FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES

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ABSTRACT

Theory suggests that foreign direct investment (FDI) contributes to capital accumulation and technological progress and is an important catalyst for industrial development. In the context of an endogenous model, we investigate the impact of FDI on economic growth, and test the hypothesis that the beneficial effect of FDI inflows is stronger in those countries with higher level of economic development. Our results show a strong direct impact of FDI on economic growth in developing countries, as well as an indirect impact through the interaction of FDI with human capital. Additionally, our results suggest that the impact of FDI on economic growth is greater among technological leaders. We conclude that absorptive capacity in the host country is important in allowing FDI to positively and fully impact economic growth. ***JEL Classifications***: F21, F23, O47

INTRODUCTION

The contribution of foreign direct investment (FDI) to economic growth in host countries has long been the subject of intense debate. The literature points to its importance in promoting economic growth and, it is actively sought by virtually all countries. The direction and volume of FDI across countries and regions, however, suggest that its attractiveness and efficacy depends on institutional and country-specific factors, including the country's openness to trade; investment in basic infrastructure and human capital; factor endowment; financial structure; and macroeconomic, political, and social stability. The hypothesis that FDI can play a key role in improving the economic growth of the host country may require, therefore, that a more conducive environment in terms of a sufficient absorptive capability of the advanced technologies be available in the host economy (Borensztein et al, 1998). According to UNCTAD (2006), only one-third of FDI flows in 2006 went to developing countries. In the developing world during the period 2003-05, Asia and Oceania received 21.4 percent of the world FDI inflows, Latin America and the Caribbean received 11.5 percent, and Africa 3.0 percent. In countries that cannot capture the spillover effects from the presence of foreign firms (due to a lack of favorable economic, political, and social climate), FDI may have little or even an adverse effect on economic growth.

It appears, therefore, that given the economic, social, and political disparities across countries, the growth effect of FDI will differ across countries. In this context, it is tempting to hypothesize that in East Asian and Latin American countries, with

admittedly higher levels of development and more favorable macroeconomic environments, FDI-led growth will be more pronounced than in Sub-Saharan African countries with relatively low levels of development and less favorable business climates. The findings of Blomstrom et al (1994), Coe et al. (1995), and Borensztein et al. (1998) seem to lend support to that hypothesis. According to Kumar (2007), the gap between the world's rich and poor countries largely comes down to the financial and physical assets that create wealth and, consequently, a key aspect of economic advancement lies in poorer nations' capacity to acquire more capital and scale the technological ladder. However, as pointed out by de Mello (1997), the role of FDI as a catalyst for output growth is a less controversial hypothesis in theory than in practice. If FDI is expected to impact growth in the long run through both knowledge transfers and the accumulation of capital stocks embodying newer technologies, then the relative impact should be lower in technological leaders than in technological laggards.

The objective of this study is to investigate the impact of foreign direct investment on economic growth, and to test the hypothesis that the beneficial effect of FDI inflows, in terms of enhanced economic growth, is stronger in those countries with higher level of economic development. Using recent data and a large number of countries, we conduct a comparative empirical investigation to determine the importance of FDI in explaining economic growth in least advanced versus more advanced developing countries. In the next section, we review theoretical considerations. Then, we present the model and interpret the empirical results. The final section summarizes our conclusions and discusses some policy lessons.

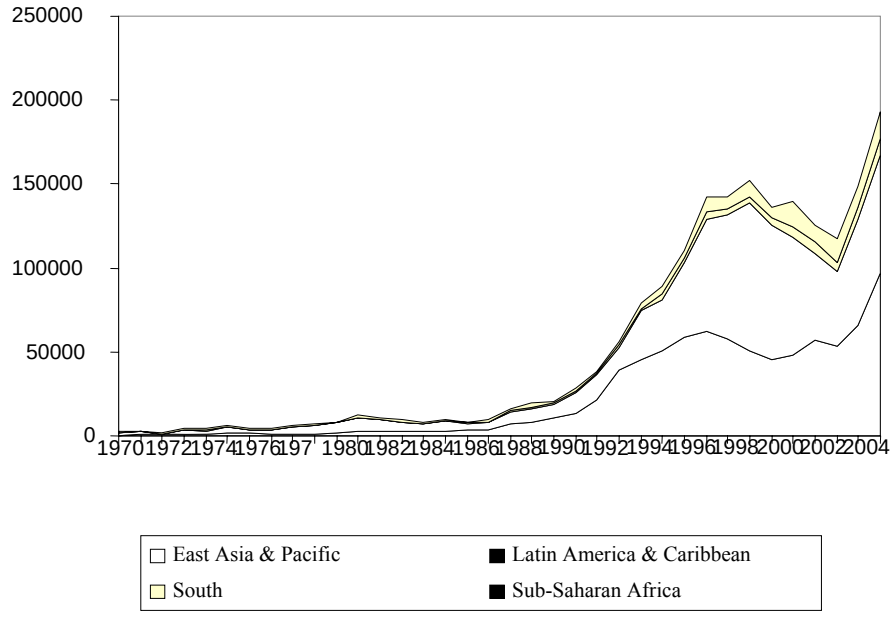
THEORETICAL CONSIDERATIONS

From a corporate perspective, the decision to make a foreign direct investment is a capital budgeting decision. Corporations make capital investments to maximize shareholder wealth. Operationally, absent capital rationing, a wealth-maximizing investment is a positive net present value (NPV) investment. If a capital project has a positive NPV, then it is expected to create shareholder wealth on a risk-adjusted basis. Corporations process prospective FDI just as they do any investment. In the case of FDI, there are unique incremental costs that must be charged to the capital project. For example, if the required infrastructure (transportation, communications, energy supplies, skilled labor, management talent, etc.) is lacking in the host country, then the cost to the company of providing this infrastructure must be charged to the project. Additionally, new product distribution channels must be established and with them will come greater shipping and handling costs that must be charged to the project. If the corporation is moving production, there will be costs (and benefits) of closing an existing production facility (providing severance pay to existing workers or retraining them, etc.). New operational controls and managerial infrastructure must be established, which will also impose incremental costs. There may also be, and probably are, externalities that an FDI will cause (costs or benefits not born by or charged to the project). For instance, multinational firms operating in emerging markets transfer technology to local suppliers to increase their productivity and to lower input prices, inducing entry and more competition in the supply market (Blalock and Gertler, 2008). Externalities can in turn lead to domestic political costs. These considerations, in addition to international risks (political, economic, and foreign exchange), must be weighed against competitive pressures if other

corporations are also exploiting FDI to gain competitive advantage. In total, properly assessing the costs and benefits of an FDI decision is clearly complex from the corporate perspective.

Foreign direct investment has grown at an exponential rate since the early 1980s. Its attractiveness and distribution reflect, among other things, its profitability and the conditions in the recipient countries. Although East Asia and Latin America have experienced phenomenal inflows of FDI, especially from the mid-1980s, FDI inflows to Africa and other least-developed countries remain low in absolute and relative terms (Figure 1). The high FDI inflows to the more advanced developing countries are generally attributed to the outward-oriented policies and more fertile environment in those countries.

Figure 1
Foreign Direct Investment (Millions of US.$)



While real per capita GDP growth in East Asia and Latin America in the past couple of decades averaged 7.1 percent and 1.5 percent, respectively, Africa recorded a growth rate of just 0.5 percent. This disappointing economic performance for Africa reflects many macroeconomic variables including real per capita income. In Africa, for the last couple of decades, average annual real income per capita was $518 compared to $912 and $3,790 in East Asia and Latin America, respectively. Individual country analysis reveals even more disturbing results. During the past decade, realizing that restricting FDI is an ineffective or even counterproductive policy, many low-income countries have removed their restrictions on and adopted economic reforms more favorable to FDI.

Based on an aggregate production function that relates the total output of an economy to the aggregate amounts of labor, human and physical capital, and the level of technology, neoclassical growth theory predicts that poor countries will grow faster than rich countries. Under the assumption of diminishing returns to capital, economic growth not only slows as capital stock grows but stops in the long run as the economy reaches its steady-state. Since capital is scare in poor countries, neoclassical growth theory implies that return on capital stock should be higher in poor countries than in rich countries. Assuming the same production function across countries, all countries must end up equally wealthy. This neoclassical prediction implies that the impact of FDI is limited to its output growth effect in the short run, with no change in the long-run growth rate. Viewed from a neoclassical perspective, factor accumulation, including FDI, cannot generate long-run growth.

Contrary to the neoclassical growth model, which emphasizes technological progress as a source of growth, recent developments have led to the so-called endogenous growth models, which emphasize other channels (including R&D, human capital accumulation, and externalities or spillover effects) through which FDI can promote growth in the long run (Grossman and Helpman (1991); Romer (1986); Lucas (1988); Barro and Sala-i-Martin (1995); and Loungani and Razin (2001)). In fact, there is evidence suggesting that FDI can be growth-enhancing even in the long run by generating increasing returns in production through its externalities and spillover effects. Branstetter (2006), by testing the hypothesis that FDI is a channel of knowledge spillovers for Japanese multinationals undertaking direct investments in the United States, found evidence that FDI increases the flow of knowledge spillovers both from and to the investing Japanese firms. Ford et al. (2008), by creating a new stock measure of FDI based on employment, were able to capture the long-term effects of FDI on states receiving it. The endogenous growth model, in which the growth prevailing in the model parameters is explained within the model, provides us with better insight into the growth-enhancing ability of FDI, based on the causes and effects of technological change as a determinant of economic growth.

According to the endogenous growth model, permanent changes in physical investment rates, human capital investment rates, population growth, export shares, and other policy variables, including government consumption, trade policy, property rights, and regulatory pressure, should lead to permanent changes in economic growth. Foreign direct investment is expected to impact economic growth primarily through two channels: First, through capital accumulation in the recipient country, FDI encourages the incorporation of new inputs and foreign technology in the production function of the recipient economy (de Mello (1999); Dunning (1993); Blomstrom et al. (1996); Borensztein et al. (1998)). Second, through knowledge transfers, FDI augments the host country's existing stock of knowledge via labor training, skill acquisition, and the introduction of alternative management practices (de Mello 1996, 1997, 1999).

In order for FDI to be an ideal catalyst for economic growth, it needs to play its 'contagion effect' role and serve as a complement to rather than a substitute for local firms. For Findlay (1978), foreign direct investment increases the rate of technological progress in the recipient economy through a 'contagion effect' from the imported advanced technology and managerial technology used by multinational firms. Markusen and Venables (1999) discusses two channels through which FDI affects the host economy: product market competition through which multinationals may substitute for domestic firms, and linkage effects through which multinationals

may be complementary. According to Borensztein et al. (1998), FDI is an important vehicle for the transfer of technology, and there are strong complementary effects between FDI and human capital on the growth rate of income.

Endogenous growth models, characterized by non-decreasing returns to the set of reproductive factors of production, treat technological change as endogenously rather than exogenously determined. Technological change is therefore considered as the important determinant of long-term economic growth. Technological change may be viewed in terms of an increase in the number of technologies (Romer (1990); Grossman & Helpman (1991)) and a quality improvement of the existing technologies (Aghion and Howitt (1992); Grossman and Helpman (1991)). Either type of technological diffusion plays a crucial role in economic growth. Transmission of new ideas and new technologies, adoption of high technology products from more advanced economies, and FDI, are channels through which technological diffusion can spread to the different sectors of the recipient economy. The ultimate impact of FDI on economic growth in the recipient economy depends on the degree of spillovers to domestic firms through which FDI leads to increasing returns in domestic production; the impact being greater, the greater the value-added content of FDI-related production (de Mello (1997)). In summary, foreign direct investment contributes to capital accumulation and technological progress and is an important catalyst for industrial development.

MODEL SPECIFICATION

The main objective of the empirical investigation is to estimate the impact of foreign direct investment on economic growth, and to test the hypothesis that the more developed a host country is, the higher will be the FDI impact on economic growth. Two income groups of developing countries are considered: More advanced (middle-income) and least-advanced (low-income) countries.

The theoretical approach adopted in this study draws on de Mello (1996, 1997, 1999). The model is based on the traditional neoclassical growth model, pioneered by Solow (1957) and Denison (1962, 1967) where, in addition to domestic capital and labor, FDI is incorporated as an additional explanatory variable.

Consider an economy that produces a product according to the following aggregate production function:

$$Y = A\Phi(K, L, F) \tag{1}$$

where Y is output, K denotes capital, L represents labor, F denotes FDI inflows, and A represents the state of the economy (including policy and control variables) that influence the productivity of the economy.[1] As a result of the FDI inflows, physical stock in the recipient economy is composed of domestic (K_d) and foreign-owned (K_f) capital. Now let H denotes the stock of knowledge or human capital in the host economy. Assuming that the production in the recipient economy is of the Cobb-Douglas type, equation (1) can then be rewritten, in per capita terms for each time period, as follows:

$$y = A\phi\left[k_d . H\right] = Ak_d^{\beta} H^{1-\beta} \tag{2}$$

where y is real GDP per capita and β is the share of domestic physical capital. Let $\beta < 1$ such that there are diminishing returns to domestic capital. Let the human capital (H) in the recipient country's economy, which depends upon domestic and foreign-owned physical capital, be represented by a Cobb-Douglas production function of the following type:

$$H = \left[k_d k_f^{\alpha}\right]^{\eta} \tag{3}$$

where α and η are the marginal and inter-temporal elasticities of substitution between foreign and domestically-owned physical capital stock. Combining equations (2) and (3) gives,

$$y = A k_d^{\beta+\eta(1-\beta)} k_f^{\alpha\eta(1-\beta)} \tag{4}$$

Taking logarithms and time derivatives of equation (4), and rearranging terms, gives the following general growth accounting equation:

$$g_y = g_A + \left[\beta + \eta(1-\beta)\right] g_d + \left[\alpha\eta(1-\beta)\right] g_f \tag{5}$$

where g_y is real per capita GDP growth, g_A denotes total factor productivity growth, g_d represents the growth rate of domestic capital stock, and g_f is the growth rate of the foreign-owned capital stock. Equation (5) can be expanded to incorporate a set of control and policy variables that are generally included in growth models as potential determinants. These control variables include, government consumption (as a percentage of GDP), terms of trade, and openness (measured as total trade as a percentage of GDP) of the country. The final equation to be estimated takes the form,

$$g_y = g_A + \zeta g_d + f g_f + \psi A \tag{6}$$

where A is a vector of control and policy variables.

In addition to physical capital (both domestic and foreign), government policy and other variables generally identified as important determinants of economic growth are therefore incorporated into the model developed above.[2] According to the International Monetary Fund (IMF (1990)), countries with stable macroeconomic policies, liberalized trade policies, and minimal financial distortions, experience rapid capital formation and total capital productivity increases, and thus are likely to grow faster.

The control and policy variables included in our model are described as follows. The "rate of inflation" and "government consumption as a percentage of GDP" are included to account for domestic fiscal policy, while the "foreign exchange" variable stands for the monetary policy of the country. Inflation control, as part of a broad macroeconomic stabilization policy, is an important precondition for economic growth.[3] As for the effect of government spending on economic growth, although sound government policy is crucial, there seems to be a growing consensus that consistent and increasing government presence in an economy can hinder economic growth, especially in developing countries. Economic growth and

prosperity may be better served by private enterprises and free market. On the other hand, exchange rate policy plays a vital role in the economic growth of developing countries. Countries that pursue major and appropriate exchange rate reform to eliminate real exchange rate misalignment are very likely to record gains in real per capita GDP. As Agarwala (1983) has shown, although there are many forms of distortion that can affect macroeconomic performance, real exchange rate misalignment is by far the single most important of these.

Cross-country differences in the external environment are captured by the "terms of trade" and "trade policy" variables. Trade liberalization increases the openness of an economy to international trade and therefore represents an important engine of economic growth. An improvement in a country's terms of trade (say, a permanent increase in export prices) can also increase real national income and stimulate economic growth, although some studies show that the impact depends on the trade pattern. Kaneko (2000) posits that, if a country specializes in a consumption commodity, its economic growth rate is significantly influenced by the terms of trade, while its economic growth rate is unaffected if it specializes in a capital commodity.

EMPIRICAL RESULTS

The discussion above leads to the following testable hypotheses:

Hypothesis 1: DFI has a "direct effect" on economic growth in recipient countries,

Hypothesis 2: The direct effect will be stronger in more advanced (middle-income) countries than in least advanced (low-income) countries,

Hypothesis 3: FDI has an "indirect effect" on economic growth because of the synergy between FDI and the level of human capital, and

Hypothesis 4: The indirect effect will be stronger in more advanced (middle-income) countries than in least advanced (lower-income) countries.

The sample is divided into two developing-country groups (low-income and middle-income) in order to verify these hypotheses. The country groups are derived from the World Bank's classification of countries into income groups according to 2006 gross national income per capita. All the data are from the *World Development Indicators* of the World Bank, except for the foreign exchange rate data, which are obtained from the IMF *International Financial Statistics*. The variables are constructed for 17 middle-income countries and 14 low-income countries for the period 1978-04.

To test hypotheses 1 and 2, we perform an OLS regression analysis using equation (6) which is estimated for the two developing-country groups. The regressions are based on pooled annual data with 27 observations on each country for a total of 459 observations for the more advanced group and 378 for the least-developed group (See the Appendix for data definitions). To eliminate any bias due to cross-sectional differences among countries, we include (as discussed above) country-specific control and policy variables that are frequently considered as determinants of growth in cross-country studies (Barro and Sala-i-Martin (1995); Borensztein et al. (1998)). Three variants (for each country group) of the growth equation are considered, each including a different set of explanatory variables.

The results, presented in Table 1, provide strong support for hypothesis 1: FDI is significantly positively correlated with economic growth in both lower-income and middle-income groups. Also, in apparent support to hypothesis 2, we find that the FDI variable has greater statistical significance in those countries with higher levels of economic development. The direct effect of FDI on economic growth in lower-income countries is less than in the case of middle-income countries. Contrary to Rodrick (1999), Aitken and Harrison (1999), and Sukar et al. (2007), who found that FDI has only marginal effect on economic growth, our findings support those in Romer (1986); Lucas (1988); Grossman and Helpman (1991); Barro and Sala-i-Martin (1995); Obwona (2001); Zhang (2001); Kumar (2007); and Ford et at. (2008). According to Tang et al. (2008), rather than crowding out domestic investment, FDI is found to be complementary with domestic investment and has not only assisted in overcoming shortage of capital, but has also stimulated economic growth in China. However, it can be argued that the FDI variable by itself contains the results of both direct and indirect effects, thus clouding the interpretation of this variable with respect to hypothesis 2.

TABLE 1
EFFECTS OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH: DIRECT FFECTS

	Least advanced (Low-Income) Countries			**More Advanced (Middle-Income) Countries**		
	1.1	1.2	1.3	1.4	1.5	1.6
Constant	0.2155	7.7498	6.5932	0.6248	-7.2461	-5.7704
	(0.87)	(2.02)	(1.64)	(4.16)	(2.45)	(1.99)
FDI	0.7064*	0.6593*	0.7125*	0.9336*	0.8039*	0.8877*
	(3.10)	(2.86)	(3.06)	(13.02)	(6.56)	(6.09)
Domestic	0.1390*	0.1383*	0.1375*	0.1549*	0.1501*	0.1513*
Capital	(11.42)	(11.35)	(11.27)	(12.35)	(11.83)	(12.19)
Population		-0.1545	-0.1716		-1.3493*	-1.3400*
		(0.86)	(0.95)		(5.13)	(5.11)
Government		-1.5220†	-1.7142‡		-0.7878†	-0.7820†
Consumption		(1.75)	(1.95)		(1.75)	(1.78)
Trade		0.3669†	0.2723		0.8298*	0.3286‡
		(1.80)	(1.54)		(2.75)	(1.99)
Terms of Trade		-0.3921	-0.2269		2.0283*	2.2116*
		(0.53)	(0.29)		(3.40)	(3.69)
Exchange Rate			0.1674			-0.0517
			(0.64)			(1.11)
Inflation			-0.0332			-0.0010*
			(1.72) †			(4.73)
R^2 (Adj.)	0.43	0.44	0.44	0.48	0.41	0.45
DW	1.86	1.89	1.89	1.46	1.56	1.67
No. Obs.	378	378	378	459	459	459

Notes: Dependent variable is real per capita GDP growth.
Numbers in parentheses are t-statistics.
*, ‡, and † denote significance at the 1%, 5%, and 10%, respectively.

Although the results in Table 1 show a strong direct impact of FDI on economic growth, irrespective of the level of economic development, a case can also be made for a second (indirect) channel through which FDI can impact economic growth: its interaction with human capital. As stressed above, the impact of foreign direct investment inflows, import of high-technology products, and adoption of foreign technology by backward countries, depends on the efficiency with which they

are absorbed and diffused. Foreign direct investment is expected to interact with the stock of human capital already available in the host country to affect economic growth. According to Borensztein et al. (1998), foreign direct investment contributes to economic growth only when a sufficient absorptive capacity of the advanced technologies is available in the host economy. The level of domestic human capital and its interaction with FDI, therefore, play an important role in the growth-enhancing effect of the latter. The strong synergism between FDI and human capital as a factor affecting economic growth is consistent with the idea that the advanced technology embodied in FDI can increase the host's economic growth through its interaction with that country's absorptive capacity.

There is no denying that factor endowments, economic and social infrastructure, market and institutional characteristics, and macroeconomic policy of the host country are important determinants of FDI, and that differentials in those factors across recipient countries may lead to different impact of FDI on the rate of economic growth. However, as de Mello (1997) suggests, the role of FDI as a catalyst for output growth is a less controversial hypothesis in theory than in practice. Given that FDI is expected to impact growth in the long run through both knowledge transfers and the accumulation of capital stocks embodying new technologies, the impact should be lower in technological leaders than in technological laggards.

To address this issue of absorptive capacity in the host country, we perform a second regression analysis using equation (6) that includes additional variables intended to capture and separate out the synergistic effect between FDI and the level of human capital formation. In other words, we test the hypothesis that the indirect impact of foreign direct investment on economic growth is significant in both country-groups and that it is even more so in the case of the more advanced (middle-income) developing countries.

The estimations, presented in Table 2, control for, among other factors, the level of human capital (represented by secondary school enrollment as a percentage of the total relevant secondary-school age group (Schooling)), the interaction between FDI and human capital (FDI*Schooling), and the initial conditions in each country (initial GDP per capita, and life expectancy at birth (Life)).

As in Table 1, the results in Table 2 show that FDI is significantly positively correlated with economic growth. The direct effect of FDI on economic growth, represented by the coefficient of FDI, is positive and statistically significant across the alternative specifications (2.1 – 2.4). Additionally, and consistent with hypothesis 3, the coefficient of the interaction term (FDI*Schooling) is positive and significant in the two income-group equations. Consistent with hypothesis 4, the impact of the FDI-schooling (synergy) interaction variable is more pronounced in the more advanced (middle-income) countries than in the least advanced (lower-income) countries. Assuming that the country's income level and its level of technology are positively correlated, these results support the arguments that the effect of FDI is greater among technological leaders, and that host-country absorptive capacity enhances the potential impact of FDI on economic growth. Sound business environment and domestic physical and human capital are needed to accommodate and support FDI in order to fully reap its benefits. We find, consistent with Choong et al. (2004), that both FDI and economic growth are not co-integrated by themselves directly, but rather through their dynamic interaction with the development of the domestic financial sector. Similarly, Vu (2008), using time-varying coefficients in an augmented production function and letting FDI indirectly affect gross domestic

product growth through labor productivity, found that FDI has significant and positive effect on labor productivity and economic growth in Vietnam.

TABLE 2
EFFECTS OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH: DIRECT AND INDIRECT EFFECTS

	Least Advanced (Low-Income) Countries		More Advanced (Middle-Income) Countries	
	2.1	2.2	2.3	2.4
Constant	15.7360	17.1420	-11.1000	-11.3130
	(2.09)	(1.92)	(1.95)	(1.71)
Initial GDP	-3.2758*	-3.5497*	-0.32250	-0.33556
	(3.13)	(3.24)	(0.92)	(0.83)
FDI	0.1778*	0.2584‡	0.24173*	0.34502‡
	(2.95)	(2.10)	(2.98)	(2.11)
Domestic Capital	3.4933*	3.5665*	4.2209*	4.2347*
	(3.37)	(5.19)	(4.73)	(4.70)
Government	-2.2873‡	-2.2913	-1.4639‡	-1.4829‡
Consumption	(2.30)	(1.45)	(2.45)	(2.32)
Schooling	-0.0839†	-0.0567	-0.0007	0.0022
	(1.77)	(1.23)	(0.06)	(0.14)
FDI*Schooling		0.0398‡		0.1216*
		(1.99)		(2.73)
Trade	0.50649‡	1.0790‡	0.0620‡	0.0464‡
	(2.52)	(1.98)	(2.15)	(2.09)
Terms of Trade	-0.11926	0.14342	0.26498	0.29402
	(0.13)	(0.14)	(0.28)	(0.28)
Life	0.0283	0.0309	0.0553	0.0565
	(0.33)	(0.38)	(1.12)	(1.12)
Continental Dummy	2.9655*	3.1693*	-	-
	(3.04)	(2.86)		
R^2 (Adj.)	0.43	0.46	0.41	0.42
DW	2.00	2.03	1.97	1.97
No. Obs.	100	100	180	180

Notes: Dependent variable is real per capita GDP growth.
Numbers in parentheses are t-statistics.
*, ‡, and † denote significance at the 1%, 5%, and 10%, respectively.

Finally, we note that including an interaction variable to capture synergies between FDI and human capital formation results in rough parity in the statistical significance of the FDI variable between the lower-income and middle-income groups. This suggests that the greater significance in Table 1 of the FDI variable in the middle-income group may have been driven by the indirect effects rather than the direct effects. We conclude that the direct effects of FDI are equally important among both groups of countries. Contrary to the results in Table 1, the direct effect of FDI on economic growth in lower-income countries (in Table 2) is no less important than it is in the case of middle-income countries.[4]

Our results partially support the findings in Blomsrtom et al. (1992) that high-income developing countries have local firms that are advanced enough to learn from the foreigners and are the likeliest candidates for FDI spillovers. They found a positive and significant FDI coefficient only in the equation for high-income countries. Our results are also in line with Borenzstein et al. (1998) that posits that the magnitude of the contribution of FDI to economic growth depends on the stock of human capital available in the host economy.

Our results, however, do not support some previous findings that there is a threshold level of human capital below which FDI impedes or contributes little to economic growth. A point can instead be made, from our empirical investigation, that FDI stimulates economic growth both directly and through its synergistic effects with human capital. The direct effect is found to be positive and strong in the two income groups, even after controlling for human capital and its interaction with FDI.[5] The lack of adequate human capital, modern infrastructures, and institutional features in developing countries, is a limiting factor but not a precondition for FDI to be productive. However, it is highly desirable that developing countries possess these wealth-creating assets.

CONCLUDING REMARKS

Theory suggests that foreign direct investment contributes to capital accumulation and technological progress and is an important catalyst for industrial development. Its attractiveness and efficiency in promoting economic growth, however, depend on the degree of spillovers to domestic firms, the extent to which the technology transfers embodied in the FDI are absorbed and diffused, and the value-added content of FDI-related production. Some researchers postulate that FDI will interact with the stock of human capital already available in the host country to affect economic growth, and that there is a threshold level of human capital below which FDI contributes little or may even adversely impact economic growth.

In our investigation, we form several testable hypotheses: 1) that FDI has a beneficial "direct effect" on recipient economies, 2) that the direct effect of FDI is stronger among more advanced (middle-income) economies, 3) that FDI has a beneficial "indirect effect" on recipient economies because of the synergies between FDI and the level of human capital formation, and 4) that the indirect effect will be stronger among more advanced economies. Our results support the conclusion that FDI is a strong contributor to economic growth, that this (direct) contribution is about equal in both lower-income and middle-income countries, that FDI does interact with human capital formation to provide enhanced economic growth, and that this interaction term is more pronounced in more advanced countries. Our results lead to the conclusion that absorptive capacity in the host country is important for FDI to fully impact economic growth.

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ENDONTES

1. A problem with the inclusion of the FDI variable in this augmented growth model is that K and L are stock variables while F is a flow variable. To address that problem, we used the investment ratio as a proxy for the capital stock (K), which is a flow variable. (See de Mello (1997) for more details on the problems and approaches of solutions to the inclusion of the FDI variable in the augmented growth model).
2. Kawai (1994) classifies government economic policies into five categories: (1) the provision and improvement of human resources and material infrastructure, (2) abolition of price regulation on the domestic market, (3) stability of macroeconomic policies, (4) liberalization of domestic financial transactions, and (5) liberalization of trade and capital operations.
3. It is worth, however, mentioning that low-to-moderate inflation may not be immediately counterproductive. According to Bruno (1995), the truly dangerous inflations occur at rates above 40 percent.
4. In 1996, for example, the rates of return on United States FDI in Africa were 34.2 percent, 19.3 percent in Asia and the Pacific, 12.8 percent in Latin America and the Caribbean, and 12.8 percent in all countries (UNCTAD, 1999).
5. The secondary school enrollment variable, surprisingly, seems to adversely impact economic growth. Similar results were reported by Knight et al. (1993), Razin and Collin (1997), and Savvides (1995). The negative, especially insignificant, coefficient for schooling may be due to measurement problem (Levine and Renelt (1992)). According to Romer (1989), and De Gregorio (1992), the statistical insignificance of the schooling variable may reflect the collinearity of schooling with physical capital accumulation. While Romer (1989) and De Gregorio (1992) found no significant impact of human capital proxy on growth, Barro (1991) on the other hand, reported a positive and significant coefficient for school enrollment. Barro (1994) also reported a positive coefficient for male secondary schooling, but found the initial level of female secondary education to be negatively correlated with economic growth.

APPENDIX: Data Definitions

Economic growth: Real per capita GDP growth

Government consumption: Includes all government current expenditures for purchases of goods and services.

Domestic Capital: Proxied by investment (gross capital formation). Gross capital formation is outlays or additions to the fixed assets of the economy plus net changes in the level of inventories.

Life: Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Population: Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship

Schooling: Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education (secondary education).

Trade: Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.

Exchange Rate: Real effective exchange rate is the weighted average of the domestic currency relative to an index or basket of other major currencies adjusted for the effects of inflation).

Foreign Direct Investment: Foreign direct investment is into the country. They represent inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments.

Terms of Trade: Terms of trade is an index representing the ratio of the price of a country's exports to the price of its imports of commodities. An increase represents an improvement in the country's terms of trade.

Inflation: Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services.

Dummy: Continental dummies