Documentos de Trabalho

Working Paper Series

"Foreign Direct Investment in Brazil and Home Country Risk"

Sandra Aguiar
Luís Aguiar-Conraria
Mohamed Azzim Gulamhussen

NIPE WP 7 / 2006

NÚCLEO DE INVESTIGAÇÃO EM POLÍTICAS ECONÓMICAS
UNIVERSIDADE DO MINHO

"Foreign Direct Investment in Brazil and Home Country Risk"

Sandra Aguiar
Luís Aguiar-Conraria
Mohamed Azzim Gulamhussen

NIPE* WP 7 / 2006

URL:
http://www.eeg.uminho.pt/economia/nipe/documentostrabalho.php

* NIPE – *Núcleo de Investigação em Políticas Económicas* – is supported by the Portuguese Foundation for Science and Technology through the *Programa Operacional Ciência, Teconologia e Inovação* (POCTI) of the *Quadro Comunitário de Apoio III*, which is financed by FEDER and Portuguese funds.

Foreign Direct Investment in Brazil and Home Country Risk

Sandra Aguiar
NIPE, Economic Policies Research Unit

Luís Aguiar-Conraria*
NIPE, Economic Policies Research Unit – Universidade do Minho

Mohamed Azzim Gulamhussen
ISCTE BUSINESS SCHOOL

Abstract

This study looks into the factors that explain foreign direct investment in Brazil by country of origin of investment. Based on a sample of more than 100 countries that invested and have not yet invested in Brazil, multiple estimation techniques, such as the Tobit, Heckit and Probit, are used to isolate the effect of country risk on outward foreign direct investment. In sharp contrast to the findings of previous studies on the effect of home country risk on foreign investment in the United States, the findings in this paper reveal that less risky countries invest more in Brazil. These results are controlled for size of the home country, distance, trade intensity and previous investments abroad. A simple out of sample check shows that the model correctly predicts probability of investing for a large number of countries. The existing literature does not document these results.

JEL: F21; F3; C59

Keywords: Foreign Direct Investment; Country Risk; Tobit and Heckit Estimation

* Corresponding author, E-mail: lfaguiar@eeg.uminho.pt

1. Introduction

There is some risk involved in every investment. If we are talking about investments across country borders, then additional types of risks have to be taken into consideration. These factors have long been recognized by the economics literature and some papers attempt to explain and estimate the relation between country risk and foreign investment.

Country risk is the probability that a sovereign state may be unable to fulfill its commitments or, as argued by Eaton, Gersovitz and Stiglitz (1986) may be unwilling to fulfill its commitments. The country risk analysis relies on the idea that economic, social or political unbalances affecting the country also affect the volatility of the investments' rate of return. Meldrum (2000) decomposes the country risk into six categories: economic risk, transfer risk, exchange rate risk, location risk, sovereign risk and political risk. Hoti and McAleer (2004) survey the literature on country risk analysis.

Nigh (1986) and Nigh and Schollammer (1987) analyze the effect of political risk with an emphasis on conflict and cooperation relationships, concluding that cooperation between nation states stimulates investment across borders. Butler and Joaquin (1998) show that the higher the risk in the recipient country the higher the required rate of return for a multinational corporation to invest in that same country. Bevan and Estrin (2004) and Janicki and Wunnava (2004) show that country risk has a significant impact on foreign investment decisions. Le and Zak (2006) argue that political instability is one of the most important factors associated with capital flight.

The cited studies conclude that risk is a determinant of foreign investment, but they focus on the characteristics of the host countries. They do not deal with the role of

the home country risk. Although the literature on this subtopic is not as rich, there are some exceptions. Brito and Sampayo (2005) develop a model that relates risk (both in the home and host countries) to the investment decisions. According to their model, higher risk (both at home and abroad) deters foreign investment. Unfortunately, probably due to data limitations, they tested the model without including a measure for home country risk. Their results confirmed previous studies: countries with higher risks had more difficulties in attracting foreign investment.

We depart from this line of empirical inquiry and focus on the characteristics of the home countries. Our approach is similar to Tallman (1988) and Grosse and Trevino (1996), who advocate that domestic country risks influences outward foreign investment. To be more precise, these authors investigate the effect of political risk in the domestic country on the decision to invest in the United States. Tallman concludes that firms from countries with higher political risk have a higher propensity to invest in the United States. On the basis of somewhat weaker evidence, Grosse and Trevino also conclude that higher home country risk deters investments abroad.

Emerging markets are now attracting considerable foreign investment. Over the last 20 years, we can observe an almost tenfold increase in foreign investment into emerging markets. Within the spectrum of emerging markets that have been attracting foreign investment, Brazil in one of the countries that stand out. In contrast to the United States, Brazil is a country with a high risk profile. We gather information for more than one hundred potential investor countries for the year of 2001. Of those countries, almost half of them do not invest in Brazil. We use the cross-section data for all countries (investors and non-investors) to analyze the factors that influence the decision to invest in

Brazil. The aim of the paper is not to suggest the optimal factors leading to foreign investment, as this would necessitate data across individual firms over a longer period of time. Rather, it seeks to assess the effect of domestic country risk on foreign investment. Testing the effect of home country factors in a single host country controls for host country effects that can obscure the home country factors of interest to the study.

We use multiple methodologies to determine the home country factors that influence foreign investment in Brazil. Besides this we also estimate the probability of countries that have not invested in Brazil to do so and provide unique estimates of the size of such investment. An out-of sample analysis shows that our model can estimate with significant precision the probability of investment, which is surprisingly missing on the existing literature. Our findings show that the riskier the home country the lower the propensity to invest in Brazil. This is in sharp contrast to the results documented by Tallman (1988) and Grosse and Trevino (1996). Their prediction of the effect of risk on foreign investment can not be generalized.

The rest of the paper is organized as follows. In section 2, we describe the hypotheses, the choice of variables, and the econometric approach. In section 3, we describe some potential data drawbacks, and discuss which empirical issues should be handled carefully. In section 4, we present our econometric results. Section 5 draws out the conclusions.

2. Hypotheses, Data and Method

2.1 Hypotheses and variables

The object of this paper is to asses the influence of home country risk on foreign investment. This is our main hypotheses. The remaining hypotheses are used simply as controls. In doing so, we turn out depicting the characteristics of the country origin that influence foreign investment.

According to Tallman (1988) and Grosse and Trevino (1996), firms operating in countries with higher internal political instability internationalize seeking to escape from home country risks. Both studies concluded that, *ceteris paribus*, investors from riskier countries are more likely to invest in the United States. But Brazil has different characteristics. Brazil is, by itself, a highly risky country and can hardly be considered a safe heaven. Contrary to the case of the United States, we may expect that firms wishing to invest in a country with a high risk profile need to have a solid and stable economic environment in the home country. Brito and Sampayo's model also predicts that increases of risk in the home country lead to less investment abroad. Given these arguments, *a priori*, it is not clear if we should expect a positive or negative correlation between home country risk and its propensity to invest in Brazil. We use the country risk index of Euromoney. The country risk index is a sum of several specific risks (like political risk, economic performance, credit ratings, etc). They are all extremely correlated (with pair wise correlations above 90%), which makes the specific choice of risk measure almost irrelevant for our purposes. Using more than one would introduce obvious multicollinearity problems. Having to choose one, we chose the one with the lowest correlation with GDP *per capita*: credit ranking risk, which is based on the ratings of

Moody's, Standard & Poor's and IBCA, and is generally considered to be a good measure of a healthy investment climate characterized by macroeconomic and political stability (e.g., see Janicki and Wunnava, 2004). According to this index, the lower the Country Risk, the higher is the index.

H.1: The relationship between home country risk and its propensity to invest is not clear. Therefore, we do not formulate a clear hypothesis.

Firms originating in countries with wealthier countries are expected to invest more. The rationale is that firms from these countries are more apt to internationalize. We use GDP *per capita* as a proxy for the wealth of a country. To assemble the GDP *per capita* figures, we used the United Nations Conference on Trade and Development (UNCTAD) database. Alternatively, we also consider the Human Development Index (HDI), which is a broader measure of the wealth of a country and is less correlated with the Country Risk. HDI figures were obtained in the United Nations Reports for Human Development.

H.2: The relationship between domestic wealth and foreign investment in Brazil should be positive.

The cultural distance of the home country from Brazil may contribute to explaining the amount of FDI. The further away the home country the greater the cost of adapting to the local business conditions. To measure cultural distance we do not build an index but, instead, we use several dummy variables. We consider two proxies to measure cultural proximity: religion and language. Because Brazil is mostly catholic, we divided religion in three groups: Catholics, other Christians and other religions. The native language in Brazil is Portuguese. We divided the languages between Portuguese, Spanish,

Italian, French, English and others. The first four are the most spoken Latin languages, and English can be considered a universal language. Information for cultural variables was obtained in the CIA World Factbook.

H.3: The relationship between cultural distance and foreign investment in Brazil should be negative.

The geographical distance between the home country and Brazil can also influence the decision to invest due to the higher cost of monitoring foreign affiliates. To measure the distance between Brazil and another country, we consider the distance in kilometers between countries' capitals. We used a software developed by Byers (1999) to estimate these distances.

H.4: The relationship between geographical distance and foreign investment in Brazil should be negative.

International trade and foreign investment are often viewed as complementary. Following the results of previous studies, we can expect higher exports to Brazil to be linked to higher levels of foreign investment. To measure bilateral trade we include the value of exports from each country to Brazil.[1] The Ministry for Development, Industry and International Trade of Brazil (Ministério do Desenvolvimento, Indústria e Comércio Exterior) made the data available.

H.5: The larger the amount of exports to Brazil, the larger the foreign investment in Brazil.

[1] Including imports does not change the results, but we would loose some observations.

The larger the economic size of a country the greater the number of home firms that can invest abroad. Naturally, we expect the relation between the size of domestic market the foreign investment into Brazil to be positive. We include two variables that serve as proxies to the economic size of a country: gross domestic product (GDP) and total accumulated direct investment abroad (DIA). GDP is a good measure of the domestic economic dimension of the home country. With DIA, we expect to measure the international presence of each country. We used the UNCTAD database to collect data on GDP and DIA.

H.6: The larger the economic output of the domestic country, the larger the foreign investment into Brazil.

The data are cross-section observations of the foreign countries variables described above and cross-section observations of foreign direct investment in Brazil. Our database includes observations for 113 countries (in the appendix we list the countries). All data refer to the year 2001. The dependent variable, foreign investment in Brazil by country of origin, was made available by the Central Bank of Brazil. The explanatory variables that we considered were described in earlier.

2.2 Method

Almost one-half of the countries included in our database have not invested in Brazil. This means that, in our analysis, we include potential foreign investors in Brazil, instead of considering only countries with positive investments. This distinguishes our study from previous studies and it is the main advantage of performing cross-section regressions: it is easier to collect information for a large number of countries. The

presence of countries with zero foreign investment in Brazil renders the typical OLS estimates to be inadequate. If we eliminate the countries with zero investment, the OLS estimates will be inconsistent (e.g. see Greene, 2003).

We can think of the investment decision as a two steps decision. First, firms have to decide whether to enter in Brazil or not. Then, if they decide to enter, they have to choose how much to invest. We consider two different models. The Tobit model (Tobin 1958) and the Heckit model (Heckman 1979).

The Tobit model can be described as follows:

$$\begin{cases} y_i^* = x_i'\beta + u_i, & \\ y_i = y_i^* & if\ \ y_i^* > 0\ , \\ y_i = 0 & otherwise \end{cases} \qquad (1)$$

where y_i* is the latent dependent variable, y_i is the observed dependent variable, x_i is the vector of the independent variables, β is the vector of coefficients, and the u_i's are assumed to be independently normally distributed.

The alternative approach that we consider, the Heckman sample selection model, can be summarized as follows:

$$\begin{cases} z_i = 1 & if\ \ z_i^* > 0 \\ z_i = 0 & if\ \ z_i^* \le 0 \\ z_i^* = w_i\gamma + e_i & \\ y_i = x_i'\beta + u_i & observed\ only\ if\ \ z_i^* > 0 \end{cases}, \qquad (2)$$

where z_i* is the latent dependent variable. If positive there is investment (z = 1), if negative there is no investment (z = 0), w_i is the vector of the independent variables that

influence the decision of whether to invest in Brazil, γ is the vector of coefficients, and the e_i's are assumed to be independently normally distributed. If $z = 1$, then the last equation determines how much is invested.

Whereas the Tobit model was designed to deal with estimation bias associated with censoring, the Heckit model is a response to sample selection bias. The two models have different motivations. The rationale behind equation 1 is that firms choose how much to invest in Brazil (y*), but choices below zero are censored, because it is not possible to invest less than nothing. Therefore, we do not observe $y < 0$. Behind equation 2, the idea is that firms first decide if they want to invest in Brazil $(z = 1)$ or not $(z = 0)$. Then, only if they chose to invest, they have to choose how much (y). We estimate both the Tobit and the Heckit models by Maximum Likelihood.

3. Results

3.1 Exploratory Analysis

Some preliminary results led us to eliminate some of the independent variables. Cultural distance, as measured by religion, was statistically insignificant. In appendix 2, we list some descriptive statistics of the variables included in table 1. The mother language dummies were also irrelevant, except for Portuguese and Spanish, which is a natural result since Portuguese is the official language of Brazil and Spanish is so similar.

[Insert table 1 here]

In table 1, we can see the matrix of correlations between several independent variables. Looking at the table we observe that multicollinearity may be a potential problem. Country Risk is highly correlated with GDP *per capita*. This is particularly relevant because we want to assess the explanatory power of Country Risk and we want to be sure that effects of other variables do not contaminate the estimated coefficients.

We consider three different approaches to ensure that multicollinearity is not a problem in our estimations. First, we perform the Condition Index test proposed by Belsley (1991). Second, we calculate the variance inflation factors associated with each independent variable. Third, to measure wealth, we replace GDP *per capita* by HDI, which is less correlated with Country Risk. All these approaches point towards the same direction. Multicollinearity is not a problem and it is unlikely that our results are being contaminated by its presence.

3.2 Main Results

Table 2 presents the main results. There are four groups of estimated models. For each group, we report the Tobit and Heckit estimation results in different columns. The estimations are remarkably similar. The Heckit includes the estimation of a Probit auxiliary selection model. We report the Probit estimation results associated with the fourth Heckit estimation in a separate column.[2]

[Insert table 2 here]

[2] We do not include the Probit estimations for each Heckit model because there are no significant differences.

The results for Model 1 and 2 reveal that GDP *per capita's* estimated coefficient appears with a negative sign and it is not statistically significant, while Country Risk's estimated coefficient is positive and statistically very significant. Variables measuring cultural distance have the expected signs: speak Portuguese or Spanish have higher propensity to invest in Brazil. The geographic distance appears with the expected sign, but the estimated coefficient is statistically significant at 10% level only if we consider a one tail test. This may happen because the neighboring countries of Brazil speak Spanish, and hence it is possible that the Spanish language dummy is capturing part of its effect.

Generally speaking, we confirm the results of previous studies. The proximity, both culturally and geographically, of the countries enhances the interest in foreign direct investment decisions. Contrary to expected, the bilateral trade estimated coefficient is statistically not significant. This variable was removed in model 2. Variables that measure both country domestic and international dimension are relevant. As expected, the higher the GDP and total Direct Investment Abroad, the higher is the propensity to invest in Brazil. These results are supported by several other studies.

In Table 2, model 4 reports the estimated results, when only variables with statistically significant coefficients are included. As one can observe there are no significant differences in the results. The variables included in the Probit were all the variables present in model 1. As we can see, the estimated coefficients are in line with the other estimation results.

Our results differ from previous similar studies (e.g. Tallman, 1988, and Grosse and Trevino, 1996) on two regards: GDP *per capita* has no explanatory power and the effect of Country Risk is the opposite. Before drawing definite conclusions about these

estimates, we first rule out the possibility of linear dependence between the independent variables. Note, however, that the main consequences of these are generally the large standard errors leading to lower z-statistics, which can lead to incorrect non-rejections of the null hypothesis. Therefore, the relevance of the Country Risk is not in question. The biggest hazard is to incorrectly conclude that GDP *per capita* is irrelevant.

3.3 Multicollinearity Robustness Check

If there is perfect multicollinearity, at least one of the eigenvalues of the matrix X^TX will be zero. If it is not perfect, small eigenvalues indicate strong multicollinearity. To assess the severity of multicollinearity problems,) we used the condition index test (Belsley, 1991), which involves the following steps: (1) standardization of the explanatory variables to unit variance; (2) computation of the eigenvalues of the standardized X^TX; (3) the condition index is given by $\sqrt{\lambda_{max}/\lambda_{min}}$, where $\lambda_{max}(\lambda_{min})$ is the highest (lowest) eigenvalue. As a rule of thumb, it is usually considered that if the index is above 30, then there is definitely linear dependence between the variables. Greene (2003) suggests that values above 20 may indicate such dependence. Computing the condition index of our models 1 and 2, we find a value of 8.354 and 8.275 respectively. These values are way below the suggested lower bounds, indicating that linear dependence is not a serious problem.

Another typical procedure to check if multicollinearity is a problem is to regress each independent variable against all the others and then use the R^2 of this auxiliary regression to compute the variance inflation factor (*VIF*). As a rule of thumb it is common to consider that multicollinearity is a problem if $VIF > 10$. For each independent

variable of model 2, we computed its VIF. The highest value we got was 4.25. Again, the evidence suggests that the results are not poisoned by multicollinearity.

As we can see in table 1, the correlation between Country Risk and HDI, although still high, is lower than the correlation between Country Risk and GDP *per capita*. If we substitute HDI for GDP *per capita*, the results do not change substantially. In table 2, the results for the Tobit and Heckit estimations of model 3 shows that the coefficient associated to HDI is statistically not significant. Country Risk is still significant at 1% level.

One of the main consequences of multicollinearity is the high sensibility of the estimators to small changes in the sample size, or the chosen variables. We omit the results of several of the experiments that we undertook, such as removing variables or trying to increase the sample size. In all the regressions, the message was the same. Country Risk is perennially relevant while the estimated coefficients for GDP *per capita* are statistically not significant. The fact that the Tobit and Heckit estimates are so similar is also evidence on the same direction.

4. Simple Out-of-Sample Check

The models were estimated using data for 2001. Looking at countries that did not invest in Brazil in 2001, we can expect that the ones with higher probability of investing will decide to invest in subsequent years. To check if this is true, we gathered data on foreign investment in Brazil for 2005. In the appendix we report the values for foreign investment in Brazil for 2001 and 2005. We also included, for each country, the estimated investment according to the Tobit and Heckit models. For the Tobit model we used the expected value of the latent variable. For both Tobit and Heckit we replaced negative

values by zero. We also report the probabilities of investing given by the estimated Selection Probit model.

The 49 countries that in 2001 did not invest in Brazil had an average estimated probability of investing of 16%. But the 11 countries that did not invest in Brazil but decided to do so in 2005 had an average estimated probability of 28%. If we restrict our attention to the 64 countries that did invest in Brazil in 2001, we see that the average of the estimated probability is 57%. Of these countries, six of them did not invest in 2005. For these, the average of the estimated probability is 21%. Again, the facts do conform to the predictions of the model. Notably, the model's performance is very poor in the case Liberia that invested in Brazil in both years, but whose estimated probability is about 7%. El Salvador and Iceland did not invest in Brazil in both years, but the estimated probabilities are 67% and 57%.

5. Conclusions

Tallman (1988) and Grosse and Trevino (1996) studied the effect of home country risk on foreign investment in the United States. Their work was original because they focused on the characteristics of the home country. Among other conclusions, both studies documented that, *ceteris paribus*, investors from riskier countries are more likely to invest in the United States.

In this paper, we have studied the effect of home country risk on foreign investment in Brazil. Like Tallman (1988), our main concern was with the importance of Country Risk. There are some important differences between our papers. First, unlike the United States, Brazil is a risky country. Second, because we consider cross-section data, we are not able to capture any dynamic effects. Instead, we are able to consider a much

larger set of countries, including countries that have never invested in Brazil. Standard results from previous studies (like the importance of distance or the country dimension) are basically replicated. The more important result is the effect of Country Risk. Our results are in sharp contrast to the ones reported by Tallman (1988) and Grosse and Trevino (1996). Investors from safer countries are more enthusiastic about investing in Brazil. Interestingly, and contradicting previous studies, the wealth effect seems irrelevant on the decision of whether and how much to invest in Brazil. Probably this happens because the relevant dimension of wealth is already captured by the Country Risk index, which also captures other socio-economic features of the home country, like political and financial stability, friendly investment environment, etc.

We do not follow the same econometric approach of Tallman (1988) and Grosse and Trevino (1996), but there is no reason to believe that the difference in results are due to that idiosyncrasy; especially because the results are so highly significant and because the Tobit and Heckit (and the associated Probit) estimations delivered, essentially, the same results. Further the out of sample analysis attests the predictive ability of the model. It is certainly reasonable to think that this result is explained by the risk profile differences between the United States and Brazil. Whether firms from safe heavens invest in Brazil to diversify their portfolio or to exploit growth opportunities that an emerging market like Brazil has to offer are interesting avenues for future research.

References

Belsley, D. (1991), *Conditioning Diagnostics-Collinearity and Weak Data in Regression*, Wiley Series in Probability and Mathematical Satistics, John Wiley & Sons.

Bevan, A. and Estrin, S. (2004) 'The determinants of Foreign Direct Investment in Transition Economies', *Journal of Comparative Economics*, **32**: 775-787.

Brito, J., and Sampayo, F. (2005) 'The timing and probability of FDI: an application to US multinational enterprises', *Applied Economics*, **37**: 417-437.

Byers, J. (2003) 'Great Circle Distances', *http://chemical-ecology.net/*.

CIA (2006), *The World Factbook 2006*, Central Intelligence Agency.

Eaton, J., Gersovitz, M. and Stiglitz, J. (1986) 'The pure theory of country risk', *European Economic Review*, **30**: 481-513.

Euromoney (2001), 'Cautious Optimism on World Economy', Issue 383.

Greene, W. (2003) *Econometric Analysis*, 5ª Edition, Prentice Hall.

Grosse, R. and Trevino, L. (1996) 'Foreign direct investment in the United States: An analysis by country of origin', *Journal of International Business Studies*, **27**(1): 139-155.

Heckman, J. (1979) 'Sample Selection Bias as a Specification Error', *Econometrica*, **47**(1): 153-161.

Hoti, S. and McAleer, M. (2004) 'An empirical assessment of country risk ratings and associated models', *Journal of Economic Surveys*, **18**: 539-588.

Janicki, H. and Wunnava, P. (2004) 'Determinants of foreign direct investment: empirical evidence from EU accession candidates', *Applied Economics*, **36**: 505-509.

Le, Q. V. and Zak P. (2006), 'Political risk and capital flight', *Journal of International Money and Finance*, **25**: 308-329.

Meldrum, D. (2000) 'Country risk and foreign direct investment', *Business. Economics*, **35**:33-40.

Nigh, D. (1986) 'Political Events and the Foreign Direct Investment Decision: an Empirical Examination', *Managerial and Decision Economics*, **7**: 99-106.

Nigh, D. E Schollhammer, H. (1987) 'Foreign Direct Investment, Political Conflict and Co-operation: The Asymmetric Response Hypothesis', *Managerial and Decision Economics*, **8**: 307-312.

Tallman, S. (1988) 'Home Country Political Risk and Foreign Direct Investment in the United States', *Journal of International Business Studies*, **19**(2): 219-233.

Tobin, J. (1958) 'Estimation for relationships with limited dependent variables', *Econometrica*, **26** (1), 24-36.

Table 1 ─ Independent variables correlation matrix

	Country Risk	GDP pc	HDI	Portuguese	Spanish	Distance	Exports to Brazil	GDP	DIA
Country Risk	1	0.82	0.76	-0.11	-0.07	0.16	0.19	0.31	0.44
GDP pc	0.82	1	0.67	-0.10	-0.18	0.12	0.19	0.40	0.52
HDI	0.76	0.67	1	-0.21	0.04	0.04	0.10	0.22	0.32
Portuguese	-0.11	-0.10	-0.21	1	-0.08	-0.13	-0.03	-0.04	-0.05
Spanish	-0.07	-0.18	0.04	-0.08	1	-0.52	-0.01	-0.06	-0.09
Distance	0.16	0.12	0.04	-0.13	-0.52	1	0.04	0.05	0.02
Exports to Brazil	0.19	0.19	0.10	-0.03	-0.01	0.04	1	0.22	0.19
GDP	0.31	0.40	0.22	-0.04	-0.06	0.05	0.22	1	0.85
DIA	0.44	0.52	0.32	-0.05	-0.09	0.02	0.19	0.85	1

Table 2 ─ Regression results on FDI in Brazil

	Model 1		Model 2		Model 3		Model 4		Probit
	Tobit	Heckit	Tobit	Heckit	Tobit	Heckit	Tobit	Heckit	selection
Constant	-486 (-2.95)	-486 (-3.03)	-486 (-2.95)	-486 (-3.00)	-589 (-1.28)	-588 (-1.28)	-495 (-3.03)	-495 (-3.10)	-1.236 (-3.11)
Country Risk	9.42 (4.12)	9.42 (4.19)	9.43 (4.15)	9.43 (4.05)	9.11 (3.43)	9.10 (3.41)	8.81 (5.39)	8.81 (5.50)	0.022 (5.26)
GDP *per capita*	-2.46E-03 (-0.39)	-2.44E-03 (-0.40)	-2.46E-03 (-0.40)	-2.43E-03 (-0.39)					-3.01E-08 (-0.02)
HDI					-22.7 (-0.04)	-22.3 (-0.04)			
Portuguese	673 (2.86)	673 (2.86)	673 (2.86)	673 (2.86)	732 (2.89)	733 (2.89)	681 (2.91)	681 (2.90)	1.699 (2.85)
Spanish	363 (2.44)	363 (2.45)	362 (2.44)	363 (2.44)	448 (2.96)	448 (2.95)	378 (2.63)	378 (2.64)	0.943 (2.65)
Distance	-0.021 (-1.50)	-0.021 (-1.50)	-0.026 (-1.52)	-0.021 (-1.5)	-0.013 (-0.87)	-0.013 (-0.85)	--0.020 (-1.46)	-0.020 (-1.45)	-4.96E-05 (-1.44)
Exports to Brazil	1.15E-04 (0.02)	1.15E-04 (0.02)							6.79E-09 (0.79)
GDP	2.63E-04 (3.71)	2.63E-04 (3.70)	2.63E-04 (3.75)	2.63E-04 (3.74)	2.58E-04 (3.64)	2.58E-04 (3.64)	2.61E-04 (3.73)	2.61E-04 (3.72)	6.49E-07 (3.55)
DIA	9.61E-04 (2.22)	9.61E-04 (2.21)	9.59E-04 (2.22)	9.61E-04 (-0.486)	9.93E-04 (2.27)	9.96E-04 (2.27)	9.51E-04 (2.20)	9.53E-04 (2.21)	2.40E-06 (2.18)

z-statistics in parenthesis

Appendix 1 (a)

Country	2001 Values	2005 Values	TOBIT estimated values	Heckit estimated values	PROBIT
United States	4,464.9	4,644.2	4,271.2	4,271.7	1.00
Spain	2,766.6	1,220.4	916.5	916.8	0.99
France	1,912.8	1,458.4	1,045.9	1,046.0	0.99
Netherlands	1,891.8	3,207.9	620.4	620.6	0.93
Portugal	1,692.3	334.6	915.7	916.8	0.99
Germany	1,047.5	1,269.3	1,267.3	1,267.2	1.00
Japan	826.6	779.1	1,334.4	1,333.8	1.00
Bermuda	606.9	38.9	174.1	175.3	0.67
Canada	441.1	1,435.3	606.6	607.3	0.93
United Kingdom	416.2	153.3	1,412.4	1,411.9	1.00
Luxembourg	284.7	139.1	224.9	225.7	0.71
Italy	281.3	345.7	556.6	557.0	0.91
Bahamas	264.2	87.8	0.0	0.0	0.45
Switzerland	181.8	341.5	515.0	515.4	0.89
Uruguay	180.6	169.2	263.8	264.4	0.75
Panama	133.0	165.6	188.2	188.4	0.68
Belgium	113.1	685.6	351.8	352.2	0.80
Norway	83.1	43.2	283.1	283.7	0.76
Austria	67.0	6.1	272.9	273.6	0.75
Chile	62.0	102.7	457.0	457.9	0.87
Mexico	61.1	1,661.2	324.4	324.2	0.79
Argentina	56.8	112.2	183.7	183.9	0.68
Sweden	54.3	32.9	302.0	302.3	0.77
Denmark	33.2	239.9	288.9	289.4	0.76
Hong Kong	33.0	17.4	150.4	148.4	0.62
China	28.1	7.6	59.9	58.7	0.56
Korea South	25.0	168.0	0.0	0.0	0.33
Singapore	15.9	42.3	111.9	111.1	0.60
Finland	12.7	6.6	237.0	237.4	0.72
Taiwan	12.3	3.7	49.0	47.9	0.54
Australia	10.7	926.0	217.3	217.0	0.70
Morocco	9.0	0.0	0.0	0.0	0.28
Ireland	9.0	125.1	260.1	260.8	0.74
South Africa	5.7	3.7	0.0	0.0	0.34
Philippines	5.5	0.0	0.0	0.0	0.12
Barbados	4.8	6.8	13.3	14.4	0.51
Israel	4.6	3.2	0.0	0.0	0.46
India	3.4	7.9	0.0	0.0	0.23
Venezuela	3.2	5.6	0.0	0.0	0.49
Ecuador	2.3	1.8	0.0	0.0	0.35
Colombia	1.3	1.6	201.2	201.4	0.69
Paraguay	1.2	1.4	0.0	0.0	0.47
Mauritius	0.7	1.6	0.0	0.0	0.25
Cyprus	0.6	0.1	0.0	0.0	0.47
Greece	0.6	1.6	12.6	12.9	0.51

Appendix 1 (b)

Country	2001 Values	2005 Values	TOBIT estimated values	Heckit estimated values	PROBIT
Angola	0.5	0.4	56.6	55.9	0.56
Slovenia	0.5	0.0	5.0	5.3	0.51
Czech Republic	0.3	0.3	0.0	0.0	0.40
Qatar	0.3	0.0	0.0	0.0	0.26
Libya	0.3	0.0	0.0	0.0	0.05
Guatemala	0.2	0.1	0.0	0.0	0.47
Guyana	0.2	0.0	0.0	0.0	0.09
Malaysia	0.1	0.0	0.0	0.0	0.24
Turkey	0.1	0.2	0.0	0.0	0.11
Malta	0.1	0.1	0.0	0.0	0.46
Liberia	0.1	0.4	0.0	0.0	0.07
Costa Rica	0.1	0.8	101.7	101.6	0.60
Dominican Republic	0.0	0.1	0.0	0.0	0.47
Peru	0.0	1.0	91.6	91.7	0.59
Thailand	0.0	0.0	0.0	0.0	0.23
United Arab Emirates	0.0	0.1	57.1	57.2	0.56
New Zealand	0.0	48.1	107.1	107.2	0.61
Hungary	0.0	0.0	0.0	0.0	0.42
Zimbabwe	0.0	0.0	0.0	0.0	0.05
Albania	0.0	0.0	0.0	0.0	0.04
Saudi Arabia	0.0	0.0	0.0	0.0	0.24
Armenia	0.0	0.0	0.0	0.0	0.04
Azerbaijan	0.0	0.0	0.0	0.0	0.03
Bahrain	0.0	0.0	0.0	0.0	0.24
Bangladesh	0.0	0.0	0.0	0.0	0.02
Belarus	0.0	0.0	0.0	0.0	0.04
Belize	0.0	0.2	0.0	0.0	0.22
Bolivia	0.0	2.1	62.0	62.2	0.56
Bosnia and Herzegovina	0.0	0.0	0.0	0.0	0.04
Bulgaria	0.0	0.1	0.0	0.0	0.09
Burkina Faso	0.0	0.0	0.0	0.0	0.06
Cape Verde	0.0	0.2	100.2	99.9	0.60
Cambodia	0.0	0.0	0.0	0.0	0.02
Cote d'Ivoire	0.0	0.0	0.0	0.0	0.07
Croatia	0.0	0.0	0.0	0.0	0.25
El Salvador	0.0	0.0	178.6	178.6	0.67
Slovakia	0.0	0.0	0.0	0.0	0.23
Estonia	0.0	0.0	0.0	0.0	0.32
Ethiopia	0.0	0.0	0.0	0.0	0.04
Guinea	0.0	0.0	0.0	0.0	0.07
Haiti	0.0	0.0	0.0	0.0	0.07
Iran	0.0	0.0	0.0	0.0	0.07
Iceland	0.0	0.0	77.1	77.6	0.58
Jamaica	0.0	0.0	0.0	0.0	0.15
Kenya	0.0	0.0	0.0	0.0	0.05

Appendix 1 (c)

Country	2001 Values	2005 Values	TOBIT estimated values	Heckit estimated values	PROBIT
Laos	0.0	0.0	0.0	0.0	0.02
Latvia	0.0	0.0	0.0	0.0	0.22
Lebanon	0.0	1.0	0.0	0.0	0.09
Lithuania	0.0	0.0	0.0	0.0	0.22
Macedonia	0.0	0.0	0.0	0.0	0.04
Madagascar	0.0	0.0	0.0	0.0	0.04
Moldova	0.0	0.0	0.0	0.0	0.04
Mozambique	0.0	0.0	22.7	21.7	0.52
Oman	0.0	0.0	0.0	0.0	0.23
Pakistan	0.0	0.0	0.0	0.0	0.05
Papua New Guinea	0.0	0.0	0.0	0.0	0.06
Poland	0.0	0.1	0.0	0.0	0.41
Romania	0.0	0.1	0.0	0.0	0.08
Russia	0.0	0.4	0.0	0.0	0.10
Rwanda	0.0	0.0	0.0	0.0	0.05
Saint Lucia	0.0	0.0	0.0	0.0	0.08
Saint Vincent and the Grenadin	0.0	0.0	0.0	0.0	0.08
Seychelles	0.0	0.1	0.0	0.0	0.04
Sri Lanka	0.0	0.0	0.0	0.0	0.03
Swaziland	0.0	0.0	0.0	0.0	0.05
Tunísia	0.0	0.0	0.0	0.0	0.31
Uganda	0.0	0.0	0.0	0.0	0.05

Appendix 2

	FDI in Brazil	Country Risk	GDP pc	HDI	Portuguese
Mean	160	43.51	8995	0.76	0.035
Median	0.075	43.80	3866	0.78	0
Maximum	4465	100	56046	0.94	1
Minimum	0.00	0	91.5	0.33	0
Std. Dev.	579.87	36.7	11189	0.16	0.19
Observations	113	113	113	110	113
Unit	10^6 US Dollars	index	10^3 US Dollars	index	Binary
Source	Central Bank of Brazil	Euromoney	United Nations Conference on Trade and Development	United Nations	CIA - The World Factbook

	Spanish	Distance	Exports to Brazil	GDP	Direct Investment Abroad
Mean	0.142	9316	994	265818	56587
Median	0	9401	75	19969	729
Maximum	1	18803	58223	10075900	1460352
Minimum	0	1	0	346	0.00012
Std. Dev.	0.35	4055	5631	1050227	183519
Observations	113	113	113	113	113
Unit	Binary	Kilometers	10^6 US Dollars	10^6 US Dollars	10^6 US Dollars
Source	CIA - The World Factbook	Byers (2003)	Ministry for Development, Industry and International Trade of Brazil	United Nations Conference on Trade and Development	United Nations Conference on Trade and Development

Most Recent Working Papers

NIPE WP 7/2006	**Aguiar-Conraria, Luís; Gulamhussen, Mohamed Azzim** and **Aguiar, Sandra**; "Foreign Direct Investment in Brazil and Home Country Risk", 2006.
NIPE WP 6/2006	**Veiga, Francisco José** and **Veiga, Linda Gonçalves**, "The impact of local and national economic conditions on legislative election results?", 2006.
NIPE WP 5/2006	**Veiga, Linda Gonçalves and Veiga, Francisco José,** "Does Opportunism Pay Off?", 2006.
NIPE WP 4/2006	**Ribeiro, J. Cadima and J. Freitas Santos,** "An investigation of the relationship between counterfeiting and culture: evidence from the European Union", 2006.
NIPE WP 3/2006	**Cortinhas, Carlos,** "Asymmetry of Shocks and Convergence in Selected Asean Countries: A Dynamic Analysis", 2006.
NIPE WP 2/2006	**Veiga, Francisco José,** "Political Instability and Inflation Volatility", 2006
NIPE WP 1/2006	**Mourão, Paulo Reis,** The importance of the regional development on the location of professional soccer teams. The Portuguese case 1970-1999, 2006.
NIPE WP 17/2005	**Cardoso, Ana Rute and Miguel Portela,** The provision of wage insurance by the firm: evidence from a longitudinal matched employer-employee dataset, 2005.
NIPE WP 16/2005	**Ribeiro, J. Cadima and J. Freitas Santos,** Dilemas competitivos da empresa nacional: algumas reflexões, 2005.
NIPE WP 15/2005	**Ribeiro, J. Cadima and J. Freitas Santos,** No trilho de uma nova política regional, 2005.
NIPE WP 14/2005	**Alexandre, Fernando, Pedro Bação and Vasco J. Gabriel,** On the Stability of the Wealth Effect, 2005.
NIPE WP 13/2005	**Coelho, César, Francisco José Veiga and Linda G. Veiga,** Political Business Cycles in Local Employment, 2005.
NIPE WP 12/2005	**Veiga, Francisco José and Ari Aisen,** The Political Economy of Seigniorage, 2005.
NIPE WP 11/2005	**Silva, João Cerejeira,** Searching, Matching and Education: a Note, 2005.
NIPE WP 10/2005	**de Freitas, Miguel Lebre,** Portugal-EU Convergence Revisited: Evidence for the Period 1960-2003, 2005.
NIPE WP 9/2005	**Sousa, Ricardo M.,** Consumption, (Dis) Aggregate Wealth and Asset Returns, 2005.