THE SIGNIFICANCE OF INFRASTRUCTURE FOR FDI INFLOW IN DEVELOPING COUNTRIES[1]

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Abstract

This paper assesses the importance of infrastructure availability in the host developing country in increasing its attractiveness for overseas investors. I also take into account market size, economic development, macroeconomic stability, regional and income groupings, ability of the people to speak an international language and access to sea. Using annual data for a panel of 90 developing countries over the years 1980-2007, I found that consistent with the prediction of the market size hypothesis, population is found to have a significant positive effect on inward FDI. Sound macroeconomic management proxied by exchange rate and economic development have plausible significant effects on FDI inflows, whereas, high inflation signalling economic disorder deter foreign investors. Infrastructure availability measured through telephone-density positively influence overseas investors location choice. Though, it is sensitive to alternative proxy measures but robust with respect to specification of the estimating model. Language and geographic location dummies confirm that foreign firms prefer Anglophones, and are reluctant to invest in South Asia, MENA and Francophone countries. A significant time trend is also witnessed.

Keywords*: FDI, Infrastructure, Market Size, Macroeconomic Stability, Economic Development.*

JEL Classifications*: C230, F130, 140, F210, F230,*

1. INTRODUCTION

The proportion of affiliate products in world trade has increased many folds during the last few decades and so has the importance of the factors helping or resisting their flow[3]. Moreover, empirical evidence indicates that availability of necessary infrastructure in the host country positively affect Foreign Direct Investment *(FDI)* inflows (Haile and Assefa 2006). At the same time a firm's investment decision is likely to be influenced by the traditional location pull factors such as the capacity of the host country to absorb the multinationals product, purchasing power of the population indicated by gross domestic product per capita *(GDPPC)* and sound macroeconomic environment to enable the multinational to optimally utilise its resources. Similarly, the recent economic constriction in the developed world has limited their ability to invest abroad; enhancing the competition among the developing world to lure them to invest in a particular host, hence focus on factors affecting their investment decision in a developing country seems suitably well-timed. Thus, it is important to continuously understand, explore, and grasp the existing and possible new factors that may influence *FDI* flows to the developing nations.

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[3]. On average 50 percent of US trade occurs between the affiliates of the same multinational where as 90 percent of *US* exports and imports flow through a *US MNC* (Blonigen 2006). Multinationals hire more than 80 million people worldwide (Li et al. 2010) and overall *MNC* trade account for about 70 percent of world trade (Li and Resnick 2003).

This study by specifically examining the role of infrastructure and other variables such as market size, macro-stability, trade liberalisation and so on, using annual data for a panel of 90 developing countries over the years 1980-2007 sheds some light on the issue. The findings support the argument that infrastructure availability, market size, economic development, macroeconomic stability have a significant positive effect on inward foreign direct investment in developing countries.

The next section explores the interrelationship between location *FDI* pull factors and their plausible influences on *FDI* inflows. The third section presents the reduced form empirical model and examines the estimation issues. Section four reports and analyse the empirical results and discuss the robustness checks. The final section, five, presents some conclusions.

2. THEORETICAL FOUNDATIONS OF THE LOCATION FACTORS AFFECTING INWARD FDI

In order to deal with the primary question addressed in this paper I need to first discuss and sift the impact of other host country characteristics that affect the location decision of overseas investors. Once I have controlled for them then the effect of infrastructure on the inward *FDI* in a developing country can be explored and assessed with appropriate proxies.

2.1 Market Size

Empirical *FDI* literature has established the importance of market size on inward *FDI*. The primary explanation is based on the presence of economies of scale. Bigger markets offer additional possibilities to fully exploit the factors of production and make an optimal use of the imported technology. Glaring examples are of export oriented vertical *FDI* in Mexico, China, Malaysia, Indonesia and the Eastern European countries, especially in labour intensive industries (Feenstra 1998). In the empirical section I have used gross domestic product *(GDP)* and population as alternative proxy measures and expect a positive relationship between *FDI* inflows and market size.

2.2 Economic Development /Capital Abundance/Income Level

The type and pattern of inward *FDI* is expected to be reflective of a country's level of development (Loungani et al. 2002) and causes it to become more horizontal as development proceeds (Maskus 1998). Gross domestic product per capita (*GDPPC*) also signifies the income level of the host country population and hints at the expected quantity and kind of goods that can be sold in the host market.

I have employed per capita gross domestic product and a few other per worker and per capita measures as proxies for the development level/capital abundance of the host developing country and expect a positive influence on *FDI* inflows[4].

2.3 Openness/Liberalisation

Developing countries imposed quotas, custom duties and tariff barriers in the 1970s and 1980s predominantly for import substitution and to some extent for technology transfer and other spill over considerations. This caused tariff jumping *FDI* in these countries

[4]. However, due to its direct association with wage level it may exert a negative effect on inward *FDI* (Cieślik 2005a). The details and sources of all the variables are provided in appendix 1.

necessitated by the cost considerations resulting from tariff and other restrictions (Balasubramanyam et al. 2002).

However, in the 1990's the success of East Asian countries (Balasubramanyam and Sapsford 2001) and particularly Mexico in drawing *FDI* despite trade and investment liberalisation led many other developing countries to open up their economies (Nunnenkamp 2002)[5]. For example Poland's increasing commercial ties with Western Europe and its rapid liberalization and deregulation program led to multi-fold increase in inward *FDI* in the early 1990s (Cieślik 2005b)[6]. Even Sub-Saharan countries like Mali and Mozambique witnessed increased *FDI* after introducing reforms and liberalisation (Morisset 2000).

In the present study I have utilised trade (sum of exports and imports of goods and services) measured as percentage of *GDP* as a proxy for a host country's openness and anticipates a positive association between *FDI* inflows and a developing country's market liberalisation.

2.4 Macroeconomic Stability

Inflation, government budget balance, interest and exchange rates are used to measure macroeconomic stability of a host country. An economy with a good track record of fiscal prudence, financial stability and managing inflation and interest rates without sudden and abrupt fluctuations in exchange rate shall gain investors confidence and encourage them to invest, especially in the current climate of global economic slowdown.

I have used inflation and direct exchange rate to proxy macroeconomic stability. However, the impact of both of them is ambiguous and will depend on the extent of multinational local liability exposure. On the one hand, devaluation/depreciation will make their products cheaper in international markets. On the other, if they require a high import component, it will make the intermediate inputs expensive, making their products non-competitive in the local market. Nonetheless, the effect on re-exports will be negligible and will partly benefit *MNC's* due to reduction in the cost of inputs procured from the local market.

Considering that one of the standard symptoms of the loss of fiscal or monetary control is unbridled inflation, it will discourage savings and dampen private, domestic and foreign investment as evident from low FDI in many African, Caribbean, Latin American and Pacific countries (Morrissey 2008). Therefore, allowing for the fact that investors prefer to invest in more stable economies that reflect a lesser degree of uncertainty, it is reasonable to expect a negative effect on direct investment of economic instability in a developing host country.

2.5 Infrastructure

The amount, availability and quality of supportive infrastructure is essential for the smooth functioning of multinational's affiliate production and trade activities. Better infrastructure can significantly reduce overhead costs (Asiedu 2004) and thereby positively affect investor's location decision (Shah and Ahmed 2003). If infrastructure functionality alone is not multinational's engine of production, it for sure is their wheel of economic activity in the developing countries (Khan and Kim 1999).

[5]. It shall be kept in mind that many African countries despite liberalising their markets failed to attract substantial *FDI* inflows, whereas countries like China, though recently liberalised its economy witnessed significant inward investment.
[6]. Poland, Hungary and the Czech Republic are the *CEEC* leaders in liberalisation reforms, deregulation, openness and *FDI* inflows (Holland and Pain 1998).

In *FDI* literature infrastructure is captured with the total length of metalled roads, rail networks, uninterrupted power and water supply, number of sea and international airports, dummy variables for their existence and lately telecommunication density approximated with the number of fixed line telephone and mobile phone subscribers or internet access possibilities.

Multinationals are expected to prefer countries with well-established/developed infrastructure as other things constant they can optimally utilise the imported machinery/paraphernalia in such economies.

Though, the use of telephone-density as an infrastructure proxy is questioned on the pretext of the extent to which it can facilitate multinationals operations (Morisset 2000). Nevertheless, the emergence and growth of transnational corporations to the present level seems inconceivable without an adequate communication infrastructure at the international level. The complex nature of ever increasing communication needs between the headquarters and the subsidiaries indicates the existence of a dynamic and mutual relationship between communication infrastructure, information flows and economic, financial, trade and other kinds of spatial interactions. Consequently, higher density of telecommunications network shall decrease coordination costs between firms and their affiliates (Campos and Kinoshita 2003). Hence, I have utilised the number of mobile and landline telephone subscribers in the host economy and expect a direct positive association between it and *FDI* inflows.

In addition I have also utilised gross fixed capital formation as an alternative proxy for infrastructure availability (Haile and Assefa 2006). According to World Bank, world development indicators *(WB, WDI)* Gross fixed capital formation *(GFCF)* includes land improvements including fences, ditches, drains, and so on; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, together with schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. Therefore, I expect a positive influence on *FDI* inflow possibility of *GFCF* and it will act as a robustness check as well.

2.6 Geographical Location, Sea Access, International Language & Income Group

I have also tried to gauge the effects of geographical location, population ability to speak an international language, regional and income based dummies and access to sea. Data on these variables was constructed from *CIA's* world fact book and Centre d'Etudes Prospectives et d'Informations Internationales *(CEPII)*.

Access to water appears to be important for international trade due to the significantly cheaper ocean transportation of intermediate or finished goods. However, it is difficult to theoretically justify, and empirically gauge the significance of the other dummy variables like language, regional and income based dummies in *FDI* flows[7].

2.7 Summary

Building on the prior discussion, this paper seeks to provide an insight into the role of infrastructure availability in particular and other location pull factors in general in motivating multinationals to engage in foreign direct investment.

[7]. The classification of the host developing countries into different income and regional groups and sea access and language dummies is given in appendix 2.

Though, the importance of the traditional location factors such as the size of the market to be served, the long-term macroeconomic stability of the host country, the supply of skilled or trainable workers still exist for many prospective investors. However, once these criteria are satisfied, then the extent of the presence of modern communications infrastructure in the host economy shall certainly influence the investor's choice among the probable investment sites.

3. EMPIRICAL MODEL AND ESTIMATION ISSUES

According to Blonigen (2006) "deriving a theoretically based empirical specification of *FDI* is a fairly complicated problem". Nevertheless, on the basis of the arguments on the possible determining factors of inward *FDI* in the second section, I postulate the following reduced form set up to explain the effect of infrastructure availability and other relevant factors on the investment inflows into a developing country:

$$FDI_{jt} = f\begin{pmatrix} MarketSize_{jt}, EconomicDevelopment_{jt}, Openness_{jt} \\ MacroeconomicStability_{jt}, Infrastructure_{jt}, \\ SeaAccess_{j}, Language_{j}, Geographicalregion_{j} \end{pmatrix} \quad (1)$$

Where the subscript j denotes a developing country and varies from 1 to 90. The time subscript t varies from 1 to 28 covering the years 1980 to 2007. Therefore, I can have a total of 90*28= 2520 observations for each variable included in the sample. FDI_{jt} is the stock of the foreign direct investment from rest of the world in country j. The choice of aggregate *FDI* stock in the host country as the dependent variable, in addition to data availability, was necessitated by the inadequacy of the available alternative, the net *FDI* inflow, where it cannot be distinguished whether a reported positive (negative) value is caused by decreased (increased) outflows or increased (decreased) inflows. This would have complicated interpreting the results. The criteria for the independent variables choice include ease of data availability, sound theoretical justifications, and the variable's robustness in the empirical *FDI* literature. I have made a conscious attempt to gauge the relative importance of each factor. However, it is difficult, at times, because the factors are interrelated and vary across countries and time periods in distinct orders.

Log linearising equation 1 and replacing the variables with the appropriate proxies I get:

$$\begin{aligned} \ln fdi_{jt} = {} & \alpha_0 + \beta_1 \ln Population_{jt} + \beta_2 \ln Gdppc_{jt} + \beta_3 \ln Trade_{jt} \\ & + \beta_4 \ln ExchangeRate_{jt} + \beta_5 \ln TeleDensity_{jt} + \beta_6 SeaAccess_{j} \\ & \beta_7 Language_{j} + \beta_8 Geographic\,\mathrm{Re}gion_{j} + \xi_{jt} \end{aligned} \quad (2)$$

Where, ln is used for natural log. Logging the variables helps in reducing the expected hetereoskedasticity.

Table 1 provides the summary statistics for each variable used in the empirical estimations including means, standard deviations, minimum and maximum values and the number of observations.

To utilise the appropriate panel estimation model for a large and diverse cross-section of countries as in this study I carried out the Hausman (1978) specification test to choose between the fixed and random effect model. The test with the following results chi^2 (6) = 64.70, Prob > chi^2 = 0.0000 reject the null hypothesis assumptions that the coefficients estimated by the efficient random effects estimator are the same as the one estimated by the consistent fixed effects estimator and suggests the application of the fixed effect estimator, indicating the presence of correlation between the individual component and the explanatory variables, that is, between the α_i and X_{it}[8] (Braga and Cardoso 2004). I carried out The Breusch-Pagan / Cook-Weisberg test for heteroskedasticity[9] which failed to reject the null hypothesis of constant variance or homoskedastic standard errors $chi^2(1)$ = 0.54, Prob > chi^2 0.4643 (Carr et al. 2001).

Table 1

Summary Statistics					
Variable Name	Number of Observations	Mean Value	Standard Deviation	Minimum Value	Maximum Value
LnFDI Stock	2520	20.62	2.28	7.08	28.04
LnGDP	2520	22.77	1.95	17.69	28.85
Ln Population	2520	15.86	1.92	10.60	20.99
LnGDPPC	2520	6.91	1.12	4.42	9.70
LnGDPPCPPP	2520	7.64	1.09	4.78	10.17
LnGFCFPC	2520	5.29	1.32	0.00	8.36
LnTrade%GDP	2520	4.15	0.55	1.99	5.64
Ln Exchange Rate	2520	3.18	2.44	0.00	12.99
Ln Inflation	2520	2.26	1.32	-3.29	10.10
Ln Tele-Density	2520	12.23	2.81	0.00	20.63
LnGFCF	2520	21.12	2.11	0.00	27.96
All the Langual and Regional dummies vary from 0 to 1.					

4. RESULTS DISCUSSION AND SENSITIVITY ANALYSIS

In table 2 using fixed effects panel estimation I have tried to establish a set of location factors for the baseline model to measure the effects of infrastructure related aspects. The third column presents the result of a fixed effects regression assuming host country specific intercepts. The coefficient for the market size variable (population) is positive and significant as expected. An increase in the size of a host country is associated with more *FDI* inflows. Using the log of gross domestic product as a proxy for the market size produced the same results but I avoided using it due to the expected endogeneity between current *GDP* and contemporary *FDI* inflows.

A country's development level proxied by gross domestic product per capita is a positive, statistically significant determinant of foreign direct investment location. The array of coefficient estimates indicates that foreign direct investment is very responsive to per capita *GDP* in the host developing countries. Trade (sum of the imports and exports of goods and services) as a percentage of *GDP* employed as a measure of liberalization reveals with a

[8]. Or in other words the unit error component is correlated to the regressors $\{H_0: E(U_{it}/X_{it} \neq 0)\}$ (Winchell 2007).
[9]. For theoretical purpose consult Hsiao (2003, page 55-57), Studemund (2006, Chapter 10) or Wooldridge (2009, Chapter 8).

strongly positive and highly significant coefficient that increased openness of the host country causes more *FDI* because of lower trade barriers.

The overall positive impact of trade liberalisation appears to assert the argument that market reforms and opening of the economy leads to a general reduction in administrative barriers and improves the business environment in the host country, conveying the right signals to the international business community, and thus increases *FDI* inflows.

Factors representing macroeconomic stability such as inflation and exchange rate are introduced in model 2 and 3 (table 2) respectively. Other results remain the same as presented in the previous regression, that is, model 1. The coefficient for inflation is significantly negative showing that an increase in consumer prices causes a decrease in inward *FDI*. This result supports the empirical evidence that sound macroeconomic management and the ability of the host government to monitor and manage inflation encourage foreign investors. Using direct quote, that is, 1US$ = units of host country's currency, as exchange rate gives a positive coefficient at 1% significance level. It indicates that depreciation/devaluation inducing a reduction in local production costs in term of foreign currency stimulates more investment inflows[10].

The coefficient for tele-density in model 4 and 5, used as a proxy for infrastructure is positive and statistically significant at 1% significance level. It supports the evidence that availability of better communication infrastructure represents value added factors that led investors to choose a particular location. However, gross fixed capital formation *(GFCF)*[11] used as the alternative proxy for infrastructure in model 6 and 7 is insignificant. However, this doesn't mean that the results for infrastructure do not hold; rather the unavailability of a suitable proxy for such a large sample of developing countries over the given 28 year's period necessitated its utilisation in the first place.

Given the importance of the improvement in infrastructure in the developing countries in modern times, an empirical investigation into its effect on inward *FDI* should be able to account for its variation both across countries and over time. Consequently, in table 3, I control for regional, lingual and sea access dummies that are invariant over time and cannot be tested with panel data fixed effects or first difference dynamic models since these factors are either spanned by the country dummies or are differenced away and cannot be identified[12]. I therefore, have to use the alternative panel data technique, that is, random effect method to shed light on role of these factors. It will also act as a robustness check of my results with the fixed effect model.

It can be seen from table 3 that the random effects specification produces essentially the same estimates as the fixed effects model regressions in table 2. Model one shows the positive effects of a larger market, degree of development, market liberalisation and

[10]. An interesting case is that of *ASEAN* countries. Since mid-1980s China devaluing the Yuan against the dollar, indirectly devalued it against the yen as well, while Indonesia, Malaysia, Thailand and Philippines (the *ASEAN-4*) pegged their currencies to US dollar. The devaluation of the Yuan led to the appreciation of the *ASEAN-4's* currencies versus the Yuan, making their products expensive, thereby improving China's competitiveness for *FDI* (Xing and Wan 2006).

[11]. For its earlier empirical utilisation see Asiedu (2004) and Haile and Assefa (2006).

[12]. Strictly speaking, with the Hausman specification test favouring the fixed effects model, it is the appropriate estimation technique to use.

Table 2 Estimation Results for Establishing Base Line Model of FDI Inflows

Estimation Method / Variables	Proxy Utilised	Fixed Effects						
		1	2	3	4	5	6	7
Market Size	lnPopulation	2.6206* (0.1154)	2.5526* (0.1168)	1.8333* (0.0351)	1.1985* (0.1991)	0.4864$^{\alpha}$ (0.2072)	1.7998* (0.1380)	2.5174* (0.1205)
Economic Development	lnGDPPC	1.2812* (0.0495)	1.2298* (0.0516)	1.2947* (0.0484)	0.9126* (0.0635)	0.9782* (0.0606)	1.2622* (0.0558)	1.1965* (0.0587)
Openness	lnTrade%GDP	1.1433* (0.0775)	1.1505* (0.0774)	0.9255* (0.0785)	0.9501* (0.0799)	0.7266* (0.0809)	0.9068* (0.0801)	1.1309* (0.0791)
Macroeconomic Stability	lnInflation		-0.0678* (0.0196)		-0.0672* (0.0193)			-0.0674* (0.0196)
	lnExchange Rate			0.2405* (0.0227)		0.2397* (0.0223)	0.2403* (0.0227)	
Infrastructure Availability	lnTeleDensity				0.2716* (0.0326)	0.2706* (0.0319)		
	lnGFCF						0.0359 (0.0307)	0.0372 (0.0313)
R-Squared		46.87%	47.10%	51.49%	60.69%	57.13%	51.50%	47.11%
No of Observations		2520	2520	2520	2520	2520	2520	2520
Standard errors are reported in parenthesis under the coefficient estimates. * represents significance at 1 %, α at 5 % and φ at 10 %.								

Table 3 Estimation Results for Time Invariant, Sea Access, Regional, Lingual and Income Phenomenon

Estimation Method /Variables	Proxy Utilised	Random Effects								
		1	2	3	4	5	6	7	8	9
Market Size	Ln Population	0.7279* (0.0647)	1.2929* (0.0590)	0.7375* (0.0646)	0.7597* (0.6522)	0.7308* (0.0649)	0.7262* (0.0646)	0.7838* (0.0667)	0.7572* (0.0644)	0.7698* (0.0647)
Economic Development	Ln GDPPC	0.8573* (0.0562)	1.3031* (0.0547)	0.8701* (0.0565)	0.8503* (0.0561)	0.8816* (0.0574)	0.8729* (0.0577)	0.8516* (0.0571)	0.8435* (0.0569)	0.8487* (0.0546)
Openness	Trade % GDP	1.0134* (0.0769)	1.4778* (0.0727)	1.0152* (0.0768)	1.0097* (0.0768)	1.0097* (0.0768)	1.0055* (0.0769)	1.0039* (0.0769)	1.0105* (0.0768)	0.7969* (0.0745)
Macroeconomic Stability	Inflation	-0.0767* (0.0189)	-0.1065* (0.0195)	0.0762* (0.0189)	-0.0778* (0.0189)	-0.0729* (0.0190)	-0.0736* (0.0190)	-0.0778* (0.0189)	-0.0788* (0.0191)	-0.0395$^{\alpha}$ (0.0183)
Infrastructure Availability	lnTeleDensity	0.3070* (0.0226)		0.3051* (0.0226)	0.3045* (0.0225)	0.3079* (0.0226)	0.3096* (0.0226)	0.3012* (0.0226)	0.3042* (0.0226)	0.0488 (0.0309)
	lnGFCF		0.0208 (0.0319)							
Geographic Regions	MENA			-0.7288$^{\alpha}$ (0.3301)						
	South Asia				-1.2883$^{\alpha}$ (0.5102)			-1.5199* (0.5237)	-1.2883$^{\alpha}$ (0.5034)	-0.9735$^{\varphi}$ (0.5157)
	SSA					0.4576$^{\alpha}$ (0.2178)	0.5717$^{\varphi}$ (0.2314)			
Sea Access	Dummy						0.3829 (0.2750)	0.1174 (0.2507)	0.1351 (0.2498)	0.6136$^{\alpha}$ (0.2570)
Language	English							0.3471$^{\varphi}$ (0.2140)		
	French								-0.0249 (0.2456)	-0.6479$^{\alpha}$ (0.2542)
Time Trend										1.4964 (0.0931)
R-Squared		63.48%	63.93%	63.98%	64.63%	63.40%	63.93%	65.18%	64.89%	69.50%
No of Observations		2520	2520	2520	2520	2520	2520	2520	2520	2520
Standard errors are reported in parenthesis under the coefficient estimates. * represents significance at 1 %, α at 5 % and φ at 10 %.										

infrastructure provision. The negative effects of macroeconomic instability are also evident. Model 2, shows once again the insignificance of *GFCF*.

Estimates from model 3, 4 and 5 confirm the importance of controlling for regional effects. The Middle East and North African *(MENA)* and South Asian countries seems to deter overseas investors despite the post 1990 surge of *FDI* into India and this effect is robust to inclusion of other variables[13]. The Sub-Saharan African *(SSA)* countries exhibit significant positive effects. This is contrary to the findings of Asiedu (2002) and Aizenman and Spiegel (2006) who found a significant negative coefficient for *SSA* countries. Though, insignificant and not shown in the table the Latin American & Caribbean *(LAC)* and the East Asian & Pacific ones have a positive coefficient. Access to sea has an insignificant effect.

In model 7, I included the language dummy; the coefficient for the Anglophone countries is significant at ten percent level, whereas the one for francophone's is significantly negative in model 9. However, both are sensitive to specifications and turn insignificant in some of the following regressions. The coefficients for Spanish and Portuguese were insignificant despite the fact that the Latin America & Caribbean *(LAC)* countries predominantly speak these two languages and the regional dummy for *LAC* is positive. These asymmetries in the effects of regional and lingual dummies on inward *FDI* seem difficult to interpret. The dummies for the income groups though, positive were generally insignificant[14].

Like most regression based analysis, omitted variable bias cannot be altogether written off, for example the host country dummies will capture merely the time invariant lingual or geographic effects. Consequently, to control for time variant phenomenon equallyaffecting all the dyads μ_t was added to model 9 in table 3. Its coefficient is significant at 1 % level and reduces the effect of the other variables, though most remain significant at the same level. The worst affected is the infrastructure (teledensity) variable which turns insignificant. According to Mátyás (1998) without properly controlling for these effects the coefficients estimates can lead us to make incorrect inferences.

Hence with its inclusion, I perceive that omitted variable shall not, significantly, bias my results, as potentially all static relationships involving the host countries are accounted for. However, it need to be remembered that a time trend is somewhat restrictive, unlike time dummies, and allows us only to capture a decreasing, increasing or smooth pattern of *FDI* flows.

Market size, economic development, liberalisation, macroeconomic instability still exerts a significant effect whereas the language and sea access are sensitive to specifications. However, it shall be kept in mind that the infrastructure is proxied by number of telephone and mobile phone subscribers in a country and their number significantly increased in the last two decades. For this reason, the time trend may be swamping its significant effect.

5. CONCLUSION

Utilising fixed effects and a random effects panel model I investigated the effect of infrastructure avaiability on *FDI* inflows in a sample of 90 developing countries over the years 1980-2007, after controlling for the traditional location determinants of inward *FDI*.

[13]. This may be caused by the political and economic instability and insurgencies in the region, such as the Maoists in Nepal, *LTTE* in Sri Lanka and Islamists problems in Pakistan. Moreover, according to Asiedu (2004 and 2006) 40% of South Asian people live on less than a dollar a day.

[14]. Though, I have tried various combinations but avoided using all the dummies for the same characteristic as it may lead to dummy variable trap causing exact multicolinerity (Harms and Ursprung, 2001 and Asteriou, 2006, page 205).

The results confirm that presence of a large domestic market; economic development and liberalisation exert a strong positive influence. Macroeconomic instability deters overseas investors. Infrastructure though significant is sensitive to specifications but robust to estimations techniques. However, this does not imply that it can be left out of a coherent strategy to increase the attractiveness of a developing country for the overseas investors.

Finally, it is found that the geographic regional and lingual characteristics of the developing country affect the multinational firm's investment decision. Sub-Saharan Africa, contrary to earlier findings, seems to be their preferred region and *MENA* and South Asia countries the least sought after. English being the lingua franca of global commerce exerts a positive effect on multinationals, whereas French a negative one, probably due to large number of North African (MENA) francophone countries. Spanish and Portuguese speaking nations have a positive but insignificant effect; the same is for East Asian and Pacific region.

The positive impact of infrastructure availability highlights the importance of the rapport between necessary infrastructure provision in the host nation and investment inflows in the developing countries.

My analysis signals interesting patterns of multinational behaviour that national governments can refer to in their efforts to attract foreign direct investment. I can conclude that even now much of the *FDI* in developing countries is prompted by traditional location factors. Nevertheless, even there multinational firms, when they have a choice value infrastructure availability and it tends to play a more decisive role than it once did.

Appendix 1: Data Sources for the Variables Used

Dependent Variable	Proxy for / Source
Stock Inward FDI	$LnFDIstock_{jt}$, Foreign Direct Investment stocks in the host developing country j at the end of the time period t from all the source countries. Source: UNCTAD FDIStat database.
Independent Variables	**Proxy for / Source**
Gross domestic product & Population	LnGDP and LnPOP, Alternative proxies for market size. Host country GDP or population at time period t. Source: World Bank, World Development Indicators.
Gross domestic product per capita, GDPPC adjusted for purchasing power parity & gross fixed capital formation per capita.	Logs of these measures are used as alternative proxies for Economic development, income level, factor endowments and human capital accretion. Host country LnGDPPC, LnGDPPC adjusted for PPP and LnGFCFPC. Source: World Bank, World Development Indicators.
Aggregate trade as a percentage of GDP	LnTrade, Aggregate trade of the host country is used as a proxy for openness. Source: World Bank, World Development Indicators.
Exchange Rate 1US$ = host currency and inflation	Proxies for macroeconomic stability of the host country. Source: Exchange Rate. Pen world table version 6.3. Inflation. World Bank WDI.
Infrastructure	1. LnTele-Density, Number of mobile and fixed line subscribers as a proxy for infrastructure availability. Source: International Telecommunication Union, WB WDI. 2. LnGFCF, Gross fixed capital formation as alternative proxy for overall infrastructure development and availability. Source: WB WDI.
Language	Dummies for international languages e-g English, French, Spanish and Portuguese. Sources: 1. CIA world fact book and 2. Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).
Sea Access	Dummies for access to sea, landlocked, island etc. Sources: 1. Google map and 2. Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).
Geographical and Income groups	Dummies for regional and income groups. Source: World Bank, World Development Indicators.

Appendix 2: List of the Developing Countries and their Characteristics

Country Name	Income Group	Geographic Region	Sea Access	Language
Algeria	LMINC	MENA	Yes	French
Angola	LMINC	SSA	Yes	Portuguese
Argentina	UMINC	LAC	Yes	Spanish
Barbados	UMINC	LAC	Yes	English
Benin	LINC	SSA	Yes	French
Bolivia	LMINC	LAC	No	Spanish
Botswana	UMINC	SSA	No	English
Brazil	LMINC	LAC	Yes	Portuguese
Burkina Faso	LINC	SSA	No	English
Burundi	LINC	SSA	No	French
Cameroon	LMINC	SSA	Yes	English
Central African Republic	LINC	SSA	No	French
Chad	LINC	SSA	No	French
Chile	UMINC	LAC	Yes	Spanish
China	LMINC	EAP	Yes	Other
Colombia	LMINC	LAC	Yes	Spanish
Congo Dem. Republic	LINC	SSA	Yes	French
Congo Republic	LMINC	SSA	Yes	French
Costa Rica	UMINC	LAC	Yes	Spanish
Cote d'Ivoire	LINC	SSA	Yes	French
Dominican Republic	LMINC	LAC	Yes	Spanish
Ecuador	LMINC	LAC	Yes	Spanish
Egypt, Arab Republic	LMINC	MENA	Yes	English
El Salvador	LMINC	LAC	Yes	Spanish
Ethiopia	LINC	SSA	No	English
Fiji	LMINC	EAP	Yes	English
Gabon	UMINC	SSA	Yes	French
Gambia	LINC	SSA	Yes	English
Ghana	LINC	SSA	Yes	English
Guatemala	LMINC	LAC	Yes	Spanish
Guinea	LINC	SSA	Yes	French
Guyana	LMINC	LAC	Yes	English
Honduras	LMINC	LAC	Yes	Spanish
Hungary	UMINC	ECA	No	Other
India	LINC	SA	Yes	English
Indonesia	LMINC	EAP	Yes	English
Iran, Islamic Republic	LMINC	MENA	Yes	Other
Jamaica	LMINC	LAC	Yes	English
Jordan	LMINC	MENA	Yes	English
Kenya	LINC	SSA	Yes	English
Lebanon	UMINC	MENA	Yes	French
Lesotho	LMINC	SSA	No	English
Libya	UMINC	MENA	Yes	English
Madagascar	LINC	SSA	Yes	English

Malawi	LINC	SSA	No	Other
Malaysia	UMINC	EAP	Yes	English
Mali	LINC	SSA	No	French
Mauritania	LINC	SSA	Yes	French
Mauritius	UMINC	SSA	Yes	English
Mexico	UMINC	LAC	Yes	Spanish
Morocco	LMINC	MENA	Yes	French
Mozambique	LINC	SSA	Yes	Portuguese
Nepal	LINC	SA	No	English
Nigeria	LINC	SSA	Yes	English
Niger	LINC	SSA	No	French
Oman	UMINC	MENA	Yes	English
Pakistan	LINC	SA	Yes	English
Panama	UMINC	LAC	Yes	Spanish
Papua New Guinea	LINC	EAP	Yes	English
Paraguay	LMINC	LAC	No	Spanish
Peru	LMINC	LAC	Yes	Spanish
Philippines	LMINC	EAP	Yes	English
Poland	UMINC	ECA	Yes	Other
Rwanda	LINC	SSA	No	French
Samoa	LMINC	EAP	Yes	English
Senegal	LINC	SSA	Yes	French
Seychelles	UMINC	SSA	Yes	English
Sierra Leone	LINC	SSA	Yes	English
Solomon Islands	LINC	EAP	Yes	English
South Africa	UMINC	SSA	Yes	English
Sri Lanka	LMINC	SA	Yes	English
Saint Kitts and Nevis	UMINC	LAC	Yes	English
Saint Lucia	UMINC	LAC	Yes	English
Saint Vincent & Grenadines	UMINC	LAC	Yes	English
Sudan	LINC	SSA	Yes	English
Swaziland	LMINC	SSA	No	English
Syrian, Arab Republic	LMINC	MENA	Yes	French
Tanzania	LINC	SSA	Yes	English
Thailand	LMINC	EAP	Yes	English
Togo	LINC	SSA	Yes	French
Trinidad and Tobago	UMINC	LAC	Yes	English
Tunisia	LMINC	MENA	Yes	French
Turkey	UMINC	ECA	Yes	Other
Uganda	LINC	SSA	No	English
Uruguay	UMINC	LAC	Yes	Spanish
Vanuatu	LMINC	EAP	Yes	English
Venezuela Republic	UMINC	LAC	Yes	Spanish
Vietnam	LINC	EAP	Yes	English
Zambia	LINC	SSA	No	English
Zimbabwe	LINC	SSA	No	English

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