will be the logarithm of the size (Verwaal & Donkers 2002). The data about firms' size is given by the database of *Revista Exame*.

**Real Effective Exchange Rate** – (REER) - Miller & Reuer, 1998, suggest and find evidence that using multiple currencies is more accurate than using a single currency (usually US\$). This is also suggested by Faff & Marshal, 2005. Therefore the REER of each selected target country is used. According to The World Bank definition, the REER of a country is the nominal value of a country's currency when it is

measured against a set of important exchange rates, such as the euro and the dollar, divided by a measure of the level of prices of the countries, such as the inflation rate. The REERs are provided by the The World Bank database and have 2005 as the base year (2005=100) for all given years and rates.

**Firm Ownership** – Is a binary variable that divides firms in Domestic (105 firms) and Foreign owned firms (109 firms). *Revista Exame* provides the country that has the ownership, with some firms being owned by several nationalities. Firms that had multiple country ownership but included Brazil were considered as domestic firms because even though they have foreign ownership influence, they can be assumed to have local market ownership influence that may decrease negative effects such as the liability of foreignness and outsidership. There were six firms considered by *Revista Exame* database to have domestic and foreign ownership together, representing 2.8% of the total sample. In the domestic owned group there are also both private and state owned firms, but no distinction is made. There is however, no other information regarding the structures of ownership neither the percentages owned by the foreign firms. Some other articles have used this variable as a dummy or to create subsamples (Greenway et al., 2010; Gao et al., 2009; Johanson & Vahlne, 2009; or Wu et al., 2007).

Control variables

**Economic Freedom Index** – The Heritage Foundation Economic Freedom Index is an annual publication of the level of freedom of each country. This index is a good control variable for the aspects that exporters face in each country they export to. Estrin & al., (2008) use this index for their analysis.

**Gross National Product (GDP) of target country** – The GDP is a widely used economic indicator. It will control not only for country size, but also for country economic growth, market growth and potential, which will affect, for example, the economic power and interest of importers and therefore Brazilian export opportunities. (Salomon & Shaver, 2005; Agarwal & Ramaswami, 1991). Due to big differences between

countries' GDP, the variable used will be the logarithm of the GDP. The GDP of the target countries are provided by the The World Bank database.

**Import Propensity** – takes the value 1 if the firm imports from a given country and 0 if it did not. (e.g. Greenway et al., 2010; Bertrand, 2010). The data about firms' exports is provided by MDIC.

**Operational Rentability** – Earnings Before Interests and Taxes and Amortizations over Total Sales. It controls for the production effectiveness of firms. This variable is limited between -0.3 and 1 in order to both eliminate outliers and possible typos in the database such as mistypes or incorrect values. The data about firms' operational rentability is given by the database of *Revista Exame*.

**Debt to Equity** – Ratio of the leverage of a firm, with debt has long term debt. It is the firm's long term debt divided by its reported equity (e.g. Hovakimian, Opler & Titman, 2001). This variable is limited between -0.5 and 1.5 in order to both eliminate outliers and possible typos in the database such as mistypes or incorrect values. The data about firms' debt to equity ratio is given by the database of *Revista Exame*.

#### Analytical approach

Sample is organized in a panel format, so that it can capture the effects over the years. Time variable are the years between 2001 and 2010, with firm name and target country of export as individual panel variable. For the data analysis a logistic regression with fixed effects is used. This regression model is a common way to regress categorical or dichotomous variables as is the case of the dependent variable in this study. Logistic regressions limit outcome values to be between 0 and 1. It does so by calculating the probabilities of the outcome, using the independent variables and using the natural logarithm to calculate the odds, which can also be represented by the regression coefficients that are reported below. When represented, the logistic regression is S-shaped, with outcome values between 0 and 1 and with coefficients and odds varying freely, since they do not directly represent a probability. Similarly to Bernard & Jensen (2004) and



Xufei & Xiaoxuan (2012), regressions with fixed effects are used in order to capture the firm and destination unobserved variables. Regressions using random effects would not suit the analysis because size and other firm characteristics are likely correlated with other firm characteristics.

## **Results**

For the data analysis, the statistical software Stata, version 12 was used. It is a widely used package suitable for panel regression analysis that is also able to provide suitable regression tables using the program Outreg2. The objectives of this paper are not only to understand whether the exchange rate (Real Effective Exchange Rate – REER) and Size affect the Export Propensity of Brazilian exporters, but also to have a better understanding of how the ownership moderates the firms' export propensity. To understand how the effects of REER and Firm Size differ for firms with domestic and foreign ownership, we divided the sample into corresponding subgroups. First, results of the regressions for all manufacturing firms are displayed, followed by the results for the domestic manufacturing firms and finally for the foreign manufacturing firms. The division per subgroups will show differences between the different aspects that are expected to change firms' decisions and behaviours. Instead of using interactions to test for differences between groups, transforming ownership into a dummy variable (i.e. Domestic Ownership x REER), groups are separated by domestic and foreign firms. This allows for a visually easier distinction and analysis of the outcomes.

Each regression output table is composed by four different models. Model 1 tests the control variables. Model 2 adds the independent variable REER. Model 3 tests the size of the firm, without the REER. Finally model 4 tests all variables together. REER and size are introduced after the control variables and different regressions are used in order to check for changes in the pseudo  $R^2$  and test the consistency of results and the overall fit of the model.

Appendix 1 presents the summary of the variables for All firms. It can be noted that the export propensity of firms has an average of 0.37, while the import propensity has 0.27, which means that these firms export to more countries than they import from. Size of the firms has an average of 3930 employees.

Appendix 2 shows the correlations for All firms. Economic Freedom index and the GDP of the target countries have the highest correlation, with the exchange rate and the GDP showing negative correlation. The level of imports also shows some positive correlation with the countries' control variables, namely the Economic Freedom index and the GDP.

Appendix 3.1 presents the output of the regressions with both domestic and foreign firms included. The output shows a high coefficient for the size of firms and for their operational rentability, with size being significant at 1% and operational rentability only at 10%. Debt to Equity ratio, even though having significance only at 10%, shows a negative coefficient, suggesting that it actually decreases the export propensity of firms. REER is significant at 1% for all the predicted models, but with a low coefficient compared with firm. Size is the variable with the highest coefficient and is significant at 1%. Import Propensity shows no consistency, being significant at 10% for models 1 and 2, but not significant when size is introduced in the regression, in models 3 and 4.

As suggested by the literature review, both the REER and size have positive coefficients, with REER coefficients being quite low when compared to the size coefficients (0.012 for REER and 0.7 for size). Size therefore seems to have a higher effect on the export propensity of firms than do the movements of the exchange rate. However, REER effects on the export propensity of firms may be absorbed by the year effects or by the country variables. It should be noted that the pseudo- $R^2$  increases when the REER and size are introduced in the model, from 0.015 only with the control variables (model 1) to 0.018 with REER in model 2, 0.0197 with size in the model 3, and to 0.022 in model 4.

Country specific control variables show no effect on the export propensity. This might happen because of the fixed effects model used, which might be absorbing the variation.

There are clear differences in the regression results when dividing in subgroups of Domestic and Foreign firms (appendices 3.2 and 3.3). First, none of the control variables shows any significance with the exception of the import propensity of Brazilian firms in model 1 only, and the Debt to Equity ratio of firms with foreign ownership in models 1 and 2, when size is not in the regression. However, these results support both the hypotheses and highlight the differences in behaviour that foreign and domestic firms have when it comes to the decisions to export.

Size of the firm has high and significant coefficients at 1% of 2.15 in model 3 and 2.14 in model 4 of the foreign owned firms group. As for the Domestic firms' group, the size of the firm has no significance (p-value of 0.772 and 0.782 in models 3 and 4) and the coefficients being negative and much smaller (-0.07382 and -0.0707). Moreover, there is a considerable increase in the pseudo-R<sup>2</sup> in foreign firms' subgroup when size is introduced, with it going from 0.0218 in model 1 to 0.0475 and 0.0477 in models 3 and 4, highlighting the effect of size on the export propensity of foreign firms. When size is introduced in models 3 and 4 of the foreign firms' subgroup, the significance of the model goes from 0.0862 in model 1 to very close to 0 values in models 3 and 4. Therefore, with insignificant coefficient of the size in the domestic firms' regressions and the high significance and importance in the foreign firms' subgroup, it can be concluded that the size of the firm is more important for the export propensity of foreign owned firms than for domestic owned firms, which supports hypothesis 1.

As previously stated, REER also shows differences between subgroups. In the domestic firms' subgroup, even though it has small coefficients of 0.0166 in model 2 and 0.0165 in model 4, REER is significant at 1% in both models. This does not happen in the foreign firms subgroup, with REER not being significant (p-values of 0.529 and 0.706 in models 2 and 4) and showing even smaller coefficients (0.0045 and

0.0028). Moreover, when REER is included in model 2 of the foreign owned firms' subgroup, the model is no longer significant at 10%. Based in the results, it can then be concluded that REER movements do affect the export propensity of domestic firms, but not the export propensity of foreign firms, supporting hypothesis 2.

## **Conclusion**

This study contributes to the extent literature by (1) exploring a developing market that is gaining importance in the international markets and was lacking empirical studies in the literature (Xufei & Xiaoxuan, 2012), using a firm level database with the biggest Brazilian firms and a fixed effects logistic regression; (2) differentiating the importance of the exchange rate for domestic and foreign firms, showing evidence that foreign firms' export propensity is not affected by the REER movements, while it has very little impact on domestic firms' export propensity (see also Xufei & Xiaoxuan, 2012); and (3) explaining differences in previous literature findings of size and exchange rate effects on the export propensity, by differentiating foreign and domestic firms in a developing country (see also Talib et al., 2011).

The differences found between subgroups suggest that depending on the ownership of the firm, firm size and exchange rate fluctuation affect export propensity in different ways. As can be seen above, the size of the firm affects the export propensity of foreign firms, but not domestic owned, and the Real Effective Exchange Rate influences the domestic firms but not the foreign owned.

The size of the firm is an important factor to describe the likelihood of a firm to export for manufacturing foreign owned firms. Firms are expected to start exporting to more countries depending on their size: the bigger they are, the higher is their probability to export. In fact, investors built plants not only to explore the local market, but also to explore other countries, with global integrated logistic chains, government incentives and resource proximity advantages as possible reasons for the location advantages and high

export propensity. Given their already international approach, sunk costs to enter new markets will be lower because the firm is expected to have international business experience, with foreign investors used to the international business environment able to control firms' actions. Therefore, foreign firms' resources seem to be better suited for exporting than Brazilian firms'. Larger foreign firms will either be looking for new export opportunities or they will increase size in order to satisfy them, which is a problem of inverse causation. Thus, manufacturing firms that are aiming to export should seek to increase their size in such a way that they are better prepared for the adversities of exporting to new markets (Johanson & Vahlne, 2009). By learning with experience, firms will be adding resources such as people, competencies or capabilities (Gao, Murray, Kotabe, & Lu, 2009), which will enable them to have higher chances of future and present success in the export markets and be more confident in starting to export to new markets. Size will this way help to define firm export behaviour.

The Real Effective Exchange Rate, even though it showed significant results for domestic firms and therefore supported hypothesis 2, did not present a high coefficient, which means that the effects are not very strong. Therefore, REER movements do not influence much the export propensity of firms, which means that differences in the level of sunk costs, on the margins of domestic firms or even the perceptions of future profits and risks are not affected in such a way that makes firms start or stop exporting. This follows Das et al. (2007) conclusion that government policies that improve margins and productivity are better at promoting exports than policies that lower export barriers such as the exchange rate.

Foreign firms that seek to export to more markets should therefore focus on gaining scale economies and increase their resources, so that they have even better competitive advantage in exporting from foreign markets, in this case Brazil, and be able to maintain their target markets. Domestic firms should neither consider their size nor the exchange rate as export barriers, but should focus on improving productivity and margins. With a steady and depreciated Real, domestic owned firms should start exporting to more

countries. By doing this they will gain the required resources to increase chances of success in the future, and will retain experience, competences and capabilities that are crucial in the international business. They will also be reducing sunk costs and uncertainty of future profits with exporting. Meanwhile, the Brazilian government should focus on policies that improve margins and productivity and not so much on those that reduce export barriers. By relying on lower export barriers, domestic exporters will not automatically be becoming more efficient and, when those incentives stop, exporters will stop being competitive and will increase the probabilities of exit from the export market. If they became more productive, exporters will be able to sustain their export markets and improve Brazil's international position (see Das et al., 2007 and Christensen et al., 1987).

### **Limitations and Future Research**

There are several limitations that should be explored in the future. This study is in the first place limited to only one country, considered to be a developing one that has been growing and changing. Brazil has been receiving a great deal of attention from the international markets, with international trade growing substantially in the years this study was focused on and with a wide set of variables changing. However, the control variables and the analytic approach try to control for unobserved variables that were not included in the models. A variable that should have been used and is worth mentioning is the level of internationalization of both domestic and foreign firms, since domestic firms can have a higher level of international experience than do foreign firms. Another example of a variable that should be used when examining the ownership of firms is how the firm is structured, and how are its decisions influenced by the shareholders.

At last, according to Calof, 1994, big firms have a high propensity to export. The firms used in this study are all part of the biggest Brazilian firms database of *Revista Exame*, which makes them big firms in Brazil

and may create some biases. Besides being a limitation of the study, it also calls for more empirical studies using small and medium size enterprises, in order to better explore the relationship of firm size and export propensity of Brazilian firms.

Future research could also focus on the interaction between firm size and the exchange rate. On a model not presented here, the interaction showed no statistical evidence with the data used in this research. However, one can argue that bigger firms may easily overcome problems related to the exchange rate due to their higher level of resources.

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### **References**

- Aaby, N. E. & Slater, S. F., 1989. Management influence on export performance: A review of the empirical literature 1978-1988. *International Marketing Review*, 6(4), pp. 7-22.
- Abdel-Malek, T., 1974. Foreign Ownership and Export Performance. *Journal of International Business Studies*, Autumn, 5(2), pp. 1-14.
- Agarwal, S. & Ramaswami, S. N., 1992. , Choice of foreign market entry mode: Impact of ownership, location and internalization factors. *Journal of International Business Studies*, 1st quarter.
- Ali, A. J. & Camp, R. C., 1996. Global managers: Qualities for effective competition. *International Journal of Manpower*, 17(6/7), pp. 5-18.
- Ali, L. & Rahman, F. S., 2012. *Price and Exchange Rate impact on Australian coking coal export: An empirical analysis*. s.l.:Journal of International Business Research.
- Athukorala, P. & Menon, J., 1994. Pricing to market behaviour and exchange rate pass through in Japanese exports. *The Economic Journal*, March, Volume 104, pp. 271-281.
- Aulakh, P., Kotabe, M. & Teengen, H., 2000. Export strategies and performance of firms from emerging economies: evidence from Brazil, Chile and Mexico. *Academy of Management Journal*, Volume 43, pp. 342-361.
- Baldwin, R. & Krugman, P., 1989. Persistent Effects of Large Exchange Rate Shocks. *Quarterly Journal of Economics*, Volume 104, pp. 635-654.

- Bauerschmidt, A., Sullivan, D. & Gillespie, K., 1985. Common factors underlying barriers to export: Studies in the US paper industry. *Journal of International Business Studies*, Autumn, 16(3), pp. 111-123.
- Berman, N. & Berthou, A., 2009. Financial Market Imperfections and the Impact of Exchange Rate Movements on Exports. *Review of International Economics*, February, 17(1), pp. 103-120.
- Bernard, A. B., Eaton, J., Jensen, J. B. & Kortum, S., 1993. Plants and Productivity in International Trade. *The American Economic Review*, September, 93(4), pp. 1268-1290.
- Bernard, A. B. & Jensen, J. B., 2004. Entry, Expansion, and Intensity in the US Export Boom, 1987-1992. *Review of International Economics*, 12(4), pp. 662-675.
- Bernard, A. B. & Jensen, J. B., 2004. WHY SOME FIRMS EXPORT. *The Review of Economics and Statistics*, May, 86(2), pp. 561-569.
- Bernard, A. B., Jensen, J. B., Redding, S. J. & Schott, P. K., 2009. The Margins of US Trade. *American Economic Review: Papers & Proceedings*, 99(2), pp. 487-493.
- Bernard, A. B. & Wagner, J., 2001. Export Entry and Exit by German Firms. *Weltwirtschaftliches Archiv*, 137(1), pp. 105-123.
- Bilkey, W. J. & Tesar, G., 1977. The export behavior of small-sized Wisconsin manufacturing firms. *Journal of International Business Studies*, March, 8(1), pp. 93-98.
- Bonaccorsi, A., 1992. On the Relationship between Firm Size and Export Intensity. *Journal of International Business Studies*, 23(4), pp. 605-635.
- Boug, P. & Fagereng, A., 2010. Exchange rate volatility and export performance: a cointegrated VAR approach. *Applied Economics*, Volume 42, pp. 851-864.
- Budden, M. C., Cope, R. F., Yu Hsing, Z. & M. L., S., 2010. Stock Market Performance, the Exchange Rate, and the Brazilian Economy. *Research in Applied Economics*, Volume 2, pp. 1-10.
- Burton, F. & Schlegelmilch, B., 1987. Profile analysis of non-exporters versus exporters. *Management International Review*, 27(1), pp. 38-49.
- Calof, J. L., 1994. The relationship between firm size and export behavior revisited.. *Journal of International Business Studies*, 25(2), pp. 367-387.
- Chit, M. M. & Judge, A., 2011. Non-linear effect of exchange rate volatility on exports: the role of financial sector development in emerging East Asian economies. *International Review of Applied Economics*, January, 25(1), pp. 107-119.
- Christensen, C. H., da Rocha, A. & Gertner, R. K., 1987. An empirical investigation of the factors influencing exporting success of Brazilian firms. *Journal of International Business Studies*, Autumn, 18(3), pp. 61-77.
- Das, S., Roberts, M. J. & Tybout, J. R., 2007. Market Entry Costs, Producer Heterogeneity, and Export Dynamics. *Econometrica*, May, 75(3), pp. 837-873.
- Dhanaraj, C. & Beamish, P. W., 2003. A Resource - Based Approach to the Study of Export Performance. *Journal of Small Business Management*, July, 41(3), pp. 242-261.
- Dixit, A., 1989. Hysteresis, Import Penetration, and Exchange Rate Passthrough. *Quarterly Journal of Economics*, Volume 104, pp. 205-228.
- Douglas, S. P. & Craig, C. S., 1989. Evolution of global marketing strategy: Scale, scope and and synergy. *Columbia Journal of World Business*, September, 24(3), pp. 47-59.
- Estrin, S., Meyer, K. E., Wright, M. & Foliano, F., 2008. Export propensity and intensity of subsidiaries in emerging economies. *International Business Review*, Volume 17, pp. 574-586.
- Everett, R., Abraham, G. & Blumberg, A., 1980. Appraising currency strengths and weaknesses: An operational model for calculating parity exchange rates. *Journal of International Business Studies*, Autumn, 11(2), pp. 80-91.
- Faff, R. & Marshal, A., 2005. International Evidence on the Determinants of Foreign Exchange Rate Exposure of Multinational Corporations. *Journal of International Business Studies*, September, 36(5), pp. 539-558.



- Gao, G. Y., Murray, J. Y., Kotabe, M. & Lu, J., 2009. A "strategy tripod" perspective on export behaviors: evidence from domestic and foreign firms based in an emerging economy. *Journal of International Business Studies*, 41(3), pp. 377-396.
- Géczy, C., Minton, B. & Schrand, C., 1997. Why Firms Use Currency Derivatives. *Journal of Finance*, September, 52(4), pp. 1323-1354.
- Glaum, M., Brunner, M. & Holger, H., 2000. The Dax and the Dollar: The economic Exchange rate Exposure of German Corporations. *Journal of International Business Studies*, 4th quarter, 31(4), pp. 715-724.
- Greenway, D., Kneller, R. & Xufei, Z., 2010. The effect of exchange rates on firms exports: The role of imported intermediate inputs. *The World Economy*.
- He, J. & Ng, L. K., 1998. The Foreign Exchange Exposure of Japanese Multinational Corporations. *The Journal of Finance*, April, 53(2), pp. 733-753.
- Hovakimian, A., Opler, T. & Titman, S., 2001. The debt-equity choice. *Journal of Financial & Quantitative Analysis*, March, 36(1), pp. 1-24.
- Hultman, M., Katsikeas, C. S. & Robson, M. J., 2011. Export promotion strategy and performance: The role of international experience. *Journal of International Marketing*, Volume 19, pp. 17-39.
- Huston, E. & Stevenson, S., 2010. Openness, Hedging Incentives and Foreign Exchange Exposure: A Firm-Level Multi-Country Study. *Journal of International Business Studies*, January, 41(1), pp. 105-122.
- Johanson, J. & Vahlne, J., 1977. The internationalization process of the firm: A model of knowledge development and increasing foreign market commitments. *Journal of International Business Studies*, 8(1), pp. 23-32.
- Johanson, J. & Vahlne, J.-E., 2009. The Uppsala internationalization process model revisited: From liability of foreignness to liability of outsidership. *Journal of International Business Studies*, Volume 40, pp. 1411-1431.
- Leonidou, L. C. & Katsikeas, C. S., 1996. The Export Development Process: An Integrative Review of Empirical Models. *Journal of International Business Studies*, 27(3), pp. 517-551.
- Miller, K. & Reuer, J., 1998. Firm Strategy and Economic Exposure to Foreign Rate Movements. *Journal of International Business Studies*, 3rd quarter, 29(3), pp. 493-513.
- Nadkarni, S. & Perez, P. D., 2007. Prior conditions and early international commitment: the mediating role of domestic mindset. *Journal of International Business Studies*, 38(1), pp. 160-176.
- Ramli, I. et al., 2011. The impact of foreign direct investment and exchange rate on Malaysian export. *Economies and Finance Review*, 1(10), pp. 49-54.
- Reid, S. D., 1981. The decision-maker and export entry and expansion. *Journal of International Business Studies*, Autumn, 12(2), pp. 101-112.
- Reid, S. D., 1985. Exporting: Does sales volume makes a difference? - comment. *Journal of International Business Studies*, 16(2), pp. 153-155.
- Roberts, M. J. & Tybout, J. R., 1997. The decision to export in Colombia: An empirical model of entry with sunk costs. *The American Economic Review*, Volume 87, pp. 545-564.
- Rojec, M., Damijan, J. P. & Majcen, B., 2004. Export Propensity of Estonian and Slovenian Manufacturing Firms: Does Foreign Ownership Matter?. *Eastern European Economics*, 42(4), pp. 33-54.
- Rundh, B., 2007. International marketing behaviour amongst exporting firms. *European Journal of Marketing*, 41(1/2), pp. 181-198.
- Salomon, R. & Shaver, J. M., 2005. Export and domestic sales: Their interrelations and determinants. *Strategic Management Journal*, Volume 26, pp. 855-871.
- Shih, T.-Y. & Wickramasekera, R., 2011. Export decisions within Taiwanese electrical and electronic SMEs: The role of management characteristics and attitudes. *Asia Pacific Journal of Management*, Volume 28, pp. 353-377.
- Solakoglu, M. N., Solakoglu, E. G. & Demirag, T., 2008. Exchange rate volatility ad exports: a firm level analysis. *Applied Economics*, Volume 40, pp. 921-929.

- Statistics Division, 2008. *International Standard Industrial Classification of All Economic Activities*, New York: United Nations.
- Talib, A. N. A., Salleh, M. . F. M., Shamsuddin, F. M. & Ashari, H., 2011. THE EFFECTS OF FIRM SIZE AND INTERNATIONAL BUSINESS EXPERIENCE ON EXPORT ATTITUDES.. *Advances in Competitive Research*, 19(1&2), pp. 4-14.
- Timmor, Y. & Zif, J., 2005. A Typology of marketing strategies for export. *Journal of Global Marketing*, Volume 18, pp. 37-78.
- Torre, J., 1974. Foreign Investment and Export Dependency. *Economic Development and Cultural Change*, October, 23(1), pp. 133-150.
- Verwaal, E. & Donkers, B., 2002. Firm Size and Export Intensity: Solving an Empirical Puzzle. *Journal of International Business Studies*, September, 33(3), pp. 603-613.
- Wagner, J., 2007. Exports and Productivity: A Survey of the Evidence from Firm-level Data. *The World Economy*, 30(1), pp. 60-82.
- Wagner, J., 2008. Export Entry, Export Exit and Productivity in German Manufacturing Industries. *International Journal of the Economics of Business*, July, 15(2), pp. 169-180.
- Williams, D. A., 2011. Impact of firm size and age on the export behaviour of small locally owned firms: Fresh insights. *Journal of International Entrepreneurship*, 01 June, 9(2), pp. 152-174.
- Wolff, J. A. & Pett, T. L., 2000. Internationalization of small firms: an examination of export competitive patterns, firm size, and export performance. *Journal of Small Business Management*, 38(2), pp. 34-47.
- Wu, F., Sinkovics, R. & Cavusgil, S. T., 2007. Overcoming export manufacturers' dilemma in international expansion. *Journal of International Business Studies*, Volume 38, pp. 283-302.
- Xufei, Z. & Xiaoxuan, L., 2012. How Responsive are Chinese Exports to Exchange Rate Changes? Evidence from Firm-level Data.. *Journal of Development Studies*, October, 48(10), pp. 1489-1504.
- Yurtkur, K. & Bayramoglu, T., 2012. Export Dynamics in Emerging market economies. *Yonetim Ve Ekonomi*, 19(1).

## Appendices

### Appendix 1 – Variable Summary

| <i>All firms</i>        | <i>Firms</i> | <i>Mean</i> | <i>Std. Dev.</i> | <i>Min</i> | <i>Max</i> |
|-------------------------|--------------|-------------|------------------|------------|------------|
| Export Propensity       | 214          | .3766667    | .4845714         | 0          | 1          |
| EF                      | 214          | .6386925    | .094202          | .371       | .812       |
| GDP Target              | 214          | 2 682 683   | 1 687 235        | 223 327    | 302 701    |
| Size                    | 214          | 3929.425    | 4433.0407        | 194        | 26989      |
| Debt to Equity          | 214          | .0947       | 1.2069           | -8.4516    | 1.7525     |
| Operational Rentability | 214          | .3075       | .7974            | .6432      | 4.2682     |
| REER                    | 214          | 103.0953    | 14.8430          | 70.5033    | 195.245    |
| Import Propensity       | 214          | .277807     | .4479374         | 0          | 1          |

## Appendix 2 - Correlations

| <i>All firms</i>        | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8 |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|---|
| Export Propensity       | 1       |         |         |         |         |         |         |   |
| EFi                     | 0.0525  | 1       |         |         |         |         |         |   |
| GDP Target              | -0.1033 | 0.3336  | 1       |         |         |         |         |   |
| Size                    | 0.1249  | 0.0186  | 0.0119  | 1       |         |         |         |   |
| Debt to Equity          | -0.0440 | 0.0144  | -0.0006 | -0.2015 | 1       |         |         |   |
| Operational Rentability | 0.0616  | 0.0107  | 0.0342  | 0.1843  | -0.1203 | 1       |         |   |
| REER                    | 0.0784  | -0.3407 | -0.1956 | 0.0175  | -0.0104 | 0.0642  | 1       |   |
| Import Propensity       | 0.0004  | 0.1283  | 0.2162  | 0.0110  | 0.0053  | -0.0109 | -0.0778 | 1 |

## Appendices 3 – Logistic Regression outputs

## Appendix 3.1 – All Firms

| <i>All firms</i>        | (1)<br><i>Export Propensity</i> | (2)<br><i>Export Propensity</i> | (3)<br><i>Export Propensity</i> | (4)<br><i>Export Propensity</i> |
|-------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| ILE                     | -0.387<br>(0.713)               | 0.406<br>(0.709)                | -0.326<br>(0.758)               | 0.440<br>(0.687)                |
| GDP Target - log        | 0.0107<br>(0.852)               | -0.0103<br>(0.858)              | 0.00463<br>(0.936)              | -0.0147<br>(0.799)              |
| Import Propensity       | -0.0481<br>(0.601)              | -0.0530<br>(0.565)              | -0.0608<br>(0.510)              | -0.0655<br>(0.478)              |
| Debt To Equity          | -0.631***<br>(0.00487)          | -0.641***<br>(0.00441)          | -0.537**<br>(0.0167)            | -0.548**<br>(0.0150)            |
| Operational Rentability | 1.184**<br>(0.0114)             | 1.201**<br>(0.0108)             | 1.102**<br>(0.0186)             | 1.117**<br>(0.0179)             |
| REER                    |                                 | 0.0125***<br>(0.00398)          |                                 | 0.0122***<br>(0.00497)          |
| Size - log              |                                 |                                 | 0.771***<br>(0.000409)          | 0.760***<br>(0.000503)          |
| Year effects            | Yes                             | Yes                             | Yes                             | Yes                             |
| Observations            | 3,635                           | 3,635                           | 3,635                           | 3,635                           |
| Number of firm_country  | 663                             | 663                             | 663                             | 663                             |
| r2_p                    | 0.0151                          | 0.0181                          | 0.0197                          | 0.0226                          |
| p                       | 0.000115                        | 9.33e-06                        | 1.61e-06                        | 1.42e-07                        |

p-value in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix 3.2 – Brazilian Ownership

| <i>Brazilian Owned</i>  | (1)<br><i>Export Propensity</i> | (2)<br><i>Export Propensity</i> | (3)<br><i>Export Propensity</i> | (4)<br><i>Export Propensity</i> |
|-------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| ILE                     | 0.0482<br>(0.970)               | 1.018<br>(0.436)                | 0.0534<br>(0.966)               | 1.023<br>(0.434)                |
| GDP Target - log        | 0.00621<br>(0.932)              | -0.0226<br>(0.757)              | 0.00680<br>(0.925)              | -0.0222<br>(0.762)              |
| Import Propensity       | -0.0875<br>(0.464)              | -0.0886<br>(0.459)              | -0.0866<br>(0.469)              | -0.0877<br>(0.464)              |
| Debt To Equity          | -0.676**<br>(0.0202)            | -0.699**<br>(0.0172)            | -0.688**<br>(0.0195)            | -0.710**<br>(0.0166)            |
| Operational Rentability | 2.028***<br>(0.00141)           | 2.066***<br>(0.00124)           | 2.047***<br>(0.00137)           | 2.085***<br>(0.00120)           |
| REER                    |                                 | 0.0166***<br>(0.00328)          |                                 | 0.0165***<br>(0.00330)          |
| Size - log              |                                 |                                 | -0.0738<br>(0.772)              | -0.0707<br>(0.782)              |
| Year effects            | Yes                             | Yes                             | Yes                             | Yes                             |
| Observations            | 2,305                           | 2,305                           | 2,305                           | 2,305                           |
| Number of firm_country  | 412                             | 412                             | 412                             | 412                             |
| r2_p                    | 0.0378                          | 0.0428                          | 0.0378                          | 0.0428                          |
| p                       | 3.76e-09                        | 2.10e-10                        | 8.32e-09                        | 4.76e-10                        |

p-value in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix 3.3 - Foreign Ownership

| <i>Foreign Owned</i>    | (1)<br><i>Export Propensity</i> | (2)<br><i>Export Propensity</i> | (3)<br><i>Export Propensity</i> | (4)<br><i>Export Propensity</i> |
|-------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| ILE                     | -1.077<br>(0.585)               | -0.745<br>(0.715)               | -0.313<br>(0.875)               | -0.127<br>(0.951)               |
| GDP Target - log        | -0.00808<br>(0.932)             | -0.0140<br>(0.884)              | -0.0256<br>(0.791)              | -0.0286<br>(0.768)              |
| Import Propensity       | -0.0309<br>(0.837)              | -0.0356<br>(0.813)              | -0.0770<br>(0.612)              | -0.0798<br>(0.600)              |
| Debt To Equity          | -0.698*<br>(0.0648)             | -0.701*<br>(0.0640)             | -0.524<br>(0.176)               | -0.526<br>(0.175)               |
| Operational Rentability | 0.155<br>(0.832)                | 0.154<br>(0.835)                | 0.0637<br>(0.932)               | 0.0598<br>(0.936)               |
| REER                    |                                 | 0.00451<br>(0.529)              |                                 | 0.00277<br>(0.706)              |
| Size - log              |                                 |                                 | 2.149***<br>(1.36e-06)          | 2.143***<br>(1.50e-06)          |
| Year effects            | Yes                             | Yes                             | Yes                             | Yes                             |
| Observations            | 1,330                           | 1,330                           | 1,330                           | 1,330                           |
| Number of firm_country  | 251                             | 251                             | 251                             | 251                             |
| r2_p                    | 0.0218                          | 0.0222                          | 0.0475                          | 0.0477                          |
| p                       | 0.0862                          | 0.107                           | 3.43e-05                        | 6.04e-05                        |

p-value in parentheses: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1