RIS
DISCUSSION PAPERS

**Foreign Direct Investment, Externalities and
Economic Growth in Developing Countries:
Some Empirical Explorations and Implications
for WTO Negotiations on Investment**

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and
Jaya Prakash Pradhan

RIS-DP # 27/2002

**Research and Information System
for the Non-Aligned and
Other Developing Countries**

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Abstract

This paper analyzes the relationships between FDI, growth and domestic investment for a sample of 107 developing countries for the 1980-99 period. A dynamic nature of the effect of FDI on host country growth is posited covering an initial generally adverse competitive effect and a subsequent usually more favourable effect through backward linkages with the net effect depending on the quality of FDI. Panel data estimations in a production function framework suggest a positive effect of FDI on growth. However, tests of causality find that in a majority of cases the direction of causation is not pronounced and in a substantial number of cases the direction of causation actually runs from growth to FDI. Further estimations corroborate the proposition that FDI affects domestic investments in a dynamic manner with a negative initial effect and the subsequent positive effects for the panel data as well as for most of the countries individually. Although FDI appears to crowd-out domestic investments in net terms, in general, some countries have had favourable effect of FDI on domestic investments in net terms suggesting a role for host country policies. It is concluded with a few policy remarks including lessons for the on-going attempt to write rules on investment in the WTO framework.

Version 2.1: 8 April 2002

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1. Introduction

Foreign direct investment (FDI) has emerged as the most important source of external resource flows to developing countries over the 1990s and has become a significant part of capital formation in the country despite their share in global distribution of FDI continuing to remain small or even declining. FDI usually flows as a bundle of resources including, besides capital, production technology, organizational and managerial skills, marketing know-how, and even market access through the marketing networks of multinational enterprises (MNEs) who undertake FDI. These skills tend to spill over to domestic enterprises in the host country. Therefore, FDI can be expected to contribute to growth more than proportionately compared to domestic investments in the host country. There is now a body of literature that has analyzed the effect of FDI on growth in inter-country framework and another analyzing knowledge spillovers to domestic enterprises from MNEs (see e.g. De Melo 1997, Kumar and Siddharthan 1997, and Saggi 2000, for recent reviews of literature). However, the mixed findings reached by these studies on the role of FDI inflows in host country growth and on knowledge spillovers from MNEs suggest that these relationships are not unequivocal. The primary consideration for expecting a more favourable effect of FDI on growth is externalities of MNE entry for domestic firms. The externalities such as spillovers may not take place in some cases because of poor linkages with the domestic enterprises or poor absorptive capacity, for instance. FDI projects vary in terms of generation of linkages for domestic enterprises. There is also a possibility of MNE entry affecting domestic enterprises adversely given the market power of their proprietary assets such as superior technology, appeal of brand names and aggressive marketing techniques. Therefore, FDI may crowd-out domestic investment and may thus be immiserizing (Fry 1992, and Agosin and Mayer 2000). The crowding out effect may be sharper when the technology gap between foreign and domestic firms is very wide to be bridged. Furthermore, because FDI may be attracted to a country by high growth rates, among other factors, the observed relationships between FDI and growth rate may suffer from causality problems.

Another problem which may have affected the existing studies is that they are all made in a comparative static framework while effect of FDI on domestic investment and growth could be of a dynamic nature. There may be two rounds of effect of MNE entry on domestic investment. The initial round of effect may be felt by domestic firms in the industry where the foreign entry has taken place. Because of superior asset bundle of foreign entrant, domestic enterprises may be affected adversely as their market share is eroded. The subsequent round of effect may be more favourable with domestic rivals absorbing spillovers of knowledge (demonstration based learning) as well as diffusion of knowledge through vertical linkages with domestic enterprises. The net effect of FDI on domestic investments would depend on relative weights of these two rounds of effects. Given the dynamic nature of the effect of FDI on domestic investment and growth, analysis in a comparative static framework may yield biased results.

Against this backdrop, the present paper proposes to make some quantitative explorations into the nature of the relationships between FDI, domestic investment and growth especially taking note of possible dynamic nature of the effects using a panel data set for 107 developing countries for the period 1980-99. The structure of the paper is as follows: Section 2 presents some stylized facts regarding the mechanism of impact of FDI on growth in developing countries and also reviews the existing literature on the subject. Section 3 presents new empirical explorations into the relationships between FDI, growth and domestic investments in the framework of an augmented Solow model. It also examines the direction of causality between FDI and growth for the sample countries. Section 4 presents results of quantitative explorations into relationship between FDI and domestic investment which holds the key to its effect on growth. Finally, the paper is concluded with some remarks on policy lessons in Section 5.

2. FDI Inflows, Externalities and Growth: Mechanisms of Impact and Evidence

In the neo-classical model, growth results from technological progress, growth of labour force -both of which are treated as exogenous- and capital accumulation which is subject to diminishing returns. However, new growth theories incorporate the role of knowledge or technology endogenously as a factor of production in its own right and provide for the

possibility of non-diminishing returns to capital (see Romer 1994, Grossman and Helpman 1991). The recognition of the role of knowledge in economic growth has also led to a renewed interest in analysis of the role of FDI in growth. This is because FDI is generally accompanied by transfer of considerable production and managerial knowledge from investor to the host country that is likely to spill over to domestic enterprises in the host economy. Romer (1993: 548) has argued that by bringing new knowledge to their host countries, MNEs may help to reduce 'idea gaps' between developed and developing countries which are sources of growth. Thus FDI's effect on growth in host countries could be more valuable than its direct generation of output by complementing the domestic investments. The indirect effect of FDI on growth in the host country may comprise a sum total of its externalities on domestic investments through knowledge spillovers and vertical linkages.

The externalities of FDI on a host economy include positive as well as negative effects. Among the positive externalities are vertical linkages and knowledge spillovers for domestic enterprises. Foreign entrant may generate demand for intermediate goods and may crowd-in domestic investment to deliver it. It may also help to diffuse new skills and knowledge brought in the host economy. As observed earlier, FDI inflows are generally accompanied by a bunch of valuable resources such as technology, organizational capability, managerial skills, and marketing know-how. The knowledge spillovers associated with FDI could be classified into two broad categories viz. intra-industry spillovers and inter-industry spillovers. Intra-industry spillovers are absorbed by competitors of foreign entrants who are prompted to respond to new improved process or product technology introduced by technology importing firms by upgrading their technology. In certain cases the demonstration effect from foreign firms may speed up the diffusion of new technologies. Yet another source of spillovers could be through the increased competition from foreign entry which forces local firms to become more efficient users of existing technologies or to explore new technologies. Among the mechanisms of technology spillovers of this sort are reverse engineering by competitors, increased rivalry through R&D and product developments and the mobility of employees trained in new technologies by foreign firms.

Another mechanism of diffusion of technology imported within the host economy is through generation of vertical inter-firm linkages. The vendors and customers of foreign firms may benefit from the knowledge brought in the course of their dealings with it. MNEs may demand higher specifications, retooling and technology updation from their component vendors forcing

technology effort on their part. In quite a few cases they may actually be passing on new designs, drawings and specifications which may be significant sources of technology diffusion. Similarly, certain element of knowledge may be passed on downstream to customers of foreign firms in embodied manner. The diffusion of knowledge through this channel could be particularly significant in the case of equipment manufacturers. For instance, a foreign investment to make more efficient looms may play an important role in diffusing the new technology within the textile industry of the host country.

However, the most immediate externality of an MNE entry on domestic enterprises in the industry of the entrant is negative as foreign entry erodes their market share (Markusen and Venables 1997, Agosin and Mayer 2000). In recent years acquisition of domestic enterprises has become increasingly popular form of MNE entry at least in some regions such as Latin America. In the case of acquisition, foreign entry entirely crowds out domestic investment. Besides eroding the market share of domestic enterprise, foreign entry could affect domestic investment in the industry adversely by its entry raising conduct. It has been argued that MNE affiliates with their dowry of intangible assets such as internationally known brand names, captive access to technology and reservoirs of technical, managerial and organizational skills, are likely to pursue non-price modes of rivalry to maximize the revenue productivity of these assets. With higher emphasis on product differentiation and other modes of non-price rivalry, entry of new domestic firms to the industry is impeded by the 'contrived entry barriers' (see Kumar, 1990, 1991, for evidence). Therefore, MNE entry may crowd-out domestic investment in the industry of entrant more than just eroding the market share of existing firms.

Markusen and Venables (1997) provide a simple conceptual framework for analyzing the effects of an MNE entry on the domestic investment in the host economy, as discussed above, in the framework of a two-industry model where one industry produces final consumer goods and another produces intermediate goods. MNE entry takes place in the final good producing industry. This is depicted with the help of a Figure 1 where FF curve represents a locus of numbers of firms at which there are normal profits for the final goods industry. Above the curve FF there are more firms than can profitably operate and below there is room for entry. Similarly II is a locus of normal profit for the intermediate goods industry and B represents a point of equilibrium (see Markusen and Venables 1997, for more details). The entry of MNE in final goods industry first produces a competition effect viz. crowds out domestic enterprises in final

goods entry. Therefore, FF curve shifts downwards to F_1F_1. The second effect counters it by generating vertical linkages for the intermediate goods industry. Generation of backward linkages by MNE entrant shift the II curve to I_1I_1 or I_2I_2 depending on whether the MNE entrant generates the demand for intermediate goods in the same proportion as domestic enterprises, or at a lower level. The new equilibrium will be at B_1 or at B_2 respectively. Note that in the former case, there is no effect for the domestic intermediate goods industry as B and B_1 are at the same level on the horizontal axis. The domestic investment in intermediate goods shrinks in the second case viz. at B_2. However, if the MNE entrant produces for exports or substitutes the imports of final goods so that FF curve does not shift (viz. no crowding-out of domestic firms), then the new equilibrium could be at B_3 which represents a net crowding-in through backward linkages. Therefore, the net effect of foreign entry for domestic investments depends upon whether the foreign entrant produces for domestic market, substitutes imports or produces primarily for exports and whether it generates similar amount of backward linkages as domestic firms, or lower. This simple framework highlights the fact that the nature of FDI project has much to do with its effect on the host economy.

Figure 1: Effect of an MNE Entry on Domestic Firms
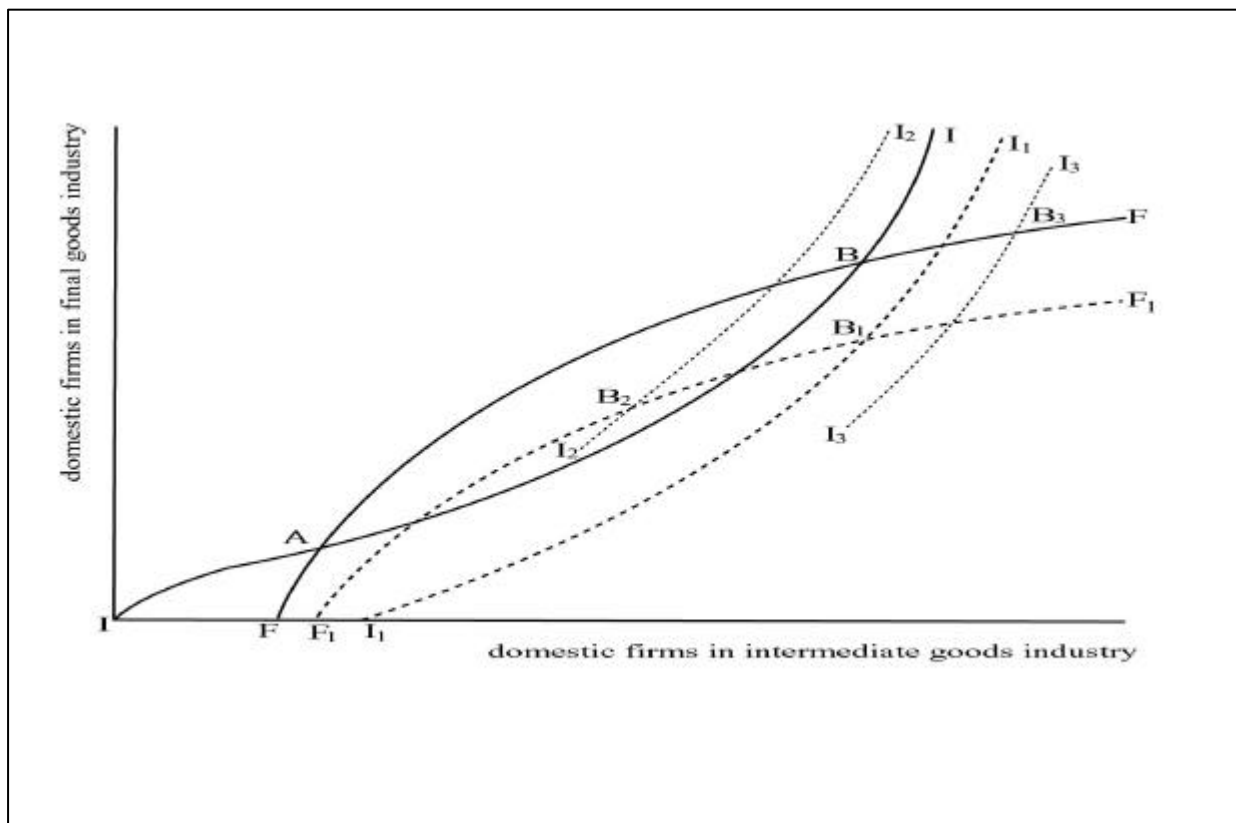
Source: Adapted from Markusen and Venables (1997)

That the extent of externalities generated by FDI depends upon the nature of the project has been recognized elsewhere too (Fry, 1992; De Mello, Jr, 1997). Kumar (2002) argues that MNE entry in modern knowledge intensive or intermediate goods industries may generate more favourable externalities for the host economy than those in matured consumer goods industries. Similarly, he expects export-oriented investments by MNEs especially those having product mandates to serve third-country markets to have more favourable externalities than domestic market oriented activities. He finds such so called 'quality' FDIs more concentrated than FDI in general, in high- and middle-income countries.

FDI, Growth and Domestic Investment: Empirical Evidence

Although a number of studies have analyzed the relationship between FDI inflows and economic growth, the issue is far from settled in view of the mixed findings reached. These studies have typically adopted standard growth accounting framework for analyzing the effect of FDI inflows on growth of national income along with other factors of production. A number of early studies have generally reported an insignificant effect of FDI on growth in developing host countries. For instance, Singh (1988) who found FDI penetration variable to have a little or no consequence for economic or industrial growth in a sample of 73 developing countries or Hein (1992) reporting an insignificant effect of FDI inflows on medium term economic growth of per capita income for a sample of 41 developing countries.

Fry (1992) examined the role of FDI in promoting growth in the framework of a macro-model for a pooled time series cross section of 16 developing countries for 1966-88 period. The countries included in the sample are Argentina, Brazil, Chile, Egypt, India, Mexico, Nigeria, Pakistan, Sri Lanka, Turkey, Venezuela, and 5 Pacific basin countries viz. Indonesia, Korea, Malaysia, Philippines, Thailand. For his sample as a whole he did not find FDI to exert a significantly different effect from domestically financed investment on the rate of economic growth, as the coefficient of FDI after controlling for gross investment rate was not significantly different from zero in statistical terms. FDI had a significant negative effect on domestic investment suggesting that it crowds-out domestic investment. Hence FDI appears to have been immiserizing. However, this effect varies across countries and in the Pacific basin countries FDI seems to have crowded-in domestic investment.

Blomström et al (1994) found that FDI inflows had a significant positive effect on the average growth rate of per capita income for a sample of 78 developing and 23 developed countries.

However, when the sample of developing countries was split between two groups based on level of per capita income, the effect of FDI on growth of lower income developing countries was not statistically significant although still with a positive sign. They argue that least developed countries learn very little from MNEs because domestic enterprises are too far behind in their technological levels to be either imitators or suppliers to MNEs. Borensztein et al (1995) for a sample of 69 developing countries for the period 1970-89 find that the effect of FDI on host country growth is dependent on stock of human capital. They infer from it that flow of advanced technology brought along by FDI can increase the growth rate only by interacting with country's absorptive capability. They also find FDI to be stimulating total fixed investment more than proportionately. In other words, FDI crowds-in domestic investment. However, the results are not robust across specifications. Balasubramanyam et al (1996) find the effect of FDI on average growth rate for the period 1970-85 for the cross-section of 46 countries as well as the sub-sample of countries that are deemed to pursue export-oriented strategy to be positive and significant but not significant and some times negative for the sub-set of countries pursuing inward-oriented strategy. Pradhan (2001) finds a significant positive effect of lagged FDI inflows on growth rates only for Latin American countries in a panel data estimation covering 1975-95 period for 71 developing countries. The effect of FDI was not significantly different from zero for the overall sample and for other regions.

De Mello (1999) has conducted time series as well as panel data estimation for a sample covering 15 developed and 17 developing countries for the period 1970-90 of the relationships between FDI, capital accumulation, output and productivity growth. The time series estimations suggest that effect of FDI on growth or on capital accumulation and total factor productivity (TFP) varies greatly across countries. The panel data estimation suggests a positive impact of FDI on output growth for developed and developing country sub-samples. However, the effect of FDI on capital accumulation and TFP growth varies across developed (technological leaders) and developing countries (technological followers). FDI has a positive effect on TFP growth in developed countries but a negative effect in developing countries but the pattern is reversed in case of effect on capital accumulation. De Mello infers from these findings that the extent to which FDI is growth-enhancing depends on the degree of complementarity between FDI and domestic investment. The degree of substitutability between foreign and domestic capital stocks appears to be greater in technologically advanced countries than in developing countries. Developing countries may have difficulty in using and diffusing new technologies of MNEs. Findings of Xu (2000) for US FDI in 40 countries for the period 1966-94 also corroborate the

finding of De Mello that technology transfer from FDI contributes to productivity growth in developed countries but not in developing countries, which he attributes to lack of adequate human capital.

Agosin and Mayer (2000) analyze the effect of lagged values of FDI inflows on investment rates in host countries to examine whether FDI crowds-in or crowds-out domestic investment over the 1970-95 period. They find that FDI crowds-in domestic investment in Asian countries, crowds-out in Latin American countries while in Africa the relationship is neutral (or one-to-one between FDI and total investment). Therefore, they conclude that effects of FDI have by no means always favourable and simplistic policies are unlikely to be optimal. These regional patterns tend to corroborate the findings of Fry (1992) who also reported East Asian countries to have a complementarity between FDI and total investment.

Knowledge Spillovers and Productivity Improvements

The other stream of studies has related the productivity levels across industries or firms within a country with the extent of foreign presence in an attempt to evaluate the presence of knowledge spillovers, following Caves (1974). These studies have also reached mixed findings. Blomström (1989, ch.4) has found a strong positive association between labour productivity of local enterprises and foreign share in employment in 1970 in Mexican manufacturing industries. However, foreign entry was not found related to changes in the technological frontier nor changes in labour productivity of the least efficient plants.

A simple relationship between productivity levels and foreign ownership as examined by these studies has the limitation of the potential overestimation of the positive impact of foreign presence if the FDI was concentrated in more productive industries. Blomström and Wolff (1989) in a further work on 20 two digit Mexican industries for the period 1965-1984 found increasing convergence of the productivity levels of locally owned firms to that of foreign owned firms thus suggesting the presence of knowledge spillovers. Haddad and Harrison (1993) in the case of Morocco's manufacturing sector using a firm level panel data set for 1985-1989 found no significant relationship between higher productivity growth in domestic firms and greater foreign presence in a sector. Aitken and Harrison (1999) in a similar exercise for Venezuela found foreign ownership to affect the productivity of domestically owned plants adversely and negative effects of FDI were large and robust. Similar results were reported for Indonesia where negative effect on productivity of domestic plants was slightly weaker.

Therefore, the authors inferred that the benefits of FDI are limited to direct effects on productivity improvements with improved technology by enterprises receiving foreign participation and the spillovers to other local enterprises are negligible and do not justify the incentives granted by host governments to foreign investors.

Kokko (1994) by examining Mexican data found no evidence of spillovers in industries where the foreign affiliates had a much higher productivity and larger market shares than local firms. In other industries, there appeared to be a positive relationship between foreign presence and local productivity. This result suggests that spillovers from foreign enterprises are dependent upon the local capability in the industry. If the local firms are too weak they will not be able to absorb spillovers and might vanish in the face of competition from foreign firms. Similar findings were obtained by Kokko et al (1996) in Uruguay and Kathuria (1998) in India.

The exiting literature, therefore, suggests that host country may not benefit from knowledge spillovers when the technology gap between foreign and domestic firms is too wide that is generally the case in poorer countries. The literature also found the effect of FDI on growth to be dependent on the presence of skills that facilitate absorption of new knowledge (Borensztein 1995, UNCTAD 1999). In view of relatively low levels of skill accumulation, low-income countries are not able to experience more favourable effects of FDI. Some studies have observed an insignificant or adverse effect of FDI on low-income countries and a more favourable effect on middle income countries (Blomstrom et al 1994, De Mello 1999, Xu 2000). Therefore, not only FDI is concentrated in relatively richer countries, these countries are also able to experience its more favourable effects than poor countries.

3. FDI and Growth in Developing Countries: New Empirical Evidence

In what follows, we attempt some fresh explorations on the effect of FDI on growth with an up-to-date panel data set for a sample of 98 developing countries covering the 1980-99 period followed by tests on the direction of causality for sample countries.

Analytical Framework

The effect of FDI on economic growth is analyzed in the standard growth accounting framework. To begin with the capital stock is assumed to comprise two components viz. domestic and foreign owned capital stock. So

$$K_t \equiv K_{dt} + K_{ft}$$

We adopt an augmented Solow production function that makes output a function of stocks of capital, labor, human capital and productivity (see Mankiw et al 1992; Benhabib and Spiegel 1994, among others). However, we specify domestic and foreign owned capital stock separately in a Cobb-Douglas type production function.

$$Y_t = A_{it} \ K_{dit}^{a} \ K_{fit}^{l} \ L_{it}^{b} \ H_{it}^{g} \qquad [1]$$

where Y is the flow of output, K_d, K_f represent domestic and foreign owned capital stock respectively, L is labor and H is human skills capital stock. A is total factor productivity that explains the output growth that is not accounted for by the growth in factors of production specified.

Taking logs and differentiating Equation [1] with respect to time, we obtain the familiar growth equation:

$$y_{it} = a_{it} + a k_{dit} + l k_{fit} + b l_{it} + g h_{it} \qquad [2]$$

Where lower case letters represent the growth rates of output, domestic capital stock, foreign capital stock, labour and human capital. α, λ, β and γ represent the output elasticity of domestic capital stock, foreign capital stock, labor and human skill capital respectively. In a world of perfect competition and constant returns to scale these elasticity coefficients can be interpreted as respective factor shares in total output. Equation [2] is the fundamental growth accounting equation, which decomposes the growth rate of output into growth rate of total factor productivity plus a weighted sum of the growth rates of capital stocks, human capital stock and the growth rate of labor. Theoretically, α, β and γ are expected to be positive while the sign of λ would depend on the relative strength of competition and linkage effects and other externalities that FDI generates in the development process as discussed in Section 2.

Following the established practice in the literature (see Bosworth and Collins 1996, for instance), K_d and K_f are proxied by domestic investment to GDP ratio (I_d) and FDI to GDP ratio (I_f) respectively in view of problems associated with measurement of capital stock. The justification for using the rate of investment comes from the assumption of a steady state situation or a linearization around a steady state. Therefore, the final form of Equation [2] could be written as follows.

$$y_{it} = a_i + a\,I_{dit} + l\,I_{fit} + b\,l_{it} + g\,h_{it} + e_{it} \qquad [3]$$

Where ε_{it} is an error term.

Data set and Estimations

The data set for estimations covers 107 developing countries representing Africa, Asia and Latin America and the Caribbean for the period 1980-99 for most countries (see Annex 1 for details). Because of missing values of certain variables, 9 countries had to excluded from estimations reducing the sample to 98. The data on growth rate of GDP, gross investment rate, FDI to GDP ratio, and labour force is from the World Bank's *World Development Indicators 2001* (CD-ROM). Domestic investment rate (I_d) is obtained by subtracting FDI to GDP ratio from gross investment rate. This helps us avoid the double counting of FDI in domestic investment that a number of previous studies have suffered from. Measurement of human skill stock has been a challenge with different studies employing literacy rates, gross enrolment rates or other measures of educational attainment as indicators of skills stock (see Benhabib and Spiegel, 1994; and Barro and Sala-i-Martin, 1995, for problems in measurement of skills). Here human skill stock has been constructed by multiplying mean years of schooling for the total population aged 25 years or over (Barro-Lee Data Set) by total population in the year. Barro-Lee data base which provides the educational attainment variable, however, has two limitations. Firstly, the average years of schooling are given for every five years and not annually. This has been resolved by interpolating the values for the intermediate years on the basis of growth rate over the five-year period. The second problem with the data set relates to the country coverage. Barro-Lee data set covers only 65 of the 98 countries in our sample. Therefore, we report two sets of estimations: one for a sample of 65 countries with full model, and second with the complete sample of 98 countries without human capital variable.

Two methods of estimation have been employed. One is the OLS with White's heteroskedasticity consistent covariance estimation. The other is the panel data estimation with fixed effects. As opposed to the random effect model, which treats country effects as random variables, the fixed effect assumes that the differences across countries reflect parametric shifts in the regression function. Hausman test (1978) strongly favors the fixed effect estimation throughout.

The estimations of Equation [3] for our data set are presented in Table 1. As observed earlier, two sets of results are presented, one for the sample of 65 countries for which we have human skill variable (Equation 1.1), and the other, for the full sample of 98 countries without skill variable (Equation 1.2). The estimations reported in Table 1 explain between 14 to 33 per cent of total variation in the data set which is reasonable considering the diverse cross-section covered and are always significant at one per cent level of confidence in terms of F-test.

The estimations suggest that the bulk of the growth of sample countries has been contributed by growth of labour force but domestic and foreign investments have also contributed to it in significant measure. In particular the finding pertaining to FDI is significant in view of previous studies reaching mixed findings regarding the role of FDI in promoting growth especially in poorer countries. The present estimations provide fresh support to the role that FDI potentially plays in fostering growth in its host countries. Furthermore, the impact of FDI is observed to be higher than the impact of domestic investment. For instance, a one per cent increase in the FDI-to-GDP ratio is observed to lead to an increase in the growth rate of about 0.37 per cent whereas the increase is 0.19 per cent in the case of domestic investment (equation 1.1). The growth of human skill stock also comes up with a positive and significant effect suggesting that accumulation of skills does contribute significantly to growth.

Shifts Across Regions and Income Levels

There are reasons to believe that the contribution of FDI to economic growth varies across different developing regions. First, the composition of FDI inflows into developing countries is highly regionally concentrated in Latin America and Asia. In the 1990s, concentration of FDI in Latin America has actually accentuated further because of its strong progress towards regional economic integration and privatization and debt-equity swaps etc. Africa, given its poor levels of development and political instability has remained less attractive vis-à-vis other developing regions. Secondly, there is considerable variation in the patterns of FDI

across regions. For instance, a greater proportion of FDI in Latin America in recent years has come on account of privatization and acquisition of existing enterprises than in other regions. Regions also differ with respect to policies towards facilitating the vertical linkages of MNEs with domestic enterprises. UNCTAD (2001), for instance, provides case studies of policies adopted by some East Asian countries to foster linkages between foreign and domestic enterprises. Finally, previous studies such as by Fry (1992) had shown that FDI was more productive in Pacific basin countries than in others. To examine any systematic differences in the role played by FDI in the explanation of growth across regions, two differential slope dummies have been included in the estimation (Equations 1.3) with Latin American countries treated as the base category. The estimations suggest that FDI has been less productive in African developing countries than in Latin American Countries as the dummy for Africa, is negative and statistically significant at the 10 percent level. The differential slope dummy for Asia, has a positive and significant coefficient in the OLS estimation suggesting that the growth impact of FDI is statistically more favourable in Asian region than in Latin America. However, the coefficient is not significantly different from zero in the panel data estimation.

Table 1: FDI and Economic Growth in Developing Countries, 1980-1999

Independent Variables	Coefficients (t-values)							
	Equation 1.1		Equation 1.2		Equation 1.3		Equation 1.4	
	OLS	Fixed-effects	OLS	Fixed-effects	OLS	Fixed-effects	OLS	Fixed-effects
I_f	0.2630*** (5.39)	0.3721*** (7.23)	0.2495*** (11.88)	0.2561*** (7.82)	0.2382*** (5.65)	0.4647*** (6.43)	0.2316*** (5.68)	0.4812*** (5.94)
I_d	0.1805*** (8.5)	0.1906*** (6.94)	0.1903*** (6.53)	0.2251*** (9.13)	0.1755*** (7.93)	0.1882*** (6.85)	0.1871*** (6.3)	0.2187*** (8.93)
Labor Growth	0.8795* (1.73)	1.4131*** (8.68)	0.9507** (2.31)	1.2527*** (7.76)	0.8916* 1.76	1.4238*** (8.74)	0.9698** (2.36)	1.2976*** (8.09)
Skill Growth	0.1051** (2.19)	0.1264* (1.85)			0.0960** (1.95)	0.1252* (1.83)	0.0036 (0.08)	-0.304*** (-3.5)
I_f*DAfrica					-0.0063 (-0.07)	-0.1695* (-1.67)		
I_f*DAsia					0.1332* (1.63)	-0.2317 (-1.23)		
I_f*DMiddle Income							0.1179* (1.72)	0.2014 (1.43)
Constant	-3.663*** (-2.51)	-5.562*** (-7.7)	-3.539*** (-2.76)	-5.025*** (-7.54)	-3.564** (-2.42)	-5.497*** (-7.58)	-3.559*** (-2.79)	-5.313*** (-8.01)
F-value	26.04	47.08	47.55	56.40	22.22	32.00	29.33	39.75
R-squared	0.1509	0.2402	0.1395	0.3308	0.1524	0.1974	0.1409	0.1922
No. of countries	65	65	98	98	65	65	98	98
No. of observations	1204	1204	1640	1640	1204	1204	1640	1640

Note: Figures in parentheses are t-ratios; ***, **, * respectively indicate 1 percent, 5 percent and 10 percent level of significance. Estimated using statistical package STATA 7.0.
Source: Authors computations as described in the text.

Furthermore, as has been argued earlier, FDI may be less productive in low-income countries in view of technology gap or lack of capacity of domestic enterprises to absorb favourable knowledge spillovers. To examine this a differential slope dummy for middle-income countries was included with low-income countries treated as the base category in Equation 1.4. In the OLS estimations the middle-income dummy achieves a positive coefficient that is significant at 10 per cent level but is not significantly different from zero in fixed effect estimations. It would appear to lend a weak support to the hypotheses that FDI is more productive in middle-income countries than in low-income countries.

To sum up therefore, the panel data estimations reported above highlight a positive effect of FDI on their host country's growth along with other factors of production such as labour deployment, domestic capital and skill accumulation. Although the results of the estimations are quite robust across different estimations and specifications, these do suffer from the limitations. For instance, as argued in Section 2, the FDI to growth relationship may suffer from causality bias. That is rather than causing growth, the observed relationship might be on account of growth attracting FDI. Furthermore, FDI's effect on growth was posited to be of a dynamic nature comprising of two rounds of effects. Hence, a contemporaneous analysis in the growth accounting framework may have limitations in capturing fully. Finally, the literature suggests that the effect of FDI on growth varies across countries depending upon, among other factors, on the nature of the effect on domestic investment and backward linkages and knowledge spillovers generated which in turn are determined by the nature of FDI received, the local absorptive capacity and technology gap between domestic and foreign enterprises (see Fry 1992, De Mello 1999). In what follows, further tests are conducted to determine the direction of causality between FDI and growth.

FDI and Growth: Which comes first?

To further understand the relationship between FDI and economic growth and to resolve the possible causality bias between FDI and growth, we have used Granger Causality test in a bi-variate VAR framework. FDI would be considered 'Granger-causing growth' only if the lagged values of FDI significantly contribute to the explanation of current growth. Therefore, this test essentially looks at the predictive performance between variables to determine the

existence or direction of causality between them. Given the fact that it takes into account the effect of lagged values of the causing variable on the current value of the dependent variable, it takes care of the dynamic nature of FDI's effect on growth that we have postulated.

Granger causality test is performed for all the 81 countries in the sample for which adequate observations are available. Schwartz Information Criterion (SC) has been used to determine the optimal lag length in the test. The detailed findings are reported in Annex Table A1 and summarized in Table 2 below. Out of 81 countries included, the causality test between FDI and economic growth suggests existence of causality only in the case of 28 countries. Unidirectional causality from FDI to economic growth was observed in 12 countries. Growth rate is found to attract FDI in 11 countries. Feedback causality, i.e. two-way interaction has been detected in five countries. In rest of the 53 countries the direction of causality is not pronounced and hence the Granger test is not able to determine the direction of it.

Table2: Causality between FDI and Economic Growth, 1980-1999

Unidirectional Causality		Feedback Causality	Granger Neutral
FDI ®Growth	Growth®FDI	FDI ≪ Growth	
Cameron Colombia Guinea-Bissau Jamaica Mexico Paraguay Senegal St. Lucia Swaziland Trinidad and Tobago Uruguay Zambia	Argentina Belize Congo Rep. Congo Dem. Rep. Ecuador El Salvador Guatemala Guyana Mauritania Tunisia Kenya	Cote d'Ivoire Indonesia Malawi Pakistan Thailand	Bangladesh, Barbados, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Central African Rep., Chad, Chile, China, Comoros, Costa Rica, Cyprus, Dominica, Dominican Rep., Egypt Arab Rep., Ethiopia, Fiji, Gabon, Gambia, Grenada, Ghana, Haiti, Honduras, India, Korea, Rep., Lesotho, Madagascar, Malaysia, Mali, Mauritius, Morocco, Mozambique, Nepal Niger, Nigeria, Panama, Peru, Philippines, Rwanda Seychelles, Sierra Leone Singapore, Solomon Islands Sri Lanka, St. Kitts and Nevis, St. Vincent and the Grenadines, Turkey, Vanuatu, Venezuela Zimbabwe

Source: based on Annex Table A1.

This analysis, therefore, suggests that the nature of FDI-growth relationship varies across countries. The predominant pattern that emerges from this analysis is that the direction of causality in majority of cases could not be determined and even in the rest of the cases it is

not always from FDI to growth. Therefore, caution needs to be applied before drawing definitive inferences from the findings of panel data estimations on the role played by FDI in determining growth. FDI is attracted by growth in an equal number of countries than other way round.

4. FDI and Domestic Investment: Complements or Substitutes?

The above analysis suggests that the nature of effect of FDI on growth varies across countries and in some countries actually growth may be pulling FDI rather than FDI contributing to growth. Hence, the findings of panel data estimations need to read with caution. Conceptually we expect the effect of FDI to be different from that of domestic investment because of the potential of FDI to crowd-in domestic investment through vertical linkages, or improve their productivity through knowledge spillovers or its ability to substitute domestic investments. FDI's effect on growth would be more favourable than domestic investments if it crowds-in more domestic investment than it crows-out. Furthermore, we have also posited that these effects may have a dynamic dimension. In this section, we explore into the nature of relationship between FDI and domestic investment.

The nature of FDI and domestic investment is first examined in the framework of a simple model in which the current values of domestic investment are made a function of current and past values of FDI besides lagged values of itself (dependent variable) and lagged growth variable. That is:

$$I_{d,it} = \lambda_{i0} + \lambda_1 I_{d,it-1} + \lambda_2 I_{d,it-2} + \lambda_3 I_{f,it} + \lambda_4 I_{f,it-1} + \lambda_5 I_{f,it-2} + \lambda_6 g_{y,it-1} + \varepsilon_{it} \qquad [4]$$

where I_d and I_f are the domestic investment and FDI, both expressed as a per cent of GDP of the host economy, and $g_{y,it-1}$ is the lagged growth rate. λ_{i0} is the country effect and is assumed to be time invariant. ε_{it} is the classical disturbance term.

The inclusion of present and lagged values of FDI in the model [4] enables us to capture the possibly dynamic nature of effect of FDI on domestic investment as argued earlier. In particular, we have posited that the initial effect of FDI on domestic investment may be negative as it erodes the market share of domestic investors. However, in the subsequent

period, it could have a positive effect on domestic investment with generation of backward linkages.

Dynamic Panel Data Estimations

The inclusion of lagged dependent variables in the specification makes Model [4] a dynamic panel data model. For such models, the conventional estimation techniques namely OLS and panel data (both fixed and random-effects) are not appropriate. The OLS estimates are biased and inconsistent as the lagged dependent variables is correlated with the error term violating a fundamental assumption. In the typical panel data setting with large cross-sections and short time series such as the present one, the fixed-effects estimator is also biased as well as inconsistent because the Within transformation wipes out the individual effects but does not resolve the problem of correlation between the differenced lagged variable and the error term.. Anderson and Hsiao (1982) suggested an instrumental variable (IV) method for estimation of dynamic panel data models. The IV estimates, even though consistent, however, are not efficient, as they do not utilize all the available moment conditions. Arellano and Bond (1991) have proposed one-step and two-step generalized method of moments (GMM) framework that utilizes the orthogonality conditions that exist between the lagged values of dependent variable and the disturbances. The method takes the first-difference of the model to eliminate the individual effects and then estimates it by using two or higher period lagged dependent variables as instruments following Hansen's optimal GMM framework (see Baltagi 1995, for more details).

We follow the Arellano-Bond GMM method for estimation of Model [4]. The estimation results using OLS (with White's heteroskedasticity consistent covariance estimation) as well as Arellano-Bond GMM estimations are summarized in Table 3. For these estimations data are available for all the 107 developing countries in our panel for the period 1980-1999. Irrespective of the techniques used, the estimated models are found to be highly significant in terms of F-test and explain over 70 per cent of variation in the dependent variable in the case of OLS and over 63 percent in the GMM estimation. The Sargan test from the two-step estimator cannot reject the null hypothesis that the over-identifying restrictions are valid. Further, it is not possible to reject the null hypothesis of no second-order autocorrelation, which suggest that the obtained estimates are consistent.

It can be seen that FDI inflows in the current period and in the past two years have a significant effect on domestic investment in the current year besides lagged domestic investment and lagged growth rate. However, the signs of the effect of FDI inflows in current period and the two past years are different. FDI in current period has a strong negative effect on domestic investment in the current period while the lagged inflows have positive effect. Keeping in mind the first difference form of the model in dynamic panel data estimation the following interpretation can be provided. A one percent increase in the FDI ratio in the current period on the average decreases current domestic investment ratio by 0.65 percent. A one per cent increase in the FDI ratio in the previous two years, on the average, is followed by an increase of about 0.28 per cent and 0.17 per cent in the current period domestic investment ratio respectively. The pattern observed tends to corroborate our proposition that the effect of FDI on domestic investment is of a dynamic nature and the nature of effects over times may differ.

Table 3: Estimations Capturing the Effect of FDI on Domestic Investment

Independent Variables	Coefficients (t-values)	
	Equation 1.1	
	OLS estimation	Arellano-Bond GMM Dynamic Panel Data Estimation[@]
$I_{d, t-1}$	0.6345*** (10.89)	0.3503*** (44.46)
$I_{d, t-2}$	0.1811*** (4.05)	0.0131*** (4.2)
$I_{f, t}$	-0.6579*** (-15.6)	-0.6464*** (-114.85)
$I_{f, t-1}$	0.4774*** (7.29)	0.2830*** (43.52)
$I_{f, t-2}$	0.2156*** (3.13)	0.1731*** (50.87)
$g_{,y, t-1}$	0.1187*** (4.01)	0.0457*** (12.81)
Constant	3.0387*** (5.8)	
F-value	227.97	99258.95
Sargan test: Chi-square		98.94
Serial correlation of 1st order		-2.96
Serial correlation of 2nd order		0.97
R-squared	0.7207	0.6290#
No. of countries	107	107
No. of observations	1667	1559

Notes: Figures in parentheses are t-ratios; ***, **, * respectively indicate 1 percent, 5 percent and 10 percent level of significance. @Using the Arellano-Bond two-step GMM estimation estimated using STATA 7.0. In the estimation, the current period FDI has been treated as a predetermined variable rather than a strictly exogenous variable. #-obtained from the one-step GMM differenced residuals.
Source: Authors computations as described in the text.

Country-wise Estimations

While the estimations for the panel of 98 countries reported above do indicate that on the whole crowding-out dominates the effect of FDI on domestic investment, there may be important inter-country differences depending upon their ability to attract FDI of better 'quality' viz. those that generate more favourable externalities for domestic investment. Hence, Model 4 was re-estimated for each of the 83 countries for which we had at least 17 observations. The optimal lag structure was determined with the help of Schwartz criterion. The results of estimations are presented in Annex Table A2. Table 4 summarizes the findings of these estimations for 52 countries for which FDI variable had a significant coefficient. In other cases FDI did not have a significant effect on domestic investments.

Table 4: Countries with Significant coefficient of FDI in Investment Equation

Country	Sign of the Coefficient of			Net effect of FDI
	FDI (t)	FDI (t-1)	FDI (t-2)	
Argentina	-1.581		2.059	Crowding In
Bangladesh	4.996			Crowding In
Barbados		5.374		Crowding In
Belize		-1.4231	1.1499	Crowding Out
Bolivia			-1.644	Crowding Out
Botswana	-1.059	0.64	-0.499	Crowding Out
Brazil			-4.351	Crowding Out
Burkina Faso		6.4846		Crowding In
Cameroon	-0.86	0.962	0.912	Crowding In
Chad*		1.575		Crowding In
Chile	-1.0538	0.8613		Crowding Out
Colombia		1.455	-1.773	Crowding Out
Costa Rica	-4.373		3.27	Crowding Out
Cote d'Ivoire		0.961	-1.018	Crowding Out
Cyprus		3.682		Crowding In
Dominica	-0.7966			Crowding Out
Ecuador		-2.3571		Crowding Out
El Salvador	-0.765	0.5392		Crowding Out
Fiji	-0.826	0.319		Crowding Out
Gambia	-0.6966	0.7869		Crowding In
Ghana	1.42	-1.109		Crowding In
Grenada	-1.121	1.073		Crowding Out
Guyana	-0.929	0.916	-1.088	Crowding Out
Haiti		8.0696		Crowding In
Honduras		3.0889		Crowding In
India*		-5.2697		Crowding Out
Jamaica	-1.3717	1.5725		Crowding In
Korea, Rep	-12.4973	17.3632		Crowding In
Lesotho	-0.8213			Crowding Out
Mali	-1.6768			Crowding Out
Mauritania		1.6746		Crowding In
Mauritius	3.567			Crowding In
Mexico	-1.635			Crowding Out
Morocco			-2.513	Crowding Out
Nepal	14.8534			Crowding In

Country					Effect
Nigeria	-1.0687				Crowding Out
Panama	-0.6461	0.8545			Crowding In
Papua New Guinea	-0.9432				Crowding Out
Paraguay	-1.255				Crowding Out
Peru	-1.2983				Crowding Out
Philippines	-1.5022				Crowding Out
Rwanda*	4.539				Crowding In
Senegal				0.75	Crowding In
Sierra Leone	-0.959			1.072	Crowding In
Singapore	-1.067	0.9511			Crowding Out
Sri Lanka		1.2265			Crowding In
St. Kitts and Nevis	-0.7589	0.5047			Crowding Out
St. Lucia*	-0.725	0.656	-0.404		Crowding Out
Swaziland	-2.367				Crowding Out
Thailand	-2.6068	3.2418			Crowding In
Uganda	-1.9627	1.7744			Crowding Out
Uruguay	-1.9017	2.1955			Crowding In

*-Denotes cases where the estimated model is not significant even at 10 percent level. Blank cells indicate that estimated coefficient is not significantly different from zero in statistical terms.

The general pattern of effects of FDI on domestic investment is that current values of FDI have a negative effect on domestic investment in the current period whereas a positive effect dominates the relation with one period lag. This is exactly the pattern observed in panel data estimations. By taking account of the sign and magnitude of the FDI coefficient for the current and lagged periods, the nature of the net effect of FDI can be determined for each country. Of the 52 countries that have significant coefficient of FDI in Table 4, 29 countries experience net crowding-out effect from FDI and 23 experience a net crowding-in.

In order to examine regional patterns of the nature of effect of FDI on domestic investment, we cross-tabulated the countries according to their regions and the nature of effect in Table 5. Apparently crowding-out seems to dominate the relationship between FDI and domestic investment in the Latin America and Caribbean region with 17 countries in this group and only 7 reporting a crowding-in. In Asia and Africa the patterns of crowding-in and crowding-out are more evenly distributed. These regional patterns appear to be consistent with the observations of Fry (1992) and Agosin and Meyer (2000).

Table 5: Summary Patterns of Relationships between FDI and Domestic Investments

	Asia	Africa	Latin America and the Caribbean
Crowding In	Bangladesh Korea, Rep. Nepal Sri Lanka Thailand	Burkina Faso Cameroon Chad* Gambia Ghana Mauritania Mauritius Rwanda* Senegal Sierra Leone	Argentina Barbados Haiti Honduras Jamaica Panama Uruguay
Crowding Out	Fiji India* Papua New Guinea Philippines Singapore	Botswana Cote d'Ivoire Lesotho Mali Morocco Nigeria Swaziland Uganda	Belize Bolivia Brazil Chile Colombia Costa Rica Dominica Ecuador El Salvador Grenada Guyana Mexico Paraguay Peru St. Kitts and Nevis St. Lucia*
FDI coefficients not significantly different from zero	China Indonesia Malaysia Pakistan Turkey	Algeria Benin Burundi* Cen. African* Rep Comoros Congo Dem Rep. Congo Rep* Egypt, Arab Rep Ethiopia* Gabon* Guinea-Bissau Kenya Madagascar* Malawi* Mozambique Niger Seychelles* Togo* Tunisia Zambia* Zimbabwe*	Dominican Rep* Guatemala St. Vincent and the Grenadines Trinidad and Tobago Venezuela*

*-Denotes cases where the estimated model is not significant even at 10 percent level.

5. Concluding Remarks and Policy Implications

In this paper we have analyzed the relationships between FDI, growth and domestic investment for a sample of 107 developing countries for the 1980-99 period. We have argued that the effect of FDI on growth could be of a dynamic nature in that there may be two rounds of effect viz. a competition effect for domestic enterprises in the industry of the foreign

entrant that is generally negative, and a subsequent round could include a usually favourable externality on domestic investment because of backward linkages. The net weight of these effects could depend on the nature of FDI projects or the quality of FDI which is known to vary greatly for different types of investments.

Our panel data estimations in the standard growth accounting framework using Solow's augmented production function suggest a significant positive effect of FDI on growth in developing countries. However, this finding needs to treated with caution given the causality bias and limitations of a contemporaneous estimation in capturing a possibly dynamic relationship. The tests of causality suggest that in a majority of cases the direction of causation is not pronounced. Furthermore, in poor countries, the direction of causation seemed to be running from growth to FDI in an equal number of cases as from FDI to growth. Thus in a substantial number of cases, growth rate of economy acts as a signaling mechanism for FDI.

Given the fact that the nature of the relationship between FDI and domestic investment is at the heart of former's effect on growth, we analyzed the effect of current and lagged values of FDI on domestic investment in current year. The findings of these estimations corroborate our proposition that FDI affects domestic investments in a dynamic manner with initial effect being negative and the subsequent effect positive for the panel data as well as for most of the countries individually. Furthermore, in net terms the effect of FDI on domestic investments appears to be negative for the pooled estimations as well as for majority of countries. So FDI appears to crowds-out domestic investment in net terms, in general. However, for a number of countries, FDI is seen as crowding-in domestic investment. Therefore, some countries have been able to benefit from FDI more than others. A more detailed examination of the factors that explain greater success of some countries in experiencing more favourable effects of FDI is clearly warranted.

What are the policy lessons from the above analysis for poorer developing countries? The finding that causality runs from growth to FDI in a substantial proportion of cases suggests that the poorest countries need to pursue alternative strategies for getting the process of their development going rather than waiting for MNE investment to stimulate the process of their industrialization and development with incentives and policy liberalization. They would do better by focusing on improving infrastructure, human resources, developing local

entrepreneurship, creating a stable macroeconomic framework and conditions conducive for productive investments to kick-start the process of development. The restoration of concessional development finance should help in complementing the meagre domestic resources that can be invested. Once the pace of development picks up, FDI will probably flow in by itself and help in carrying the process forward. Building absorptive capacity will facilitate absorption of knowledge brought in by FDI. The international development community needs to discuss alternative ways of contributing to the process of industrialization of the poorest countries with a revival of transfer of capital and technological resources.

It is clear that the effect of FDI on domestic investments and growth depend very much on the nature or quality of FDI. Certain types of FDI tend to have more favourable developmental externalities than others. In that context attention needs to paid by host countries to the quality of FDI inflows besides attracting greater magnitudes of FDI. Recent work has shown that host country policies have an important bearing on the quality of FDI inflows received (see Kumar 2002, among others). Governments have employed various measures to improve the overall quality of FDI inflows. These include selective policies to target more desirable FDI inflows. Many governments –in developed as well as developing countries alike- have imposed performance regulations like local content requirements on MNEs to intensify generation of local linkages or export obligations for 'triggering a burst of export-focused investments' (see Moran 1998, Kumar 2001, for examples). Some have employed incentives such as pioneer industry programmes to attract FDI in industries that have the potential to generate more favourable externalities for domestic investment (see UNCTAD 1999, 2001, for examples). Similarly because MNE entry through acquisition of domestic enterprises is likely to generate less favourable externalities for domestic investment than greenfield investments, some governments discourage acquisitions by foreign enterprises (see Agosin and Mayer 2000, for examples).

Another sphere where governmental intervention may be required to maximize gains from globalization is in diffusion of knowledge brought in by foreign enterprises. An important channel of diffusion of knowledge brought in by MNEs in the host economy is vertical inter-firm linkages with domestic enterprises. The host governments could consider employing proactive measures that encourage foreign and local firms to deepen their local content as a number of countries, e.g. Singapore, Taiwan, Korea and Ireland have done so successfully

(see Battat, et al. 1996). The knowledge diffusion could also be accomplished by creating sub-national or sub-regional clusters of inter-related activities which facilitate the spillovers of knowledge through informal and social contacts among the employees besides traditional buyer-seller links. UNCTAD (2001) also highlights the policy measure employed by different governments in promoting linkages.

Finally, these findings have implications for the on-going attempt of some developed countries to write GATT-type investment rules through multilateral trade negotiations as per the mandate of the Doha Ministerial Conference (see Hoekman and Saggi 2001, Kumar 2001, for a discussions of these proposals and their implications). The Doha Ministerial Declaration proposed the launch of negotiations on trade and investment 'subject to explicit consensus on the modalities' at the Fifth Ministerial Conference. Keeping in mind the findings of this paper that role of FDI in development varies from country to country and the importance of government policies in determining the contribution of FDI in their economic development, developing countries would be well advised to participate in these negotiations effectively to retain their policy flexibility to influence the quality of FDI inflows.

Data Annex

Data Sources and Variable Measurements

The data on GDP growth (annual %), Gross Fixed Capital Formation (% of GDP), net FDI inflows (% of GDP) and total labour force has been obtained from World Bank's World Development Indicators 2001 (CD-ROM). The mean years of schooling has been collected from Barro-Lee Human Capital Appendix Table A2.

<u>The measurements of the variables used in the study</u>:

y_{it} is the growth rate of GDP (annual %).

$I_{d, it}$ is the domestic investment rate. It is obtained as the difference between the total investment rate and FDI ratio of the host economy.

$I_{f, it}$ is the FDI ratio. It is defined as the net FDI inflows as a percentage of GDP of the host country.

l_{it} is the growth rate of labour force (annual %).

h_{it} is the growth rate of human capital stock. This variable, as mentioned earlier, is constructed as the mean years of schooling multiplied by the population of the country. In Barro Lee data set, mean years of schooling are available only at the five-year interval. For intermediate years the study has calculated an arithmetic growth rate of the form: $S_h = [((H_{t+5}-H_t)/H_t)*(1/5)]$ for mean years of schooling and fill in the missing cell. This methodology is consistent with the methodology of mid-year estimation of population adopted worldwide.

Sample Coverage: The sample covers 107 developing countries from Africa, Asia and Latin America and the Caribbean. The period covered is from 1980-99. However, for some countries data is available for fewer years.

Table A1: Granger Causality between FDI and Economic Growth

Country	Null Hypothesis#	Obs	Number of lags	F-Statistic	Probability	Conclusion
Argentina	FDI dngc Growth	16	4	0.86109	0.53094	Growth→FDI*
	Growth dngc FDI	16	4	2.78975	0.11206	
Bangladesh	FDI dngc Growth	15	5	1.18812	0.44618	Granger Neutral
	Growth dngc FDI	15	5	1.08368	0.48243	
Barbados	FDI dngc Growth	19	1	0.01724	0.89717	Granger Neutral
	Growth dngc FDI	19	1	0.66855	0.42557	
Belize	FDI dngc Growth	19	1	0.51942	0.48149	Growth→FDI
	Growth dngc FDI	19	1	7.25640	0.01597	
Benin	FDI dngc Growth	18	2	2.16644	0.15416	Granger Neutral
	Growth dngc FDI	18	2	0.63803	0.54410	
Bolivia	FDI dngc Growth	15	5	1.77561	0.29897	Granger Neutral
	Growth dngc FDI	15	5	0.59889	0.70862	
Botswana	FDI dngc Growth	17	3	1.27003	0.33682	Granger Neutral
	Growth dngc FDI	17	3	0.43915	0.72999	
Brazil	FDI dngc Growth	19	1	0.39344	0.53935	Granger Neutral
	Growth dngc FDI	19	1	0.62399	0.44112	
Burkina Faso	FDI dngc Growth	15	5	2.47322	0.20050	Granger Neutral
	Growth dngc FDI	15	5	1.30007	0.41131	
Burundi	FDI dngc Growth	18	2	1.22198	0.32636	Granger Neutral
	Growth dngc FDI	18	2	1.47023	0.26569	
Cameron	FDI dngc Growth	15	5	7.17057	0.03973	FDI→Growth
	Growth dngc FDI	15	5	1.32717	0.40343	
Central African Rep.	FDI dngc Growth	15	5	0.51271	0.75941	Granger Neutral
	Growth dngc FDI	15	5	1.39778	0.38387	
Chad	FDI dngc Growth	13	5	7.60652	0.12026	Granger Neutral
	Growth dngc FDI	13	5	0.66739	0.69087	
Chile	FDI dngc Growth	17	3	1.28365	0.33266	Granger Neutral
	Growth dngc FDI	17	3	0.35388	0.78746	
China	FDI dngc Growth	19	1	0.49255	0.49287	Granger Neutral
	Growth dngc FDI	19	1	1.72484	0.20759	
Colombia	FDI dngc Growth	15	5	4.10456	0.09801	FDI→Growth
	Growth dngc FDI	15	5	2.65268	0.18290	
Comoros	FDI dngc Growth	18	1	0.29381	0.59575	Granger Neutral
	Growth dngc FDI	18	1	0.23655	0.63374	
Congo Rep.	FDI dngc Growth	15	5	0.26409	0.91164	Growth→FDI
	Growth dngc FDI	15	5	4.20146	0.09458	
Congo Dem. Rep.	FDI dngc Growth	14	5	0.38865	0.83288	Growth→FDI
	Growth dngc FDI	14	5	11.3386	0.03654	
Costa Rica	FDI dngc Growth	17	3	1.31129	0.32440	Granger Neutral
	Growth dngc FDI	17	3	0.23472	0.87015	
Cote d'Ivoire	FDI dngc Growth	19	1	3.18900	0.09310	FDI↔Growth
	Growth dngc FDI	19	1	3.33134	0.08670	
Cyprus	FDI dngc Growth	19	1	0.03257	0.85904	Granger Neutral
	Growth dngc FDI	19	1	0.17527	0.68103	
Dominica	FDI dngc Growth	19	1	0.37563	0.54856	Granger Neutral
	Growth dngc FDI	19	1	2.04492	0.17195	
Dominican Rep	FDI dngc Growth	19	1	1.15932	0.29757	Granger Neutral
	Growth dngc FDI	19	1	1.03687	0.32370	
Ecuador	FDI dngc Growth	15	5	0.76995	0.61698	Growth→FDI
	Growth dngc FDI	15	5	10.3374	0.02097	
Egypt Arab Rep.	FDI dngc Growth	19	1	0.00938	0.92407	Granger Neutral
	Growth dngc FDI	19	1	1.20982	0.28764	
El Salvador	FDI dngc Growth	15	5	0.75399	0.62498	Growth→FDI
	Growth dngc FDI	15	5	11.1952	0.01818	
Ethiopia	FDI dngc Growth	13	5	4.78835	0.18174	Granger Neutral
	Growth dngc FDI	13	5	2.09977	0.35334	
Fiji	FDI dngc Growth	19	1	0.87121	0.36449	Granger Neutral
	Growth dngc FDI	19	1	0.43705	0.51796	
Gabon	FDI dngc Growth	18	1	0.00587	0.93994	Granger Neutral
	Growth dngc FDI	18	1	0.29490	0.59508	

Gambia	FDI dngc Growth	15	4	0.33771	0.84361	Granger Neutral
	Growth dngc FDI	15	4	2.81828	0.12397	
Grenada	FDI dngc Growth	15	5	1.22387	0.43462	Granger Neutral
	Growth dngc FDI	15	5	0.29303	0.89469	
Ghana	FDI dngc Growth	16	4	1.27125	0.36572	Granger Neutral
	Growth dngc FDI	16	4	0.05621	0.99276	
Guatemala	FDI dngc Growth	16	4	2.11801	0.18167	Growth→FDI
	Growth dngc FDI	16	4	3.09723	0.09151	
Guinea-Bissau	FDI dngc Growth	15	5	44.9040	0.00132	FDI→Growth
	Growth dngc FDI	15	5	0.84221	0.58225	
Guyana	FDI dngc Growth	19	1	1.72872	0.20711	Growth→FDI
	Growth dngc FDI	19	1	4.55976	0.04854	
Haiti	FDI dngc Growth	19	1	1.07701	0.31480	Granger Neutral
	Growth dngc FDI	19	1	0.14570	0.70770	
Honduras	FDI dngc Growth	19	1	1.46714	0.24338	Granger Neutral
	Growth dngc FDI	19	1	0.01629	0.90003	
India	FDI dngc Growth	16	4	2.17488	0.17398	Granger Neutral
	Growth dngc FDI	16	4	0.36002	0.82982	
Indonesia	FDI dngc Growth	15	5	3.97237	0.10299	FDI↔Growth
	Growth dngc FDI	15	5	4.65320	0.08073	
Jamaica	FDI dngc Growth	19	1	2.78987	0.11431	FDI→Growth*
	Growth dngc FDI	19	1	0.02609	0.87370	
Kenya	FDI dngc Growth	19	1	0.55010	0.46903	Growth→FDI
	Growth dngc FDI	19	1	7.07330	0.01713	
Korea, Rep	FDI dngc Growth	19	1	0.04370	0.83704	Granger Neutral
	Growth dngc FDI	19	1	1.02613	0.32614	
Lesotho	FDI dngc Growth	18	1	0.01248	0.91252	Granger Neutral
	Growth dngc FDI	18	1	0.09040	0.76779	
Madagascar	FDI dngc Growth	18	2	1.12079	0.35558	Granger Neutral
	Growth dngc FDI	18	2	0.88676	0.43550	
Malawi	FDI dngc Growth	16	4	4.57002	0.03945	FDI↔Growth
	Growth dngc FDI	16	4	2.84920	0.10766	
Malaysia	FDI dngc Growth	16	5	0.53972	0.74321	Granger Neutral
	Growth dngc FDI	15	5	0.44451	0.80123	
Mali	FDI dngc Growth	19	1	0.79501	0.38580	Granger Neutral
	Growth dngc FDI	19	1	0.29637	0.59367	
Mauritania	FDI dngc Growth	17	3	1.15596	0.37401	Growth→FDI
	Growth dngc FDI	17	3	2.88033	0.08924	
Mauritius	FDI dngc Growth	16	4	2.09364	0.18510	Granger Neutral
	Growth dngc FDI	16	4	2.57050	0.13036	
Mexico	FDI dngc Growth	15	5	17.4180	0.00807	FDI→Growth
	Growth dngc FDI	15	5	0.10424	0.98551	
Morocco	FDI dngc Growth	15	5	3.55836	0.12130	Granger Neutral
	Growth dngc FDI	15	5	3.04920	0.15128	
Mozambique	FDI dngc Growth	14	5	2.03587	0.29637	Granger Neutral
	Growth dngc FDI	14	5	0.55698	0.73543	
Nepal	FDI dngc Growth	15	5	2.90376	0.16187	Granger Neutral
	Growth dngc FDI	15	5	3.05504	0.15088	
Niger	FDI dngc Growth	15	5	2.44477	0.20351	Granger Neutral
	Growth dngc FDI	15	5	1.20615	0.44029	
Nigeria	FDI dngc Growth	15	5	1.23298	0.43174	Granger Neutral
	Growth dngc FDI	15	5	1.89667	0.27744	
Pakistan	FDI dngc Growth	18	2	6.17275	0.01304	FDI↔Growth
	Growth dngc FDI	18	2	8.42949	0.00449	
Panama	FDI dngc Growth	19	1	0.00765	0.93140	Granger Neutral
	Growth dngc FDI	19	1	0.00382	0.95145	
Papua New Guinea	FDI dngc Growth	15	5	1.40814	0.38111	Growth→FDI
	Growth dngc FDI	15	5	5.86900	0.05558	
Paraguay	FDI dngc Growth	15	5	5.37542	0.06415	FDI→Growth
	Growth dngc FDI	15	5	2.06865	0.25053	
Peru	FDI dngc Growth	18	2	1.32841	0.29858	Granger Neutral
	Growth dngc FDI	18	2	0.28650	0.75551	
Philippines	FDI dngc Growth	15	5	1.04485	0.49690	Granger Neutral
	Growth dngc FDI	15	5	2.02853	0.25646	

Rwanda	FDI dngc Growth	15	5	2.98154	0.15607	Granger Neutral
	Growth dngc FDI	15	5	0.52770	0.75039	
Senegal	FDI dngc Growth	19	1	3.35404	0.08572	FDI→Growth
	Growth dngc FDI	19	1	1.24827	0.28038	
Seychelles	FDI dngc Growth	19	1	0.09464	0.76233	Granger Neutral
	Growth dngc FDI	19	1	0.00189	0.96589	
Sierra Leone	FDI dngc Growth	19	1	1.40588	0.25305	Granger Neutral
	Growth dngc FDI	19	1	0.91350	0.35341	
Singapore	FDI dngc Growth	19	1	0.16051	0.69399	Granger Neutral
	Growth dngc FDI	19	1	0.00548	0.94191	
Solomon Islands	FDI dngc Growth	19	1	2.67682	0.12134	Granger Neutral
	Growth dngc FDI	19	1	1.74463	0.20513	
Sri Lanka	FDI dngc Growth	14	5	1.02192	0.52731	Granger Neutral
	Growth dngc FDI	14	5	3.40110	0.17128	
St. Kitts and Nevis	FDI dngc Growth	19	1	0.56361	0.46371	Granger Neutral
	Growth dngc FDI	19	1	0.08468	0.77479	
St. Lucia	FDI dngc Growth	14	5	8.12832	0.05746	FDI→Growth
	Growth dngc FDI	14	5	1.84872	0.32511	
St. Vincent and the Grenadines	FDI dngc Growth	19	1	0.93278	0.34851	Granger Neutral
	Growth dngc FDI	19	1	0.09826	0.75797	
Swaziland	FDI dngc Growth	16	4	5.04083	0.03126	FDI→Growth
	Growth dngc FDI	16	4	0.42202	0.78873	
Thailand	FDI dngc Growth	18	2	15.5694	0.00035	FDI↔Growth
	Growth dngc FDI	18	2	6.41221	0.01155	
Togo	FDI dngc Growth	15	5	0.76754	0.61818	Growth→FDI
	Growth dngc FDI	15	5	3.83461	0.10860	
Trinidad and Tobago	FDI dngc Growth	15	5	4.31291	0.09085	FDI→Growth
	Growth dngc FDI	15	5	1.27217	0.41964	
Tunisia	FDI dngc Growth	18	2	0.21620	0.80841	Growth→FDI
	Growth dngc FDI	18	2	3.81828	0.04960	
Turkey	FDI dngc Growth	15	5	0.90743	0.55290	Granger Neutral
	Growth dngc FDI	15	5	2.04355	0.25421	
Uruguay	FDI dngc Growth	18	2	4.15796	0.04018	FDI→Growth
	Growth dngc FDI	18	2	1.37770	0.28664	
Vanuatu	FDI dngc Growth	13	5	1.85462	0.38630	Granger Neutral
	Growth dngc FDI	13	5	5.98104	0.14942	
Venezuela	FDI dngc Growth	18	2	1.41419	0.27816	Granger Neutral
	Growth dngc FDI	18	2	0.75008	0.49171	
Zambia	FDI dngc Growth	15	5	13.4937	0.01295	FDI→Growth
	Growth dngc FDI	15	5	0.53429	0.74645	
Zimbabwe	FDI dngc Growth	15	5	2.41404	0.20685	Granger Neutral
	Growth dngc FDI	15	5	0.52322	0.75308	

Note*-indicate the borderline cases i.e., conclusion is valid at 11 percent level of significance. #dngc stands for 'does not Granger cause'.

Table A2: FDI and Domestic Investment Relationship for Developing Countries

Country	Coefficients (t-value)							No of Observations	Adjusted R-squared	F-value	D-W statistic
	Dinv(t-1)	Dinv(t-2)	FDI(t)	FDI(t-1)	FDI(t-2)	Growth(t-1)	Constant				
Algeria	0.7528*** (4.381)		-16.6589 (-0.8231)	0.9421 (0.2691)		-0.1561 (-0.7159)	7.6123 (1.436)	19	0.6225	8.4207	1.8672
Argentina	0.515** (2.566)	0.238 (1.309)	-1.581*** (-13.201)	0.249 (0.417)	2.059*** (3.271)	0.131** (2.580)	3.181 (1.595)	18	0.8915	24.285	2.130
Bangladesh	0.775** (2.839)	-0.341 (-1.554)	4.996** (2.906)	-1.062 (-0.467)	3.334 (1.293)	0.142 (1.206)	9.283*** (3.447)	18	0.8046	12.6678	2.109
Barbados	0.507*** (5.254)	0.071 (0.305)	-3.288 (-0.539)	5.374** (2.362)	0.096 (0.048)	0.269* (1.961)	4.836 (0.915)	18	0.5499	4.4625	2.554
Belize	0.4308** (2.5014)		-1.4231*** (-2.9996)	1.1499** (2.3703)		0.3279** (2.2953)	11.591*** (2.972)	19	0.5234	5.9427	1.7348
Benin	0.3116 (1.2856)		-1.9516 (-0.8264)	2.3944 (0.9599)		0.3376 (1.3228)	9.2023** (2.3486)	19	0.0154	1.0705	2.2678
Bolivia	0.469*** (3.159)	-0.896*** (-3.961)	0.209 (0.634)	0.480 (0.804)	-1.644* (-2.042)	-0.726** (-2.187)	21.850*** (3.956)	18	0.6535	6.3429	2.651
Botswana	0.978*** (5.174)	-0.476** (-2.773)	-1.059*** (-4.741)	0.640** (2.304)	-0.499* (-2.020)	0.356* (1.944)	11.071** (2.568)	18	0.7873	11.4854	2.357
Brazil	0.509** (2.272)	-0.160 (-0.389)	-1.158 (-1.109)	2.801 (1.547)	-4.35**1 (-2.698)	0.132 (0.617)	14.176** (2.618)	18	0.4975	3.8049	2.681
Burkina Faso	0.6987*** (3.5504)		-4.5179 (-1.5247)	6.4846** (2.2764)		-0.0449 (-0.2679)	6.6318* (1.7239)	19	0.5052	5.5939	2.6088
Burundi	0.3715 (1.4506)		3.8178 (0.9692)	0.4254 (0.0946)		0.1071 (0.5160)	7.9891** (2.1161)	19	0.0155	1.0711	2.3498
Cameroon	0.263 (1.295)	0.255* (1.842)	-0.860*** (-4.028)	0.962** (2.844)	0.912* (2.069)	0.161 (1.634)	7.910*** (4.303)	18	0.9020	27.0812	2.130
Cen. African Rep	0.2042 (0.7907)		-1.6539 (-1.1988)	0.5804 (0.3848)		0.1398 (0.9973)	9.0832*** (2.9709)	19	-0.0144	0.9362	1.8542
Chad	0.002 (0.006)	0.415 (1.119)	-1.381 (-1.461)	1.575** (2.474)	-1.041 (-1.309)	-0.281*** (-3.572)	8.178* (2.139)	16	0.3173	2.1618	1.832
Chile	0.2725 (1.001)		-1.0538*** (-2.882)	0.8613* (1.688)		0.5488** (2.650)	11.270** (2.6199)	19	0.6027	7.8270	2.0823
China	0.3025* (2.0718)		0.1845 (0.8175)	-0.3333 (-1.5586)		0.3395*** (4.8630)	21.046*** (4.2838)	19	0.6788	10.5109	2.2425
Colombia	0.984*** (4.986)	-0.756*** (-3.220)	-0.305 (-0.803)	1.455*** (3.299)	-1.773*** (-5.270)	0.584** (2.678)	12.602*** (4.016)	18	0.7128	8.0329	2.292
Comoros	0.6271*** (2.9086)		-1.7277 (-1.2011)	0.1994 (0.1321)		0.3848 (0.8916)	8.2163 (1.5257)	18	0.4939	5.1467	2.3805
Congo Dem Rep.	0.3259 (1.1323)		-1.1143 (-0.9514)	0.0878 (0.0738)		0.2923 (1.5874)	6.8084** (2.2183)	18	0.4283	4.1835	2.0779
Congo Rep	0.2954 (1.1105)		-1.6366 (-0.2355)	-1.6625 (-0.3048)		0.8799* (1.7409)	20.5879** (2.5212)	19	0.0975	1.4862	2.0718

								N	R^2	F	DW
Costa Rica	0.295 (1.372)	0.076 (0.337)	-4.373** (-2.819)	-0.846 (-0.898)	3.270* (1.775)	0.271** (2.103)	16.992 (1.587)	18	0.8195	13.8646	1.364
Cote d'Ivoire	0.805** (2.409)	-0.117 (-0.429)	0.048 (0.100)	0.961** (2.545)	-1.018** (-2.271)	0.080 (0.289)	2.962** (2.264)	18	0.7241	8.4370	2.295
Cyprus	-0.025 (-0.089)	-0.845** (-2.628)	0.001 (0.001)	3.682* (2.039)	0.245 (0.383)	-0.212 (-1.307)	43.156*** (5.905)	17	0.3879	2.6906	2.240
Dominica	0.3257* (1.7146)		-0.7966*** (-3.0179)	0.2526 (0.8311)		0.0626 (0.1686)	19.1856*** (2.9133)	19	0.5247	5.9677	1.3534
Dominican Rep.	0.4641** (2.1040)		-0.6686 (-1.3043)	0.4425 (0.5483)		0.2070 (1.1455)	10.5240** (2.14269)	19	0.1625	1.8734	1.8046
Ecuador	0.0974 (0.3930)		0.7317 (0.5752)	-2.3571* (-1.7753)		0.2566 (1.2834)	18.1994*** (3.3895)	19	0.3294	3.2106	2.0754
Egypt, Arab Rep	0.6836*** (3.7108)		0.7413 (0.8026)	1.0220 (0.9979)		-0.1187 (-0.3132)	3.9747 (1.2571)	19	0.6547	9.5326	1.3823
El Salvador	0.6766*** (3.6304)		-0.7650*** (-3.5116)	0.5392* (2.0384)		0.0997 (1.0325)	4.7557* (1.7279)	19	0.6455	9.1944	1.9844
Ethiopia	0.0395 (0.1292)		-0.2543 (-0.1863)	1.3102 (0.9157)		0.1348 (1.2943)	12.9390*** (3.1332)	17	-0.0379	0.8538	2.0714
Fiji	0.277* (1.849)	0.321** (2.131)	-0.826*** (-5.998)	0.319** (2.510)	0.124 (0.751)	0.158* (1.959)	4.936*** (4.431)	18	0.8948	25.095	2.271
Gabon	0.3674 (1.4353)		-0.3926 (-0.5459)	0.4227 (0.5889)		-0.3014 (-1.1417)	18.9411** (2.6135)	19	-0.0119	0.9468	1.7512
The Gambia	0.6181*** (4.0102)		-0.6966** (-2.2244)	0.7869** (2.2890)		0.1013 (0.5781)	6.0619* (1.8875)	19	0.5340	4.6896	1.9563
Ghana	0.382 (1.309)	0.510* (1.743)	1.420** (2.232)	-1.109*** (-3.133)	0.311 (0.535)	0.175 (1.181)	1.936 (1.610)	18	0.8868	23.1922	2.279
Grenada	0.736*** (5.116)	-0.472** (-2.330)	-1.121*** (-3.837)	1.073** (2.378)	-0.239 (-0.431)	0.044 (0.204)	22.345*** (2.890)	18	0.5227	4.1032	2.453
Guatemala	0.4059* (1.8532)		-0.5736 (-1.4416)	0.2588 (0.6138)		0.4319* (2.2146)	7.1827** (2.4134)	19	0.4893	5.3115	2.0468
Guinea-Bissau	0.3953 (1.5404)		-1.9174 (-0.8110)	-3.7014 (-1.4811)		0.1553 (0.6502)	19.5804** (2.3169)	19	0.2223	2.2913	1.7682
Guyana	0.630** (2.304)	-0.838*** (-3.647)	-0.929*** (-10.890)	0.916*** (3.296)	-1.088*** (-5.264)	0.329 (1.454)	36.358*** (7.057)	18	0.8311	14.9517	1.611
Haiti	0.4651*** (3.0706)		3.1069 (1.1978)	8.0696** (2.4510)		-0.1329 (-1.1761)	3.1134** (2.1065)	19	0.8247	22.1672	1.7374
Honduras	0.7713*** (5.8180)		-0.7084 (-0.6038)	3.0889* (1.7916)		0.3794 (1.0738)	1.7924 (0.6293)	19	0.7567	14.9991	1.8553
India	-0.0579 (-0.2471)		3.9794 (1.3537)	-5.2697* (-1.7918)		0.0281 (0.1536)	24.2511*** (4.6409)	19	-0.0214	0.9057	1.8905
Indonesia	0.028 (0.081)	0.062 (0.285)	0.574 (0.785)	0.364 (0.221)	-0.871 (-0.523)	-0.043 (-0.218)	26.332*** (3.093)	18	-0.1418	0.6481	2.052
Jamaica	0.6316*** (3.6274)		-1.3717*** (-2.9205)	1.5725*** (2.9182)		0.2274 (1.1934)	9.2119** (2.3209)	19	0.5736	7.0535	2.2733
Kenya	0.2543 (0.9644)		3.1547 (1.0828)	2.8229 (1.1962)		0.0586 (0.1689)	11.1774*** (2.6775)	19	0.2766	2.7209	2.0327

								n	R²	F	DW
Korea, Rep.	0.6986*** (5.5755)		-12.4973*** (-6.0480)	17.3632*** (5.5224)		0.0113 (0.0844)	8.9673** (2.0537)	19	0.8163	20.9978	1.9398
Lesotho	0.7483*** (4.0524)		-0.8213*** (-3.0940)	0.4406 (1.2435)		0.3383 (0.7140)	11.6481 (1.4116)	18	0.7063	11.2194	2.2046
Madagascar	0.1476 (0.6441)		1.1605 (0.7246)	-0.4506 (-0.1819)		0.1794 (1.1045)	8.6206*** (3.4231)	19	-0.0131	0.9415	2.1917
Malawi	0.0169 (0.0647)		-1.1282 (-0.8783)	-1.8046 (-1.1715)		0.0285 (0.1477)	18.2894*** (3.4622)	19	0.1796	1.9852	2.0202
Malaysia	0.4800* (1.7938)		0.2877 (0.2787)	0.3744 (0.3927)		0.3350 (0.9927)	9.8914 (1.3958)	19	0.4755	5.0792	2.0105
Mali	0.8539* (5.1749)		-1.6768** (-2.6088)	0.9286 (1.4004)		0.0889 (0.6633)	3.4451 (1.0858)	19	0.5857	7.3612	2.0385
Mauritania	0.6970*** (4.8132)		1.8548 (1.4722)	1.6746* (2.0279)		0.1456 (0.5452)	3.6178 (1.0092)	19	0.6830	10.6968	2.0764
Mauritius	0.581* (1.935)	-0.047 (-0.208)	3.567*** (2.884)	-1.010 (-0.571)	2.131 (1.454)	0.074 (0.212)	8.078 (1.337)	18	0.5043	3.8827	1.479
Mexico	-0.091 (-0.277)	-0.022 (-0.102)	-1.635*** (-3.909)	0.348 (0.480)	1.477 (1.631)	0.188 (1.625)	22.259*** (7.919)	18	0.5578	4.5746	2.218
Morocco	0.591* (1.923)	-0.140 (-0.541)	-1.629 (-1.333)	2.060 (1.393)	-2.513* (-1.946)	-0.099 (-0.805)	13.937** (2.462)	18	0.3332	2.4163	2.221
Mozambique	0.5707*** (3.5049)		0.1518 (0.2208)	0.7387 (0.5644)		0.2209** (2.3348)	4.6182** (2.6797)	18	0.8139	19.5987	1.8526
Nepal	-0.1957 (-0.6114)		14.8534* (2.6472)	5.0722 (1.0551)		0.1696 (1.3740)	22.2131*** (3.6019)	19	0.6352	8.8361	2.1124
Niger	0.4694** (2.7072)		-0.5077 (-0.5112)	0.9502 (1.1151)		-0.1206 (-0.6176)	5.2513** (2.3297)	19	0.2559	6.1316	2.0739
Nigeria	0.6902*** (3.1681)		-1.0687* (-2.0659)	0.4315 (0.9177)		0.3572* (1.8016)	5.9896 (1.5384)	19	0.3158	3.0773	2.0205
Pakistan	0.9411*** (3.1915)		-1.1981 (-0.9826)	1.4644 (1.1131)		0.2556** (2.2251)	-0.6699 (-0.1179)	19	0.4966	5.4398	2.1692
Panama	0.5780*** (3.5351)		-0.6461** (-2.3267)	0.8545*** (3.1042)		0.4003* (2.0003)	6.5635** (2.0979)	19	0.64083	9.0289	1.8286
Papua New Guinea	0.5899** (2.5843)		-0.9432** (-2.2412)	0.7202 (1.4311)		-0.0784 (-0.44	8.8526 (1.4981)	19	0.3503	3.4258	1.7288
Paraguay	0.226 (1.012)	-0.139 (-0.727)	-1.255** (-2.647)	0.488 (0.968)	-0.536 (-1.020)	0.115 (0.996)	21.573*** (5.755)	18	0.4295	3.1329	2.933
Peru	0.5296*** (3.009)		-1.2983* (-2.020)	0.4707 (0.720)		0.4317** (2.854)	10.4686** (2.3965)	19	0.5030	5.5549	2.5544
Philippines	0.4783** (2.7869)		-1.5022* (-1.9864)	0.1804 (0.2460)		0.4863** (2.5312)	11.0815** (2.6255)	19	0.5931	7.5581	1.8567
Rwanda	-0.107 (-0.582)	-0.251 (-1.257)	4.539** (2.821)	-2.377 (-1.441)	-1.060 (-0.956)	0.009 (0.705)	19.250*** (6.370)	18	0.2783	2.0926	1.905
Senegal	0.383** (2.104)	0.603** (2.764)	-0.607 (-1.412)	0.168 (0.553)	0.750** (2.894)	-0.006 (-0.063)	0.597 (0.324)	18	0.6505	6.2727	1.615
Seychelles	0.5139* (1.9888)		-1.3041 (-1.0799)	1.6206 (1.2877)		-0.1946 (-0.5692)	9.1289 (1.1294)	19	0.1109	1.5611	1.7936

Country								N	R²	F	DW
Sierra Leone	-0.427 (-0.960)	0.887** (2.227)	-0.959*** (-9.163)	-0.363 (-0.791)	1.072** (2.484)	0.062 (0.674)	4.640** (2.948)	15	0.9068	23.7077	2.284
Singapore	0.8479*** (6.0252)		-1.0670*** (-4.0889)	0.9511** (2.6566)		0.0204 (0.0878)	4.7499 (0.6788)	19	0.7812	17.0705	2.1351
Sri Lanka	0.4793*** (3.6898)		-0.1378 (-0.2161)	1.2265* (1.7368)		0.2381 (0.7616)	10.1621*** (3.1917)	19	0.5119	5.8699	2.0141
St. Kitts and Nevis	0.5834** (2.3743)		-0.7589*** (-3.1773)	0.5047* (1.9395)		0.4816 (1.0840)	12.3284 (1.4289)	19	0.3197	3.1143	1.8355
St. Lucia	0.579 (1.710)	-0.515* (-1.909)	-0.725* (-2.083)	0.656** (2.403)	-0.404*** (-3.330)	0.184 (1.452)	18.513*** (3.119)	18	0.1691	1.5766	2.096
St. Vincent and the Grenadines	0.4088 (2.3462)		-1.0059 (-8.2525)	0.5930 (2.9760)		0.0838 (0.5615)	15.4568*** (2.7945)	19	0.8766	32.9761	1.6483
Swaziland	0.373 (1.254)	-0.763* (-1.848)	-2.367*** (-4.239)	0.272 (0.364)	-0.640 (-0.862)	-0.174 (-0.459)	43.515* (2.101)	18	0.7385	9.0002	1.760
Thailand	0.5381*** (4.8662)		-2.6068*** (-4.7596)	3.2418*** (5.1769)		0.8502*** (4.8324)	8.1951*** (2.6280)	19	0.9066	44.6431	2.4211
Togo	0.3853* (1.6784)		-0.4470 (-0.4399)	0.7390 (0.7872)		0.0406 (0.2544)	9.2353** (2.1597)	19	0.0966	1.4817	2.1867
Trinidad and Tobago	0.7487*** (4.3181)		-0.0148 (-0.0520)	-0.0131 (-0.0434)		0.0605 (0.2520)	3.5756 (0.9734)	19	0.5853	7.3518	2.0496
Tunisia	1.162*** (5.131)	-0.642** (-2.347)	-0.522 (-0.569)	0.572 (0.534)	-0.012 (-0.013)	-0.470 (-1.352)	14.444** (2.490)	18	0.4802	3.6175	2.829
Turkey	0.839* (1.800)	-0.437 (-0.910)	-2.711 (-0.356)	8.608 (0.918)	1.309 (0.208)	-0.300 (-0.895)	12.188* (2.016)	18	0.3881	2.7967	2.089
Uganda	0.9887*** (6.1403)		-1.9627** (-2.5418)	1.7744** (2.1952)		0.0308 (0.3221)	0.9093 (0.5977)	19	0.8232	18.4619	2.4850
Uruguay	0.5901*** (4.5438)		-1.9017* (-1.9229)	2.1955*** (4.2342)		0.1805** (2.3448)	5.1702*** (2.6576)	19	0.7299	13.1643	1.7962
Venezuela	0.1105 (0.4159)		-1.2352 (-1.1430)	0.0925 (0.0882)		0.3543 (1.2349)	16.8329*** (2.9389)	19	0.0587	1.2805	1.9449
Zambia	0.2191 (0.8484)		-0.6888 (-1.0980)	0.0455 (0.0744)		-0.2190 (-0.9035)	11.1620** (2.4796)	19	0.0867	1.4269	2.2165
Zimbabwe	0.3041 (1.1431)		-0.3625 (-0.6206)	-0.8717 (-1.4658)		0.0625 (0.3888)	12.8313** (2.5709)	19	0.1113	1.5633	1.8721

Note: Schwarz criterion has been used to determine the lag length in the estimation.

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