

**THE MACROECONOMIC DETERMINANTS OF OUTWARD FDI: THE INFLUENCE OF  
THE EXCHANGE RATE IN THE BRAZILIAN CASE**

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## **THE MACROECONOMIC DETERMINANTS OF OUTWARD FDI: THE INFLUENCE OF THE EXCHANGE RATE IN THE BRAZILIAN CASE**

### **Abstract**

This paper models the outward foreign direct investment from Brazil series using time a series econometrics model, namely the Vector Auto Regressive (VAR) model. We have drawn impulse response functions for the key relevant factors that may explain the outward foreign direct investment flows. We start with a review of the literature on the Dunning location approach to international business. We worked with a data set of quarterly observations from Q1-1995 to Q1-2010. We carried also out Granger causality tests as for determining whether international business travelling should be included as an explanatory variable in our model. Results stressed that although the strong exchange rate in Brazil is often blamed for forcing companies to invest abroad, the evidence found in the aggregate data suggests that there is not a significant relationship between the level of foreign exchange rate and the outward Brazilian foreign direct investment. Differently from previous studies, this paper uses impulse response functions to present dynamic results, thus avoiding the typical binary results “affect” or “don’t affect”, and in so doing we provide a more detailed insight into this important location factor.

### **Keywords**

International business; Brazilian foreign direct investment; exchange rates; Latin American Financial Markets; Vector Auto Regressive.

## **1 INTRODUCTION**

The determinants of outward FDI are subject to considerable scrutiny by the International Business literature. Notwithstanding, in the Brazilian business community there seems to prevail in the conventional wisdom the view that exchange rates are a key factor leading to internationalization of local companies. Under this view, they might respond to unfavorable local exchange rates by investing abroad, possibly by the transfer of their productive units into foreign territories. Those who support that argument usually argue that companies shut down part of their domestic operations and they relocate plants. This study argues that location advantages or disadvantages related to exchange rate

levels are not a major factor determining exchange rates.

This paper models the outward foreign direct investment from Brazil series using time a series econometrics model, namely the Vector Auto Regressive (VAR) model. We have drawn impulse response functions for the key relevant factors that may explain the outward foreign direct investment flows.

This paper is organized in five sections including this introduction. The next section presents the methodology adopted and the data source. The third section discusses the literature in international business and the influence of exchange rate, as well, it is shown a background on the Brazilian economy and outward foreign direct investment. The fourth section presents the results. Finally, a final section proposes research directions.

## **2 METHODOLOGY**

In this study we have carried out time series econometric procedures so as to find out how the dynamics of the Brazilian outward FDI series was influenced by several factors, from which the main focus of our attention is the exchange rate. We have assessed the common wisdom prevailing in Brazil that accounts for a “push factor” in which local companies go abroad in response to unfavorable exchange rate movements and vice versa.

The econometric procedure started with the determination of the order of integration of the data series of our data set. We have tested the variables for unit roots and we have found that two of them present unit roots and the remaining ones are stationary. After having discovered the order of integration, we were able to proceed with a Johansen cointegration test for assessing which of the five cases presented by Johansen and Juselius (1990) and Johansen (1995) should be adopted. The underlying reason is that when estimating the Vector Error Correction Model (VEC) from the Vector Autoregressive Model (VAR) the deterministic terms of the VEC may differ from those of the VAR. More precisely, when a deterministic cointegration relationship exists, the deterministic terms of the VAR model will not be present in the VEC.

The variables chosen are the following:

- FDI represents the outward foreign direct investment of Brazil, net of investment repatriations, as registered in balance of payments' data by the Central Bank.
- FX is the level of real exchange rate of the Brazilian Real against the US Dollar, after considering the respective consumer price index for Brazil (IPCA, Índice de Preços ao Consumidor Ampliado calculated by IBGE, Instituto Brasileiro de Geografia e Estatística) and for the United States (US CPI).
- PIBBRUS, which stands for the ratio between the Brazilian real GDP index and the United States real GDP index, the latter taken as a proxy of the worldwide real GDP index.
- X, the level of exports from Brazil, collected by the Ministry of Development.
- KMTSBR, which stands for the liquidity of domestic capital markets in Brazil.
- VIAGENS, the amount spent in international travelling for business purposes by Brazil-residents travelers.

We had 61 quarterly observations available for each variable ranging from the first quarter of 1995 into the first quarter of 2010.

In addition, we tested whether or not the model should include international business travelling from Brazil as an explanatory variable in the FDI model. It was used Granger's causality tests according GRANGER (1969) to verify the causality direction among the variables outward FDI and business travel from Brazil.

Thus, for variable VIAGENS, we were not sure about the direction of causality of this variable, meaning we were not comfortable with entering with the variable as an explanatory variable in the model. On the one hand, international business travelling from Brazilian executives may help in the establishment of the relevant networks, but on the other hand FDI may cause international travelling as well. We then have investigated the issue of the direction of the causality through a Granger Causality test. We could not reject the null hypothesis of absence of causality in both directions when the estimation was done with 2 lags. Using 3 lags, results change and FDI turns out to Granger-cause VIAGENS, thus suggesting that the variable cannot be used as an explanation of FDI. International business travelling of Brazilians may be a consequence of FDI rather than a cause of the increase in

outward FDI from Brazil. The results suggest that after the decision to invest abroad the business traveling activities take an average of nine months to start showing up in the data.

### **3. THE LITERATURE IN INTERNATIONAL BUSINESS**

#### **3.1 Why firms invest abroad?**

There are several competing explanations for foreign direct investment (FDI). The key explanations include the eclectic paradigm and; and the internalization theory, both of these briefly summarized below.

John Dunning (1977) and his so-called eclectic paradigm of international production is based in three components, ownership (O), location (L) and internalization (I), and so it can be named “OLI”. The ownership component is related to firm-specific availability of resources to the firm and is related to the Resource Based View (RBV) of the organization, the latter having been proposed by Penrose who saw the firm as “a set of productive resources.” The RBV explains how companies manage to obtain sustainable competitive advantage, analyzing their internal resources to correct their weaknesses and develop their potentials. The existence of assets – tangible or intangible – is related to the firm’s capacity to expand and stand out from its competitors. Among the tangible assets are economies of scale or patents, while the intangible assets include the firm’s brands and reputation. Dunning’s eclectic approach is criticized on the grounds of being too general, and was recently updated in Dunning and Lundan (2007).

In its turn, the internalization theory of the multinational enterprise is based on the Coasian nature of the firm in which imperfect markets can be internalized into firm’s internal non-market “transactions”. Such approach leads to the discussion of the boundaries of the firm, which “are set at the margin where the benefits of further internalization of markets are just offset by the costs” (B&C, p. 1564). In addition, firms seek the least-cost location for each activity considering relevant linkages, and there is a relevant role for R&D in firm’s profitability and growth (B&C, 2009). However, elements of the Dunning paradigm somewhat coincide to the theories herein presented. For example, Buckley and Casson (2009) propose the view that internationalization occurs as a result of the interaction between internalization and location effects, which can be linked to Dunning’s L and I

components, as they have influenced the development of the OLI paradigm.

The “I” component reflects a view that the boundaries of a firm should be large as long as it faces transaction costs. Ronald Coase (1937) led the view that transaction costs are important to how the market is organized and that was subsequently extended by authors like Williamson (1985), who further developed the notion of the boundaries of the firm in presence of important market imperfections. The B&C approach on internationalization is very much based upon this view, in their internalization component.

It is also noteworthy that there are arguments in the literature pointing to the need of “tropicalization” of existing International Business theories, so as to make them capable of explaining a set of new phenomena that are taking place in emerging markets (or in developing nations, these terms being used interchangeably in this paper). Research on emerging markets has increased. For example, Meyer (2004) and Ramamurti (2004) present a research agenda that is more focused on the negative and positive effects of MNE on home and host developing countries, in addition to impacts of home contexts and policies on MNE behavior and some other issues like diaspora investments. However, we have concentrated here on the explanations of foreign direct investments from a home country that is an emerging market, namely Brazil, in the specific feature of the effects of the exchange and its movements on the foreign direct investment by Brazilian firms, which is an analysis that is mostly related to the Dunning’s “L” vector.

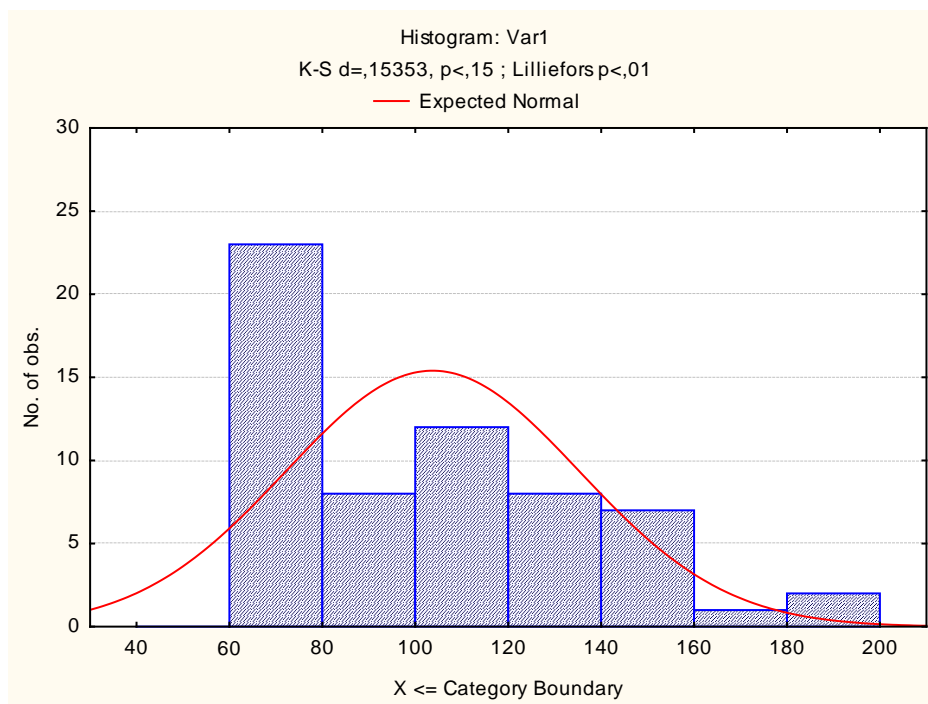
### **3.2 Exchange rate and FDI: the literature**

The incorporation of the effect of exchange rate movements into the theory of international production of goods and services has been carried out by several authors in some different ways. According to Dunning and Lundan (2008), a pioneering work on that direction was carried out by Aliber (1970), whose PhD thesis made a point on Hymer’s (1970) classical work which identified a failure of financial markets. Aliber “was not concerned with why firms produce abroad but why they should finance their foreign assets in their domestic currency” (Dunning and Lundan, 2008, p. 90). The underlying reason is the ability of firms to arbitrage between their original home currency and any other international currency, thus making foreign exchange gains while making foreign direct

investments. However, according to Dunning and Lundan (2008, p. 90), there are some weaknesses in Aliber's theory like "it is difficult to see how it explains (...) the cross-hauling of direct investment between weak and strong currency areas". They claim the lack rigorous empirical testing for this proposition and "there is only limited support for this thesis – at least as the predominant explanation for such investments" (Dunning and Lundan, 2008 p. 90).

In addition to those points, we submit that Aliber's theory may not sustain if the exchange rate is not stable over long periods of time. Firms should make their decisions based on both the prevailing currency levels and, more importantly, their expectations on the future exchange rate movements that may eventually cause a loss of the gains that may be realized through currency arbitrage. If so, exchange rate levels will not be sufficient to explain foreign direct investment at a very aggregate level, although some firms may be motivated by this reasoning, even though some in a myopic manner. In some very specific periods in specific countries or currency settings it may be case that the massive perception of an imminent currency undervaluation or overvaluation may lead to such movement by a large number of firms, but again that story would be rather quite concentrated in time and space.

Consider for instance the distribution of the real exchange rate values of the Brazilian Real against the US Dollar, which is plotted in the Chart below. Considering the four statistical moments of the distribution of 61 quarterly observations from Q1-1995-Q1 to Q1-2010, namely (1) mean, (2) coefficient of variation of 30.5% around the average, (3) skewness of 0.75 thus skewed to the right in the sample here considered, and (4) kurtosis of -0.22. Independently of the specific features of the sample chosen, i.e., including some 12 quarters of strong Real for an exchange rate anchor that was in place, it is clear in the distribution that any foreign direct investment decision that was based on any central tendency measure of the exchange rate shows a high probability of prove a bad decision in the future.



Source: own elaboration.

Many streams of literature converge to an inconclusive role of exchange rates. Dunning and Lundan (2008) have also surveyed the literature on the influence of exchange rate on the location of MNE activity. Froot and Stein (1991), for example, found a relationship between currency movements and the geography of MNEs base but they “contradicted their own earlier research on outward investment” (Dunning and Lundan, 2008, p. 91).

There are also commentaries on the relative wealth channel through which exchange rate may influence MNEs’ activities, as the foreign exchange rate may be seen as a proxy for relative wealth like in Dewenter (1995), or Cushman (1985) and Culem (1988). The latter authors argued that “rather than reflecting relative wealth, exchange rate movements mirrored changes in relative real labour costs, and it was these that determine FDI” (Dunning and Lundan, 2008, p. 91). However, such effects if they exist are spread over time and are difficult to assess in empirical time series modeling.

Few works have been made on the relationship between exchange rate and foreign direct investment in the Brazilian case. There seemed to us to be common sense in the Brazilian contemporary debate that the outward foreign direct investment is to be shown as strongly correlated with the exchange rates, i.e., Brazilian firms respond to unfavorable domestic exchange rate conditions with internationalization. For instance, Trevisan (2006) and Lima and Correa (2007) have argued in



that direction. Against that argument, Concer and Turolla (2008) have carried out empirical testing to show that there is no Granger causality between those variables and in addition they are not significantly related in a multivariate regression analysis, thus not supporting the common sense view of the presence of a push out effect of the domestic exchange rate on Brazilian firms. That line of analysis is worthy of extensions, in light of perceived weaknesses in models like the one presented in Concer and Turolla (2008), which lacks adequate consideration of some relevant factors, what is done in this paper.

Against that background, we will proceed with an econometric analysis of the relationship between exchange rate and outward FDI from Brazil. Our theoretical hypothesis is that:

Hypothesis 1. The exchange rate is not a relevant variable in the explanation of the Brazilian outward foreign direct investment flows.

Macroeconomic factors may also weigh on the relationship or, in line with Buckley (1988), may also be an important factor of explanation of aggregate FDI flows, and then the next section will present a historical analysis of the country-specific developments that are relevant to the sample period under study. We argue that there are possible Brazilian idiosyncrasies that may be important in the determination of the observed data of outward FDI but we do not see a relevant role for the exchange rate, except for its indirect effect via enhanced competitiveness of domestic firms that was brought about by the pressure of intense competition made up by a combination between increased trade openness, macroeconomic reforms, newly achieved price stability, and within the same set of drivers, currency strength itself between 1994 and 1998.

### **3.3 Country specific developments**

In the 1980's, Brazil was located practically in insular position with reference to the foreign direct investment flows (FDI). At the end of that decade, worldwide foreign direct investment averaged 2.7% of the world's Gross Domestic Product, whereas FDI inflows into Brazil amounted to merely 0.4% of GDP. In addition, after years of government intervention, price controls and limited exposition of firms to the global competition, most Brazilian industrial firms were revealed inefficient and little competitive.

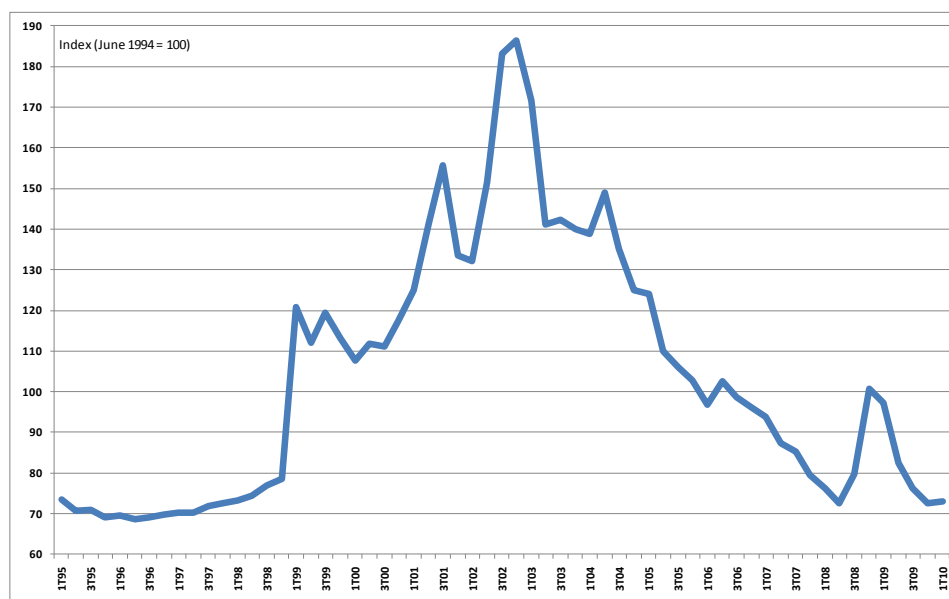
In the 1990's the country witnessed a wide but incomplete reversal of the formerly adopted import substitution strategy. Early in the nineties, the Collor administration promoted a wide trade liberalization effort that has increased the exposure of firms to competition, even though in disorderly manner (however, being almost unilateral, Brazil missed a historic opportunity of securing access to many foreign markets). Even so, it brought a result of promoting internal competition. The Mercosur devices implemented in 1994 have contributed to increased access into Brazilian market in that period.

In the nineties, Brazil had narrowed the gap as the country increased the attraction of the FDI flows. Late in the nineties, Brazil was already receiving an equivalent of more than 5% of its GDP in FDI, lining up to developed countries' typical figures. This is an evidence of major insertion of the Brazilian economy large movement of productive integration have accompanied the current the globalization process, since 1990s. Consequently, over the past decade, Brazil has consolidated its position as important destination for foreign direct investment and has become, in various segments, an important stage of direct competition among the top world corporate names. On the other hand, recently, Brazil also became an important direct investor in the global scene.

The set of efforts comprised by trade liberalization, currency appreciation and a large array of structural reforms through the 1990s are characters of Brazilian environment that can be found among the important roots of the strong rise in inward foreign direct investment flows from the second half of 1990s onwards, and outward FDI from this decade onwards. These are the main Brazilian idiosyncratic factors explaining the FDI boom – nonetheless, there are certain global factors that shall be considered, since most developing economies experienced increases in FDI in both directions over the same period, although in most cases to a smaller extent than in Brazil.

In particular, the appreciation of Real lasts in the middle of the 90's until the 1999 was relevant not merely to the role of containment of prices, but also for represent fierce competitive pressure over the domestic producers. The chart below shows the real exchange of the Real against the US Dollar between Q1-1995, corrected by the Brazilian IPCA and the United States CPI.

### Real exchange rate Brazilian Real to US Dollar, June 1994 = 100



Source: Central Bank of Brazil, public data series #11753

It was noteworthy that the exchange rate anchor between 1995 and 1998 was responsible for the strong Real. After the administered regime was relaxed early in 1999, the currency floated and weakened through 2002. There was a lot of uncertainty surrounding the presidential elections in 2002. However, the leftist party won and took office in 2003 with policies that were even more “neoliberal” and conservative than it has criticized in the past, and that paved the way for a dramatic reduction in country risk and contributed to currency strength from then on. Also, the quite favorable international environment helped both exports and capital flows into the country and the exchange rate plummeted into a very strong position until the 2008 crisis. With the crisis, the Real had a temporary weakening but soon it returned to a strong position through the end of the sample.

Probably many firms that produced in Brazil have experienced, in the 1994-1998 period, what could have been the most difficult period of competitive pressure of their history. Under double pressure, commercial opening and unfavorable foreign exchange, the Brazilian firms were faced with three alternatives: (1) close the activities; (2) sell the company to international groups that could operate with the same capital but with more productivity or (3) make costs adjustments to confront directly the competition.

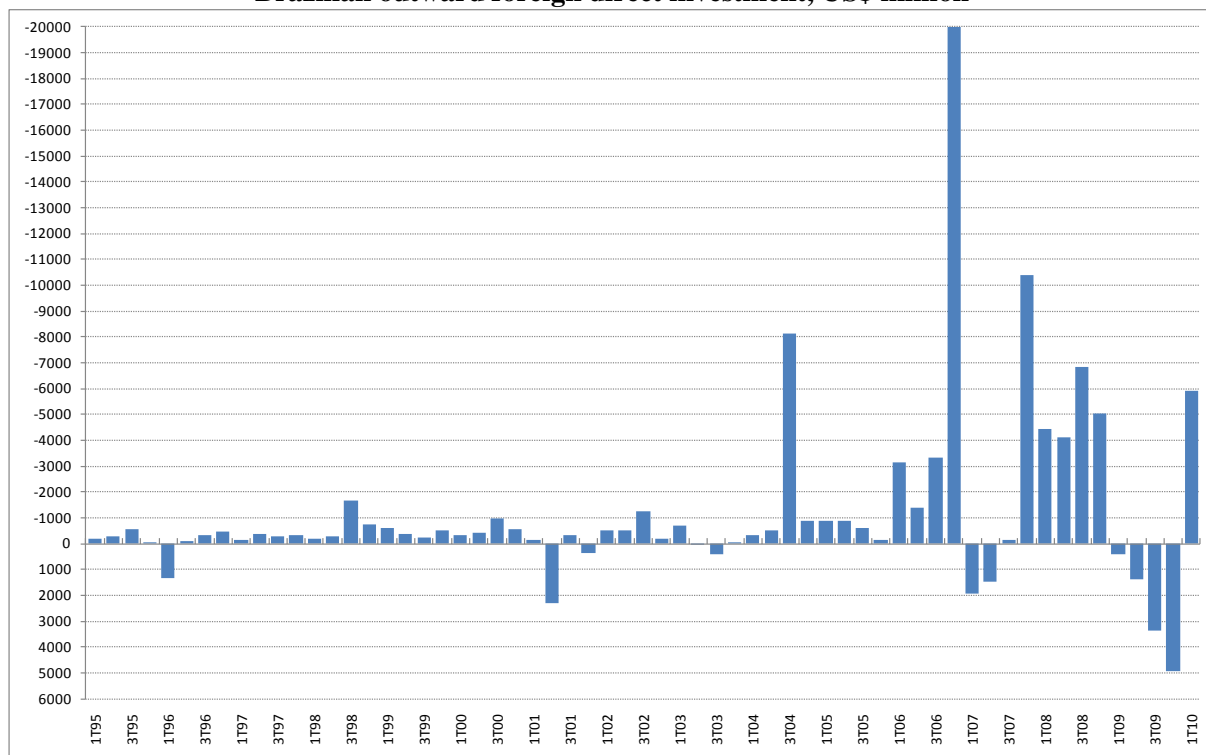
The firms with large resistance were capable of modernizing themselves and of taking new

steps that eventually lead toward international production. The winners of such a Darwin-style natural selection are those who have made harsh adjustments and had benefited from the strong Real and smaller import barriers for the modernizing of the productive equipment, reallocation of plants and products and process review. The appreciated Real have contributed to the imports of machines and equipments, what created unprecedented conditions for the incorporation of new, modern equipment soon after Plano Real.

The external impulse of Brazilian firms was intensified, initially with the export. After intense competition, devaluation of the Brazilian Real currency by early 1999 offered degrees of freedom in own internal market, and also brought a relief for the export activities. Ever since one witnessed a significantly increase in the quantum exported, intensified in the period 2004-2008 by quite favorable prices. The positive behavior was enhanced by public policies for the agribusiness sector created during the previous decade that have put back the country in the condition of potential of exports in this segment.

It is observed that, at the initial stages, the Brazilian direct investment destination was related to similar conditions of development countries, a scenario that remained through the nineties, like in other emerging economies. For instance, UNCTAD (2007) highlights the increasing of foreign direct investment flows in the South-South direction, i.e., between developing countries. However, important recent investments by developing countries in developed markets suggest that can be changes in the South-South investment trend. Among these operations, it can be mentioned the Ambev and Interbrew merger, the acquisition of Inco by Vale and even more with the purchase of Swift by the JBS Friboi Group. With the latter, the JBS Group has become the world's large slaughterhouse group with largest capacity of processing worldwide. There were also setbacks, like investments that returned on a net basis for four quarters in a row after the 2008 international crisis. The chart below shows the outward foreign direct investment by Brazilian firms on quarterly basis since Q1-1995 into Q1-2010.

### Brazilian outward foreign direct investment, US\$ million



**Source:** Central Bank of Brazil, public data series #2637. The vertical axis was inverted because negative values refer to outward net investments.

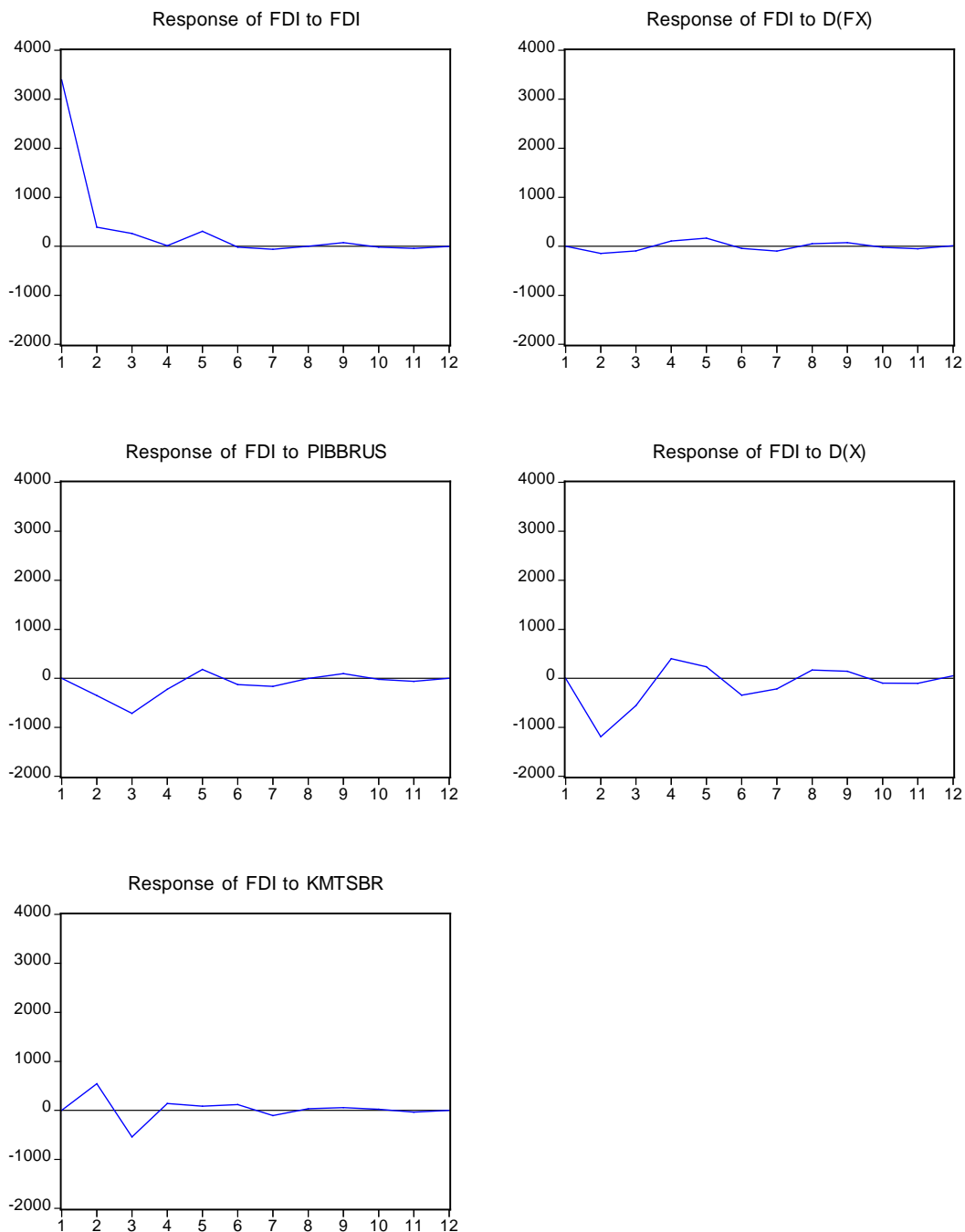
## 4. ESTIMATION AND RESULTS

It is required for the time series procedure that all variables be stationary. For this condition to be warranted, we carried unit root tests using the ADF – Augmented Dickey Fulley method. Variables FX and X were found to be integrated as they presented one unit root. The remaining variables were found to be stationary. For the purposes of the Johansen cointegration test that was carried out in the sequence, the integrated variables were entered in the test procedure after one differentiation. The Johansen cointegration test allowed for a linear deterministic trend in the data.

Upon the Johansen cointegration test having found 5 vectors of cointegration for 5 variables, it is then recommended that we estimate a VAR – Vector Auto Regressive model. We have estimated the VAR and the relevant output in this case is the VAR variance decomposition, which allows the identification of the shocks over the relevant variables and their effects. The impulse-response functions for the variable FDI are shown below. They show how the outward Brazilian FDI responds

in face of impulses from the selected variables that were chosen in this paper. The results are shown in the figure below.

Response to Cholesky One S.D. Innovations



Source: own elaboration

The first important conclusion from the observation of the impulse response function is that the exchange rate change has little impact on the outward foreign direct investment. As opposite to conventional wisdom and against some arguments in the local literature, exchange rate movements are not a relevant explanation or a “push factor” that leads domestic companies to invest abroad seeking more favorable exchange rate environments. The traditional location factor does not fits well to the empirical observation in what concerns the exchange rates.

It is noteworthy that previous studies like Concer and Turolla (2008) and others have considered a binary assessment of the relationship between the exchange rate and outward FDI. The impulse response function approach that was used herein allows one to perceive the relevant effects in a dynamic setting, including the relevant adjustment process to shocks. We have found, however, that in such a dynamic setting, the magnitude of the impacts are small or possibly negligible.

The other interesting result is that the stronger impulse into outward FDI is to be given by the variable itself, i.e., in response to a shock in itself, the outward FDI from Brazil responds more vigorously than with shocks from other variables. Such a pattern resembles very much the Johansen and Vahlne (2009) model or the so-called Uppsala paradigm in which the process of internationalization is moves gradually according to the pace of reduction of the formation of networks. The liability of outsidership to relevant business networks and communities, formerly seen in a narrower sense as liabilities of foreignness, makes the process of foreign investment evolve gradually and a growing one once started. Another implication may be the historic path dependence of such process, which may be strongly related to the Brazilian history from the nineties onward, as it was shown in a specific session of this paper.

An increase in the relative strength of the Brazilian economy as measured by its real GDP decreases foreign direct investment activity for some months, but a further movement is a rebound in FDI. This is a dynamic process that links local economic activity to corporate internationalization. It is also noteworthy that changes in exports at first reduce foreign direct investment but latter on the FDI activity resumes to the original levels.

The capital markets effect was also an interesting finding. The availability of local funding is related to corporate internationalization for some months, but that effect is offset some months later. It may be the case that the Brazilians are used to be quick when they see a window of opportunity in domestic capital markets, as in the past those windows opened and closed very rapidly and suddenly. Although this point should be further investigated, it is consistent with commentaries often heard from capital markets' practitioners in Brazil.

## **5 CONCLUSIONS**

Our estimates confirmed that the exchange rate plays a small or negligible role in explaining foreign direct investment from Brazil, contrary to what seems to be the conventional wisdom in the country. Although we have focused on the issue of the relationship between the exchange rate level and the pace of internationalization of Brazilian firms through foreign direct investment abroad, we have reached important side conclusions. One is that international travelling for business purposes comes after foreign direct investment and does not lead FDI flows as one might have anticipated. Another is that the windows of opportunity in capital markets may lead to quick responses in corporate internationalization.

A third important side conclusion is that the shocks in the variable outward Foreign Direct Investment cause the variance to be almost entirely determined by its own effects. This has two possible explanations. One is the Uppsala paradigm in which the process of internationalization is moves gradually according to the pace of reduction of the formation of networks. The liability of outsidership to relevant business networks and communities, formerly seen in a narrower sense as liabilities of foreignness, makes the process of foreign investment evolve gradually and a growing one once started. Another implication may be the historic path dependence of such process, which may be strongly related to the Brazilian history from the nineties onward, as it was shown in a specific session of this paper.

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