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The impact of spatial interdependence on FDI in Latin America

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This analysis considers whether spatial interdependence is an important determinant of foreign direct investment (FDI) in Latin America. Two types of spatial interdependence are explored: 1) surrounding market potential and 2) spatial autocorrelation of FDI. Using a sample of 17 Latin American countries, with observations from 1986 to 2006, we find that spatial interdependence matters for world net FDI in the region. Surrounding market potential has a positive effect on FDI of significant magnitude, but there is no evidence that FDI is spatially autocorrelated. Other contributors to FDI in this analysis include governance, specifically control of corruption, and exports of raw materials. We find differences in contributors to American FDI in the region. When considering only American FDI, we find that FDI is spatially autocorrelated, and that surrounding market potential is not significant when the spatially lagged dependent variable is included in the model.

JEL Categories: F21, O54
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1. INTRODUCTION

Foreign direct investment (FDI) has contributed significantly since the early 1990s to the economic development of Latin America, a region where capital is scarce. Because of its positive effect on growth, FDI is an important resource for economic development in Latin America. FDI contributes to growth through its effects on productivity and capital accumulation, especially in less developed countries (Blomström and Kokko, 2003; Blonigen and Wang, 2005; Branstetter, 2006; Havranek and Irsova, 2010; Wooster and Diebel, 2010).[1] Understanding what contributes to increasing FDI is therefore relevant for Latin American policymakers.

Since the early 1970s, FDI inflows to Latin America have increased from to 1 percent to 4 percent of GDP.[2] Latin America's share of global FDI in less-developed countries (LDCs) is also substantial. In the early 1970s, as Figure 1 indicates, Latin America received 53 percent of FDI in LDCs, while Africa received 34 percent and Asia received 10 percent. While FDI to LDCs has shifted over time, with Asia receiving 64 percent in the late 2000s and Africa receiving 12 percent in the late 2000s, Latin America still receives a significant amount, including 25 percent in the late 2000s. It is also relevant to compare the FDI inflows share of Latin America with the FDI inflows share of China. Figure 2 shows the share of total FDI inflows to LDCs for Latin America, Asia (without China), and China. In the early 2000s (2000-2004) the FDI inflows share was equal to 33 and 24 for Latin America and China, respectively.

In the late 2000s China's share decreased to 18 percent, and Latin America's share increased to 25. Even with the increasing flows of FDI to Asia, and in specifically to China, the Latin America region continues to receive a large share of total FDI to LDCs.[3]

[FIGURE 1]

[FIGURE 2]

Because FDI has important implications for growth and development, policymakers must find means to continue attracting it to Latin America. In this paper, we develop a model of the determinants of FDI, exploring the role of space. We evaluate whether spatial interdependence, as measured by spatial correlation between FDI and surrounding market potential, affects capital flows. We also explore other contributors such as financial liberalization, institutions, and natural resource dependence to FDI in Latin America.

We find that space matters for capital flows to Latin America. Surrounding market potential, which relates to market opportunities in neighboring countries, has a significant positive effect on world net FDI in the region. In relation to spatial autocorrelation, where the amount of FDI in one country is affected by levels of FDI in neighboring countries (i.e. agglomeration and spillovers effects), world net FDI does not seem to be spatially autocorrelated in this analysis. In models of world net FDI flows, we find variables related to institutions and natural resource abundance, specifically control of corruption and exports of raw materials, have positive effects. Yet our models for American FDI in Latin America have differing results. When considering only American net FDI, we find evidence of FDI being spatially autocorrelated, and that the inclusion of the spatially lagged dependent variable leads to statistically insignificant effects of surrounding market potential.

Below we review the literature on the spatial interdependence of FDI and the determinants of FDI in Latin America. We then review the methods and data we use to explore these issues, discuss our research results, and conclude with implications for FDI and future research on it.

2. LITERATURE REVIEW

(a) The spatial interdependence of FDI in Latin America

Analyses of the determinants of FDI should consider the role of geography in Multinational Corporations' (MNCs) investment decisions and must recognize the possibility of neighborhood effect on capital inflows. The amount of FDI that a country receives not only depends on its domestic conditions but also on those of its neighbors, including the amount of FDI flowing to them. Surrounding market potential and FDI spillovers are likely to be important determinants of FDI. Recent studies on FDI have incorporated spatial econometrics techniques to account for the effect of spatial interdependence on capital flows.

Blonigen et al. (2007) were among the first to consider the spatial interdependence of FDI, and account for it in two ways. First, they incorporated a variable to account for surrounding market potential into their FDI model. Second, they included a spatially lagged dependent variable accounting for the effect that capital inflows in other countries have on FDI inflows into a specific country. They find that FDI interdependence has a significant effect on FDI, but this finding is sensitive to different samples.

Blonigen et al. (2007) suggest two motivations for the spatial interdependence of FDI: export-platform and vertical FDI. Export-platform FDI occurs when multi-national corporations (MNCs) choose a specific location to serve nearby markets. Under this form of FDI, there is a positive effect from surrounding market potential, but a negative spatial lag effect as countries

compete for the capital inflow. There are two observed forms of vertical FDI: pure and complex. Under the pure form of vertical FDI, a MNC locates production in the lowest-cost country. This results in a negative spatial lag effect, as FDI flows to that country and not its neighbors. Under the complex form of vertical FDI, firms locate different production activities in surrounding countries to reap agglomeration benefits. This results in a positive spatial lag effect, as investment flows to areas surrounding the site of initial investment. Under both forms of vertical FDI, surrounding market potential is irrelevant.

Most empirical analyses of FDI in Latin America have ignored the role of geography. Yet considering space when examining determinants of FDI is important for several reasons. First, empirical studies not controlling for spatial interdependence might provide biased coefficients (i.e. omitted variable bias). Second, understanding the role of space in relation to capital inflows can provide a better understanding about the motivation of MNCs when they invest in Latin America. Third, if space plays an important role for capital inflows, then studying it will provide insights for regional collaboration seeking to increase FDI.

Geographic patterns of FDI in the region indicate geography may indeed play a role.[4] Figure 3 presents two maps, grouping countries by quartiles in average total world FDI inflows (in millions of current U.S. dollars) and average total FDI inflows per capita (in current U.S. dollars) between 1986 and 2006. Mexico received the most total FDI in the region, followed by Brazil, Argentina, and Chile. Chile received the most total FDI per capita, followed by Panama, Argentina, and Mexico. In other words, after accounting for population size, the pattern of FDI is similar, with Argentina, Chile, and Mexico receiving the most FDI. If FDI were spatially autocorrelated, then countries with relatively lower levels of FDI might benefit from proximity to those countries with large capital inflows.

[FIGURE 3]

Figure 4 presents two maps, grouping countries by the average of the natural log of net FDI inflows (in current million US dollars) between 1986 and 2006. The map on the left classifies countries by world net FDI; that on the right groups them by U.S. net FDI. Mexico has the highest level of world net FDI in the region, followed by Chile, Colombia, and Brazil. Similarly, Mexico has the highest level of U.S. FDI, followed by Brazil, Chile, and Argentina.[5]

[FIGURE 4]

These maps indicate there may be significant spillovers of FDI in the Latin American region. We will later further discuss spatial autocorrelation of FDI, where the existence of the spatial autocorrelation of FDI will be determined using spatial econometrics techniques.

(b) The Determinants of FDI in Latin America

Table 1 summarizes previous empirical analyses on the determinants of FDI in Latin America, including the number of countries and period of each analysis, FDI indicator assessed (world or American FDI), methodology, and main findings.[6] Below we discuss important determinants for FDI that are of special interest in Latin America.

[TABLE 1]

Latin American countries have liberalized their financial sectors, and there has been a significant improvement on institutions related to democracy and governance since the 1980s. It is likely that these changes are associated with greater capital flows to the region. The average of the financial liberalization indicator in Latin America in the 1980s was -0.73, but this increased to 0.22 in the 1990s and 1.34 in the 2000s.[7] Democracy has also made strides in the region. While some countries in the region had military dictatorships in the 1970s and early 1980s, data

from the Polity IV database (Marshall and Jaggers, 2008) shows that the region average polity score was 2.38 in the 1980s, 7.15 in the 1990s, and 7.99 in the 2000s (index ranges between -10 and 10, where higher score indicates stronger democratic system).

Latin American countries have had mixed progress on several governance measures. Data from the International Country Risk Guide (ICRG; Political Risk Services, 2009) shows that the region average of bureaucratic quality was 1.23 in the 1980s, increasing to 1.64 in the 1990s and 2.01 in the 2000s. The region average control of corruption index was 2.85 and increased to 3.00 in the 1990s but decreased to 2.47 in the 2000s. Similarly, the region average of the law-and-order index was 2.47 in the 1980s, 3.09 in the 1990s, and 2.74 in 2000s.[8] Regarding internal stability, which is related to governance, the internal conflict index of the ICRG increased from 6 in the 1980s to8 in the 1990s and 9 in the 2000s, respectively (with higher values representing less internal conflict).

Empirical analyses of FDI Latin America have shown that financial liberalization and institutions are relevant for capital inflows. Biglaiser and Brown (2004) as well as Campos and Kinoshita (2008) show that financial liberalization leads to greater FDI. Other analyses also show that government stability (Tuman and Emmert, 2004), economic freedom (Bengoa-Calvo and Sanchez-Robles, 2003) and privatization (Campos and Kinoshita, 2008; Trevino et al., 2002) lead to greater capital inflows. Montero (2008) presents a good overview on the impact of institutions for capital flows in Latin America. Still other empirical analyses that are not specific to the variables mentioned above have shown that financial development leads to greater FDI (Al Nasser and Garza, 2009) and exchange-rate uncertainty affects FDI in Latin America (Ruiz and Pozo, 2008).

Natural resource abundance may also affect FDI in Latin America. Efforts to promote natural resource exports in the region in recent decades raise questions on their contribution to FDI in the region. Data from the UNCOMTRADE (2009) shows that the value of natural resource exports as a share of GDP in Latin America was 12 percent in the 1980s and 1990s and 13 percent in the 2000s.

There are scant studies on the contribution of natural resource abundance on FDI in Latin America. Most studies focus on Africa, (Asiedu, 2006; Morrisset, 2000; Onyeiwu and Shrestha, 2004) and shows a positive contribution of natural resource abundance on FDI. Nonetheless, work by Asiedu and Lien (2011), which includes countries from all regions, has shown a negative effect. Montero (2008), which is the one of the few who have considered natural resource abundance in a FDI model, found that fuel exports as a share of total merchandise has a negative effect on FDI, but this effect is not robust to different models of FDI.[9]

Only one previous analysis on the determinants of FDI in Latin America appears to have considered the spatial interdependence of FDI. Orr (2008) analyzes the determinants of American FDI inflows to Latin America and Asia and considers a spatial lag model with fixed effects. She uses sales of U.S. foreign affiliates as a proxy for U.S. FDI. Her model accounts for effects of FDI in one country on its neighbors. She finds that American FDI is spatially autocorrelated in Latin America, but not in Asia.

This analysis expands on previous work on the determinants of FDI in Latin America in several ways. First, this study especially emphasizes the importance of spatial interdependence of FDI in Latin America. The analysis of Blonigen et al. (2007) on the spatial interdependence of FDI is not specific to the Latin American region. Most work on the determinants of FDI in Latin America has ignored the role of space on capital inflows. While Orr (2008) recognizes its

importance, controlling for the spatial autocorrelation of FDI, her work does not consider the importance of surrounding market potential. Furthermore, Orr (2008) includes Latin American and Asian countries in the estimation but does not include as independent variables some of the regional developments discussed above. Our analysis will determine whether spatial interdependence affects the significance of determinants of FDI found in previous analyses.

Second, this analysis evaluates whether the spatial interdependence of FDI differs for world net FDI and U.S. FDI. Tuman (2006) has suggested using U.S. FDI instead of pooled FDI when studying the determinants of FDI because pooled FDI cannot account for characteristics of the home country for investment funds. One limitation to assessing U.S. FDI in this analysis is that the sample decreases significantly because of limited data availability.[10] Orr (2008), in considering U.S. FDI, uses sales of U.S. foreign affiliate companies in the host country used as a proxy for FDI activity. Our analysis differs by using data on American net FDI.

Third, our work is one of the few that considers the importance of natural resource dependence as a determinant of capital inflows in Latin America. While Montero (2008) discusses this topic, his work only includes the exports of fuels and ores as indicators of resource dependence. This analysis considers the impact of different types of commodities, such as mineral, oil, agricultural, and raw materials, on FDI inflows.

Finally, this analysis includes a large set of Latin American countries (17 countries) during a long period of time (1986-2006) in which Latin American countries experienced significant institutional changes.

3. EMPIRICAL METHODOLOGY AND DATA

This analysis proposes a model for FDI in Latin America that considers its spatial interdependence. The specification of the model has several control variables found to be

important determinants of FDI in previous analysis as well as several indicators on institutions and natural resource dependence. We use, for the period 1986-2006, a sample of 17 Latin American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.[11]

Our model specification is

(1) $FDI_{i,t} = \alpha_1 \text{Surrounding market potential}_{i,t} + \alpha_2 \text{Financial liberalization}_{i,t-1}$

$+ \alpha_3 \text{Democracy}_{i,t-1} + \alpha_4 \text{Governance}_{i,t-1} + \alpha_5 \text{ internal stability}_{i,t-1}$

$+ \alpha_6 \text{Agricultural exports}_{i,t-1} + \alpha_7 \text{Mineral exports}_{i,t-1} + \alpha_8 \text{Oil exports}_{i,t-1}$

$+ \alpha_9 \text{Material exports}_{i,t-1} + X_{i,t}\beta + \varepsilon_{i,t}$

The dependent variable is the average of the natural log of a country's net FDI in US dollars (millions).[12] We obtained net global FDI inflows from the United Nations Conference on Trade and Development (UNCTAD, 2010) website. The control variables included in equation 1, represented in X_{it}, are those commonly included in FDI models: the initial level of real GDP per capita, total population, trade openness, exchange rate, and inflation (all in natural logs).[13]

To account for spatial interdependence, we include an indicator of surrounding market potential as independent variable. I construct this indicator as Blonigen et al. (2007) did. For country j, this index is equal to the sum of the inverse distance weighted GDP per capita for all countries where $k \neq j$.

Among the independent variables we used in the model that are of special interest are financial liberalization, democracy, governance, internal stability, and natural resources. To measure financial liberalization, we used Chinn and Ito's (2008) measure of financial openness is used. This indicator measures the intensity of capital controls and is correlated to other

restrictions on international transactions. From previous analysis (Asiedu and Lien, 2004), we expect financial liberalization to have a positive effect on FDI. For our measure of democracy, we use the *Polity2* indicator of Marshall and Jaggers (2008). We expect the effect of democracy on FDI to be positive (Jakobsen and de Soysa, 2006) or insignificant (Yang, 2007).

Institutions related to governance are measured in the model by including the principal component of three indicators: control of corruption, bureaucratic quality, and law and order.[14] Because corruption explains most of the variability of the principal component (being the only indicator with an eigenvalue greater than 1), we estimate a model considering only corruption in the right hand side of the equation. We include an indicator of internal stability, which is the index of internal conflict (higher score in the internal conflict index means lower instability). We obtain our governance indicators and internal-conflict index from the International Country Risk Guide Dataset (Political Risk Services, 2009). Based on previous work (Louie and Rousslang, 2008) we expect higher governance and internal conflict indices (i.e better governance and lower instability), indicating a business environment more appealing to foreign investors, to affect FDI positively. Nonetheless, the positive effect of governance and democracy on FDI has been contested by Wijeweera and Dollery (2009) and Li and Resnick (2003).

We measure natural resource dependence as the natural log of the exports of natural resource intensive commodities as a share of GDP. We construct this indicator using data from the UNCOMTRADE. We consider four categories of natural commodity exports: agricultural, mineral, oil, and raw materials.[15] Because the production of different categories of commodities requires different intensities of labor and capital, we expect these categories will have differential impacts on FDI.

Table 2 presents summary statistics of the variables we use, and Table 3 provides more descriptive information and sources. We first estimate the model using random effects with robust standard errors. The random-effects model is appropriate for this analysis based on the Breusch and Pagan Lagrangian multiplier test, and it is preferred over the fixed-effects model according the Hausman test. An F test indicates time dummies are not necessary in the estimation. We entered variables related to financial liberalization, institutions, internal stability, and natural resources in Equation 1 as lags so as to address endogeneity.[16] We found no evidence of serial autocorrelation at the 5 percent level in the model. We also found no evidence of multicolinearity.[17]

[TABLES 2 and 3]

To further explore the role of spatial interdependence of FDI in Latin America, we considered a spatial lag (SL) model in this analysis.[18] Following Blonigen et al. (2007), we estimated a spatial-lag model to determine whether there is a substitution or complementarity effect of FDI in Latin America. There is a spatially autoregressive parameter for the SL model, where a spatially lagged dependent variable is included in the right hand side of the equation. The SL model is specified as follows:

$$(2) \quad FDI_{i,t} = \rho W_y FDI_{i,t} + \Phi_{i,t}\beta + \varepsilon_{i,t}$$

In Equation 2, W represents the weighting matrix, and ρ is the parameter to be estimated to account for the spatial autocorrelation of FDI. In Equation 2, Φ represents a set of variables included in the right hand side of Equation 1. Following Blonigen et al. (2007), the W matrix is constructed in a panel set-up, where W is made by TxT matrices of dimension IxI (T represents the number of periods and I the number of countries).[19] The diagonal matrices are symmetric matrices of the ratio of the shortest bi-lateral distance in the sample and the bi-lateral distance

from country i to country j (the weight for the countries with the shortest distance is equal to 1).[20] The other matrices that compose W are matrices of zeros of dimensions IxI. W is normalized so that each row sums to unity.

We construct the spatially lagged dependent variable using the W matrix discussed above with the splagvar code from Stata.[21] We use the Moran's I statistic (i.e. spatial autocorrelation coefficient) for testing the null hypothesis that values in different countries are spatially independent (i,e. observed values are assigned at random among locations; no spatial autocorrelation). The Moran's scatter plot is also useful for visualizing the presence of spatial autocorrelation in FDI because it provides the relationship between FDI and $\rho W_y FDI_{i,t}$ in Equation 2. We discuss Moran's I statistics and scatter plots in the results section.[22]

When using a SL model in a panel framework it is necessary to consider the endogeneity of the spatially-lagged dependent variable. According to Anselin et al. (2008, p. 630), there is a "two way directionality of the neighbor relation in space (I am my neighbor's neighbor)", which leads to a spatial multiplier. $\rho W_y FDI_{i,t}$ and $\varepsilon_{i,t}$ are jointly determined in a SL model in a panel set-up, and this problem can be addressed by taking an instrumental variable approach. We estimate the SL model using a Two Stage Least Square (TSLS) with random effects (RE) approach. For the SL-TSLS-RE, the first order spatially lagged exogenous variables (the initial level of real GDP per capita, total population, trade openness, exchange rate, and inflation) are used as instruments.

4. RESULTS

(a) World FDI

Table 4 shows estimates using the natural log of net FDI from the world as dependent variable. Column 1 shows the estimates obtained when using the OLS estimator with RE and without the variable that accounts for surrounding market potential. For the control variables, population is statistically significant at the 10 percent level. The signs of initial GDP and population are not as expected, but the signs for the other control variables are as expected. The indicator for governance is positive and statistically significant at the 5 percent level. The variable for raw material exports is also positive and statistically significant at the 1 percent level. Other variables that account for natural resource dependence (agricultural, mineral, and oil exports) are not statistically significant. Democracy and internal stability are positive as expected but not statistically significant.

[TABLE 4]

In Column 2 of Table 4, we incorporate the surrounding market potential variable that accounts for the spatial interdependence of FDI. Surrounding market potential is positive and statistically significant at the 5 percent level. Blonigen et al. (2007) found a similar positive effect of surrounding-market potential in non-OECD countries. Such an effect is attributable to the impact of neighboring market potential on the export-platform of MNCs. As economic activity in surrounding markets increases, there will be more FDI with the purpose to serve surrounding markets. For Latin America, this empirical finding shows that geography matters for capital flows and that the economic conditions of neighboring countries affect MNCs' investment decisions in a specific country.

The significance and size of other coefficients are similar in the models including surrounding market potential (Column 2) and excluding it (Column 1). Nevertheless, given that the surrounding market potential variable, which was not included in previous research, is

statistically significant, this analysis suggests that it is necessary to include it in models to better estimate the true size of the coefficients for other determinants of FDI.

Similarly, when including control of corruption in the model (instead of the principal component of the governance indicators), as in Column 3 of Table 4, we find that corruption has a positive and statistically significant effect at the 5 percent level, and other estimates are very similar to those in Column 2. This model also shows a significant effect of surrounding market potential. Specifically, if surrounding market potential were to increase by 1 percent (i.e. economic activity in surrounding markets), then net world FDI would increase by 5.5 percent. This model also shows that if the GDP share of exports of raw materials were to increase by 1 percent, then net world FDI would increase by 2.6 percent. Similarly, as control of corruption increases by one percent for the average country (an increase of 0.29 points in the control of corruption index), world net FDI increases by 37 percent, indicating the impact of control of corruption has a large magnitude. It is important to note that control of corruption is an index between 0 and 6 points (higher values represent more control of corruption), where the maximum value observed in Latin America is 5. The control of corruption does not seem to vary a lot over time in the sample, and has a small standard deviation (0.98). This tell us that while the coefficient is of a large magnitude, its impact on net world FDI might not be as large because this variable is likely to experience changes over time of small magnitude.

When determining the spatial interdependence of capital flows in the form of spatial autocorrelation of FDI, the Moran's I statistic and scatter plot are useful. The Moran's I statistic is equal to -0.0203, with a P-value of 0.50 (normal approximation). Figure 5 shows the Moran's scatter plot. From the Moran's I statistic and scatter plot, we see no evidence of spatial autocorrelation of world FDI in Latin America.

[FIGURE 5]

Columns 4 through 6 in Table 4 show estimates accounting for the spatial interdependence of FDI in the form of spatial autocorrelation of FDI. For these estimations, we estimate the TSLS model with RE in order to address the endogeneity of the spatially lagged dependent variable (world net FDI). Column 4 shows the model estimated without surrounding market potential and with the governance indicator. Column 5 shows the estimates for the model that includes the surrounding market potential indicator with the governance indicator. Column 6 shows the estimates for the model that includes the surrounding market potential indicator with the control of corruption variable. In all these estimations, the spatially lagged dependent variable has a negative sign, but it is not statistically significant.[23]

In the estimations that account for the spatial autocorrelation of FDI (i.e inclusion of the spatially lagged dependent variable in the model), we observe that the governance indicator, control of corruption, and exports of raw materials variables are statistically significant at least at the 5 percent level. When accounting for the spatial autocorrelation of FDI, surrounding market potential is statistically significant only in the model that includes control of corruption, but this does not make the impact of surrounding market potential less robust. Focusing on estimates obtained from the model that does not include the spatially lagged dependent variable (estimates in Columns 1, 2, and 3) is appropriate because there is no evidence of spatial autocorrelation of FDI.

Other models using alternative indicators for the institutional variables of interest were estimated. A variable that accounted for political ideology of the president (1-5 index; 1=left and 5=right) was not statistically significant in the model.[24] We also performed other estimations using alternative indicators of institutions, such as the Economic Freedom Index (EFI) from the

Heritage Foundation (2011) and the control of corruption variable provided by the Worldwide Governance Indicators (WGI, Kaufmann et al., 2011) dataset.[25] These also were not statistically significant. Such results should be interpreted cautiously. For many of these alternative measures, data are available only since the mid-1990s, which is problematic since many Latin American countries underwent significant reforms in the late 1980s and early 1990s.

Altogether, estimations that include world net FDI show several important findings. While there is evidence of spatial interdependence of FDI in terms of surrounding market potential, there is no evidence that FDI is spatially autocorrelated. There is also evidence that institutions matter for world net FDI, given the robust positive effects found for the governance indicator and the control of corruption variable. This analysis also shows that exports of raw materials have a robust positive effect on FDI.

Analysis of the spatial interdependence of FDI in Latin America requires examining whether space matters when data is disaggregated by country of origin. Spatial interdependence might differ for FDI from different countries and regions. Below we examine the determinants of American net FDI in Latin America when accounting for spatial interdependence.

(b) American FDI

To test spatial interdependence for a given country, we estimated the above models using American net FDI as the dependent variable. For this estimation, the sample is considerably smaller given the lack of data on American net FDI for Guatemala and Brazil and observations for other countries are available only from 1987 to 2005.[26] When using American net FDI as dependent variable, fixed effects (FE) are preferred over RE according to the Hausman Test. The estimates in Columns 1, 2, and 3 of Table 5 do not include the spatially lagged dependent

variable and are based on the OLS-FE model. The estimates in Columns 4, 5, and 6 are based on the SL-TSLS-FE model, where the spatially lagged dependent variable is instrumented as before. There are several findings to note when using American net FDI as dependent variable

[TABLE 5]

First, Table 5 shows that the variables accounting for institutions are positively and statistically significant at the 10 percent level in the estimations that do not account for the spatial autocorrelation of FDI (Columns 1, 2, and 3). In the model considering the spatially-lagged dependent variable, institutional variables are not statistically significant (Columns 4, 5, and 6).

Second, the effect of surrounding market potential on FDI is positive, statistically significant, and of large magnitude in the estimations that do not account for the spatial autocorrelation of FDI (Table 5, Columns 1, 2, and 3). Nevertheless, Moran's I statistic, 0.0727 with a p-value of 0.01 (normal approximation) and the accompanying scatter plot in Figure 6 show American FDI is spatially autocorrelated. Once we account for the spatial autocorrelation of FDI, surrounding market potential is no longer statistically significant (Table 5, Columns 4, 5, and 6). We observe that the spatially lagged dependent variable has a positive sign and it is statistically significant, which goes according with the complex-vertical FDI motivation (i.e. agglomeration benefits) and Orr's (2008) finding. Third, exports of raw materials are statistically significant at the 5 and 10 percent level in the SL-TSLS-FE model (Table 5, Columns 4, 5, and 6). Looking at the magnitude of the coefficient of the spatially lagged term in Columns 4, 5, and 6, we observe that if FDI in nearby countries (where country proximity is accounted with the weighting matrix) increases by 1 percent, FDI in a specific country will increase between 0.89

and 0.79 percent. Thus, we observe that the spatial autocorrelation of American FDI is of significant magnitude.

[FIGURE 6]

Although the part of the analysis that uses American net FDI as dependent variable is limited by the lack of data for Brazil, one of the main recipients of FDI, this analysis provides evidence that the spatial interdependence of FDI in Latin America might be different by origin of investment. There is also evidence that in some cases the significance of variables changes once we account for the spatial autocorrelation of FDI.

5. CONCLUSION

Understanding the determinants of FDI in Latin America can help policymakers ensure the competitiveness of the region as a FDI host in the future. This research sought to fill several gaps in knowledge of FDI determinants.

First, given scant research on the spatial interdependence of FDI in Latin America, this analysis contributes to the literature by exploring the role of space on capital flows in detail. This analysis found a positive and significant effect of surrounding market potential on world FDI. Unlike Blonigen et al. (2007), it found an insignificant spatially-lagged effect of world FDI, suggesting FDI may function differently in Latin America. From these results, we can conclude that economic conditions in neighboring countries will matter for FDI in Latin America. Considering the role that economic conditions in neighboring countries play for capital flows will be important for designing regional trade and investment agreements in the region. There is also evidence that American FDI flows through complex-vertical structures, given the spatially-lagged dependent variable is positive and statistically significant. From this finding, we

concluded that there are significant agglomeration benefits of American FDI from one country to another, which is helpful information for policymakers as they move for further economic integration in the region.

Second, this analysis shows institutions matter for FDI. Control of corruption has a positive robust effect on world FDI. This finding provides a clear focus for policymakers seeking to provide settings that are conducive to business. By attacking corruption, policymakers can make their countries more attractive to MNCs. Developed countries can perhaps share best practices and provide training here.

Third, this analysis provides new insight on the effects of resources on FDI. Our findings that raw material exports have a positive significant effect on FDI, and that exports of other commodities do not affect FDI, suggest there is no "resource curse" in relation to FDI in Latin America. Policies that ensure the development of the raw materials sector may prove beneficial for FDI.

Further research might analyze disaggregated FDI by country of origin and sector. While this analysis explores American FDI, further research could address the role of space for FDI from Japan, China, and the European Union. As we further disagregate FDI, we might observe that the roles of geography and space will differ by origin. FDI by sector might also show varying dynamics in differing industries. Firm level data might also yield new insights on the importance of location for FDI in Latin America.

NOTE

[1] To be sure, in recent years several authors have questioned whether FDI has a positive effect on development. See Porzecanski and Gallagher (2007) for a critical assessment of FDI in Latin America.

[2] We calculated FDI inflows from a sample of 17 Latin American countries for which data was consistently available. Data on FDI used in this section was obtained from the United Nations Conference on Trade and Development (UNCTAD, 2010).

[3] The change in the share of FDI inflows by region cannot all be attributed to the financial crisis of 2008. Shares of FDI to LDCs by region in the early 2000s, including 58 percent to Asia, 33 percent to Latin America, and 8 percent for Africa, were similar to those in the late 2000s. There is also little evidence that the increase of FDI in China has adversely affected FDI inflows in Latin America, contrary to initial fears it would diminish. Gallagher and Porzecanski (2008) argue that China and Latin America are unlikely to compete in the world market because of differences in the structures of their export markets. They also find that, excepting exports from Mexico, Chinese exports are not replacing Latin American exports. Cravino et al. (2006) also find no evidence of a negative relationship between FDI in China and that in Latin America and further suggest there might be synergy in investment flows to them.

[4] Maps created using the Spmap code in Stata and data from UNCTAD (2010) and Bureau of Economic Research (BEA, 2011) data.

[5] Data on American FDI obtained from BEA (2011). We note we had very few observations for which to construct averages for Brazil and Guatemala. Because of this, we do not include them in our estimation equations.

[6] We summarize only those studies relevant to Latin America given our focus and space limitations. Blonigen (2005) provides an excellent review of empirical analyses on the determinants of FDI. Albuquerque et al. (2005) provides a good empirical analysis on the determinants of FDI that includes countries from all regions. Calvo et al. (1993) present an interesting analysis on the determinants of capital inflows in Latin America, considering changes in capital accounts but not distinguishing FDI from other capital flows.

[7] This average is estimated using Chinn and Ito's (2008) measure of financial liberalization and the country sample considered in this paper. Average for the 2000s considers observations between 2000 and 2008.

[8] Average for decades calculated with available data between 1985 and 2008.

[9] A few other papers have examined at the impact of resource abundance on FDI in Latin America, but they do not take the same approach as we or Montero (2008) do. Mascarell (2011) examines how natural resource dependence affects FDI through its effect on inequality. He claims that inequality levels generated by natural resource exports can explain 40 percent of the variance of secondary and tertiary FDI. Swart and van Marrewijk (2009) study how

resource dependency affects mergers and acquisitions, using a sample of 49 African and Latin American countries. They find that natural resource wealth diminishes mergers and acquisitions in sector-intensive natural resources.

[10] Data on American FDI obtained from the BEA (2011). For 1986 to 2006, there are several years in which U.S. direct investment abroad is not available, either because it is too small (between -$500,000 and +$500,000) or because it has been suppressed to avoid disclosure of data of individual companies. Even if small values are set equal close to zero and data is interpolated, net FDI inflows are not available for Brazil between 1996 and 2006 and Guatemala between 1999 and 2006. We therefore exclude Brazil and Guatemala from our estimations of U.S. FDI because the spatial model requires a balanced panel.

[11] Including observations between 1986 and 2006 allowed us to have a balanced panel (i.e observations from the same period of analysis for each country are included in the estimation), which is required for the estimation of spatial models. We selected our countries and period of analysis based on data availability.

[12] We calculated the natural log of net FDI inflows with available observations. Because taking logarithm of a non-positive number is not possible, we truncated non-positive observations to a number very close to zero (1E-11), and used the natural log of that value. Blonigen and Wang (2005) used this approach for negative values of net FDI.

[13] The control variables included are those identified in previous empirical analyses as important determinants of FDI. See Blonigen (2005) for a comprehensive review of the literature related to the determinants of FDI. We use the initial level of GDP rather than GDP growth as a control variable because FDI and GDP may be simultaneously determined. See Chowdhury and Mavrotas (2006), Hansen and Rand (2006) and Sylwester (2005) for discussion on the two-way causality between FDI and economic growth. Some empirical analyses include a lag of the dependent variable in the right hand side. An autocorrelation test for the baseline model shows that there is no need to include the lag of the dependent variable as right hand regressor. Using the natural log transformation of the dependent variable and other control variables allows these variables to be symmetric, normed, and additive (Törnqvist et al., 1985).

[14] The creation of this governance index is similar to the approach taken in Chinn and Ito's (2006) analysis.

[15] See Blanco and Grier (2011) for an explanation of why it is important to disaggregate the indicator of natural resource dependence in various categories and for further discussion on what commodities are considered in each category.

[16] We performed an endogeneity test for each lagged variables to determine whether using the lag values was appropriate. We found no evidence of endogeneity when using the lagged values of financial liberalization, governance, internal stability, and natural resources in the model (one endogeneity test for each variable was performed).

[17] Variance Inflation Factors (VIFs) for all variables in the model were less than 6; there is multicolinearity when the largest VIF is greater than 10.

[18] As in Blonigen et al. (2007), the spatial error (SE) is of secondary interest for us because this model will only improve the standard errors and will not provide any evidence on the nature of the interdependence of FDI.

[19] W is a diagonal matrix, where there are 21 matrices of dimension 17x17 in the main diagonal (T=21 and I=17). Anselin et al. (2008) and Elhorst (2003) provide a good overview on the estimation of a spatial lag model in a panel set up.

[20] We construct the symmetric (i.e. distance) matrix using the distance between countries calculated with the great-circle formula that considers the latitudes and longitudes of the most important cities (provided by Mayer and Zignago, 2006). We estimate the components of the diagonal matrices as the shortest distance in the sample divided by the distance from country i to country j. The shortest distance within the sample is that between Guatemala and El Salvador, 181 kilometers. In the distance matrix, the smaller the distance between country i and country j is, the larger the value of the matrix component (implying greater proximity). For further discussion on the W matrix, see Blonigen et al. (2007).

[21] The Stata code splagvar created by Jeanty (2010). I am very thankful to Jeanty for making this code available to me and for providing assistance on how to use it properly in a panel framework.

[22] See LeSage and Pace (2009) for further discussion.

[23] The Hausman test statistics and probabilities are shown in Columns 4, 5, and 6. This test has the null hypothesis that the excluded instruments are valid instruments (i.e., uncorrelated with the error term and correctly excluded from the estimated equation). In all estimations we fail to reject the null hypothesis at the 10 percent, which tell us that the instruments are valid.

[24] Please refer to Blanco and Grier's (forthcoming) for further discussion on how political ideology of the president is identified and data used.

[25] Several indicators from the EFI were entered into the model one at the time and lagged (business, financial, trade, investment, and corruption freedom) but they were statistically insignificant. Other indicators from the WGI were also considered in the same form as the EFI indicators and they were statistically insignificant (voice and accountability, political stability, government efficiency, regulatory quality, and rule of law).

[26] Sample is reduced in this form in order to have a balanced panel that can be used for the estimation of the SL-TSLS-FE model. The weighting matrix, W, has been adjusted adequately for this sample.

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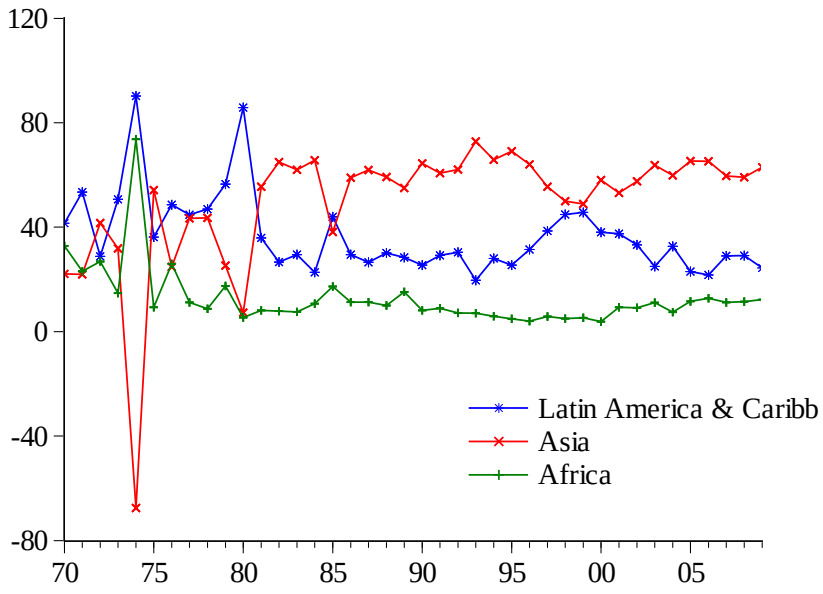
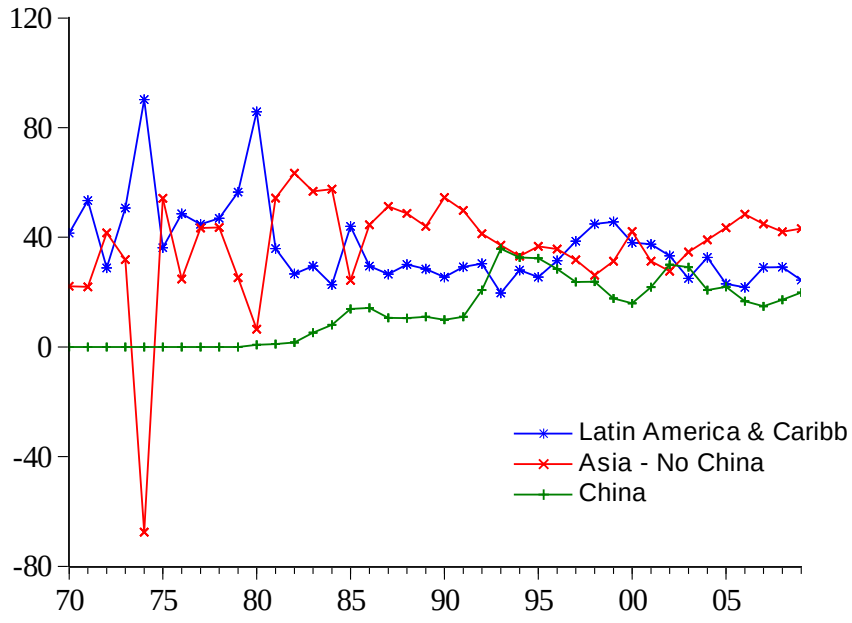
Figure 1. Percentage share of FDI inflows to LDCs by region



Source: Author's construction with data from UNCTAD (2010).

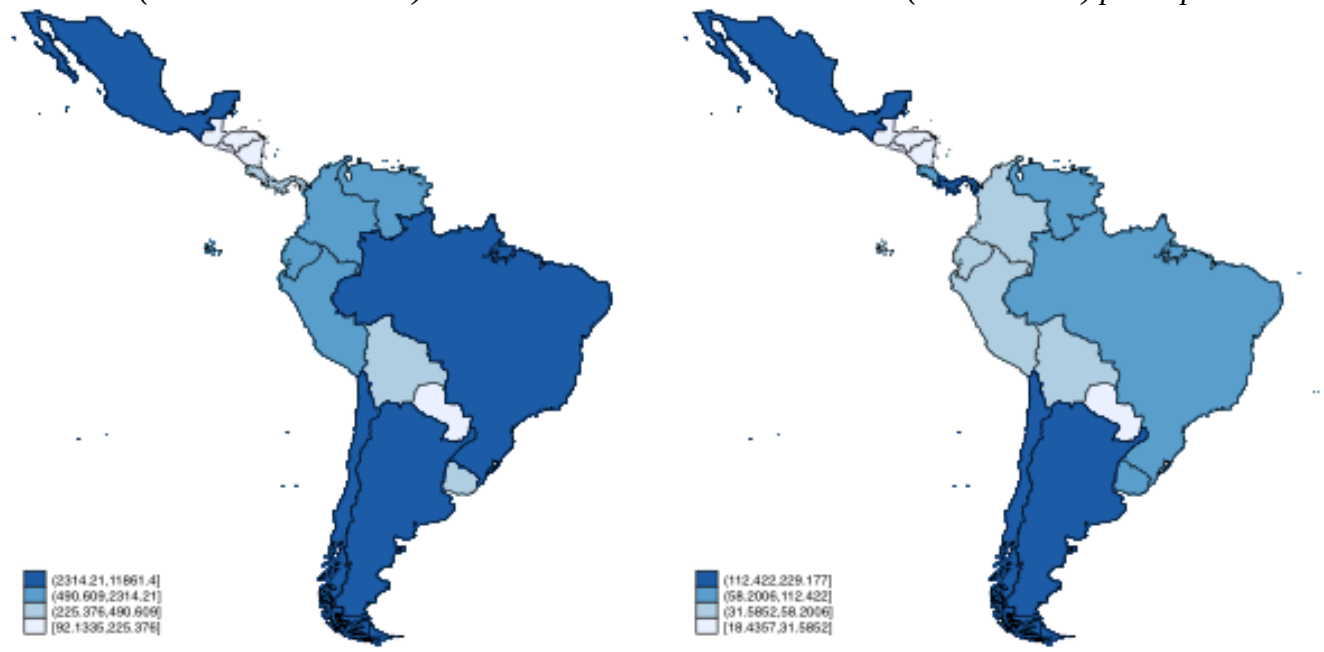
Figure 2. Percentage share of FDI inflows LDCs - Asia, China, Latin America



Source: Author's construction with data from UNCTAD (2010).

Figure 3. Spatial Interdependence of FDI in Latin America – Average Total FDI, 1986-2006

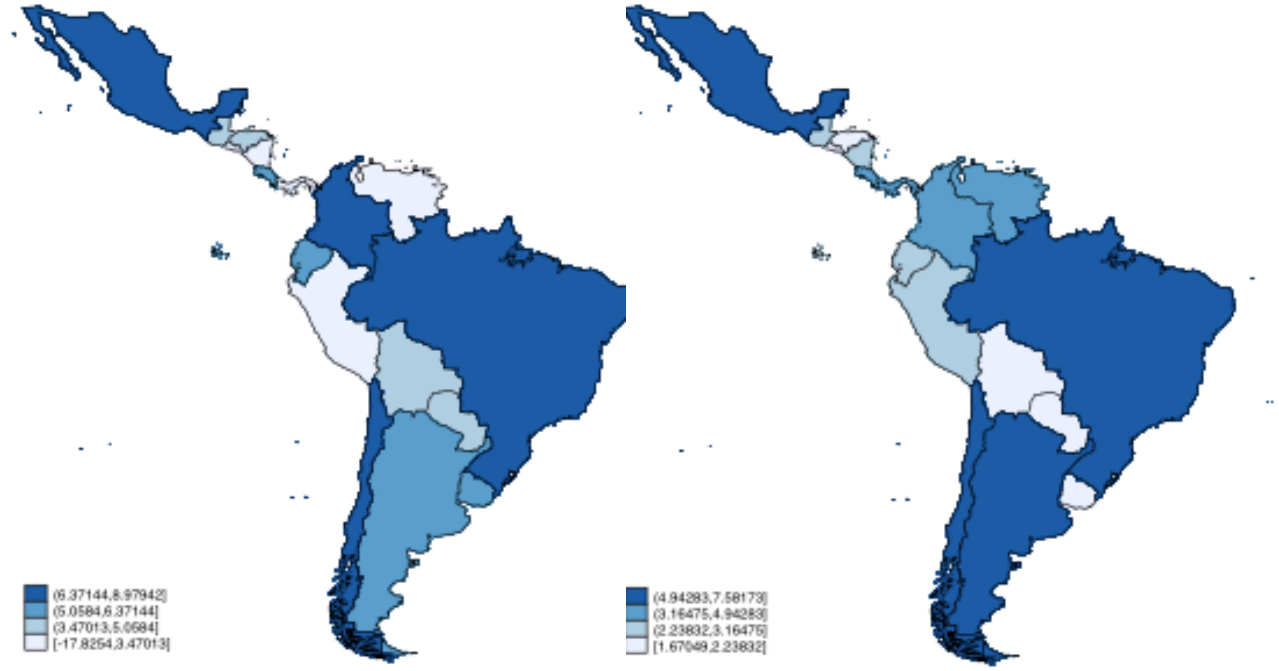
Total FDI (current million USD) *Total FDI (current USD) per capita*



Source: Author's construction with data from UNCTAD (2010).

Figure 4. Spatial Interdependence of FDI in Latin America – Average Net FDI, 1986-2006

World Net FDI (current million USD, log) *American Net FDI (current million USD, log)*



Source: Author's construction with data from UNCTAD (2010) and BEA (2011).

Figure 5 – Moran's Scatter Plot – World Net FDI

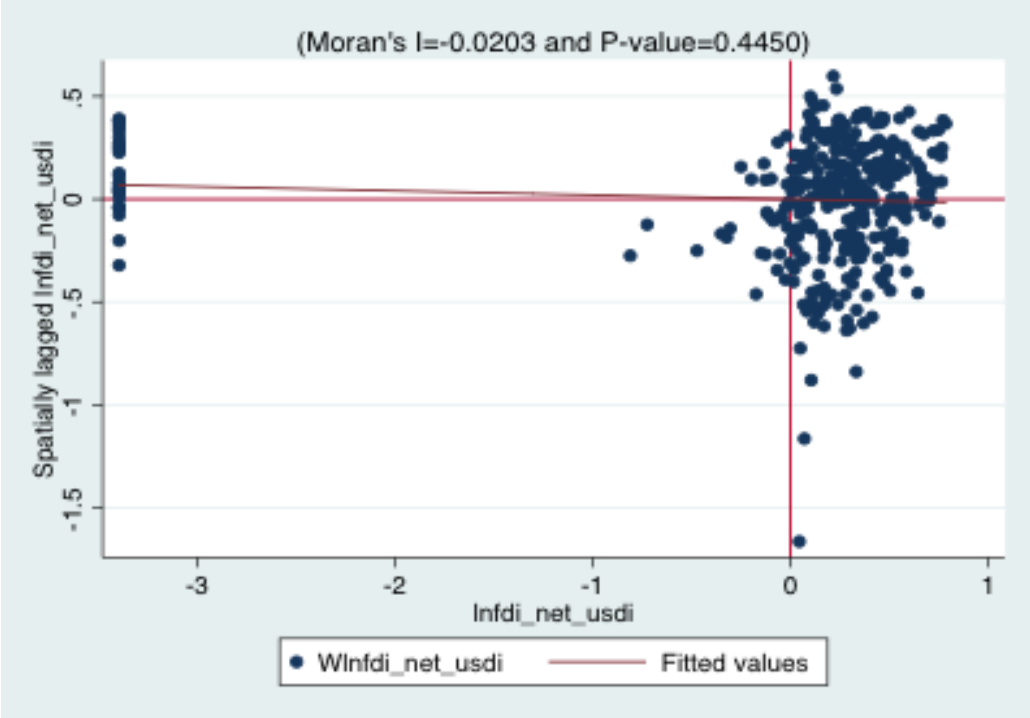


Figure 6 – Moran's Scatter Plot – US Net FDI

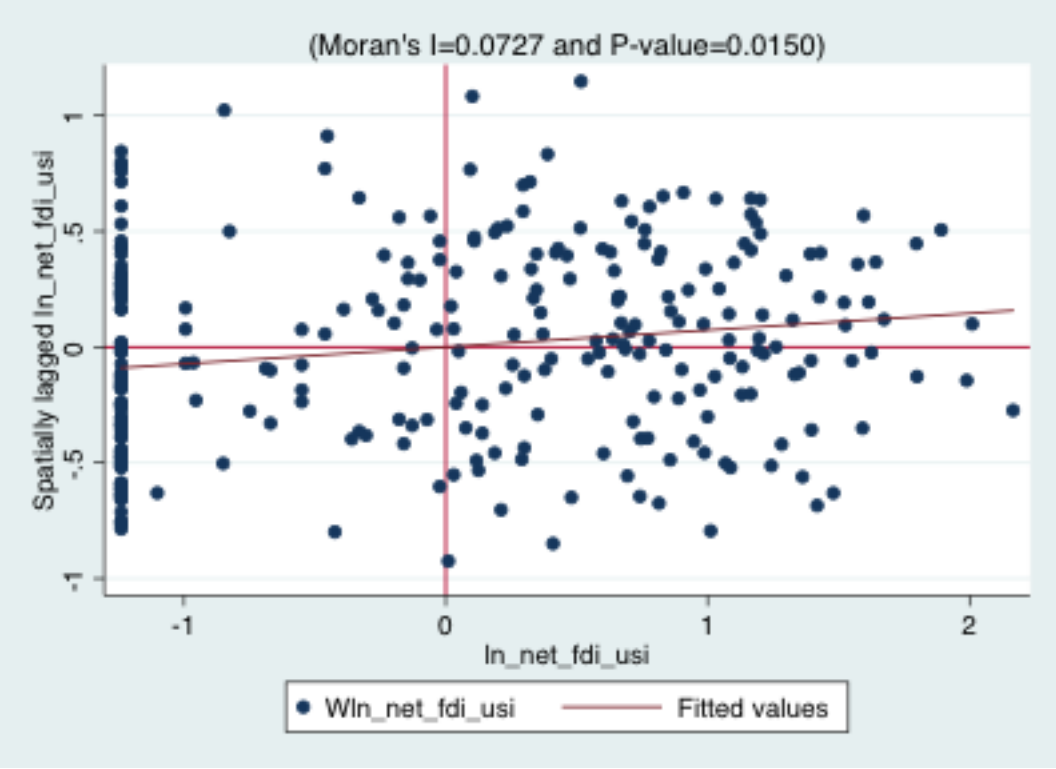


Table 1. Empirical Analyses on the Determinants of FDI in Latin America

Authors (Year)	*Sample (Period)*	*Data- Method*	*Main Contribution*
Al Nasser and Garza (2009)	15 countries (1978-03)	World FDI inflows, FE	(+) effect on FDI : trading volume, financial development
Bengoa-Calvo and Sanchez-Robles (2003)	18 countries (1970-99)	World FDI inflows, FE, RE	(+) effect on FDI : economic freedom, economic growth
Biglaiser and Brown (2004)	17 countries (1980-95)	World FDI inflows, FE	(+) effect on FDI : financial liberalization, trade opening, and privatization
Campos and Kinoshita (2008)	19 countries (1989-04)	World FDI inflows, GMM (Blundell and Bond)	(+) effect on FDI : financial liberalization and privatization
Maniam (2007)	6 countries (1975-03)	US FDI inflows, OLS	Country by country estimation, findings differ across countries
Montero (2008)	15 countries (1985-03)	World FDI inflows, OLS	(+) effect on FDI: current account
Orr (2008)	18 countries (1997-04)	US FDI inflows, RE, SL-FE, SL-TSLS-FE	Evidence of spatial autocorrelation
Ruiz and Pozo (2008)	7 countries (1994-05)	US FDI inflows, GARCH	(–) effect on FDI: exchange rate uncertainty
Trevino et al. (2002)	7 countries (1988-99)	World FDI inflows, OLS	(+) effect on FDI: GDP and privatization
Tuman and Emmert (2004)	15 countries (1979-96)	US FDI inflows, OLS	(+) effect on FDI : Market size, openness to trade, education, poor human rights, and military coups (–) effect on FDI: revolutions

Table 2. Summary Statistics

Panel A	Mean	Std. Dev.	Min	Max
Ln(net FDI inflow)	3.6307	8.5253	-25.3284	10.3254
Ln(Surrounding market pot.)	3.2778	0.3721	2.4963	4.0163
Financial liberalization	0.2251	1.5431	-1.8312	2.5000
Democracy	6.7199	3.5891	-8.0000	10.0000
Institutions for business	0.0073	1.3382	-3.1654	3.0106
Control of corruption	2.8423	0.9857	0.0000	5.0000
Bureaucratic quality	1.6471	0.8887	0.0000	3.0000
Law and order	2.8581	1.0953	1.0000	5.0000
Internal stability	7.9549	2.5140	0.0000	12.0000
Ln(Agricultural exports)	-3.1254	0.9094	-6.5104	-1.4343
Ln(Mineral exports)	-6.5171	2.9903	-25.3284	-2.1667
Ln(Oil exports)	-5.8508	2.5206	-16.0101	-1.1030
Ln(Material exports)	-4.2425	0.9950	-7.2280	-1.7898
Ln(Initial GDP)	7.7876	0.6749	6.4941	8.9993
Ln(Population)	16.3183	1.1638	14.6143	19.0528
Ln(Trade)	3.9531	0.5421	2.6213	5.2921
Ln(Exchange rate)	2.2265	3.9809	-17.7527	10.1266
Ln(Inflation)	4.9054	0.6888	4.3376	9.5260

[1]

Panel B	Mean	Std. Dev.	Min	Max
Ln(net U.S. FDI inflow)	3.4979	2.8224	-25.3284	9.6119
Ln(Surrounding market pot.)	3.2847	0.3671	2.4963	3.9531
Financial liberalization	0.2937	1.5153	-1.8312	2.5000
Democracy	6.8421	3.5415	-8.0000	10.0000
Institutions for business	0.0558	1.2881	-3.1654	2.7213
Control of corruption	2.8595	0.9948	0.0000	5.0000
Bureaucratic quality	1.6354	0.8485	0.0000	3.0000
Law and order	2.9420	1.0900	1.0000	5.0000
Internal stability	7.9355	2.5262	0.0000	12.0000
Ln(Agricultural exports)	-3.1091	0.9225	-6.5104	-1.4343
Ln(Mineral exports)	-6.3907	2.9690	-25.3284	-2.1705
Ln(Oil exports)	-5.8329	2.5397	-15.4340	-1.1851
Ln(Material exports)	-4.2330	1.0356	-7.2280	-1.7898
Ln(Initial GDP)	7.7867	0.7032	6.4941	8.9993
Ln(Population)	16.1587	1.0266	14.6349	18.4511
Ln(Trade)	4.0241	0.5049	2.6213	5.2921
Ln(Exchange rate)	2.6090	3.6920	-17.7014	10.1266
Ln(Inflation)	4.8730	0.6592	4.3376	9.5260

In panel A (B) all variables have 357 (285) observations, and data period 1986-2006 (1987-2005). Some variables use lagged values in the sample, please refer to paper.

Table 3. Variable Description and Sources

	Description and Source
Ln(Net FDI inflows)	Natural log of net FDI inflows (FDI inflows minus FDI outflows) in US dollars (current). Variable is truncated for non-positive values in order to take natural log (a value of 1E-11 is assigned for non-positive values). Series filled in with linear interpolation for missing observations. Source: UNCTAD, WIR (2009).
Ln(Net US FDI inflows)	Natural log of net FDI inflows (FDI inflows minus FDI outflows) in US dollars (current). Variable is truncated for non-positive values in order to take natural log (a value of 1E-11 is assigned for non-positive values). Net US FDI constructed as capital outflows minus capital inflows (both without current-cost adjustment). Net FDI series filled in with linear interpolation for missing observations. Source: BEA (2011).
Ln(GDP initial)	Natural log of the initial level of GDP per capita (in constant US dollars) in a 5 year period. Ln(GDP initial) is time variant, where its value is the same for a five year period 1985-89, 1990-94, etc… Source: World Bank (2010).
Ln(Population)	Natural log of total population. Source: World Bank (2010).
Ln(Exchange rate)	Natural log of official exchange rate (local currency units per US dollar). Fill in for Ecuador for a value of 25000 Sucre per US dollar from 2000 to 2006 (dollarization started in 2000). Series filled in with linear interpolation for missing observations Source: World Bank (2010).
Ln(Openness)	Natural log of trade openness (exports plus imports) as share of GDP Source: World Bank (2010).
Ln(Inflation)	Natural log of inflation plus 100. Source: World Bank (2010).
Ln(Surrounding market potential)	Sum of all inverse distance weighted GDPs per capita (in constant US dollars) of all countries in the sample (following Blonigen et al., 2007). Source: World Bank (2010).
Financial liberalization	Indicator of capital account openness, measures the intensity on capital controls. Source: Chinn and Ito (2008). Latest dataset update as of May of 2010.
Democracy	Polity2 score, democracy score minus autocracy score. Index ranges between -10 (strongly autocratic) and 10 (strongly democratic). Source: Marshall and Jaggers (2009).
Internal stability	Index of internal conflict. Political Risk Services (2010).
Institutions for business	Principal component of three institutional indicators: bureaucratic quality, control of corruption, and law and order. Source: Political Risk Services (2010).
Ln(Agricultural Exports)	Natural log of the total exports of agricultural commodities as a share of GDP (SITC codes 1-9, 11, 12, 41-43, and 94). Source: UNCOMTRADE (2009).
Ln(Mineral Exports)	Natural log of the total exports of minerals (no oil) as a share of GDP (SITC codes 32, 34, 35, and 68). Source: UNCOMTRADE (2009).
Ln(Oil Exports)	Natural log of the total exports of oil as a share of GDP (SITC code 33). Source: UNCOMTRADE (2009).
Ln(Material Exports)	Natural log of the total exports of raw materials as a share of GDP (SITC codes 21-29, 63 and 64). Source: UNCOMTRADE (2009).

Table 4. Determinants of World FDI in Latin America – OLS-RE, and SL-TSLS-RE

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Surr. market pot.) $_t$		5.5881**	5.5049**		6.1113	6.6769**
		(2.4613)	(2.4893)		(3.7174)	(2.9120)
Spatially weighted FDI				-0.1313	-0.2522	-0.3122
				(0.4124)	(0.4702)	(0.4373)
Financial lib. $_{t-1}$	0.2427	-0.1336	-0.1150	0.3094	0.0404	0.0042
	(0.3720)	(0.3607)	(0.3975)	(0.4083)	(0.3975)	(0.3968)
Democracy $_{t-1}$	0.0319	-0.0069	0.0281	0.0368	0.0060	0.0414
	(0.2207)	(0.1979)	(0.2012)	(0.1311)	(0.1298)	(0.1293)
Governance $_{t-1}$	1.4827**	1.6378**		1.5299***	1.6913***	
	(0.6232)	(0.6561)		(0.5663)	(0.5625)	
Control of corruption $_{t-1}$			1.2938**			1.3444**
			(0.5197)			(0.5683)
Internal stability $_{t-1}$	-0.2534	-0.2686	0.0486	-0.2781	-0.3077	0.0370
	(0.3157)	(0.3180)	(0.2610)	(0.2616)	(0.2620)	(0.2187)
Ln(Agricultural exp.) $_{t-1}$	-0.9571	-1.2685	-0.9604	-1.1397	-1.5061	-1.2407
	(1.0002)	(1.0018)	(0.9923)	(1.0280)	(1.0617)	(0.9398)
Ln(Mineral exp.) $_{t-1}$	-0.2734	-0.2431	-0.1932	-0.2636	-0.2360	-0.1760
	(0.2179)	(0.1853)	(0.1867)	(0.2535)	(0.2411)	(0.2249)
Ln(Oil exp.) $_{t-1}$	0.0250	0.1078	0.1829	0.0185	0.0541	0.1606
	(0.3146)	(0.2927)	(0.3076)	(0.2786)	(0.2656)	(0.2513)
Ln(Material exp.) $_{t-1}$	2.2914***	2.5622***	2.6174***	2.2510***	2.4669***	2.7039***
	(0.7642)	(0.7421)	(0.8679)	(0.8461)	(0.7529)	(0.6655)
Ln(Initial GDP) $_t$	-1.0984	-1.5484	-1.0418	-0.9350	-1.4723	-0.9477
	(1.6602)	(1.3457)	(1.1807)	(2.0733)	(1.5796)	(1.2017)
Ln(Population) $_t$	2.2759*	2.7990**	3.0428**	2.3017	2.9573**	3.2618***
	(1.2795)	(1.1606)	(1.2047)	(1.4171)	(1.1821)	(0.9623)
Ln(Trade) $_t$	-0.8598	-1.5411	-1.6211	-0.5245	-1.0928	-1.3829
	(1.0600)	(1.1395)	(1.1237)	(1.7931)	(1.6473)	(1.5180)
Ln(Exchange rate) $_t$	0.2313	0.2532	0.2784	0.2355	0.2445	0.2930**
	(0.2266)	(0.2095)	(0.1938)	(0.1677)	(0.1577)	(0.1490)
Ln(Inflation) $_t$	-1.5110	-1.5745	-1.4725	-1.5253**	-1.5391**	-1.4780**
	(1.1777)	(1.1965)	(1.2206)	(0.6747)	(0.6723)	(0.6824)
Constant	-7.8290	-26.8966*	-39.2548**	-10.9060	-34.0867	-47.9819*
	(13.7547)	(15.4053)	(17.1006)	(27.6333)	(29.4754)	(25.8560)
R-sqr	0.298	0.364	0.361	0.293	0.373	0.372
Hausman test (prob)				0.655 (0.96)	4.146 (0.39)	5.388 (0.25)

OLS with RE estimates shown in columns 1, 2, and 3. SL-TSLS-RE estimates shown in columns 4, 5, and 6. The first order spatially lagged value of initial GDP, population, trade, exchange rate, and inflation are used as instruments for the SL-TSLS-RE model. Standard errors in parenthesis. ***, **, and * represent statistical significance at the 1, 5, and 10 percent level. All estimations use the natural log of world net FDI as dependent variable, include 17 countries, and have 357 observations (period 1986-2006).

Table 5. Determinants of US FDI in Latin America – OLS-FE, and SL-TSLS-FE

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Surr. market pot.) $_t$		16.0765***	16.3783***		4.6039	4.0790
		(2.9292)	(2.9272)		(6.3949)	(6.3186)
Spatially weighted FDI				0.8900***	0.7872**	0.8342**
				(0.3129)	(0.3480)	(0.3368)
Financial lib. $_{t-1}$	0.2263	0.1910	0.2287	0.2473	0.2348	0.2565
	(0.2283)	(0.1855)	(0.1823)	(0.1842)	(0.1838)	(0.1822)
Democracy $_{t-1}$	-0.0132	0.0000	0.0057	-0.0341	-0.0279	-0.0271
	(0.0470)	(0.0387)	(0.0379)	(0.0564)	(0.0569)	(0.0571)
Governance $_{t-1}$	0.5461*	0.5007*		0.2660	0.2854	
	(0.2809)	(0.2612)		(0.2623)	(0.2595)	
Control of corruption $_{t-1}$			0.4368*			0.2687
			(0.2311)			(0.2764)
Internal stability $_{t-1}$	0.0403	0.0408	0.1052	0.0045	0.0088	0.0384
	(0.1313)	(0.1154)	(0.0825)	(0.1075)	(0.1069)	(0.0995)
Ln(Agricultural exp.) $_{t-1}$	-0.2746	-0.2121	-0.0971	-0.3279	-0.3038	-0.2486
	(0.5823)	(0.5012)	(0.5001)	(0.4820)	(0.4797)	(0.4794)
Ln(Mineral exp.) $_{t-1}$	-0.0062	0.0125	0.0110	-0.0232	-0.0159	-0.0212
	(0.1020)	(0.0825)	(0.0894)	(0.1168)	(0.1165)	(0.1181)
Ln(Oil exp.) $_{t-1}$	-0.2315	-0.2551	-0.2067	-0.1097	-0.1305	-0.0974
	(0.1755)	(0.1656)	(0.1692)	(0.1452)	(0.1484)	(0.1427)
Ln(Material exp.) $_{t-1}$	0.9352	1.1222*	0.9874	0.8702*	0.9312**	0.8499*
	(0.6532)	(0.6040)	(0.5857)	(0.4527)	(0.4587)	(0.4484)
Ln(Initial GDP) $_t$	-1.4242	-3.0346*	-2.7134	-1.8460	-2.2584	-2.0088
	(2.0130)	(1.5700)	(1.6105)	(1.6469)	(1.7081)	(1.7217)
Ln(Population) $_t$	0.7789	-9.5030**	-9.2355**	-1.9546	-4.5834	-4.1250
	(2.6200)	(3.3988)	(3.2948)	(2.6308)	(4.1034)	(4.0616)
Ln(Trade) $_t$	-0.3477	-0.7159	-0.6491	-0.0686	-0.2063	-0.1272
	(0.9882)	(0.8775)	(0.7796)	(0.8719)	(0.8930)	(0.8979)
Ln(Exchange rate) $_t$	0.1124	0.0816	0.0588	0.0398	0.0394	0.0264
	(0.1095)	(0.0965)	(0.1025)	(0.1018)	(0.0998)	(0.0978)
Ln(Inflation) $_t$	-0.4442**	-0.1852	-0.2125	-0.3473	-0.2843	-0.3136
	(0.1864)	(0.1812)	(0.2079)	(0.3049)	(0.3101)	(0.3165)
Constant	6.6615	133.7230**	124.1075**	50.3933	81.7303	72.7973
	(41.8072)	(52.6760)	(50.1054)	(39.7793)	(52.9208)	(52.4168)
R-sqr	0.108	0.166	0.16	0.119	0.137	0.129
Hausman test (prob)				1.955(0.74)	1.635(0.80)	1.819(0.77)

OLS with FE estimates shown in columns 1, 2, and 3. SL-TSLS-FE estimates shown in columns 4, 5, and 6. The first order spatially lagged value of initial GDP, population, trade, exchange rate, and inflation are used as instruments for the SL-TSLS-FE model. Standard errors in parenthesis. ***, **, and * represent statistical significance at the 1, 5, and 10 percent level. All estimations use the natural log of US net FDI as dependent variable, include 15 countries, and have 285 observations (period 1987-2005).