FOREIGN DIRECT INVESTMENT IN LATIN AMERICA: A PANEL REGRESSION STUDY

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ABSTRACT

Since the early 1980s developing countries have generally experienced a heavy influx of foreign capital, and among the developing regions, Latin America has emerged as a prime destination of FDI. An extensive literature has evolved on the inflow of FDI in Latin America, which identifies a number of variables, such as market size, trade openness, etc., as the key determinants of FDI. Due to non-availability of reliable and consistent data, domestic investment climate as a determinant of FDI has been generally excluded from the literature. This study seeks to fill that void by using the Economic Freedom Index, published since 1995 by The Heritage Foundation, as a proxy for domestic investment climate for a sample of 18 Latin American countries over 1995-2004 period. Employing panel regression methodologies, this study finds that economic freedom is a significant and robust determinant of FDI in Latin America. This study also finds that NAFTA has created an insignificant locational advantage for Mexico vis-à-vis other countries in the sample.

INTRODUCTION

Development economists generally concur that the inflow of foreign direct investment (FDI) can play a vital role in the growth dynamics of developing economies. The literature generally accepts that the inflow of FDI in developing countries can help fill at least three "development gaps" – first, the "investment gap" by providing capital for domestic investment; secondly, the "foreign exchange gap" by providing foreign currency through initial investments and subsequent export earnings made possible by the initial investments; and finally, the "tax revenue gap" by generating tax revenues through additional economic activities (Smith, 1997). The FDI inflow can also create many other benefits for recipient economies. For example, FDI can help generate domestic investment in matching funds, increase local market competition, create modern job opportunities, increase global market access for locally produced export commodities, facilitate transfer of managerial skills and technological knowledge from developed countries, etc. -- all of which should ultimately contribute to economic growth in host countries.

Recognizing the manifold benefits of FDI, developing countries have generally eased restrictions on the inflow of foreign capital since the early 1980s. Furthermore, the end of the Cold War in the early 1990s brought about a new political era that not only witnessed the end of the foreign aid programs sponsored by the erstwhile Soviet Union in socialist LDCs (less developing countries), but also diminished strategic alliances between the US and the pro-US developing nations resulting in a sizable reduction in the US-sponsored foreign aid programs. The new political reality forced many LDCs to vigorously seek out alternative sources of foreign private capital. As a result, the annual FDI inflow to developing countries has increased manifold from $23 billion (0.7% of their combined GDP) in 1990 to about $211 billion (2.6% of combined GDP) in 2004 (World Bank, 2006).

The vital role played by FDI in the growth dynamics of developing countries has created considerable research interest among development economists. Consequently, a sizeable empirical literature has evolved on the determinants of FDI. These studies have identified a number of variables, such as market size, economic openness, financial liberalization, rate of return, quality of infrastructure, human capital, political instability, etc. as key determinants of FDI. However, due to non-availability of reliable and consistent set of quantitative data on investment climate, the literature has generally excluded the domestic investment climate in recipient countries as a determinant of FDI. A few recent studies, such as

Quazi (2006) and Quazi and Mahmud (2006), have used the Index of Economic Freedom, an annual publication by The Heritage Foundation/The Wall Street Journal since 1995, as a reliable proxy for domestic investment climate in South Asia and East Asia.

The primary focus of this study is to investigate whether, in addition to the other variables routinely used in the literature, economic freedom is also a significant determinant of FDI in Latin America. Among developing regions, this particular region receives a very high share of FDI, which perhaps can be explained by two factors – first, having formed many trade blocks (such as MERCOSUR, Andean Community, etc.), these countries are at the forefront of free trade movement, which helps attract FDI to the entire region, and secondly, the geographical proximity to the U.S. and Japan – the two most significant source countries of FDI, can also boost their locational advantage. The World Bank (2006) reports that the annual FDI inflow to Latin America & Caribbean countries has jumped from $8 billion (0.8% of regional GDP) in 1990 to about $61 billion (3.0% of regional GDP) in 2004.

This study analyzes the determinants of FDI during 1995-2004 in 18 countries in Latin America - Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Belize was initially included in the sample, but was ultimately dropped, as data for some key variables were not available for the period covered in the study. One country in the sample that deserves special attention is Mexico, which is currently among the most popular destinations of FDI in the world. This study investigates whether NAFTA has created significant locational advantage for Mexico vis-à-vis other countries in the region. Employing panel estimation methodologies, this study finds that economic freedom is a significant and robust determinant of FDI in Latin America. This study also finds that among the other determinants of FDI, return on investment, trade openness, infrastructure, and incremental lagged changes in FDI help attract more FDI in the region. The results also suggest that, accounting for the economic fundamentals, NAFTA has created an insignificant locational advantage for Mexico vis-à-vis other countries in the sample.

LITERATURE REVIEW

An extensive empirical literature exists on the determinants of FDI in developing countries. Most of these studies have identified market size, quality of infrastructure, labor cost, economic openness, return on capital, political stability, etc. among the key variables that drive the flow of FDI. The literature has by and large excluded the domestic investment climate in recipient countries as a determinant of FDI, as reliable data on investment climate has been generally lacking. There are many instances of conflicting results regarding the direction of influence of the determinants of FDI (Chakrabarti, 2001). Notwithstanding these differences, the FDI literature has continued to grow and capture the fascination of applied development economists.

Scaperlanda and Mauer (1969) put forth the hypothesis that FDI inflow responds positively to the recipient country's market size once it grows beyond a threshold level that is large enough to allow economies of scale and efficient utilization of resources. Many studies have tested this hypothesis for host countries with mixed results. For example, Schneider and Frey (1985), Tsai (1994), and Lipsey (1999) found that higher per capita income, which is used as a proxy for purchasing power and market size, had a positive effect on the FDI inflow, but Edwards (1990) and Jaspersen et al (2000) found the effects to be negative, while Loree and Guisinger (1995) and Wei (2000) found the effects to be statistically insignificant.

Availability of skilled workers can significantly boost the international competitiveness of a host country, which plays a key role in attracting FDI. Several studies, such as Hanson (1996) and Noorbakhsh et al (2001), have used different proxy variables for the level of human capital and found the effects of human

capital on FDI to be positive; however, several other studies, such as Root and Ahmed (1979) and Schneider and Frey (1985) found the effects to be statistically insignificant.

Political instability should erode the foreign investors' confidence in the local economy, which in turn should repel foreign investment away. Barro (1991) and Corbo and Schmidt-Hebbel (1991) stated that political instability creates an uncertain economic environment detrimental to long-term planning, which reduces economic growth and investment opportunities. Asiedu (2002) and Haque et al. (1997) contended that countries located in Sub-Saharan Africa are perceived as inherently risky, which likely keeps foreign investors away from that region. Several studies, such as Schneider and Frey (1985) and Edwards (1990), have found that political instability significantly depresses the FDI inflow, but Loree and Guisinger (1995), Jaspersen et al (2000), and Hanson (1996) found the effects to be insignificant. It should be noted here that this present study uses a cross-section of countries from Latin America over 1995-2004 – a period of relative political stability in the region; as a result, political instability is not included in the econometric model as a determinant of FDI.

Other variables routinely used in the FDI literature include: lagged changes in FDI ($\Delta FDI_{i,t-1}$), infrastructure, economic openness, and return on investment. Noorbakhsh et al. (2001) hypothesized that investors, who are typically risk-averse and hesitant to invest in unknown foreign territories, increase their foreign investment incrementally in familiar locations. The study also found that FDI inflow responds positively to lagged changes in FDI ($\Delta FDI_{i,t-1}$), which was used as a proxy for the level of familiarity foreign investors have about a particular country. Edwards (2000), Jaspersen et al. (2000), and Asiedu (2002) found that the rate of return on investment positively affects the FDI inflow, while Edwards (1990) and Gastanaga et al (1998) found that economic openness also causes the same. Finally, several studies, such as Wheeler and Mody (1992), Loree and Guisinger (1995), Asiedu (2002), etc., found that availability (and also quality) of infrastructure, a critical determinant of productivity and international competitiveness, significantly affects the FDI inflow.

THE MODEL

Empirical models found in the FDI literature have generally included various subsets of the following variables as determinants of FDI: trade openness, domestic market size, political instability, human capital, infrastructure, return on investment, incremental lagged changes in FDI (ΔFDI_{t-1}), etc. In the absence of a consistent theoretical framework to guide the empirical work, this study formulates the following general-to-specific model. Since the model is estimated with panel data (time-series data over 1995-2004 from a cross-section of 18 countries), subscript *i* refers to countries and t refers to time.

$$FDI_{i,t} = \alpha + \beta_1 \Delta FDI_{i,t-1} + \beta_2 \text{Economic Freedom}_{i,t} + \beta_3 \text{Trade Openness}_{i,t} + \beta_4 \text{Market Size}_{i,t} + \beta_5 \text{Human Capital}_{i,t} + \beta_6 \text{Infrastructure}_{i,t} + \beta_7 \text{Return on Investment}_{i,t} + \varepsilon$$

Rationale of the Model

Lagged changes in FDI (ΔFDI_{t-1}): Since foreign investors are typically risk averse and tend to avoid unfamiliar territories, it is important for host countries to establish track records of receiving FDI. Furthermore, many MNCs may test new markets by staggering their investments, which gradually reach the desired levels after some time adjustments. Incremental lagged changes in FDI should therefore positively affect the current level of FDI.

Economic Freedom: The overall investment climate in host countries plays a critical role in attracting foreign capital. The investment climate, however, is very difficult to measure or quantify, as it is determined by a host of economic and non-economic qualitative factors. The annual index of economic

freedom (EF), jointly published by The Heritage Foundation and The Wall Street Journal, is a reliable proxy for domestic investment climate. The publication defines economic freedom as "the absence of government coercion or constraint on the production, distribution, or consumption of goods and services beyond the extent necessary for citizens to protect and maintain liberty itself" (Heritage Foundation 2006, p. 56). The EF index therefore broadly reflects the extent to which an economy is pursuing policies conducive to free enterprise.

The EF index is constructed by incorporating 50 independent variables that fall under 10 broad categories -- trade policy, fiscal burden of government, government intervention in the economy, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation, and black market activity. These factors are weighted equally in constructing a country's overall index score on a scale of 1 to 5. A score of 1 signifies a consistent set of policies most conducive to economic freedom, while a score of 5 signifies a set of policies least conducive to economic freedom. Therefore, countries with lower EF index scores are likely to attract more FDI vis-à-vis countries with higher scores.

Market Size: Market demand in recipient countries can play a crucial role in attracting "market seeking" FDI, where the primary objective of multi-national corporations is to serve the domestic market. This type of FDI, however, does not generally flow to poor countries, where consumers do not have adequate purchasing power. The average per capita annual income in the sample countries during the sample period was about US $3,100, which is not particularly high. However, it is possible that some FDI flowing particularly to the middle-income countries in the sample – Argentine (per capita income - $7,450), Uruguay – ($5,900) and Mexico – ($5,600), is "market seeking" in nature. Following the literature, this study uses per capita real GDP as a proxy for the domestic market size.

Human Capital: Multi-national corporations are often attracted to developing nations by the abundance of their cheap labor. The cost advantages yielded by low wages can however be offset by even lower labor productivity in developing nations. Higher level of human capital is a good indicator of the availability of skilled workers, which, along with cheap labor, can significantly boost the locational advantage of a host country. Following the literature, this study uses the adult literacy rate as a proxy for the level of human capital.

Infrastructure: Availability of infrastructure, such as roads, highways, communication networks, electricity, etc. should increase productivity and thereby attract higher levels of FDI. Following the literature, this study uses the natural log of per capita electricity consumption (in kilowatt hours) as a proxy for the availability of infrastructure. In addition to availability, reliability of infrastructure (such as the frequency of electricity outage) could also be a crucial indicator of the overall quality of infrastructure, for which data is not readily available for most countries.

Return on Investment: Higher return on investment should naturally attract higher levels of foreign capital to host countries. Measuring the rate of return on investment, however, is not easy because most developing countries lack well-developed capital markets. To get around this problem, several studies, such as Edwards (1990), Jaspersen et al. (2000), and Asiedu (2002), have used the inverse of per capita income in natural log as a proxy for the return on investment. The rationale is that return on investment should be positively correlated with the marginal product of capital, which should be high in capital-scarce poor countries where per capita income is low (or the inverse of per capita income is high). Therefore, the inverse of per capita income should be positively related to FDI inflow. Following the literature, this study uses the natural log of inverse of per capita real GDP as a proxy for return on investment.

DATA, METHODOLOGY, AND ESTIMATION

This study uses panel data from 18 Latin American countries over 1995-2004. Data for FDI (annual FDI inflow as a percentage of GDP), trade openness (volume of trade as a share of GDP), per capita income, per capita electricity consumption, and adult literacy rate are collected from the *World Development Indicators CD-ROM* (World Bank, 2006), while data for economic freedom are collected from the *Index of Economic Freedom* (Heritage Foundation, 2006). The time frame covered in this study (1995-2004) is determined by the availability of data (the EF index is available from 1995 and the *WDI CD-ROM 2006* reports annual FDI inflow until 2004).

To ensure robustness of the estimated results, two widely used panel regression methods -- Generalized Least Squares (GLS) and Random Effects, are used. The estimated results are presented in Table 1. Among explanatory variables included in the regression equations, incremental lagged changes in FDI, economic freedom, trade openness, infrastructure, and return on investment turned out highly significant with the correct *a priori* signs in both models. Only two explanatory variables – market size and human capital, turned out statistically insignificant. As discussed in the previous section, most countries in the sample are relatively poor (the average per capita income in the region is only US $3,100 with only a handful of countries exceeding $5,000 in per capita income), which perhaps suggests weak domestic markets; it is however also plausible that the proxy variables for market size and human capital – per capita income and adult literacy rates, perhaps inadequately capture their true effects on FDI. The overall diagnostic statistics are satisfactory for both models. The White test for heteroscedasticity was performed for each model, which revealed signs of heteroscedasticity. Therefore, the models were estimated with heteroscedastic panels. Also, it was assumed that the panels have panel-specific autocorrelation parameters (details are available from the author).

Table 1: Determinants of FDI in Latin America (1995-2004)

Explanatory Variables	**GLS Model**		**Random Effects Model**	
	Coefficient	**z stat**	**Coefficient**	**z stat**
Intercept	7.43	2.71	11.64	2.21
ΔFDI_{t-1}	0.26	3.15**	0.23	3.22**
Economic Freedom	-0.75	-1.77*	-1.41	-2.29**
Infrastructure	2.22	4.45**	1.79	1.67*
Trade Openness	0.01	2.99**	0.02	1.67*
Return on Investment	2.30	4.31**	2.18	1.96**
Diagnostic Statistics	Sample size = 162		Sample size = 162	
	Log likelihood = -329.09		R^2 Overall = 0.21	
	Wald X^2_5 = 39.93 (P value = 0.00)		Wald X^2_5 = 20.08 (P value = 0.00)	
** Coefficient statistically significant at 5%; * Coefficient statistically significant at 10%				

Table 2 below shows the effects of NAFTA on the FDI inflow in Latin America, which is captured by a dummy variable for Mexico. The estimated results again confirm the results obtained in Table 1, particularly that economic freedom is a significant and robust determinant of FDI. The results also suggest that, vis-à-vis other countries in Latin America, Mexico has not gained a significant locational advantage due to NAFTA. Although this result may at first appear inconsistent with the FDI literature, for example Cuevas et al (2005), Aroca and Maloney (2005), etc., which holds that NAFTA has substantially boosted the FDI inflow to Mexico, a careful analysis reveals that the estimated models here in fact explore whether NAFTA has improved the locational advantage of Mexico over other Latin American

countries. Since other Latin American countries already belonged to several trade blocks, such as MERCOSUR (Argentina, Brazil, Paraguay, and Uruguay), Andean Community (Bolivia, Colombia, Ecuador, Peru, and Venezuela), Central American Common Market (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua), etc., they had been enjoying the fruits of free trade agreements long before Mexico was afforded the same by the creation of NAFTA. Therefore, it appears that NAFTA did not create additional locational benefits for Mexico vis-à-vis other countries in the sample; perhaps NAFTA allowed Mexico to join the club of FDI-friendly destinations.

It is also quite possible that the economic crisis that crippled the Mexican economy in 1995, known as the Tequila Crisis in the literature, perhaps dampened the inflow of FDI in Mexico. Since the aftermaths of NAFTA and the Tequila Crisis coincided in the late 1990s, it is difficult to disentangle their effects on FDI inflow. Nonetheless, this issue presents an avenue of further research, which is however beyond the scope of this study.

Table 2: Effects of NAFTA on the FDI Inflow in Latin America (1995-2004)

Explanatory Variables	**GLS Model**		**Random Effects Model**	
	Coefficient	**z stat**	**Coefficient**	**z stat**
Intercept	9.84	3.01	11.78	2.05
ΔFDI_{t-1}	0.26	3.22**	0.23	3.22**
Economic Freedom	-0.95	-2.08**	-1.41	-2.22**
Infrastructure	2.49	4.76**	1.77	1.60
Trade Openness	0.01	2.99**	0.02	1.62*
Return on Investment	2.77	4.50**	2.19	1.84*
NAFTA	0.63	1.57	0.33	0.20
Diagnostic Statistics	Sample size = 162		Sample size = 162	
	Log likelihood = -327.03		R^2 Overall = 0.21	
	Wald X^2_6 = 43.99 (P value = 0.00)		Wald X^2_6 = 19.43 (P value = 0.00)	
** Coefficient statistically significant at 5%; * Coefficient statistically significant at 10%				

POLICY IMPLICATIONS

This study finds that, in addition to the usual determinants of FDI used in the literature, economic freedom, used as a proxy for domestic investment climate, is also a significant and robust determinant of FDI in Latin America. These results suggest that in order to attract more FDI inflow, host countries need to improve their domestic investment climate. Improving domestic investment climate, however, is not an effortless feat. A careful analysis of the economic freedom index (as computed by the Heritage Foundation/Wall Street Journal) suggests that host country governments can improve their domestic investment climate by lowering average tariff rate and non-tariff barriers, reducing tax rates and government expenditures, reducing government ownership of businesses and industries, curbing the inflation rate, lifting restrictions on foreign ownership of resources, liberalizing the banking and financial sectors, allowing market wages and prices, securing private property rights and an independent judicial system, reducing excessive regulatory burden, and reining in black market activities (Heritage Foundation, 2006). Adopting these policies may be politically difficult in the short run, but these policies should yield long-run economic benefits that would far outweigh any short-run political costs.

In line with the literature, this study finds that greater trade openness, better availability of infrastructure, and higher return on investment boost the inflow of FDI in Latin America. Also, higher incremental

lagged changes in FDI, which is a proxy variable for foreign investors' incremental knowledge about the host country, is found to significantly increase the current level of FDI in Latin America. This result suggests that if a host country is able to successfully attract incremental FDI, that will boost foreign investors' confidence in an already familiar host country, which in turn will open the door to additional FDI inflow, thus setting a virtuous cycle in motion. Since the level of FDI is not a policy instrument for host governments, they should utilize the available pro-FDI policy instruments to dispel the risk-averse foreign investors' fear of investing in an unknown territory.

CONCLUSIONS

This study investigates the determinants of FDI in Latin America with a panel regression methodology using 1995-2004 data for 18 countries. By explicitly treating domestic investment climate as a determinant of FDI in Latin America, which has been hitherto excluded from the literature due to non-availability of reliable data, this study makes a noteworthy contribution to the relevant literature.

The results estimated in this study suggest that better domestic investment climate, better quality of infrastructure, greater trade openness, higher return on investment, and higher incremental lagged changes in FDI boost the FDI inflow to Latin America, while lack of economic freedom causes the contrary. While these results are generally consistent with the current FDI literature, the result that domestic investment climate is a significant and robust determinant of FDI is a noteworthy improvement over the current literature. This study finds that a domestic investment climate that is not conducive to economic freedom will likely offset the stimulating effects of other positive determinants of FDI. Therefore, strategies should be formulated to promote long-term economic freedom in developing countries, which will likely bring about a healthy economic environment leading to overall economic development.

The research focus of this study is worthwhile as it seeks to further our knowledge of the FDI dynamics in Latin America. A better knowledge of the determinants of FDI is crucial for devising strategies to promote long-term economic development -- a course that holds much at stake not only for Latin America, but also for developing countries in general.

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BIOGRAPHY

Dr. Rahim Quazi is an Associate Professor of Economics and the Director of the Center for International Business Education at Prairie View A&M University, Texas. He earned a PhD in economics from the University of Illinois, Urbana-Champaign. He has taught at Knox College and the University of Georgia. He has published many refereed journal articles on policy-oriented issues, including foreign aid, foreign direct investment, capital flight, and water resource planning.

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