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Foreign Direct Investment, Host Country Factors and Economic Growth

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Abstract

This paper analyses how the levels of economic development, human capital, financial development and the qualities of the economic and political environments in host countries simultaneously affects the impact of aggregate inflows of Foreign Direct Investment (FDI) on economic growth. Multiple interaction terms are employed between inward FDI and each of the host country factors mentioned above. The System GMM estimator is applied to a panel of 111 countries from 1981 to 2005. The results show that the level of economic development, human capital and quality of the political environment all significantly affect the relationship between inward FDI and growth.

Keywords: FDI, economic growth, host country factors, System GMM and panel data.
JEL Classification: F21, F23.

Resumen

Este artículo analiza cómo los niveles de desarrollo económico, capital humano, desarrollo financiero y la calidad del ambiente económico y político en los países receptores afectan, simultáneamente, el impacto de los flujos agregados de la Inversión Extranjera Directa (IED) sobre el crecimiento económico. En este artículo, se emplean diversos términos de interacción entre los flujos internos de IED en los países receptores, con cada uno de los factores que se mencionan. La técnica del Sistema GMM se aplicará a un panel de 111 países, de 1981 a 2005. Los resultados muestran que el nivel de desarrollo económico, capital humano y calidad del ambiente

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político afectan significativamente la relación entre el flujo interno de IED y el crecimiento.

Palabras Clave: IED, crecimiento económico, factores de países receptores, Sistema GMM y datos de panel.
Clasificación JEL: F21, F23.

Introduction

Foreign Direct Investment (FDI) refers to a type of international investment whereby the investor obtains a significant influence in the management of an entity outside the investor's home country. FDI has become an important force in the global economy. According to the 2010 World Investment Report (UNCTAD, 2010), global inflows of FDI was $1,114 billion in 2009. Figures from the same report indicated that global inward and outward stocks of FDI as percentages of GDP were respectively 32.3% and 34.5% in 2009. In addition, there is some evidence that government investment policies around the world are being modified in order to promote FDI. Table 1 shows the number of investment regulatory regime changes that were adopted from 1991 to 1998 by a range of 35 to 76 countries. On average, about 112 regulatory changes took place, of which 105 (*i.e.,* 94%) of these changes were more favourable to FDI.

Table 1
National FDI-Related Regulatory Changes, 1991-1998

Item	1991	1992	1993	1994	1995	1996	1997	1998
Number of countries that introduced changes in their investment regimes	35	43	57	49	64	65	76	60
Number of Regulatory Regimes	82	79	102	110	112	114	151	145
of which:								
More favourable to FDI	80	79	101	108	106	98	135	136
Less favourable to FDI	2	-	1	2	6	16	16	9

Source: World Investment Report (1999).

The sheer magnitude of FDI inflows, together with the fact that several countries have implemented changes in their regulatory regimes to encourage FDI leads to the question of what impact inflows of FDI have on the economic growth in host countries, *i.e.*, the country that FDI flows into.

The objective of this paper is to examine the simultaneous effect of various Host Country Factors (HCF) on the relationship between inflows of FDI and economic growth. In particular, I allow for the levels of economic

development, human capital, financial development, the quality of the economic environment and the quality of the political environment in the host countries to simultaneously affect the relationship between FDI and economic growth by including interaction terms between each HCF and FDI. To conduct my empirical investigation, I apply the system GMM with a collapsed instrument set to a panel dataset of 111 OECD and Non-OECD countries from 1981 to 2005.

A major contribution of this paper is that I study how the five HCFs simultaneously affect the impact of FDI on economic growth. Most of the related study generally focus on the effect of one HCF on the FDI-growth relationship with the implicit assumption that other HCFs do not affect the relationship between FDI and economic growth at the same time. This is typically achieved by including an interaction term in the model between FDI and the relevant HCF, while other HCFs may be added as control variables. A model with multiple interactions between the HCFs and FDI could alleviate a potential omitted variable bias issue due to the correlation between the HCFs themselves. For instance, the pair wise correlation of the HCFs in my dataset range from 51% to 69%, as shown in Table 5. Therefore, testing the impact of a single HCF on the relationship between FDI and growth separately as is typically done in the literature could lead to omitted variable bias and hence misleading coefficients on the interaction term between FDI and the included host country factor. [1]

This paper also makes an econometric contribution to the literature. Specifically, it makes use of the System GMM estimator in the context of the multiple interactions framework in the FDI literature. The use of the System GMM estimator improves upon the estimations of several previous papers that examine the impact of FDI on growth across countries. The more commonly used panel data estimation techniques (*e.g.*, fixed effects estimators and Seemingly Unrelated Regressions) are seriously flawed in dynamic panel data models (which are characteristic of most growth models) because of endogeneity arising from the inclusion of the lagged or initial levels of GDP per capita to cater for the convergence hypothesis in growth theory (See Bond *et al.*, 2001). The system GMM estimator, on the other hand is able to control both for the unobserved country specific effects and the potential endogeneity of all variables.

[1] A handful of authors have worked on multiple interaction terms between FDI and HCFs. However, to the best of my knowledge, none have involved multiple interactions with such a comprehensive number of HCFs. In particular, I am aware of no other paper that examines the simultaneous contributions of the particular combination of HCFs that I employ on the FDI-growth relationship.

The results from my analysis suggest that FDI has a positive and significant impact on economic growth when all the interaction terms are included in the model. I find that the effect of FDI on growth is higher in countries with lower levels of GDP per capita (*i.e.*, less developed countries) and higher levels of human capital. The quality of the political environment has a non linear relationship between FDI and economic growth. When all other HCFs are held constant, the marginal effect of FDI on economic growth is positive up to a maximum level of the quality of the political environment, after which the marginal effect of FDI on growth becomes negative. The levels of financial development and the quality of the economic environment both have a statistically insignificant effect on the relationship between FDI and growth. Therefore, my findings support papers in the FDI literature, such as Findlay (1978), which suggest that countries which are more technologically backward gain more from inward FDI than those at the technological frontier. However, from a policy perspective especially for developing countries, inward FDI is most beneficial in countries with a better educated workforce.

The remainder of this paper is as follows: Section 1 provides a brief literature review along with the model of Borenstein *et al.*, (1998) which my analysis is based upon. In Section 2, the methodology is discussed and the data is described in Section 3. The results are presented in Section 4, and the last section gives the conclusion of this paper.

1. Literature Review

The relationship between FDI and economic growth has been, and continues to be of interest to researchers. Inward FDI can contribute positively or negatively to economic growth. On the positive side, inward FDI increases the level of investment in the host country. More importantly, it serves as a channel of technology transfer. On the negative side, FDI might take a lot of resources out of the host country through repatriated profits and transfer pricing. In addition, it might lead to the crowding out of domestic enterprises that are unable to compete with foreign enterprises. More detailed explanations of the positive and negative effects of FDI may be found in Moosa (2002).

A growing literature has suggested that the impact of FDI on economic growth is moderated by certain factors in the host country, which I refer to as Host Country Factors (HCFs). The literature has specified some of these HCFs. They include the level of human capital (Borenstein *et al.,* 1998), trade policy (Balasubramanyam *et al.*, 1996), the level of financial development (Hermes and Lensink, 2003; Durham, 2004), the level of

institutional quality (Durham, 2004), the technological gap between leaders and followers (De Mello, 1999) and the level of economic development of the host country as evidenced by its income level (Blomstrom *et al.*, 1992).

A segment of the literature, however, claims that the HCFs do not have a significant impact on the relationship between inward FDI and economic growth. A prominent paper with this opinion is that of Carkovic and Levine (2005). They examined whether a variety of HCFs (the level of human capital, the level of financial development, the level of GDP per capita and trade openness) affected the relationship between FDI and economic growth in 72 developed and developing countries from 1960 to 1995. They included interaction terms between FDI and each of the HCFs in separate specifications. Therefore, unlike the analysis in this chapter, they did not examine the simultaneous effect of the HCFs on the relationship between FDI and economic growth. Using the system GMM, they found that neither FDI nor the interaction terms were statistically significant. They noted that previous macroeconomic studies that indicated that FDI had a positive effect on growth had to be viewed with caution because they did not adequately control for endogeneity.

In recent years, a handful of papers in the FDI literature have made use of multiple interaction terms. Hermes and Lensink (2003), Makki and Somwaru (2004) are two of such papers. Hermes and Lensink (2003) applied cross-sectional analysis to a dynamic empirical specification. Data was from 67 developing countries for the period 1970 to 1995. They interacted FDI with both the level of human capital and the level of financial development. They found that financial development was the more dominant of the HCFs as the interaction term involving human capital turned out to be insignificant whereas that involving financial development was significant. Their results were robust to applying fixed and random effects estimators to a panel data counterpart of their cross-sectional data. Makki and Somwaru (2004) applied Seemingly Unrelated Regressions (SUR) to a dynamic panel dataset of 66 developing countries from 1971 to 2003. They included interaction terms between FDI and trade, FDI and human capital, together with FDI and domestic investment. They found that trade was the dominant HCF. Their findings were robust to the use of the 3SLS estimator.

My analysis differs from the above papers in two respects. First, with the inclusion of five interaction terms, I control for the broad spectrum of the HCFs that are traditionally discussed in the literature. Second, I use the System GMM estimator in contrast with the more traditional ones used by Hermes and Lensink (2003) or Makki and Somwaru (2004).

1.1 The Empirical Model of Borenstein et al. (1998)

Borenstein *et al*. (1998) examined whether the level of human capital affected the relationship between inward FDI and economic growth in 69 developing countries. They employed the following model using both cross-sectional regressions and the Seemingly Unrelated Regressions (SUR) technique.

$$g = c_0 + c_1 FDI + c_2 FDI * H + c_3 H + c_4 Y_0 + c_5 A \quad (1)$$

In equation 1, g is the average annual growth rate of GDP per capita over the decades: 1970-1979; and 1980-1989 respectively, *FDI* is inflows of foreign direct investment measured as a ratio of Gross Domestic Product (GDP), H is the stock of human capital, measured by the average years of male secondary schooling, Y_0 is GDP per capita at the start of each decade, and A comprises control and policy variables that are used as determinants of growth in cross-country studies. These include government consumption, the black market premium on foreign exchange, a measure of political instability (political assassinations and wars), a measure of political rights, a proxy for financial development, the inflation rate, and a measure of the quality of institutions.

The economic intuition underlying their empirical model is as follows: economic growth occurs as a result of Technological Progress (TP) which itself is the result of increases in the number of varieties of capital goods in the economy. The increase in the number of varieties of capital goods is important because it eliminates the tendency of diminishing returns to occur at the aggregate level. FDI is expected to have a positive impact on economic growth because it serves as a channel through which advanced knowledge of technology used in the production of capital goods abroad is brought into the economy. In their model, FDI is thus the main channel of TP because the advanced knowledge of technology brought into the host country via FDI facilitates the expansion of capital goods.

The stock of human capital, H, is expected to have a positive impact on economic growth because a higher level of human capital is expected to aid the process of creating capital goods which requires a skilled workforce. The initial GDP per capita term, Y_0, is used to proxy for technological backwardness. They assume that the more backward a country is, the greater the probability that it is an imitator of capital goods produced elsewhere rather than an innovator. The cost of creating capital goods is assumed to be less for imitators rather than innovators, hence a negative relationship is expected between Y_0 and growth. Finally, the interaction term *FDI*H* is expected to be positive. This relationship implies that higher levels of human

capital lead to higher impacts of FDI on economic growth by *c2* units. The complementarities between the level of human capital and FDI exist because of the role of human capital in aiding the diffusion of the new technology brought into the host country via FDI. The more skilled the workforce, the better they will be able to learn and make use of the new technology when they are exposed to it.

2. Methodology

2.1 Model

I modify the basic model of Borenstein *et al.* (1998) in equation 1 by including all the HCFs that I wish to analyse (the level of economic development, denoted by GDP per capita (*y*), human capital (*H*), financial development (*FIN*), the quality of the economic environment (*ECOENV*) and the quality of the political environment (*POLENV*)). I also include interaction terms between FDI and each of the HCFs. Finally, time dummies (γ_t), the unobserved time-invariant country specific term (u_i) and the random error term (ε_{it}) are added. The time dummies proxy for global shocks while the unobserved country specific term represents differences in steady state paths among the countries in the panel. These changes lead to equation 2.

$$\begin{aligned} g_{it} = \Delta \log y_{it} = {} & b_0 + b_1 \log FDI_{it-1} + b_2 H_{it-1} + \\ & b_3 \log FDI_{it-1} \times H_{it-1} + b_4 \log y_{it-1} + b_5 \log FDI_{it-1} \times \log y_{it-1} + b_6 FIN_{it-1} + \\ & b_7 \log FDI_{it-1} \times FIN_{it-1} + b_8 ECOENV_{it-1} + \\ & b_9 \log FDI_{it-1} \times ECOENV_{it-1} + b_{10} POLENV_{it-1} + \\ & b_{11} \log FDI_{it-1} \times POLENV_{it-1} + b_{12} A_{it-1} + \gamma_t + u_i + \varepsilon_{it} \end{aligned} \quad (2)$$

The data is averaged over nonoverlapping, five year periods from 1981 to 2005, over the following intervals: 1981-1985, 1986-1990, 1991-1995, 1996-2000 and 2001-2005. Thus, there is a maximum of five observations per country. In equation 2, *g* is the average annual growth rate of GDP per capita. All explanatory variables are lagged one period due to endogeneity concerns. Also, from an economic perspective, spillovers and hence technological diffusion from inward FDI take time to occur.

As mentioned above, the role of FDI in this framework is that it serves as a channel for the transfer of technology from foreign countries into the host country. The impact of FDI on economic growth would only have substantial effects, however, if technological spillovers occur from the foreign affiliates to domestic enterprises. Technological spillovers lead to technological diffusion (*i.e.*, the adoption and implementation of technology in one country

that is sourced from other countries). This serves to bridge the idea gap and increase the potential for expanding the varieties of capital goods in the host country and hence economic growth. As explained by Blomstrom *et al.* (1999), the magnitude of the spillovers depends upon the willingness of the foreign owned firms to make their technology available for appropriation by domestic firms (Supply factor) as well as the willingness and ability of domestic firms to adopt and make use of technology (Demand factor). Costs and benefits are involved on both sides. Greater technological spillovers would occur if the benefits outweigh the costs to both sides.

The level of economic development of the country is proxied by the level of GDP per capita. There are two schools of thought on how it might affect the relationship between FDI and growth. One school of thought (Findlay, 1978; Wang and Blomstrom, 1992) hypothesise that inward FDI better favours less developed countries or countries with larger technological gaps. This is because such countries have more to learn or gain from inward FDI than countries at the technological frontier. However, a second school of thought (Cantwell, 1989; Glass and Saggi, 1998), argue that it is the more developed countries or countries with smaller technological gaps that benefit more from FDI. This is because such countries have higher absorptive capacities which enable them to better exploit the technology that FDI brings. Other studies take an intermediate line: acknowledging the need for some technology gap but stressing that it should not be too wide (*e.g.*, Kokko *et al.*, 1996).

The level of human capital in the host country affects the demand factor positively in that it affects the ability of the domestic firms to make use of the foreign technology. The expected benefit of the adoption of foreign technology by the domestic firms would be higher the better able the labor force is able to work with the technology. Moreover, the level of human capital directly affects the imitation capabilities of the host economy because high technical skills are needed on the part of the labor force to accomplish this (Blomstrom, 1991; Blomstrom and Kokko, 1997). Indeed, the results by Borenstein *et al.* (1998) were such that FDI only had a positive impact on growth in developing countries where the level of human capital was above a minimum level.

Financial development refers to the development of the financial sector. The financial sector mobilizes savings and channels them for investment purposes. Levine (1997, 691) lists five key functions of the financial sector: facilitate the trading, hedging, diversifying and pooling of risk; allocate resources; monitor managers and exert corporate control; mobilize savings, and facilitate the exchange of goods and services.

The level of financial development is dictated by how well the financial sector performs these functions. It affects both the demand and supply factors. From the demand side, the adoption of new technology by domestic firms is both costly and risky. Higher levels of financial development provide funding for the domestic firms to aid such activities. No matter how willing and capable (in terms of ability of the workforce) they are, if there is no steady source of funds available, then the adoption of technology by the domestic firms would be severely limited. On the supply side, the foreign firms will be more willing to supply their technology if they know that the domestic firms have the necessary funds to compensate them in exchange for their technology. The importance of the development of the financial sector in the relationship between FDI and economic growth has been described in detail by Hermes and Lensink (2003). Among other reasons, they argued that the financial sector lowers the set-up costs for technology adaptation, reduces the risk of adopting new technology or upgrading technology, and enables the foreign firms themselves to borrow to extend their innovative activities.

Institutional quality has been defined by the Nobel laureate, Douglas North as the rules of the game in society or, more formally, are the humanly devised constraints that shape human interaction (North, 1991). There are three broad types of institutions: economic, political and social. These institutions shape the environment which governs activity in a country. In this paper, I focus on the quality of the economic environment and the quality of the political environment, as indicators of the economic and political institutions respectively.

The quality of the economic environment, as shaped by economic policy is an essential factor that affects the relationship between FDI and growth. It affects both the demand and supply factors. On the demand side they affect the incentive of local firms. In countries with more favourable economic environments, domestic firms have greater incentives to engage in productive activities (such as adopting better technology) rather than in non-productive, rent seeking activities. On the supply side, Blomstrom *et al.* (1999) state that the foreign firms would be more willing to supply their technology in countries where intellectual property rights are better protected. In addition, Balasubramanyam *et al.* (1996) argued that countries with more open trade policy would attract higher volumes of FDI and experience higher efficiency gains from FDI than countries that adopted import substitution strategies. Finally, according to Durham (2004), countries with higher legal standards tend to channel foreign investment more efficiently, and reduce the expropriation of funds by managers and entrepreneurs, which affect the development of capital markets. The quality of the economic environment is proxied with the index of economic

freedom. This is an index that ranges from 0 to 10, with 10 being the highest economic freedom. The index of economic freedom broadly captures the quality of the economic environment. It includes measures of government size, taxes, trade openness, legal structure and protection of property rights, growth of money supply, inflation as well as regulations on the credit market, labour market and business. This index, which is relatively unexploited in the FDI literature is, in my opinion, a useful concise indicator of the quality of the economic environment. It not only captures the economic policy of the government, but also the legal soundness of the economy and macroeconomic stability.

The quality of the political environment is proxied by an index of democracy from Freedom House. It is an index that ranges from 0 to 10, with 10 being the most democratic. The index combines measures of political rights, civil liberties and Polity (a measure of the degree of autocracy). The quality of the political environment could potentially affect the demand and supply factors necessary for technological diffusion. Countries with a higher quality of the political environment, *i.e*., countries where there exists greater political freedom, could create the right incentives to attract inward FDI. More democratic environments tend to be related with lower levels of corruption (Bennedsen *et al*., 2005) and a greater respect of property rights (Glaeser *et al.*, 2004). The quality of the political environment also affects political stability which directly affects incentives of both domestic and foreign firms alike to engage in productivity activity. However, the relationship between democracy and political stability is not straightforward particularly in developing countries. Countries that operate democracies might not necessarily be politically stable especially where there are high levels of corruption. In certain cases, the more autocratic regimes might create some sense of political stability, as there may be much less opportunities for political unrest. Choi and Samy (2005) compare the findings of Li and Resnick (2003) and Jensen (2003). Both papers provided contrasting views on how regime types, proxied by Polity, affected FDI inflows to developing countries. Li and Resnick (2003) argued that more autocratic regimes (*i.e.* countries with a less democratic score) encouraged multinational activity because such regimes provided the multinationals with better entry deals. They also argued that the monopolistic and oligopolistic tendencies of multinationals were more constrained in democratic regimes. Jensen (2003), on the other hand, found a positive relationship between democracy and inflows of FDI. He argued that the political constrains on the leadership that occurred in a democracy sent signals of credibility to multinationals, and therefore encouraged their entry. Choi and Samy (2005) concluded that the findings of Jensen (2003) were more credible than that of Li and Resnick (2003).

To summarize, it has been argued above that FDI affects technological progress and hence economic growth, and that all HCFs could potentially affect the relationship between FDI and growth by affecting the extent of technological spillovers.

2.2 Econometric Methodology

This paper involves the application of the system GMM estimator which was introduced by Arellano and Bover (1995) and Blundell and Bond (1998) to the empirical model[2] in equation 2. The System GMM comprises two sets of moment conditions. The first set consists of first differences of the dataset which is instrumented using the level series of the corresponding variables lagged two periods and beyond. The second set of moment conditions comprises the (original) level series of the dataset which is instrumented using the lagged first differences of the corresponding variables.

The System GMM has three main advantages over other estimators that are used in the literature. First, it is able to control for the unobserved country specific term. This it does because the first difference of the data series has to be taken to implement the estimator, which eliminates the unobserved country specific term.[3] Second, it is able to control for the potential endogeneity of all the explanatory variables including the lagged value of dependent variable by using appropriately lagged values of the variables as instruments. Third, it is particularly useful in short panel data models that are persistent, as is characteristic of many of the datasets that have been used in the FDI literature. The last point is a particular benefit of the System GMM over the closely related Arellano-Bond (1991) or first-differenced GMM estimator. This is because the Arellano-Bond (1991) estimator relies on using lagged levels of the variables in the dataset as instruments for their corresponding first-differenced series. If the variables are highly persistent (*i.e*., they tend towards unit root), then the lagged levels become weak instruments for the first differenced series leading to biased estimates.

The above mentioned advantages suggest that the System GMM is an appropriate estimator of choice to carry out the empirical analysis in this paper because of the following features of the dataset. First, the panel comprises 111 countries of varied characteristics. There is therefore the need to control for the unobserved country specific terms as they could be

[2] This section draws heavily from Bond *et al*. (2001) and Carkovic & Levine (2005).

[3] Note that the unobserved country specific term could be a potential problem in the System GMM since it also relies on the use of the level series. The Difference-Sargan or the Difference-Hansen test is used to examine the validity of the System GMM by testing whether the correlation between the error term (which includes the unobserved country specific term) and the instruments are statistically significant.

correlated with any of the explanatory variables leading to biased estimates. Second, all the variables could be potentially predetermined or endogenous due to issues of simultaneity. Third, the dataset displays evidence of a rather high persistence in most of the variables. This is shown in Table 2, which reports the AR (1) specifications for all the variables in the dataset using four estimators: OLS, fixed effects, first-differenced GMM and system GMM. This high persistence (combined with the short panel comprising only five time periods) suggests that the first-differenced GMM estimator would be inappropriate, hence my use of the system GMM.

Table 2
AR(1) Specifications for Series

	OLS	Fixed Effects	First-differenced GMM	System GMM
log (y_{it})				
log (y_{it-1})	1.009***	0.716***	0.0877	1.009***
	(159.46)	(17.23)	(0.46)	(39.41)
log (FDI_{it})				
log (FDI_{it-1})	0.738***	0.342***	0.173*	0.485***
	(22.62)	(10.40)	(1.94)	(3.92)
H_{it}				
H_{it-1}	0.982***	0.625***	0.600***	0.898***
	(121.94)	(20.34)	(6.92)	(18.77)
FIN_{it}				
FIN_{it-1}	1.050***	0.778***	1.353***	1.000***
	(60.15)	(15.25)	(9.65)	(18.37)
$ECOENV_{it}$				
$ECOENV_{it-1}$	0.850***	0.467***	0.312***	0.703***
	(43.56)	(10.12)	(3.64)	(7.32)
$POLENV_{it}$				
$POLENV_{it-1}$	0 .913***	0.589***	0.762***	0.853***
	(89.31)	(16.27)	(7.54)	(13.57)
POP $GROWTH_{it}$				
$POPGROWTH_{it-1}$	0.418**	0.0452	0.128	0.531***
	(2 .20)	(0.60)	(0.70)	(2.58)
$GFCF_{it}$				
$GFCF_{it-1}$	0 .737 ***	0.335***	0.254	0.692***
	(25.22)	(6.18)	(1.33)	(6.39)

Notes: All regressions carried out using Stata 9.2. Time dummies included in all regressions. Student t-statistics in parenthesis. *, ** and *** denote respectively significance levels at 0.10, 0.05 and 0.01. Difference and System GMM make use of instruments from the 2nd to the maximum lag.

There are three conditions that must be fulfilled to ensure the validity of the System GMM. First, there should be no serial correlation in the random error term. This condition is tested by examining the first and second order serial correlations of the first-differenced residuals. The first-differenced residuals should have a negative and significant first-order serial correlation but no second-order serial correlation. Second, the instruments should be uncorrelated with the error term. This condition can be tested using either a Sargan or Hansen test of the overidentifying restrictions. That is, the extra (overidentified) instruments should not be correlated with the error term. The null hypothesis of either the Sargan or Hansen test is that there is no correlation between the overidentified instruments and the error term. Third, the extra instruments employed in the System GMM must be valid. This can be examined using either the Difference-Sargan test or the Difference-Hansen test. They test whether the additional subset of instruments used for the System GMM is correlated with the error term (which includes the unobserved country specific terms in the level series). The null hypothesis is that the additional instruments are uncorrelated with the error term. I opt for the Hansen and the Difference-Hansen tests (rather than the Sargan and Difference-Sargan tests) because they are robust to heteroskedasticity.

An issue of concern in the GMM literature is instrument proliferation. Roodman (2009) shows that the consequences of using too many instruments relative to the number of cross-sectional units leads to overfitting, which generates biased estimates and a severe weakening of the specification tests. He suggests that one way of dealing with overfitting is the use of the Stata *collapse* command which collapses the instrument set. The idea is explained below.[4]

Consider a simple autoregressive model of the variable (y) with the unobserved individual specific effects term (μ_i) and the random error term (ε_{it}): The number of individuals is denoted by $i=1,2,...N$ and the number of time periods is $t=1,2,...T$

$$y_{it} = \gamma y_{it-1} + \mu_i + \varepsilon_{it} \tag{3}$$

Assume that y is a predetermined (rather than an endogenous) variable. Then, the moment conditions for the first-differenced series of the system GMM are as follows.

$$E(y'_{it-l}\Delta\varepsilon_{it}) = 0 \; for \; each \; t \geq 3, \; l \geq 2 \tag{4}$$

[4]This section is drawn from Roodman (2009).

where *l* denotes lags. This yields a total of *(T-2)(T-1)/2* moment conditions. Note that separate instruments are included for each time period and each lag available per time period. The set of moment conditions for the levels equations is given as:

$$E(\Delta y_{it-1}\varepsilon_{it}) = 0 \; for \; each \;\; t \geq 3 \tag{5}$$

The set of moment conditions for the levels series grows linearly in *T*. Therefore, the moment conditions for the first-differenced GMM and system GMM could grow very quickly in *T*. The most important is that there is a separate moment (*i.e*., column of instruments) for each time period and each lag.

With the *collapse* command, the instrument set is compressed such that there is a separate column or moment for each lag only. Hence, the moment conditions for the difference equations become

$$E(y'_{it-l}\Delta\varepsilon_{it}) = 0 \; for \; each \; l \geq 2 \tag{6}$$

and the matrix of moment conditions for the levels series shrinks to a single moment. By collapsing the instruments, the number of moment conditions reduces from being a quadratic function of *T* to a linear function of *T*.

3. Data

The sample coverage of this paper is for developed and developing countries from 1981 to 2005 in averaged five year intervals. All 111 countries are listed in the Appendix. The proxies for the variables in my empirical model are as follows. Details of the data sources are also listed below.

- *y*: Gross domestic product (GDP) per capita in PPP (constant international 2005 dollars), sourced from the World Bank's *World Development Indicators* (2009).
- *g*: Log difference of real GDP per capita within each 5 year interval.
- *FDI* : FDI as a percentage of GDP, sourced from the World Bank's *World Development Indicators* (2009)
- *H*: Human capital which is proxied by the tertiary gross enrolment rate (%), sourced from World Bank's *Edstats* (2007).
- *FIN*: Financial development is proxied by private credit from deposit money banks and other financial intermediaries as a proportion of GDP. This indicator measures the extent to which funds are channelled from savers to the private sector via the private intermediaries. It is sourced

from the World Bank's *World Development Indicators* (2009).

- *ECOENV*: Quality of the economic environment, proxied by the chained index of economic freedom, with 2000 as the base year. The index is scaled from 0 (least free) to 10. It was developed by Gwartney and Lawson (2006) of the Fraser institute, but I sourced it from Teorell *et al*. (2009) database with the variable name *fi_clindex*. The index measures economic freedom in five main groups: (i) size of government, (ii) legal structure and security of property rights, (iii) access to sound money, (iv) freedom to trade internationally and (v) regulation of credit, labor and business.
- *POLENV*: A democracy index of political and civil liberties and polities. The index is scaled from 1 to 10 (highest). It is sourced from Teorell *et al*. (2009) database with the variable name *fh_ipolity2*.
- *A*: This comprises: (i) *POPGROWTH*- Population growth, sourced from the World Bank's *World Development Indicators* (2009). (ii) *GFCF*- Gross fixed capital formation as a percentage of GDP which is my proxy for domestic investment. It is sourced from the World Bank's *World Development Indicators* (2009).

Table 3 displays some summary statistics of the dataset. The real average income per capita (*y*) across the countries for the 25 year period was about $9,084 with an average growth rate of about 5%. Inward FDI flows accounted for about 3.5% of the GDP. The secondary gross enrolment ratio (*H*) was 63% on average. The amount of credit received by the private sector from the banks (*FIN*) amounted to about 41% of the GDP. Moderate values of the indices of economic freedom (*ECOENV*) and the index of political and civil liberties (*POLENV*) were attained on average. The annual population growth rate (*POPGROWTH*) amounted to about 1.6% on average. Domestic investment (*GFCF*) was about 22% on average, far exceeding FDI as a percentage of GDP. As expected, the variation in most of the variables occurred mostly between countries rather than over time due to the large number of countries in the dataset.

Table 3
Descriptive Statistics, 1981-2005

	Mean	Standard Deviation		Minimum Value	Maximum Value	No. of Observations
		Between Variation	Within Variation			
y ($)	9084.334	11092.66	2503.838	237	69315.98	840
ln(y)	8.405	1.246	0.211	5.468	11.146	840
g (%)	5.139	11.890	14.109	-154.593	116.057	798
FDI (% of GDP)	3.591	26.545	4.355	-8.694	346.46	779
H	62.836	32.414	9.316	3.266	164.921	834
FIN (% of GDP)	40.964	33.620	14.228	0.022	220.968	813
ECOENV	5.858	1.025	0.748	1.718	8.853	580
POLENV	5.722	3.010	1.413	0	10	878
POPGROWTH (%)	1.608	1.279	1.560	-44.41	9.042	994
GFCF (% of GDP)	22.039	7.279	4.415	3.183	83.043	832

Notes: GDP per capita (y) is expressed in PPP, at constant 2005 international dollars. Both ECOENV and POLENV are indices that range from 0 to 10, with 10 being the highest rating. Negative figures in FDI in the dataset arise because the World Bank only publishes net inflows rather than gross inflows of FDI.

4. Results

The results of the impact of FDI on economic growth are shown in columns 1 to 6 of Table 4. The dependent variable in each column is the growth of real GDP per capita. In columns 1 to 5, each of the five host country factors (HCFs): the log of GDP per capita, human capital, financial development, the quality of the economic environment and the quality of the political environment, are respectively interacted individually with FDI. Column 6,

on the other hand, takes into account interactions of FDI with the five host country factors simultaneously. Non linear terms are also included in Table 4. I include the square of human capital (H^2), the square of financial development (FIN^2), the square of the quality of the political environment ($POLENV^2$) and an interaction term involving the log of FDI and the quality of the economic environment to take the non linear effects of these variables into account.[5]

The table also includes: results of tests for the joint significance of the interaction terms on economic growth, the specification tests (serial correlation tests, Hansen test and the Difference-Hansen test), the number of observations, the number of cross-sections (countries) and the number of collapsed instruments used in the system GMM estimations. [6]

Instruments comprised the first to the fourth lags of each of the explanatory variables. Hence, I assume that the explanatory variables are predetermined. The reason being that they enter the specification lagged one period.

The tests of autocorrelation in the residuals indicate that there is a negative and significant first order serial correlation but an insignificant second order serial in the first differences in the residuals in all columns. They suggest that there is an absence of serial correlation in the error terms. The Hansen test supports the validity of instruments at conventional levels of statistical significance. Similarly, the Difference-Hansen test indicates that the extra instruments used in the System GMM estimation are valid in all but the first column.

FDI is positive and statistically significant in most columns. Focusing on column 6, the FDI coefficient indicates that the FDI elasticity of growth is about 0.7. This result, in line with Borenstein *et al.* (1998), supports the positive role of FDI as a channel of technology transfer that enhances the creation of capital goods in the host countries. The coefficients on the control variables (*POPGROWTH* and *GFCF*) are also generally positive and statistically significant.

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[5]In unreported results, without the non-linear terms, I found that the coefficients on the level of human capital, financial development and the interaction terms involving FDI and the quality of the economic and political environments were negative, contrary to expectation. This signings therefore indicated the potential presence of non-linear effects, hence, my inclusion of the squared terms. I experimented with adding an interaction term involving the log of FDI and the square of the economic environment but this was statistically insignificant.

[6]The number of collapsed instruments range from 63 to 88, which is reasonable compared to the 111 countries in the sample. Although unreported, the number of instruments without collapsing ranged from 161 to 181, which is excessive.

The lagged dependent variable, *y*, generally has a positive and statistically significant effect on growth. The interaction term between FDI and *y* is insignificant in column 1 but becomes significant in column 6 where all the interaction terms are included. According to column 6, an increase in the log of the initial level of GDP per capita by one unit leads to a fall in the FDI elasticity of growth by about 0.06% when all other HCFs are zero.

Columns 1 to 6 indicate that the level of human capital (*H*) itself has little effect on economic growth. The interaction term between the log of FDI and *H* is negative and insignificant in column 2. However, when the other interaction terms are included in column 6, the interaction term turns positive and statistically significant. According to column 6, when all the other host country factors are zero, an increase in the secondary gross enrolment ratio by 1% leads to an increase in the marginal effect of FDI on growth by 0.002%.

Results indicate a non-linear relationship between the level of financial development (*FIN*) and economic growth. The interaction terms involving FDI and *FIN* are insignificant whether or not they enter individually (column 3) or with the other interaction terms (column 6). Therefore, the results suggest that the effect of FDI on growth on GDP per capita does not depend on the level of financial development.

The quality of the economic environment (*ECOENV*) is positive and highly statistically significant in all columns. However, the interaction term between the log of FDI and the quality of the economic environment is negative and statistically significant where it enters alone in column 4 but loses its significance in column 6. Therefore, the results indicate that while the quality of the economic environment is itself essential for economic growth, it does not seem to increase the average effect of FDI on growth.

Table 4
Impact of FDI on Economic Growth: Effect of Host Country Factors

Dependent variable: $g = d.\log(y_{it-1})$	(1)	(2)	(3)	(4)	(5)	(6)
$\log(y_{it-1})$	0.141**	0.112***	0.078*	0.065*	0.062	0.040
	(2.19)	(3.02)	(1.90)	(1.87)	(1.40)	(0.85)
$\log(FDI_{it-1})$	0.218	0.083*	0.075*	0.210***	0.241***	0.721***
	(1.19)	(1.71)	(1.90)	(2.58)	(2.67)	(3.06)
$POPGROWTH_{it-1}$	0.006***	0.006***	0.006***	0.006***	0.006***	0.004
	(4.34)	(4.76)	(4.19)	(4.36)	(3.06)	(1.05)
$GFCF_{it-1}$	0.000	0.004*	0.005**	0.006***	0.008***	0.001
	(0.10)	(1.91)	(2.20)	(2.84)	(3.53)	(0.27)
H_{it-1}	-0.005	-0.005*	-0.002	-0.002	-0.001	0.003
	(-1.25)	(-1.89)	(-0.68)	(-0.80)	(-0.51)	(0.98)
H_{it-1}^2	0.000	0.000	0.000	0.000	0.000	0.000
	(0.59)	(1.18)	(0.05)	(0.41)	(0.07)	(-2.26)
FIN_{it-1}	-0.257*	-0.265***	-0.248**	-0.208*	-0.309***	-0.173
	(-1.70)	(-2.58)	(-2.12)	(-1.71)	(-3.08)	(-1.13)
FIN_{it-1}^2	0.060	0.057	0.093*	0.049	0.087*	0.048
	(0.81)	(1.27)	(1.72)	(0.92)	(1.77)	(0.79)
$ECOENV_{it-1}$	0.086***	0.080***	0.075***	0.084***	0.078***	0.086***
	(4.06)	(4.60)	(4.01)	(4.87)	(5.06)	(3.69)
$POLENV_{it-1}$	0.086***	0.078***	0.056**	0.054**	0.115***	0.090***
	(2.59)	(3.21)	(2.31)	(2.27)	(3.98)	(3.10)
$POLENV_{it-1}^2$	-0.006**	-0.006***	-0.004*	-0.004**	-0.009***	-0.007**
	(-2.03)	(-2.68)	(-1.90)	(-2.03)	(-3.28)	(-2.49)
$\log(FDI_{it-1})^* \log(y_{it-1})$	-0.021					-0.056*
	(-1.14)					(-1.90)
$\log(FDI_{it-1})^*H_{it-1}$		-0.001				0.002**
		(-1.21)				-1.97
$\log(FDI_{it-1})^*FIN_{it-1}$			-0.06			-0.004
			(-1.44)			(-0.09)
$\log(FDI_{it-1})^*ECOENV_{it-1}$				-0.027**		-0.014
				(-2.17)		(-0.64)
$\log(FDI_{it-1})^*POLENV_{it-1}$					-0.087**	-0.091***
					(-2.57)	(-3.25)
$\log(FDI_{it-1})^*POLENV_{it-1}^2$					0.007**	0.007***
					(2.51)	(2.94)
Observations	388	467	467	467	467	388
Countries	111	111	111	111	111	111
Instruments (collapsed)	63	65	65	65	70	88
AR1 test of autocorrelation in residuals (p -value)	0.011	0	0	0	0	0.002
AR2 test of autocorrelation in residuals (p -value)	0.361	0.303	0.353	0.342	0.559	0.682
Hansen test of overidentication of instruments (p -value)	0.169	0.742	0.501	0.6	0.383	0.299
D iff-Hansen test for validity of System GMM (p -value)	0.239	0.625	0.133	0.631	0.314	0.547
Joint significance of HCFs (p -value)						0.014

Notes: All estimations were carried out using Stata 9.2. All estimations were run using the two-step system GMM with Windmeijer (2005) correction. Z statistics in parenthesis. *, ** and *** denote respectively significance levels at 0.10, 0.05 and 0.01. Unreported constant and time dummies included. Collapsed instrument set comprises the 2nd to 4th lags for the dependent variable, and from the 1st to 4th lags of each variable in the estimation.

There is a strong evidence of an inverted U-shaped relationship between the quality of the political environment (*POLENV*) and average growth in GDP per capita. The impact of the quality of the political environment on the relationship between inward FDI and growth takes on a U-shaped relationship in both columns 5 and 6. Note, however, that this U-shaped relationship must be interpreted with caution because the coefficient on FDI itself is positive (0.721). This means that at lower levels of the democracy index, the average effect of FDI on growth would be positive but falls at higher levels of the index, holding the contribution of other HCFs constant at their zero levels. The maximum level of the democracy index that is needed to obtain a positive marginal effect of FDI on growth in this sample[7] is 9.3638.

Recall that the democracy index ranges from 0 to 10, so the threshold of 9.36 is very high. This back of the envelope computation shows that if the other host country factors were zero, all but countries with extremely high levels of democracy would obtain positive marginal effects of FDI on growth. This finding might indicate that the effect of FDI on growth is more likely to be positive in developing countries rather than OECD countries, who have very high values of the democracy index.

Notice the value of the multiple interactions model and the implications that it could have on the effect of the host country factors on the FDI-growth relationship. For instance, the coefficient on the interaction term between *FDI* and *y* in column 6 is nearly three times that of column 1. The coefficient involving *FDI* and *H* actually involves a sign change when we compare columns 2 and 6. Also, we find that the coefficient between *FDI* and *ECOENV* in column 4 is almost double that of column 6. These differences in size show the potential bias that could occur when we fail to take into account that several HCFs could affect the FDI-growth relationship at the same time. This is because the host country factors are moderately correlated among themselves (See Table 5). The multiple interactions framework allows us to isolate the effect of the various host country factors (since each interaction term is interpreted holding the other HCFs equal to 0).

The above results suggest that the dominant HCFs that have an influence on the FDI-growth nexus are the level of economic development, the level of human capital and the quality of the political environment. The marginal

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[7] This can be derived by estimating the derivative of growth with respect to FDI holding the contribution of other host country factors (apart from *POLENV*) constant at 0. Using column 6, this gives: $\frac{\delta g}{\delta \log FDI} = 0.721 - 0.091\ POLENV + (2*0.007)\ POLEN\ V = 0$. $POLENV = 0.721/0.077 = 9.3638$.

effect of inward FDI on growth is greater in poorer countries with higher levels of human capital. The fact that FDI favors poorer countries is in line with the hypotheses of Findlay (1978) and Wang and Blomstrom (1992) who found that the effect of FDI on growth was higher in countries with larger technological gaps. In other words, the effect of FDI is more significant in countries that have more to learn from the technology arising from inward foreign investment.

Table 5
Correlation matrix of the Host Country Factors

	y	H	FIN	ECOENV	POLENV
y	1				
H	0.69	1			
FIN	0.61	0.60	1		
ECOENV	0.61	0.62	0.60	1	
POLENV	0.43	0.63	0.42	0.51	1

Source: own calculations.

The fact that human capital is positive when all host country factors are taken into account (and insignificant when the interaction term between FDI and human capital enters alone in column two) could indicate that human capital works through the channels of political and economic institutions to increase the effect of FDI on growth. Indeed, Glaeser *et al*., (2004) found that initial levels of schooling improved political institutions.

It is particularly interesting to compare my findings with others in the literature who have used multiple interaction terms such as: Hermes and Lensink (2003) and Makki and Somwaru (2004). Hermes and Lensink (2003) interacted FDI with the level of human capital and the level of financial development. They found that the level of financial development was the more dominant factor in affecting the FDI-growth relationship. Makki and Somwaru (2004) interacted FDI with human capital, trade and domestic investment. They concluded that trade, together with sound macroeconomic policies and institutional stability were preconditions needed to bring about a positive effect of FDI on growth. These factors are captured in the economic freedom index, which is my proxy for the quality of the economic environment. My results, however, are in contrast to both papers, since I find that the positive impact of inward FDI on economic growth does not operate through the channels of either the quality of the economic environment or financial development.

Nevertheless, the findings in this paper are in line with other researchers such as: Borenstein *et al.* (1998), Blonigen and Wang (2005), Hsu and Wu (2009) and Vadlamannati and Tamazian (2009). Borenstein *et al.* (1998) and Blonigen and Wang (2005) both found that the level of human capital had a positive effect on the relationship between FDI and economic growth. Using a variety of proxies for financial development and various econometric techniques, Hsu and Wu (2009) did not find a positive and significant interaction term between FDI and financial development. They concluded that their cross country evidence could not support the growth effect of FDI through financial development. Finally, Vadlamannati and Tamazian (2009) found that the index of economic freedom was important for economic growth in 22 Latin American countries from 1980 to 2006. They, however, found that the effect of the index on the relationship between FDI and growth was only marginal.

The interpretation of the marginal effect of FDI in Table 4 assumes that each of the HCF variables is zero. This is highly unrealistic of the dataset. Table 3, which displayed the summary statistics showed that zero was outside the ranges of all the host country factors except the quality of the political environment. Therefore, it might be more informative to evaluate the impact of FDI on economic growth at more meaningful levels of the HCFs. Details can be found in Wooldridge (2006), Jaccard and Turrisi (2003) and Aiken and West (1991). In line with the above discussion, Tables 6 to 8 are a reproduction of column 6 of Table 4 but with the exception that FDI is interacted with the deviations of the HCFs from their average levels in each country. Such reparameterization is described on pages 204 - 206 in Wooldridge (2006). The technique allows for the examination of the impact of FDI on economic growth when the host country factors are at their average levels in each country. Only the FDI coefficient changes to reflect the effect of the reparameterization. Therefore, I only report the FDI coefficient with its t-statistic for each country.

The results for countries with positive, negative and insignificant marginal FDI effects on growth are predicted in Tables 6 to 8 respectively. Out of the 111 countries in the sample, the marginal effect of FDI is predicted to be positive in 34 countries, negative in 12 countries and insignificant in 65 countries. The estimates show that it is mostly developing countries that are predicted to have positive FDI effects on growth. On the other hand, the effect of inward FDI on growth is predicted to be insignificant in OECD countries. The literature suggests that other channels of technology transfer and diffusion come to the forefront in these countries. These channels include human capital as found by Engelbrechtf (2002) and outward FDI as found by Lichtenberg and van Pottelsberghe de la Potterie (1996).

Table 6
Countries with predicted positive marginal Effects of FDI on growth

Country	Predicted Marginal Effect of FDI	Z stat	Country	Predicted Marginal Effect of FDI	Z stat
Morocco	0.0686*	1.82	Algeria	0.117*	1.69
Philippines	0.0787**	2.12	Central African Republic	0.117**	2.2
Zambia	0.0806*	1.93	Chad	0.117**	2.15
Tunisia	0.0828**	2.07	Sierra Leone	0.119**	2.14
Czech Republic	0.0797**	1.98	Uganda	0.119**	2.19
Indonesia	0.0862**	2.13	Romania	0.126*	1.79
Kenya	0.0864**	1.99	Egypt, Arab Rep.	0.128**	2.5
Cote d'Ivoire	0.0883*	1.92	Congo, Rep.	0.129**	2.43
Guyana	0.0891*	1.77	Guinea - Bissau	0.139**	2.42
Benin	0.0951**	1.99	Bulgaria	0.147**	2.36
Mali	0.100*	1.91	Malawi	0.153***	2.58
Tanzania	0.101**	1.99	Albania	0.156**	2.5
Niger	0.106*	1.87	Rwanda	0.164***	2.61
Ghana	0.108**	2.14	Burundi	0.183***	2.64
Cameroon	0.112**	2.19	Congo, Dem. Rep.	0.228***	3.01
Jordan	0.112***	2.7	China	0.251***	3.5
Haiti	0.113**	2.09	All countries with Positive Effects	0.0874**	2.07

Average value of HCFs: y=7.4, H=33.6, FIN=0.2, ECOENV=5.0 & POLENV=3.0

Notes: *, ** and *** denote respectively significance levels at 0.10, 0.05 and 0.01. The estimates of FDI are obtained by rerunning the specification in column 6 of Table 4 with the average values of the host country factors for each country.

Table 7
Countries with predicted marginal negative effects of FDI on growth

Country	Predicted Marginal Effect of FDI	Z stat
Dominican Republic	-0.0397*	-1.69
Colombia	-0.0464*	-1.86
Honduras	-0.0587*	-1.74
Mexico	-0.0599*	-1.69
Thailand	-0.0611*	-1.8
Guatemala	-0.0668*	-1.85
Turkey	-0.0692*	-1.75
El Salvador	-0.0698**	-2.41
Malaysia	-0.0770**	-2.3
Botswana	-0.0798**	-2.22
Singapore	-0.0979*	-1.84
Venezuela	-0.101**	-2.47
All Countries with Negative effects	-0.0870***	-2.95
Average value of HCFS (y = 8 .7 ,H = 42.7 ,FIN = 0.4 , ECOENV = 6 .0 & POLENV=6.6)		

Notes: *, ** and *** denote respectively significance levels at 0.10, 0.05 and 0.01. The estimates of FDI are obtained by rerunning the specification in column 6 of Table 4 with the average values of the host country factors for each country.

Table 8
Countries with predicted marginal insignicant effects of FDI on growth

Country	Predicted Marginal Effect of FDI	Z stat	Country	Predicted Marginal Effect of FDI	Z stat
Bolivia	0.000422	0.02	Ireland	-0.000856	-0.03
South Africa	0.00177	0.07	Spain	-0.00104	-0.04
Netherlands	0.00192	0.08	Jamaica	-0.00118	-0.05
Paraguay	0.00316	0.1	Australia	-0.00321	-0.1
Finland	0.00346	0.13	Croatia	-0.00332	-0.08
Kuwait	0.00373	0.06	Senegal	-0.00341	-0.09
Russian Federation	0.00531	0.08	New Zealand	-0.00737	-0.25
Slovenia	0.00622	0.16	Fiji	-0.00825	-0.32
Belize	0.00651	0.2	Iceland	-0.0089	-0.25
Benin	0.00828	0.24	Argentina	-0.0113	-0.27
Sweden	0.00892	0.31	Austria	-0.0125	-0.41
Denmark	0.0109	0.35	Slovak Republic	-0.0131	-0.48
Panama	0.0109	0.52	Malta	-0.0153	-0.61
Estonia	0.0139	0.35	Norway	-0.0167	-0.46
India	0.0144	0.35	Cyprus	-0.0209	-0.65
Peru	0.0159	0.39	Germany	-0.022	-0.86
Latvia	0.0161	0.48	Ecuador	-0.0236	-0.76
Chile	0.0185	0.81	United Kingdom	-0.0236	-0.83
Pakistan	0.0194	0.59	Japan	-0.0252	-0.61
Korea, Rep.	0.023	0.81	Portugal	-0.026	-0.99
Sri Lanka	0.0271	0.67	Canada	-0.0302	-0.91
Lithuania	0.0338	0.89	Mauritius	-0.0305	-1.09
Nicaragua	0.0363	1.03	Costa Rica	-0.0317	-0.75
Uruguay	0.0415	1.57	Brazil	-0.0345	-0.87
Ukraine	0.0445	0.66	France	-0.0345	-1.18
Hungary	0.0455	1.18	Trinidad and Tobago	-0.0389	-1.26
Madagascar	0.0535	1.3	Israel	-0.0393	-0.93
Bangladesh	0.0687	1.45	Greece	-0.0398	-1
Poland	0.0769	1.42	Italy	-0.0413	-1.16
Nepal	0.0811	1.57	Switzerland	-0.0507	-1.08
Oman	0.0882	1.25	United States	-0.0507	-1.13
Bahrain	0.0884	1.41	Papua New Guinea	-0.0635	-1.06
Iran, Islamic Rep	0.0893	1.58	All Countries with insignificant effects	-0.0505**	-2.11

Notes: *, ** and *** denote respectively significance levels at 0.10, 0.05 and 0.01. The estimates of FDI are obtained by rerunning the specification in column 6 of Table 1.4 with the average values of the host country factors for each country. For the value of the average HCF of all countries in the entire sample, the FDI coefficient reads -0 .0 407 with a Z statistic of -1.53

Conclusion

The objective of this paper was to study the impact of FDI on economic growth in host countries and examine what roles the levels of economic development, human capital, financial development and the qualities of the economic and political environments play in the relationship between FDI and economic growth. This empirical exercise was carried out by applying the system GMM estimator to a multiple interaction empirical model using data from 111 developed and developing countries from 1981 to 2005. The use of multiple interactions made it possible to capture the simultaneous impacts of the various HCFs on the relationship between FDI and economic growth.

The results indicated that the level of economic development, the level of human capital and the quality of the political environment were the most crucial of all the HCFs in order to obtain a positive and significant impact of FDI on economic growth. The effect of FDI on growth was higher in countries with lower levels of economic development and higher levels of human capital. The quality of the political environment, on the other hand, had a non linear effect on the relationship between FDI and economic growth. In particular, holding constant all other host country factors, the marginal effect of FDI on growth was positive until a maximum level of the quality of the political environment where the effect turned negative. The levels of financial development and the quality of the economic environment both had an insignificant impact on the relationship between FDI and economic growth.

There was significant heterogeneity in the predicted marginal effects of FDI on growth when the host country effects of each of the 111 countries were taken into account. The marginal effect of FDI on growth was predicted to be respectively insignificant, positive and negative in about 59%, 31% and 10% of the countries. Positive effects of FDI existed largely in developing countries. Most of the OECD countries were predicted to have insignificant effects from FDI. The considerable heterogeneity in the prediction of FDI on growth across the countries could account for the lack of consensus in the macro literature of the growth effects of FDI.

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Appendix

Albania, Algeria, Argentina, Australia, Austria, Bahrain, Bangladesh, Belgium, Belize, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burundi, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Congo: Democratic Republic, Congo Republic, Costa Rica, Cote d'Ivore, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Fiji, Finland, France, Germany, Ghana, Greece, Guatemala, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran: Islamic Republic, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Korea, Kuwait, Republic of, Latvia, Lithuania, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritius, Mexico, Morocco, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Rwanda, Senegal, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, Ukraine, United Kingdom, United States, Uruguay, Venezuela, Zambia.