Track: 04/ FDI in and from emerging market economies
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Determinants of regional distribution of FDI in Brazil

Abstract

Many of the studies that deal with the determinants of FDI are produced based on a broad regional or national perspective, but these studies are limited when it comes to emerging countries such as Brazil, with its vast territory and marked regional differences. This work investigates the determinants of FDI flows in the Brazilian states, taking into account economic and development aspects. Besides, we attempted to assess the effect of political alignment between states and the federal government on the distribution of FDI projects among Brazilian states. Using, a panel data, we estimate the regional determinants of FDI of all Brazilian States (27), over four specific periods between 1995 and 2010. As the main results, we found a positive relationship between market size, productivity, HDI and taxes, and the distribution of FDI among the Brazilian states. The political variable, a *dummy* on whether or not the state government party is allied with that of the federal government, was positively related to the distribution of FDI, although it was not statistically significant. These results prompted us to seek other ways of measuring the impact of policy on companies' decisions to invest in Brazil.

Determinants of FDI in Brazilian states: an economic and institutional approach

1. INTRODUCTION

Foreign Direct Investment (FDI) contributes to boosting economic growth and reducing poverty. (OECD, 2002). In 2013, flows of FDI worldwide increased by 9%, reaching almost U$ 1.46 trillion. In Brazil, FDI suffered a decline of 3.9% in 2013 compared to 2012, though it remains high, at US$ 63 billion. The country fell from fifth to seventh place in the UNCTAD ranking. However, it continues to be the main destination of investments in South America, accounting for 47% of FDI to the continent. (UNCTAD, 2014).

Studies about the determinants of FDI are being developed, mainly from a national perspective, using economic and/or institutional variables (Amal and Seabra, 2007; Amal et al., 2009; Angelo et al., 2010; Mudambi et al., 2013; Malhotra et al., 2014). But the study of the attraction determinants of FDI at country level is inadequate when it comes to emerging countries such as Brazil, with its vast territory and marked regional differences (Mccann and Mudambi, 2004). In the case of Brazil, despite the increased proportion of FDI flow in the GDP – from an average 0.6% in 1980 to 1.9% in the 1990s, and to 2.5% from 2001 to 2010), there is still a wide disparity in the distribution of FDI (Bortoluzzo et al., 2012). Of the twenty-seven Units of the Federation, São Paulo is the only State to receive more than US$50 Billion in FDI, in contrast to Alagoas, Tocantins, Rondonia, Acre, and Roraima, which received less than US$100 million each. There are 27 Federal Units in Brazil - the 26 states and the Federal District (See Figure 1). Throughout this article we use “states” as meaning both.

Despite these disparities, there has been little investigation on the distribution of FDI among the Brazilian states. Seeking to contribute to the development of the study on the determinants of FDI at a regional level in Brazil, the question that guides this research is: what are the characteristics that determine the distribution of FDI flows in the Brazilian states? Therefore,

this study aims to investigate the determinants of FDI flows in the Brazilian states, taking into account economic and development aspects. Besides, we attempted to assess the effect of political alignment between states and the federal government on the distribution of FDI projects among Brazilian states.

Using panel data, we estimated the regional determinants of FDI of all Brazilian Federal Units (27), over four specific periods: 1995; 2000; 2005; and 2010 (BACEN, 2014). The variables used in this article are the ones that are more suitable to explain the determinants of FDI according to the availability of data, which in Brazil, is a limiting factor due to the difficulty of obtaining data on historical series, or with comparable values, without effecting major changes in the methods used to collect and analyze the data.

The results of this study indicate that there is a positive correlation between the market size and the distribution of FDI among the Brazilian states, as well as the productivity the Human Development Index (HDI) and the level of the VAT (ICMS) tax revenue. The political variable, a *dummy* on whether or not the state government party is allied with that of the federal government, was positively correlated with the distribution of FDI, though this correlation was not statistically significant. This result prompts us to seek other ways to measure the impact of policy on investment decisions of firms in Brazil.

The paper proceeds as follow: in section two we present the literature review and the main hypothesis on Foreign Direct Investment and its determinants, the hypotheses, and the variables used in this study. The section three addresses the methodological procedures. Sections fourth and five respectively discuss the results and the main conclusions of the study.

2. GENERAL FRAMEWORK AND HYPOTHESES

2.1. Determinants of Foreign Direct Investment (FDI)

Foreign Direct Investment (FDI) represents an investment aimed at acquiring a long-term control over the activities of the acquired firm, whose exploitation occurs in a country other than that of the investor, with the objective of effectively influencing the management of the company in question. Foreign investment is considered direct investment when it has a capital holding of at least 10%, and can exert an influence on the management of the receiving company (IMF, 1998). FDI is characterized as a long-term investment. It is also a high-risk investment, considering the uncertainty of return and profitability of the capital invested (Amal and Seabra, 2007).

The literature on international business offers some theoretical explanations on cross-border production and FDI, especially through the theory of industrial organization, which considers the costs of doing international business abroad and of internalization (Hymer, 1960), the specific competitive advantages of the firm (Buckley and Casson, 1976; Caves, 1971), theory of product life cycle, (Vernon, 1966), and Dunning's Eclectic Paradigm (Dunning, 1980). These approaches are complemented by the Uppsala Model, which considers internationalization as an incremental process (Johanson and Wiedersheim-Paul, 1975; Johanson and Vahlne, 1977), as well as the studies on liability of foreignness, which point to the competitive disadvantages of Multinational Corporations (MNC) in the host country (Zaheer, 1995).

One of the most well-known theoretical models on the nature of international production and the factors that affect MNC location, is Dunning's Eclectic Paradigm (Dunning, 1973), also known as OLI, which has directly or indirectly affected research works in the area (Pinto et al., 2010). Dunning (2001) states that for MNC to have a successful FDI it must possess ownership-specific advantages (O), which are best exploited by the internalization (I) of their market transactions, and choose where is the best location (L) to do so, considering the costs and benefits of locating value-added activities in different geographical locations. Dunning

(1998; 2000) suggests that there are four kinds of strategic determinants of FDI location: market-seeking (on the demand side), and efficiency-seeking, strategic assets-seeking, and resources-seeking (on the supply side). Besides,

Most studies have analyzed the determinants of FDI at country level, but knowledge and the incorporation into the local context are key factors for the success of multinational companies, because the differences between regions, countries, cultures and societies are not attenuated by globalization, which involves an increase in the interface with actors that continue to maintain their local particularities (Meyer et al., 2011). Empirical studies on how the characteristics of the regions contribute to the performance of MNC (Chan, et al., 2010), and the determinants of FDI in locations within the same country are being developed (Jones and Phelps, 2000; Amal et al., 2007; Sethi, et al., 2011; Ledyaeva, 2009; Fallon and Cook, 2010; Bortoluzzo et al., 2012; Chattopadhyay, 2014; Antonio et al., 2015).

The literature on the determinants of FDI flows has traditionally considered economic factors, such as the mode of entry, the market size, and the existence of low transaction costs (Buckley and Casson, 1976; Caves, 1982; Dunning, 1973), as well as transport and infrastructure (Mccann and Mudambi, 2005). Based on the economic determinants of FDI, we formulated the following hypotheses:

H1: FDI distribution among Brazilian states is positively correlated with market size.

H2: FDI distribution among Brazilian states is positively correlated with resource productivity.

The literature in the area of international business has evolved to incorporate institutional elements in the analysis of determinants of FDI, such as government efficiency, tax burden and corruption, based on the work of North (1990) and more recently, works such as those of Mudambi et al. (2002; 2013), who claim that although taxes can distort the allocation of

resources, they can also be positive, in that they enable the State to invest in public assets that will improve the socioeconomic conditions of the region.

Taxes have been used as an independent variable in the study of intra-country FDI distribution (Boudier-Benseba, 2005), measured in terms of corporate taxes or tax incentives (Jones and Phelps, 2000; Amal et al., 2007; Sethi et al., 2011,). In Brazil, the states develop several policies of tax incentives, and they use future tax revenue, especially VAT on Sales and Services (ICMS), as a tool for negotiating with MNCs (Nascimento, 2008). Differences in ICMS revenue reflect the regional economic and social differences of Brazil, since the level of tax depends on the economic activity of the state (Arbix, 2000). Thus, we have the following hypothesis:

H3: the distribution of FDI in Brazil is positively correlated with the state collection of ICMS.

The level of development has been used as a determinant for FDI, measured in terms of the Human Development Index (UNDP, 2015a; 2015b), a variable that is positively correlated with FDI (Arcelus et al., 2005). Its use is also justified by the fact that this index captures the level of physical and human infrastructures in the states, and can represent their level of development. These factors are associated with the ability of companies to create firm-specific advantages, which are considered necessary for international production (Dunning, 1993; Caves, 1996). Thus, our next hypothesis is:

H4: FDI flows are positively correlated with the HDI of states.

In a study conducted in Italy, a country that also has regional disparities and an unstable political system, Mudambi and Navarra (2003) worked on the correlation between political orientation of parties and the location variables of FDI. The authors concluded that political variables have significant effects on residual FDI by MNCs.

In Brazil, in addition to the political relations between companies and the government (Camilo et al., 2012), state government party support to the federal government party may represent a way of facilitating the creation of conditions conducive to investment (e.g. obtaining funds, or support in negotiations with large MNCs). However, it is important to consider that in Brazil, politics guidance, in terms of support for the federal government by parties that govern the states, is very unstable and depends more on circumstantial factors than on the philosophy of party affiliation in itself. Thus, our study also uses a political variable as a possible determinant of the distribution of flows of FDI in Brazil, a *dummy* that reflects if the state government party supports the federal government party or not in the four periods of this study. Thus, our hypothesis concerning the political determinants is as follows:

H5: The distribution of FDI among Brazilian states is positively correlated with the political orientation of the state government.

3. METHOD

3.1 - Model

The aim of the present paper is to investigate the determinants of regional distribution of FDI among Brazilian States. More specifically, we will test variables related to economic performance of the state, level of development, economic openness and political regional orientation of the host state of FDI. Using, a panel data, we estimate the regional determinants of FDI of all Brazilian States (27). The available data are published by the Brazilian Central Bank (Censo de Capitais Estrangeiros) (BACEN, 2014), and are published every five years, reporting the stock of FDI, and its distribution by the Brazilian States.

According to Raj and Baltagi (1992), the panel data technique is used when simultaneously observations in cross sections and time series are taken into account. The purpose of this method is to specify a statistical model that reflects individual differences in behavior in a manner that allows all the data to be combined in order to draw up estimates and references.

The specification level allows a better control over the effects of individual heterogeneity (Raj and Baltagi, 1992). Another advantage of the method is its ability to reduce the effects of co-linearity among the independent variables, enhancing the efficiency of the econometric estimators.

The regional determinants of foreign direct investment (OFDI) distribution among the Brazilian States can be assumed to be given by the following equation:

$$FDI_{it} = \alpha_0 + \alpha_1 GDPPC_{it} + \alpha_2 RGDP_{it} + \alpha_3 AGGL_{it} + \alpha_4 TAXES_{it} + \alpha_5 TRADE_{it} + \alpha_6 HDI_{it} + \alpha_7 RPRODUCT_{it} + \alpha_8 DPOLIT_{it} + \alpha_9 INTERACTION_{it} + \varepsilon_{it}$$

Where FDI is the dependent variable, and express the FDI by Brazilian States. Several authors have used inward stocks of FDI to record value-adding activities of MNC affiliates in the host countries (Dunning and Lundan, 2008; Dunning et al. 2007). However, according to Beugelsdijk et al. (2010), such measurements may bias the FDI stocks as a measure of total MNC affiliate activity for many reasons. First, since FDI stocks and flows only capture the net financial capital flows (known as the Balance of Payment concept), they do not include all the funds that MNEs raise from host countries with large stock and bond markets. On the other hand, not all FDI stocks in the host countries are used to generate affiliate added value in those countries (such as the case of tax havens). We opt to use the general accumulate assets of foreign subsidiaries that allow to consider all the funds and access to resources in the host country. (Amal and Tomio, 2015)

As a dependent variable we used the general accumulate assets of foreign subsidiaries in all Brazilian States (27), over four specific periods: 1995; 2000; 2005; and 2010. The available data are published by the Brazilian Central Bank as the Censo de Capitais Estrangeiros do País – CCEP (BACEN, 2014), and are published every five years, reporting the stock of FDI, and its distribution by the Brazilian States. We opted to use the general accumulate assets of

foreign subsidiaries, which allows to consider all the funds and access to resources in the host country.

To investigate the determinants of regional distribution of FDI among Brazilian States, the variables used in this article are the ones that are more suitable to explain the determinants of FDI according to the availability of data, which in Brazil, is a limiting factor due to the difficulty of obtaining data on historical series, or with comparable values, without effecting major changes in the methods used to collect and analyze the data.

In relation to the economic determinants of FDI flows among the Brazilian states, we used variables that are related to Market Size and Resource Productivity. In order to mesure the Market size, we used four proxies: 1) State Gross Domestic Product Per Capita (GDPPC), 2) Relative GDP (RGDP); 3) Relative Industrial Agglomeration (RAGGL); 4) the state involvement in international trade (TRADE), To measure productivity, we used as a proxy the Resource Productivity, which represents resource density. A proxy escolhida para se medir os impostos foi a receita de ICMS do estado sobre o PIB do mesmo, resultando em um valor percentual da carga deste tributo sobre a economia do estado. As institutional determinants we used TAXES and the state level of development. Taxes are measured by the ratio of the montante de arrecadação do Imposto sobre Circulação de Mercadorias e Serviços (ICMS) to GDP, and the state level of development is measured in terms of the Human Development Index (HDI). Finally, we used a dummy variable to indicate whether or not the party that governed the state in each year of the CCEP was allied with the federal government (1) or not (0).

α_0 is the constant , and ε is the residual error. All variables are represented by "*i*", the state host of FDI, and "*t*", the time (period).

In the table 1, we present all the variables tested in the model, their description, and the sources of the data.

Insert Table 1 about here

3.2. Evolution and distribution of FDI by Brazilian States.

FDI flows have risen in Brazil, almost doubling from one year period to another: aproximatelly R$ 273 Million in 1995, R$ 914 Million in 2000, R$ 1,5 Trillion in 2005 and 2,4 Trillion in 2010 (BACEN, 2014). Figure 1 presents the marked discrepancy in distribution of FDI among the Brazilian States. São Paulo appears as the only State to attract more than US$ 50 Billion in investments, followed by Rio de Janeiro, Minas Gerais and Rio Grande do Sul, with investments of between US$ 10 and US$ 50 billion, and Paraná, Bahia, Espírito Santo and Santa Catarina, with investments between US$ 5 and US$ 10 Billion. The other states attracted less than US$ 5 Billion FDI. They are particularly located in the North and Northeast parts of the country, which have less degree of regional development

Insert Figure 1 about here
Insert Table 2 about here

Table 3 shows the descriptive statistics of all the 27 states for all the model variables.

Insert Table 3 about here

4. MODEL ESTIMATES AND ANALYSIS

We run a correlation matrix to check for multicollinearity among the variables. The results of the matrix correlation is presented in the table 4, and shows that the risk of multicollinearity is relatively low for most of the variables, with correlation levels below 0.8. the only variables that presented a high correlation level are trade with relative GDP (RGDP), and Resource Productivity (RPRODUCT) with GDP per capita (GDPPC). However, the panel model technique reduces the effects of multicollinearity among the independent variables, which contributes to increases the efficacy of the estimations. It is worth noting, as pointed out by Hsiao (2003, p. 311), that one of the main benefits of panel data is that it attenuates the problem of multicollinearity by increasing the degrees of freedom, which is possible because

the panel technique augments the dataset by combining several cross-section units and periods (time series).

Insert table 4 about here

In order to test the above-discussed hypotheses, we adopted a step-wise technique to run four specific models. The first model tests the effects of market size, productivity and level of development. In the second model, we included the variable that capture state politics, expressed in terms of political alignment between state and federal government. In the third and fourth models, we tested the interactive variables, which have the objective to capture the moderating effects between regional politics (*Dummy*) and level of development (HDI); and the relative industrial agglomeration level (RAGGL) and the participation of regional trade in the national trade of Brazil. Table 5 reports the model estimations.

The overall results of the estimated models show the relatively stable behavior of most of the variables, and pointing that over 40% (R^2) of the regional FDI distribution can be explained by market size, level of development and trade openness.

It seems that Model I that include market size variables, level of regional development, trade and resource productivity has the best predictive power, with all variables have been found statistically significant at 1% (with the exception of the relative state GDP). This assessment is based on the analysis of the coefficient of determination R^2, which registered a value of 0.422, with a value of the F-statistics of 10. 3, the highest among all other alternatives of model regressions. The remaining estimated models (II, III, and IV), despite increasing the coefficient of determination R^2, have not contributed to improve the robustness and significance of the general proposed model of regional distribution of FDI. The variables of state POL, and interactive variables between POL and HDI, and RAGGL and HDI have not been found statistically significant.

The estimation of model I points to some interesting and conflicting results. First, the results show that state distribution of FDI is positively correlated to RAGGL. This correlation is positive and statistically significant at 1%. The higher the participation of the industry in the relative GDP of the State, the higher the contribution of FDI to the GDP of the state. This relationship suggests that the distribution of regional FDI in the country is related to the level of industrialization of the State (Boudier-Benseba, 2005; Du, Lu and Tao, 2008). This finding is also supported by the positive impact of TAXES, which has been found statistically significant at 1% (Jones and Phelps, 2000; Boudier-Benseba, 2005; Amal et al., 2007; Sethi et al., 2011; Bortoluzzo et al. 2012). The higher this percentage (Taxes to GDP), the higher the State revenues, and, therefore, the better the conditions of the State to finance regional development and infrastructure. Important to salient that higher regional tax revenues can represent a powerful source of financing Greenfield investment project, which can be a determinant factor in the location´s decision making by MNCs (pull factor of FDI). The model also shows that the regional development (measured by HDI) is positively correlated with FDI, and statistically significant (at 1%). This suggests that FDI is mainly concentrated in the Brazilian federation units with high level of development. Regions presenting higher performance in these indicator are more likely to attract FDI (Arcelus et al., 2005).

This finding of high correlation between relative industrial agglomeration, level of development and FDI suggests that the strategy of MNCs is more likely market seeking.

The correlation between TRADE and FDI has been found positive and statistically significant at 1%. The higher the relative State participation, the higher the stock of FDI in the region (Hon et al., 2005; Amal and Seabra, 2007; Pillai and Rao, 2013). This suggests Natural resource oriented regions have a higher propensity to export their products and we can suppose that the high level of FDI in this region can be related to investment project to explore natural resources, pointing to resource seeking strategy of FDI. This evidence can be

also supported by the effect of the variable RPROD. The higher the ratio, the higher the natural resource endowment of the region. This correlation between RPROD and FDI was found positive and statistically significant at 1%.

On the other hand, since that we considered the international trade flows, the propensity of a region to attract FDI is related as well to export than to import activities. In this case, the evidence suggests a more efficiency seeking strategy, where FDI projects of MNCs are more likely to locate in regions with high conditions to serve foreign markets. The greater the insertion of the region in international trade flows, the greater its ability to attract FDI inflows. This can be particularly evident in the case of manufacturing and service industries (Hon et al., 2005; Zheng, 2011; Pillai; Rao, 2013).

It is important to salient that FDI strategies of MNCs are diverse, particularly in large economy countries. MNCs can assume simultaneously market, efficiency, and natural resource seeking strategies. The diverse FDI strategy perspective by MNCs can be seen as a way to handle regional diversity and the size of the host country.

Finally, the model "**I**" also presents two main controversial results. The relationship between RGDP and FDI has been found negative and statistically significant at 5%. The smaller the economic participation of the State in the national economy, the larger FDI in the region. This can mean that the smaller the State, the higher the contribution of FDI to the State GDP. On the other hand, the correlation between PCGDP and FDI has been found negative and statistically significant at 15%. This finding suggests that the lower the GDP per capita, the higher FDI in the region. This is not in line with the effects of other variables, like relative agglomeration, Human Development Index and tax revenues (ICMS), where we could identify strong evidences of a market seeking FDI strategy by MNCs. However, this may also suggest that lower per capita GDP can point to lower relative cost in the region, which, in a perspective of efficiency seeking, can influence positively the attraction of FDI projects.

These controversial results may be explained by the aggregate level of analysis, and can represent a limitation of the study. Analysis on the level of industry, and/or firm can better provide new avenues to the understanding of the regional determinants of FDI at the State level in Brazil.

In model "II", we include a variable that captures the influence of the political orientation of the state government on FDI. Although this result has been shown to be positively correlated, this correlation was not statistically significant. This (positive) relationship may indicate that the affiliation of the State party in relation to the Federal government is important for decision making on the destination of FDI in Brazil. However, the lack of significance may reflect the use of *dummy* variables and party instability in the country. Further studies should consider also specific variables to measure the level of Federal government support for the State government, such as the amounts invested in infrastructure and others. In the model "III", we tested the interaction between the effect of regional politics and regional development. However, this result was not statistically significant. We tested in model "IV", the interaction between RAGGL and TRADE. The correlation between the variables was positive, but not statistically significant.

Insert table 5 about here

5. DISCUSSION AND CONCLUSION

In this article we investigated the determinants of the distribution of FDI among Brazilian states. As results, it is clear that model I was one that best fitted the data, however, as demonstrated in the theoretical base, there are still other relations that must be analyzed in order to demonstrate the influence of the economic, development and political determinants on the attractiveness of FDI in the Brazilian States.

The model shows that the regional development (measured by HDI) is positive and significantly related to the distribution of FDI among the states, which indicates that variables

such as level of education, investment in education and infrastructure should be considered in future studies, as well as the relationship between RGDP and FDI.

International Trade (TRADE) also proved to be positively and significantly correlated to the distribution of FDI. Natural resource-oriented regions have a higher tendency to export their products. We can suppose that the high level of FDI in the states with high participation in international trade is be related to investment projects to exploit the natural resources, indicating a resource seeking strategy of FDI. This evidence is also supported by the effect of the variable RPROD, measured by the ratio between State GDP and land area. The higher this ratio, the higher the natural resource endowment of the region.

In line with previous studies (Zheng; 2011; Bortoluzzo et al., 2012; Liu et al., 2013; Chattopadhyay, 2014), we found a positive and significant relationship between distribution of FDI and Market Size, indicating that investments may be of the Market-seeking type. However, in a specific study on investment by Austrian and German companies, Korez-Vide et al. (2014) found that this was not their primary motivation, therefore it is important to carry out further studies at company level.

As is common to this kind of study, there were some limitations, such as the use of *dummies* and aggregated values to measure the factors of attractiveness; however, future researches will allow further analysis of the economic and institutional factors that attract FDI at state level, as well as how the political issues can affect the decisions of MNCs to invest in Brazil.

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Table 1: Variables, hypothetical signs and sources

Variables/ Description	Description	Authors	Hypothetical signs	Sources of the data
DEPENDENT VARIABLE				
Inward FDI stock: FDI	FDI by state related to the state GDP		Dependent variable	(BACEN (2014)
INDEPENDENT VARIABLES				
Market Size				
Per Capita GDP (PCGDP)	Gross Domestic Product Per Capita	Deichmann et al. (2003); Hon, et al (2005); Amal; Seabra (2007); Bortoluzzo et al. (2012); Chattopadhyay (2014)	+	IPEADATA (2014)
Relative GDP (RGDP)	The racio of state GDP to national GDP	Amal; Seabra (2007)	+	IPEADATA (2014)
Relative Industrial Agglomeration (RAGGL)	The ratio of Industrial GDP related to GDP at the state level and the Industrial GDP related to GDP at the national level.	Boudier-Benseba (2005); Du et al. (2008)	+	IPEADATA (2014)
Trade Involvement (TRADE)	The ratio of the imports and exports at the state level in relation to the imports and exports at the national level	Hon et al. (2005); Amal; Seabra (2007); Pillai; Rao (2013).	+	MDIC (2014)
Productivity				
Resource Productivity (RPROD)	The ratio of the GDP to the state land area in KM2	Hon, et al. (2005)	+	IBGE (2014)
Institutional Variables				
Taxes	The ratio of the ICMS to state GDP	Arbix (2000); Boudier-Benseba, (2005); Jones; Phelps, (2000); Amal et al. (2007); Sethi et al. (2011)	+	IPEADATA (2014)
Human Development Index (HDI)	State HDI	Arcelus et al. (2005)	+	NUDP (2015a;b)
Political Variable				
Dummy Politics	The political orientation of the state government. 0= does not support federal government; 1= supports federal government	Mudambi; Navarra (2003)	+	TSE (2015)

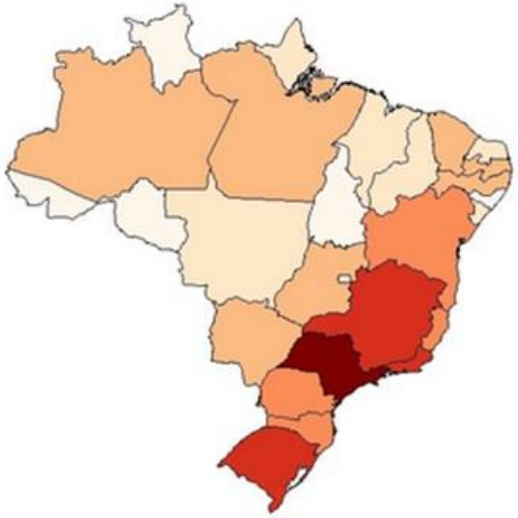
Note: For the years 1995, 2000 and 2005 it is used state HDI, retrieved from UNDP (2015a). For 2010, Brazil began to use the Municipal Human Development Index, which uses the same three sub-indices of HDI, but adapt the global methodology to Brazilian context and to the national indicators availability. (UNPD, 2015b)

Table 2 – State Distribution of FDI in Brazil, 1995-2000-2005-2010

	(1000 Reals)				(1000 Reals)				(1000 Reals)				(1000 Reals)			
	1995				2000				2005				2010			
Estado	Total FDI	Rank	Per capita FDI	Rank	Total FDI	Rank	Per capita FDI	Rank	Total FDI	Rank	Per capita FDI	Rank	Total FDI	Rank	Per capita FDI	Rank
Acre	18087.00	24	0.04	21	147716.00	25	0.26	25	233371.71	27	0.35	27	1665.4	26	0.0023	26
Alagoas	3219996.00	11	1.20	5	2210786.00	18	0.78	17	2418101.45	22	0.80	23	133232	23	0.0427	24
Amapá	153452.00	20	0.47	12	350425.00	24	0.73	18	1389392.51	24	2.34	15	183194	22	0.2736	22
Amazonas	4380669.00	8	1.89	4	10830110.00	9	3.85	5	20812899.99	9	6.44	7	6005432.4	13	1.7237	7
Bahia	7552997.00	4	0.60	10	16157124.00	7	1.23	13	44147493.64	6	3.20	13	11719419.8	6	0.8361	14
Ceará	374613.00	16	0.06	20	5996832.00	13	0.81	16	6400238.01	17	0.79	25	3359111.8	15	0.3974	20
Distr. Fed.	647286.00	15	0.37	14	6116237.00	12	2.98	8	10935864.93	13	4.69	10	922631.6	21	0.3590	21
Esp. Santo	5755845.00	6	2.07	2	16903091.00	6	5.46	3	26240294.21	8	7.70	4	10731837.6	7	3.0532	3
Goiás	647388.00	14	0.15	16	5548790.00	14	1.11	15	9245679.99	14	1.65	18	7026322.6	9	1.1703	10
Maranhão	2067047.00	12	0.40	13	3657995.00	16	0.65	19	7370012.92	15	1.21	20	2662974.6	16	0.4050	19
Mato Grosso	275912.00	18	0.12	17	4570712.00	15	1.82	10	14336453.45	11	5.11	8	2070092.2	19	0.6820	17
Mato G. Sul	287590.00	17	0.15	15	3246478.00	17	1.56	11	5100558.59	18	2.25	16	6411790	11	2.6181	5
Minas Gerais	19424584.00	3	1.18	6	62025188.00	3	3.46	6	92271353.36	3	4.80	9	41749912.6	3	2.1304	6
Pará	3811661.00	9	0.70	9	7015401.00	11	1.13	14	4148666.62	20	0.85	22	6521706.4	10	0.8603	13
Paraíba	215453.00	19	0.06	19	1248491.00	20	0.36	21	3038731.01	21	0.60	26	4180154	14	1.1098	12
Paraná	6234092.00	5	0.72	8	37291082.00	4	3.90	4	77718555.21	5	7.57	5	13827816.2	5	1.3239	9
Pernambuco	665844.00	13	0.09	18	10741880.00	10	1.35	12	13142698.75	12	1.56	19	6198618.8	12	0.7047	16
Piauí	8011.00	25	0.00	25	393632.00	23	0.14	26	2395472.94	23	0.80	24	1677057.8	20	0.5378	18
Rio de Jan	25358598.00	2	1.91	3	113711786.00	2	7.90	2	234261347.52	2	15.23	2	52280236.8	2	3.2696	2
Rio G. Norte	51256.00	21	0.02	23	1716597.00	19	0.62	20	41217734.13	7	13.73	3	2251620.8	18	0.7107	15
Rio G. Sul	4794272.00	7	0.50	11	35067247.00	5	3.44	7	80692515.37	4	7.44	6	31617619	4	2.9566	4
Rondônia	1783.00	26	0.00	26	463848.00	22	0.34	22	1301536.02	25	0.85	21	18319.4	25	0.0117	25
Roraima	0.00	27	-	27	95454.00	26	0.29	24	709269.64	26	1.81	17	0	27	0.0000	27
Sta. Catarina	3680532.00	10	0.76	7	12484322.00	8	2.33	9	18572056.37	10	3.17	14	9760909.4	8	1.5621	8
São Paulo	182789592.00	1	5.42	1	552655504.00	1	14.92	1	796245290.09	1	19.69	1	166366798.4	1	4.0319	1
Sergipe	24968.00	23	0.02	24	554683.00	21	0.31	23	6900745.64	16	3.51	11	2318236.8	17	1.1210	11
Tocantins	32773.00	22	0.03	22	90073.00	27	0.08	27	4430572.31	19	3.39	12	111581.8	24	0.0807	23
BRAZIL	**272,474,301**		**1,75**		**911291484.00**		**5,36**		**1525676906.36**		**8,28**		**390108292.2**		**12,83**	

Note: Since 2010 CCEP began to consider the distribution of the general accumulate assets of foreign as a criteria for the FDI allocation and only for industry . Declarants distributed their assets in percentage trough the different federation units. This was used to This was used to weight the direct investment by federal units.
Source: BACEN (2014)

Figure 1 – Distribution of FDI among Brazilian States (2010)



More than US$ 50 Billion
US$ 10 Billion to US$ 50 Billion
US$ 5 Billion to US$ 10 Billion
US$ 2 Billion to US$ 5 Billion
US$ 100 million to US$ 2 Billion
Less than US$ 100 Million

More than US$ 50 Bi: SP
US$ 10 Bi to US$ 50 Bi: RJ, MG, RS
US$ 5 Bi to US$ 10 Bi: PR, BA, ES, SC
US$ 2 Bi to US$ 5 Bi: GO, PA, MS, PE, AM, PB, CE
US$ 100 Mi to US$ 2 Bi: MA, SE, RN, MT, PI, DF, AP
Less than US$ 100 Mi: AL, TO, RO, AC, RR

Source: BACEN, 2014

Table 3: Descriptive Statistics

	FDI	HDI	RAGGL	DPOLIT	RGDP	PCGDP	TRADE	RPRODUCT	TAXES
Mean	0.154	0.736	0.822	0.728	3.735	14.06	0.037	1514.9	0.044
Median	0.091	0.740	0.842	1.000	1.604	11.33	0.010	356.6	0.039
Maximum	1.528	0.874	2.259	1.000	34.79	58.49	0.416	25935.3	0.101
Minimum	0.000	0.613	0.135	0.000	0.130	4.660	5.02E-05	13.87	0.007
Std. Dev.	0.220	0.059	0.343	0.446	6.540	9.250	0.073	4004.1	0.023
Skewness	3.620	-0.001	0.646	-1.030	3.610	2.523	3.843	4.218	0.433
Kurtosis	19.51	2.248	5.299	2.061	16.48	10.90	18.64	21.72	2.112
Jarque-Bera	1449.1	2.514	31.03	22.85	1043.2	392.2	1354.3	1880.2	6.861
Probability	0.000	0.284	0.000	0.000	0.000	0.000	0.000	0.000	0.032
Sum	16.48	78.77	87.95	78.00	399.6	1504.8	3.999	162100.0	4.728
Sum Sq. Dev.	5.161	0.372	12.51	21.14	4534.6	9070.5	0.577	1.70E+09	0.058
Observations	107	107	107	107	107	107	107	107	107

Table 4: Correlation Matrix

	I	II	III	IV	V	VI	VII	VIII
I FDI	1.000							
II HDI	0.283	1.000						
III RAGGL	0.452	0.057	1.000					
IV DPOLIT	0.004	-0.132	0.060	1.000				
V RGDP	0.300	0.425	0.302	-0.112	1.000			
VI PCGDP	0.053	0.685	-0.053	-0.106	0.399	1.000		
VII TRADE	0.339	0.390	0.372	-0.065	0.970	0.322	1.000	
VIII RPRODUCT	0.008	0.462	-0.224	-0.111	0.250	0.873	0.124	1.000
IX TAXES	0.091	-0.153	0.206	-0.025	-0.037	0.003	-0.001	-0.156

Table 5. Model Estimations: Regional determinants of FDI

	Model I		**Model II**		**Model III**		**Model IV**	
	Coeff	**P-value**	**Coeff**	**P-value**	**Coeff**	**P-value**	**Coeff**	**P-value**
C	-1.568	0.0000***	-1.59	0.0000***	-1.84	0.009***	-1.557	0.0000***
PCGDP	-0.029	0.0000***	-0.029	0.0000***	-0.030	0.0000***	-0.030	0.0000***
RGDP	-0.029	0.0295**	-0.03	0.0360**	-0.03	0.0320**	-0.026	0.0597*
RAGGL	0.252	0.0000***	0.251	0.0000***	0.251	0.0000***	0.203	0.0036***
TAXES	2.254	0.0079***	2.278	0.0077***	2.307	0.0074***	2.439	0.0049***
HDI	2.359	0.0000***	2.375	0.0000***	2.717	0.0005***	2.390	0.0000***
TRADE	3.157	0.0088***	3.104	0.0108**	3.199	0.0098***	-0.834	0.8015
RPROD	0.001	0.0000***	0.001	0.0000***	0.001	0.0000***	0.001	0.0000***
DUMMY_POL			0.012	0.7482	0.314	0.5452		
DUMMY_POL*HDI					-0.41	0.5600		
RAGGL*TRADE							3.428	0.1992
Obs	107		107		107		107	
R2	0.422		0.422		0.424		0.431	
F-stat	10.314***		8.956***		7.940***		9.292***	
DW stat	2.421		2.423		2.439		2.49	

Notes: *Significant at 10%. **Significant at 5%. ***Significant at 1%.