Foreign Direct Investment and Growth: Does the Sector Matter? *

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Abstract

Although it may seem natural to argue that foreign direct investment (FDI) can convey great advantages to host countries, this paper shows that the benefits of FDI vary greatly across sectors by examining the effect of foreign direct investment on growth in the primary, manufacturing, and services sectors. An empirical analysis using cross-country data for the period 1981-1999 suggests that total FDI exerts an ambiguous effect on growth. Foreign direct investments in the primary sector, however, tend to have a negative effect on growth, while investment in manufacturing a positive one. Evidence from the service sector is ambiguous.

Key words: Foreign Direct Investment, economic growth, primary sector, manufacturing sector, service sector, spillovers.

JEL Classification: F23, F36, F43

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1. Introduction

Many policy makers and academics contend that foreign direct investment (FDI) can have important positive effects on a host country's development effort.[1] In addition to the direct capital financing it supplies, FDI can be a source of valuable technology and know-how while fostering linkages with local firms, which can help jumpstart an economy. Based on these arguments, industrialized and developing countries have offered incentives to encourage foreign direct investments in their economies.

Recently, however, the special merits of FDI and particularly the kinds of incentives offered to foreign firms in practice have begun to be questioned. Fueling this debate is that empirical evidence for FDI generating positive spillovers for host countries is ambiguous at both the micro and macro levels.[2] In a recent survey of the literature, Hanson (2001) argues that evidence that FDI generates positive spillovers for host countries is weak. In a review of micro data on spillovers from foreign-owned to domestically owned firms, Gorg and Greenwood (2002) conclude that the effects are mostly negative. Lipsey (2002) takes a more favorable view from reviewing the micro literature and argues that there is evidence of positive effects. Surveying the macro empirical research led Lipsey to conclude, however, that there is no consistent relation between the size of inward FDI stocks or flows relative to GDP and growth. He further argues that there is need for more consideration of the different circumstances that obstruct or promote spillovers.[3]

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[1] The vast literature on foreign direct investment and multinational corporations has been surveyed many times. For recent surveys see Markusen (1995) and Caves (1996).

[2] For example, positive effects of FDI spillovers were reported as part of Caves' (1974) pioneering work in Australia, and by Kokko (1994) in Mexico. However, Haddad and Harrison's (1993) findings in Morocco and Aitken and Harrison's (1999) in Venezuela do not support the positive spillovers hypothesis.

[3] The work by Borensztein et al. (1998), Xu (2000), and Alfaro et al. (2003) suggests that educational level, development of local financial markets, and other local conditions play an important role in allowing the positive effects of FDI to materialize. Blomstrom and Kokko (2003) concluded from their review of the

Although the theoretical work on FDI points to advantages, conceivably, spillovers could nevertheless be small.[4] On the other hand it could be that we are looking in the wrong places. For example, the macro empirical work that has analyzed the effects of aggregate FDI inflows-stocks on host economies does not, mostly due to data limitations, control for the sector in which FDI is involved. Although it might seem natural to argue that FDI can convey great advantages to host countries, such gains might differ across primary, manufacturing, and services sectors. UNCTAD World Investment Report (2001:138), for instance, argues, "in the primary sector, the scope for linkages between foreign affiliates and local suppliers is often limited.... The manufacturing sector has a broad variation of linkage intensive activities. [In] the tertiary sector the scope for dividing production into discrete stages and subcontracting out large parts to independent domestic firms is also limited."

This paper revisits the FDI and economic growth relationship by examining the role FDI inflows play in promoting growth in the main economic sectors, namely primary, manufacturing, and services. Often-mentioned benefits, such as transfers of technology and management know-how, introduction of new processes, and employee training tend to relate to the manufacturing sector rather than the agriculture or mining sectors. For example, the theoretical work of Findlay (1978) and Wang and Bloomstrom (1992) that models the importance of FDI as a conduit for transferring technology, relates to the foreign investment inflows to manufacturing or service

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literature that spillovers are not automatic, and local conditions influence firms' adoption of foreign technologies and skills.

[4] Krugman (1998) calls into doubt benefits associated with foreign acquisition of domestic firms, arguing that in financial crises foreigners can take advantage of liquidity constrained domestic investors' fire sales of assets. In this context, foreigners are less efficient than domestic investors, since foreigners acquire local firms because of their superior cash position as opposed to a special know-how or technology advantage. Razin, Sadka and Yuen (1999) argue that foreign investors' asymmetric information advantage might lead them to over-invest; Hausmann and Fernandez-Arias (2000) also cast doubts on the special merits of FDI.

sectors rather than to the primary sector.[5] In addition, FDI's potential to create linkages to

domestic firms, as Albert Hirschman (1958) described in his seminal book on economic

development, might also vary across sectors.   Hirschman (1958:109) emphasized that not all

sectors have the same potential to absorb foreign technology or to create linkages with the rest of

the economy. He noted, for example, "linkages are weak in agriculture and mining."[6] He warned

that in the absence of linkages, foreign investments could have limited effect in spurring growth

in an economy. "The grudge against what has become known as the 'enclave' type of

development," he wrote, "is due to this ability of primary products from mines, wells, and

plantations to slip out of a country without leaving much of a trace in the rest of the economy."

About the consequences in potential linkages effects differences in manufacturing and

agriculture, Hirschman (1958:110) wrote, "the absence of direct linkage effects of primary

production lends these views (enclaves) a plausibility that they do no have in the case of foreign

investment in manufacturing." More recently, the theoretical work on linkages, by Rodiguez-

Clare (1996), shows that multinationals' intensive use of intermediate goods enhances production

efficiency in host economies. In this framework, increased demand for inputs leads to a positive

externality to other producers owing to an increase in variety. Greater varieties of inputs,

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[5] Although foreign companies will try to minimize technology leakages, the literature identifies several ways in which such advantages can spillover into the local economy. Findlay (1978) argues that FDI increases the rate of technical progress in host countries through a "contagion" or knowledge diffusion effect from the more advanced technologies in parent countries. Wang and Blomstrom (1992) suggest that contagion can take the form of imitation of processes or organizational innovations and increased competition can push other firms to adopt new technologies and modernize. Employee training and subsequent workers' turnover can help disseminate a foreign firm's superior know how. For an overview of the literature on spillover and FDI, see Blomstrom and Kokko (1996).

[6] Hirschman (1958) and more recently Kokko (1994) observe that linkages can vary across industries. Kokko (1994) argues that spillovers should not be expected in all kind of industries because foreign companies sometimes operate in "enclaves" that offer little scope for the local economy to benefit. I cannot test the hypothesis that different industries within manufacturing have different linkage effects

however, seem to be more relevant to the manufacturing than to the agricultural sector. Likewise, Markusen and Venables (1999) analyze the effect of foreign firms on the development of domestic firms in the industrial sector. In their model, foreign companies compete with domestic producers while creating additional demand for domestically produced intermediate goods through linkages with local suppliers. This can lead to domestic firms entering into the intermediate goods sector, which can result in lower costs that, reflected in lower final prices that increase demand, can benefit domestic firms producing final goods.

A stereotyped contrast can be drawn between FDI directed towards natural resources as portrayed by United Fruit Company-Chiquita in Central America and FDI directed towards labor-intensive manufacturing sectors such as those in Singapore. The dependency theory that swept Latin America in the 1970s, for example, accused multinationals of being 'imperialist predators' that exploited developing countries and charged these firms with causing the underdevelopment of the world's economy periphery. As UNCTAD (1999) notes, these views, in part, reflected the fact that multinationals many times were involved in the exploitation of natural resources and reflected the reaction against the "extractive nature" of FDI.[7]

In what is more than a simple stereotyped argument, Figures 1 to 4 suggest that although there does not seem to be a strong correlation between per capita growth rates and the share of total FDI in GDP, a strong positive correlation between manufacturing FDI and growth is apparent. Moreover, from the figures, there does not seem to be a strong positive relationship between growth and foreign investment in either the primary or the service sectors.[8]

Most of the micro studies on FDI spillovers, as Lipsey (2002) points out, tend to use manufacturing data and have regressed local firm productivity on within sector FDI. Although

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owing to limitations of the data set. This work should be seen as a complement to existing panel-case study analysis.

[7] On the dependency theory, see for example Cardoso and Faletto (1979).

[8] See Appendix for data, sources, and countries included in each sample.

such studies find no horizontal technology transfer, the empirical work at the intra-industry level might not be suitable for capturing wider spillover effects on the host economy, such as those created by backward and forward linkages with domestic firms.[9] One of the main reasons to examine productivity spillovers from foreign-owned to domestically owned firms, as Lipsey (2002) mentions, is to understand the contribution of inward FDI to host country economic growth. If foreign firms at the expense of lower productivity in domestic firms achieve higher productivity, there might be no implications for aggregate output or growth. However, there might be growth effects without spillovers just from the operation of foreign firms, which can be analyzed in terms of the impact of FDI on a country's output or growth. Moreover, because multinationals seek to minimize technology leakages to competitors while improving the productivity of suppliers by transferring knowledge, were FDI to generate spillovers they would more likely be vertical than horizontal. Consequently, in this paper I use macro-level data to study overall growth effects.

Also important to consider is the composition of the sample of countries covered by panel studies, concentrated in countries that pursued inward policies (e.g., Colombia, India, Morocco, and Venezuela). Balasubramanayam et al. (1996) found that in developing countries pursuing outward-oriented trade policies, FDI flows were associated with faster growth than in those developing countries that pursued inward oriented trade policies. Other studies cover only transition economies or industrialized countries covering different periods.[10]

These considerations suggest, apart from the complementarities of micro and macro-level work covering a wider range of countries, that positive effects of FDI on a host economy might

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[9] Grog and Greenaway (2002), in a survey of intra-industry panel work, find that only two studies that used what they argue are appropriate data and estimation techniques report positive evidence for spillovers; all other studies that use panel data find either negative or statistically insignificant effects. See also Smarzynska (2002) and Blomstrom and Kokko (2003).

[10] Gorg and Greenaway (2002) present a summary of the papers on productivity spillovers, the country or countries studied, the years of the sample, data, aggregation, and results.

depend not only on local conditions and policies but also on the sector into which FDI occurs. Simply put, one question to be asked is whether the type of FDI matters for the potential benefits derived from this particular form capital flow to materialize.

In an effort to further examine the effects of FDI on economic growth, this research explores the roles different types of FDI have played in different sectors. In order to do this, I use a data set from OECD, which breaks FDI investments down by sector. This information is complemented with data from UNCTAD's World Investment Directory (WDI), which presents FDI information for different countries in different regions, also broken down by sector, but with varying availability of dates. In total, the sample covers 47 countries.

The results find little support for FDI having an exogenous positive effect on economic growth, echoing previous work by Borensztein, De Gregorio, and Lee (1998) and Carkovic and Levine (2002) and Alfaro et al. (2003). When I distinguish among different sectors, however, I find little support for FDI spillovers or positive effects in the primary sector, a positive effect of FDI in manufacturing on growth, or ambiguous evidence from the service sector. These results are robust to the inclusion of other growth determinants, such as human capital measures, domestic financial development, institutional quality, different samples, and conditioning information sets, and the use of lagged values of FDI. A shortcoming of the data set is that, given the limited time frame, I cannot exploit the time variation of the data using statistical techniques such as those followed by Carkovic and Levine (2002) that limits comparisons. However, the evidence does suggest that not all forms of FDI have the same effects on economic growth. These are important findings when one considers that some countries, through special incentives, target or contemplate targeting certain types of FDI over others.

The rest of the paper is organized as follows: data are defined in section 2, empirical results are discussed in section 3, and section 4 concludes the discussion.

2. Data

It is difficult to construct accurate and comparable measures of FDI data by sector for a broad cross-section of countries over several decades, particularly for developing countries. Moreover, the tendency of major sources to present FDI data in broad aggregates limits the study of the effects of FDI in the host economies. In order to overcome these difficulties, I collected data from different sources. Detailed information on FDI by sector for OECD countries is available in OECD's International Direct Investment Statistics Yearbook (2001). Data on inflows by sector are available for OECD countries, in most cases, ranging from the mid-1980s to the very late 1990s. For the rest of the countries in the sample, we complemented the OECD data with information obtained from the World Investment Report seven volume series published between 1993 and 2000 by UNCTAD, each volume of which contains FDI information for countries from different regions (e.g., Asia and the Pacific, Africa, Latin America, and the Caribbean, etc.). The main difficulty with these data is that their availability and presentation evolve from volume to volume. Only the latest volume contains information comparable in level of detail to the OECD data that cover the period from 1981 to 1999. Appendix 1 describes in detail the data and sources, as well as the years covered for each country in each data set.

The per capita growth rate of output was measured as the growth of real per capita GDP in constant dollars using data from the World Bank's World Development Indicators (WDI) (2001). Inflation, measured as the percentage of change in the GDP deflator and used as a proxy for macroeconomic stability, was taken from WDI (2001) as well. In order to capture institutional quality and stability, I used data from the International Country Risk Guide (ICRG), a monthly publication of Political Risk Services that reports data on risk of expropriation, level of corruption, rule of law, and bureaucratic quality in an economy. Openness to international trade was proxied by the average of the sum of exports plus imports to total output (GDP), also from WDI (2001). Human capital was measured using average years of secondary schooling in the entire population, taken from WDI (2001). Government spending data, from WDI (2001), details

the ratio of central government expenditures divided by GDP. Private credit (PRCRED), taken

from Levine et al. (2000), measures the value of credits by financial intermediaries to the private

sector divided by GDP. A detailed description of all the data is included in the Data Appendix.

Table 1 presents descriptive statistics for growth as well as FDI data and control variables.
Per capita GDP growth rates range from –2.64% in Peru to 8.47% in China. Total FDI as a

percentage of GDP in different sectors ranges widely across sectors, from -0.07% in the primary

sector in Panama to 44.96% in services in Laos.

3. Evidence

The purpose of the empirical analysis is to determine whether FDI in the primary,

manufacturing, and services sectors exerts different effects on a country's growth. Following

Borensztein et al. (1998), Carkovic and Levine (2002), and Alfaro et al. (2003), we look at the

direct effect of the different types of FDI on economic growth using cross-section regressions

with 47 countries for the time period 1980-1999.[11]

Initially, as a benchmark, we calculated the impact of overall FDI inflows on economic

growth based on the following equation:

$$GROWTH_i = \beta_0 + \beta_1 INITIAL\ GDP_i + \beta_2 CONTROLS_i + \beta_3 FDI_i + v_i \qquad (1)$$

Table 2 presents the main results. The regressions show FDI to have a positive and

insignificant effect on growth. Column (1) shows FDI to have a positive effect after controlling

for initial income and human capital; however, the effect is not significant. Column (2) includes

domestic investment in the list of control variables. Columns (3) to (5) add other growth control

variables, such as inflation as proxy for macroeconomic instability, government spending, and

private credit. The effect of FDI remains positive, although in general and not significant.

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[11] Most of the variation in the data is across country, reflecting conditions that change slowly. The limited
time frame does not allow us to use GMM panel estimators to exploit the time series variation in the data.
See the Data Appendix for details on the data set.

Column (6) adds institutional variables (captured by the average ICRG political risk sub-indices) and obtains similar results. As further robustness checks, column (7) includes openness to the list of independent variables.[12] Finally, column (8) includes all of the variables in the conditioning set. These results summarize the findings in the literature. FDI does not exert a robust positive impact on growth. Given the limited number of observations, columns (9) and (10) include a parsimonious number of variables, among them initial income, inflation private credit, investment, and institutional quality.

Data on FDI inflows, however, includes foreign investment in all sectors of the economy: primary, manufacturing, and services. As mentioned previously, the argument that FDI generates externalities in the form of technology transfers, managerial know how, and access to markets tends to be more relevant to investment in the manufacturing or even service sector than in the agriculture or mining sectors.

We pursue this hypothesis and test the direct impact foreign investment in different sectors had on growth. Tables 2 to 4 present the results for the estimation that uses only FDI inflows in each sector, following:

$$GROWTH_i = \beta_0 + \beta_1 INITIAL\ GDP_i + \beta_2 CONTROLS_i + \beta_3 FDI_i^{\,j} + v_i \qquad (2)$$

where j corresponds to the primary, manufacturing, or services sectors, respectively.

When we consider the effects only of foreign investment in the primary sector, some interesting results emerge. In Table 3 column (1), we observe that FDI inflows in the primary sector have a negative and significant effect on growth. This result is generally robust to the inclusion of other growth determinants as seen in columns (2) through (8) and significant to at least the 5% level in most cases. This finding is robust to the addition of regional dummies, which

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[12] To ensure comparability with other work, we include a number of controls present in the literature that were found not to be significant.

turned out to be insignificant and thus not reported.[13] The significant negative effect of FDI investment on growth varies from -0.28 to -0.13.

The regressions in Table 4 are related to the effect of foreign investment in the manufacturing sector on growth. FDI in the manufacturing sector is shown to have a positive and significant effect on growth. Columns (1) through (5) show FDI to have a positive effect after controlling for initial income, macroeconomic instability (proxied through inflation), financial development, investment, and institutional quality. All regressions reported in Table 4 find the coefficients on FDI to range from 0.7 to 1.6 according to the different sets of control variables. Our main finding – the positive significance of FDI inflows to the manufacturing sector – seems to corroborate the notion that FDI plays a positive role for FDI in generating economic growth, but these effects seem to emerge from foreign investment in the manufacturing sector.

Table 5 presents results for FDI in services. In general, columns (2) through (8) show foreign investment in the services sector seems to have a positive effect on growth, although in most cases the results are not significant.

In order to test that the inclusion of only foreign investments in each sector is not capturing the effects of other foreign direct investments, Table 6 presents the results for the estimation that uses FDI inflows for each sector, following:

$$GROWTH_i = \beta_0 + \beta_1 INITIAL\ GDP_i + \beta_2 CONTROLS_i + \beta_3 FDI_i^P + \beta_4 FDI_i^M + \beta_5 FDI_i^S + v_i \quad (3)$$

where P denotes foreign investment in the primary sector; M in the manufacturing sector, and S in the service sector.

The results confirm previous findings. FDI in the primary sector has a negative and significant effect; in the manufacturing sector a positive and significant effect; and in the services sector an ambiguous effect. In this case, the coefficients for FDI in manufacturing range from 0.8 to 1.8, although the terms become slightly less significant. On the other hand, the significance of

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[13] Note that the sample includes only two countries from Africa (Nigeria and Tunisia), which generally

foreign investments in the primary sector increases with effects ranging from -0.14 to 0.32. Estimates for FDI in the service sector switch signs, although results are not significant.

For further robustness checks, Table 7 excludes from the sample those countries with FDI/GDP exceeding 10%.[14] Column (1) shows that if FDI in the primary sector has a negative effect, although not significant, manufacturing continues to have a positive and significant effect as seen in column (2); and services a positive, although not significant effect, column (3). When all sectors are included, column (4), the negative effect of FDI in the primary sector becomes significant. Overall, the positive and significant effect of FDI in manufacturing remains robust to the exclusion of outliers. Table 7 also presents the results of the estimations that exclude the Latin American countries for which only information on FDI for the 1980s was available. Columns (5) and (8) show the positive and significant effect of foreign investment in manufacturing on growth. In this case, however, the effects of FDI in the primary sectors and services are not significant.

A final issue of robustness is the interaction of FDI with human capital, this having been shown to have a significant positive effect on economic growth as suggested in Borensztein et al. (1998) and Xu (2000). Table 8 reports the results for this regression, which tests the significance of the interaction term of human capital and FDI in each sector and reports that schooling does not play a significant role in enabling positive effects of FDI in either the primary or service sectors as seen in columns (1) and (3). Interestingly, although the interaction of schooling and FDI in the manufacturing sector is not significant, the positive effect of FDI in manufacturing remains robust.[15]

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have high foreign investments in the primary sector as well as low growth rates.

[14] In effect excluding Papua New Guinea, Laos, and Vietnam.

[15] A different human capital variable for a slightly different time period having been used, this result might not be comparable with previous findings. Carkovic and Carkovi (2002) and Alfaro et al. (2003) do not find a significant effect on the interaction term.

It is important to note that the estimates might be biased by endogeneity issues. It is plausible that FDI into different sectors responds to higher growth rates in the economy. Because we use the average values of these variables to estimate the coefficients, this would lead to an overstatement of the effects of each of the two variables and their interaction on growth. On the other hand, if FDI is attracted to each sector because of its growth rate, but the particular sector is not the driving force behind the economy's overall growth, the problem might be less severe. Figures 5-7 indicate that the correlation between the overall growth in the economy and the growth in the primary sector, although positive, is very low (0.2);[16] particularly high (0.92) in the service sector; and in the middle (0.7) in the manufacturing sector. Lacking clear instruments for FDI and sectorial FDI inflows, lagged FDI was used, which the literature consistently has found to be a significant determinant of FDI. Wheeler and Mody (1992) show FDI to be self-reinforcing because the existing stock of foreign investment is a significant determinant of current investment decisions. This result is further reinforced in several country level studies in the literature.[17] Columns (1) through (6) in Table 9 control for the endogeneity of manufacturing FDI using lagged FDI. Given the nature of our data, the sample was reduced to only 30 countries, limiting comparisons in an already limited exercise. However, the results for the manufacturing sector remain robust. Columns (7) to (9) control for endogeneity of the service FDI using lagged values of FDI flows in this sector. Although the coefficients are positive, they are generally not significant.

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[16] Data includes growth in the agriculture sector and excludes mining.

[17] See Borensztein et al. (1998), Markusen and Maskus (1999) use different FDI determinants, such as lagged FDI, to discriminate among alternative FDI theories.

4. Conclusions

Attitudes and government policies towards FDI as well its characteristics have varied considerably over time.[18] From 1880 and until the first decades of the twentieth century, for example, FDI grew exponentially and became heavily concentrated in the exploitation of natural resources. World War I and the nationalization of foreign property in Russia in 1917 dealt heavy blows to FDI, but it was the onset of the Great Depression in 1929 that marked the end of its golden era. Between the 1930s and the 1970s, there was a worldwide growth in restrictions because governments became more concerned about the impact FDI had on their economies. After decades of skepticism, in the 1980s international events reshaped the attitude towards FDI as the debt crisis severed developing countries' access to credit and portfolio investment. In addition, there was a shift in the industries in which foreign firms were active compared to the post war period, which involved mostly the exploitation of oil and natural resources, towards manufacturing, services, and high technology. Governments began to ease restrictions on FDI and increasingly offer incentives in an effort to attract investment. During the 1990s, FDI soared, growing more than 20% per year. This recent surge of FDI had its own distinctive characteristics: more than 50% of new investments were in the service sector.

This paper finds that FDI flows into the different sectors of the economy (namely primary, manufacturing, and services) exert different effects on economic growth. FDI inflows into the primary sector tend to have a negative effect on growth, whereas FDI inflows in the manufacturing sector a positive one. Evidence from the foreign investments in the service sector is ambiguous. Despite the limitations of the data used, the results are robust to the inclusion of other growth determinants, such as income, human capita measures, domestic financial development, institutional quality, different samples, and the use of lagged values of FDI. One can conjecture that these investments, given their nature — agriculture and mining — have little spillover potential for the host economy. FDI flows to manufacturing seem to have a positive

effect on growth. Indeed, most of the theoretical work on the benefits associated with FDI tends to be related to the manufacturing-industry sector. Foreign investment in the service sector has an ambiguous effect. The macroeconomic literature had focused on total FDI inflows or stocks, in part due to data limitations. This work suggests that not all forms of foreign investment seem to be beneficial to host economies. A priori, this might suggest differentiated efforts towards attracting different forms of FDI flows and even negative incentives to certain types, in particular investment in natural resources. In effect, countries have recently begun to pursue targeted policies towards attracting foreign direct investment. Evidence that countries might want to target certain sectors needs to be weighed against bureaucratic costs and increased potential for the corruption of differentiated schemes. The economic nature of the host country is also an important determinant. More work in this area is warranted, in particular, in terms of better data sets that will support exploiting the time variation in the data.

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[18] For a historical overview see Jones (1996).

Data Appendix

A2.1 Countries in the Samples

There are 47 countries in the sample. The period for which FDI by sector data was available (shown in parenthesis) differs by country according to the source.

Australia (85-99), Brazil (81-89), Canada (85-99), China (87-97), Czech Republic (93-99), Denmark (85-99), Dominican Republic (81-90), Ecuador (81-90), El Salvador (81-90), Fiji (88-97), Finland (85-99), France (85-99), Germany (85- 99), Greece (87-92), Iceland (85-99), India (92-97), Indonesia (89-97), Ireland (88-99), Italy (85-99), Japan (85-99), Korea, Rep. (85-99), Laos PDR (88-99), Mexico (85-99), Nepal (87-97), Netherlands (85-99), New Zealand (84-89), Nigeria (81-92), Norway (94-99), Pakistan (87-97), Panama (81-89), Papua New Guinea (93-98), Peru (81-90), Philippines (87-99), Poland (94-99), Portugal (85-99), Spain (85-99), Sri Lanka (87-99), Sweden (89-99), Switzerland (86-99), Thailand (87-97), Trinidad and Tobago (84-90), Tunisia (90-94), Turkey (92-99), United Kingdom (85-99), United States (85-99), Venezuela (81-90), Vietnam (88-96).

For the robustness checks, two sub-samples were generated. The first excluded countries for which FDI as a percentage of GDP in either sector represented more than 10%. These countries were Laos (FDI Services/GDP = 45%), Papua New Guinea (FDI Primary/GDP = 17%), and Vietnam (FDI Services/GDP = 10%).

The second subset excluded these three countries, plus those Latin American countries for which FDI figures were available primarily for the 1980s only, i.e., Brazil, Dominican Republic, Ecuador, El Salvador, Panama, Peru, Trinidad and Tobago, and Venezuela.

A2.2 Data Sources and Descriptions

For most of the variables in the regression, the values represent the average of the period for which sector FDI was available. Exceptions are for initial values (e.g., initial GDP) and indicators for which few data points are available (e.g., institutional quality).

Output levels and growth: Output level and growth data reflect the growth of real per capita GDP (in constant 1995 US$). Source: World Bank Development Indicators (2001).

Foreign Direct Investment: FDI inflows are generally defined as the measure of the net inflows of investment needed 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. FDI by sector as a % of GDP was used in the regression analysis. Sources: For OECD countries, the International Direct Investment Statistics Year Book (2001); FDI by sector for other countries in the sample was calculated using UNCTAD's World Investment Directory (7-volume series 1992-2000).

Government Spending: Comprises general government final consumption expenditure as a percentage of GDP. Source: World Bank Development Indicators (2001).

Inflation: Percentage changes in the GDP deflator. Source: World Bank Development Indicators (2001).

Institutional Quality (INSTQUAL): Institutional Quality is measured as the average of the 12 sub-indices of Political Risk as measured by the International Country Risk Guide: Government Stability, Socio Economic Conditions, Investment Profile, Internal Conflict, External Conflict, Corruption, Military in Politics, Religion in Politics, Law and Order, Ethnic Tensions, Democratic Accountability, and Bureaucracy Quality. Source: International Country Risk Guide (ICRG).

Inflation: Percentage changes in the GDP deflator. Source: World Bank Development Indicators (2001).

Openness: Trade Openness is defined as the average of exports and imports as a percentage of GDP. Source: World Bank Development Indicators (2001).

Private credit (PRCREDBANK): The value of credits by financial intermediaries to the private sector divided by GDP, this variable excludes credits issued by central and development banks and credit to the public sector as well as cross claims of one group of intermediaries on another. Source*:* Levine et al. (2000).

Schooling: Average years of secondary schooling of the total population. Source: Barro and Lee (1996) and World Bank Development Indicators (2001).
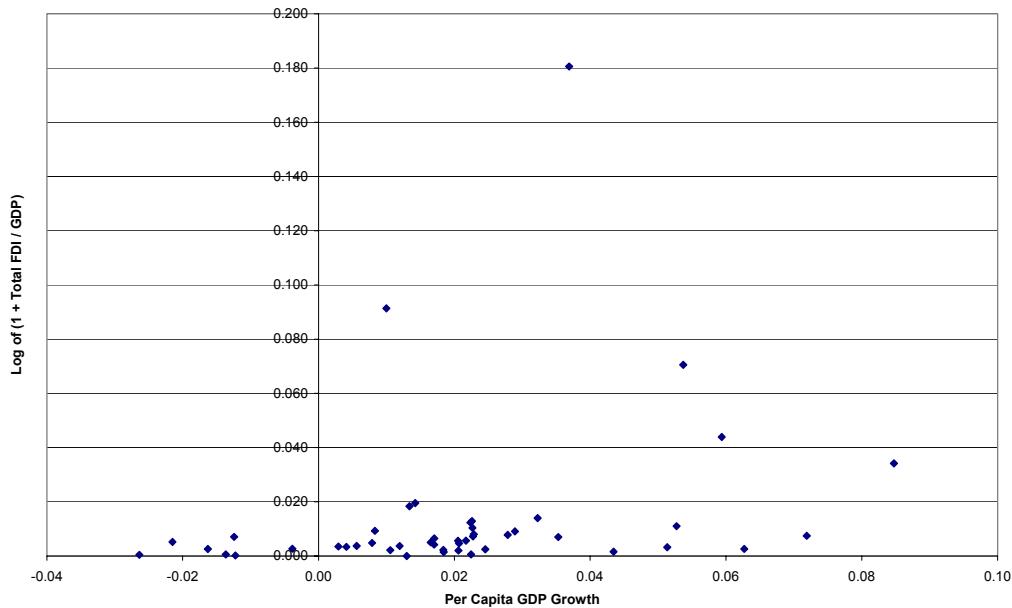
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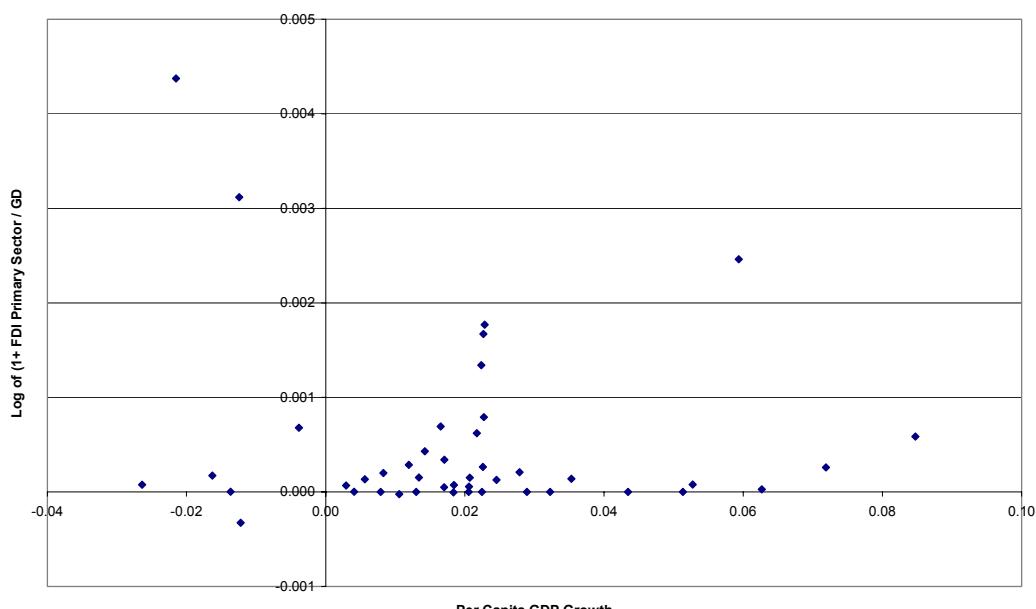
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Figure 1: FDI and Growth (1981-1999)
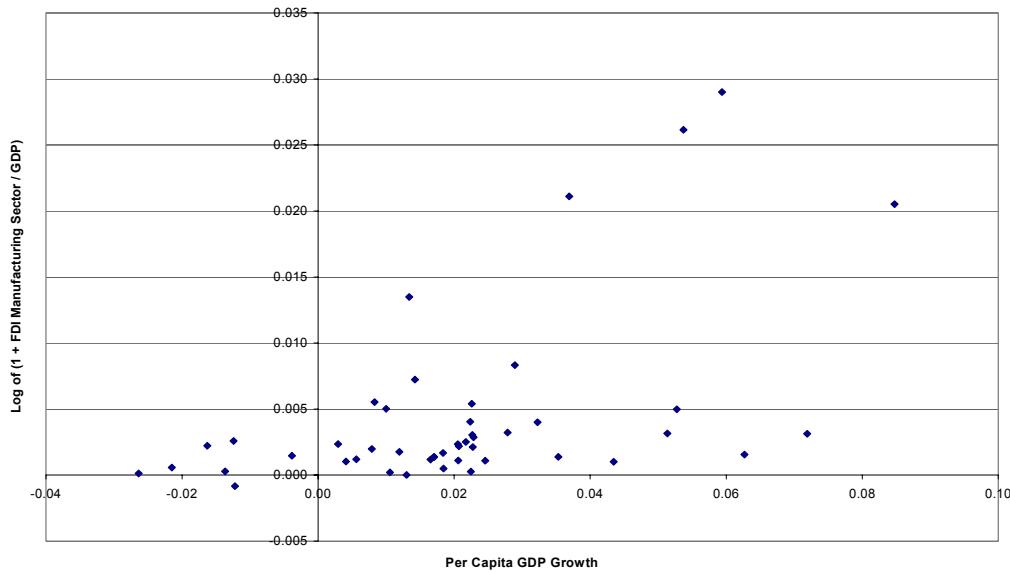
Notes: Plot includes all 47 countries in the sample. See Data Appendix for countries included in the sample, sources, and definitions.

Figure 2: FDI in the Primary Sector and Growth (1981-1999)

Notes: Plot excludes 3 countries with a sector FDI as a percentage of GDP exceeding 10%. See Data Appendix for countries included in the sample, sources, and definitions.
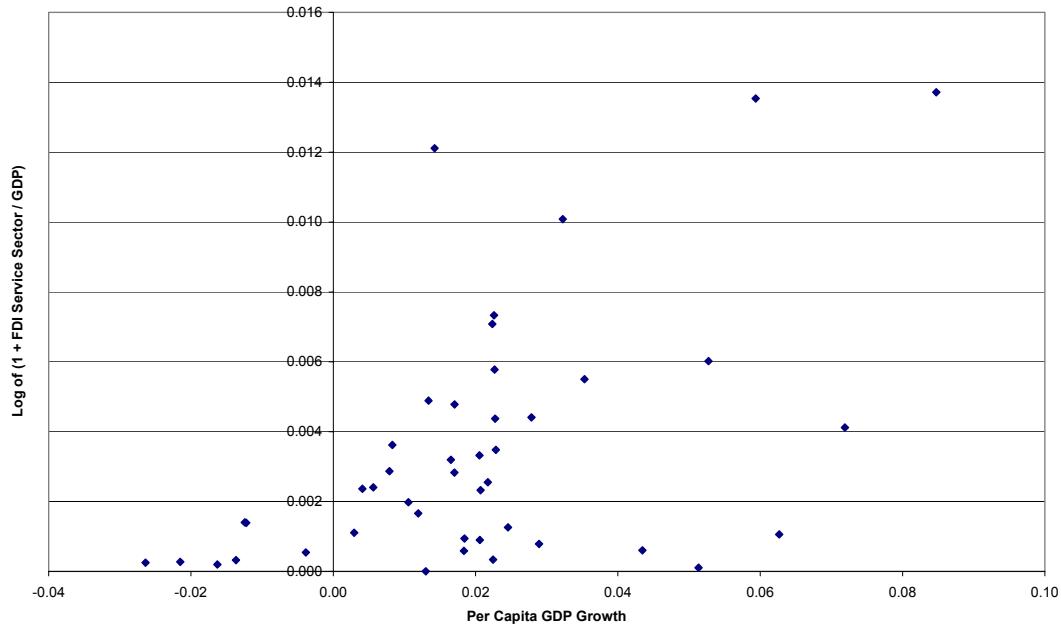
Figure 3: FDI in the Manufacturing Sector and Growth (1981-1999)
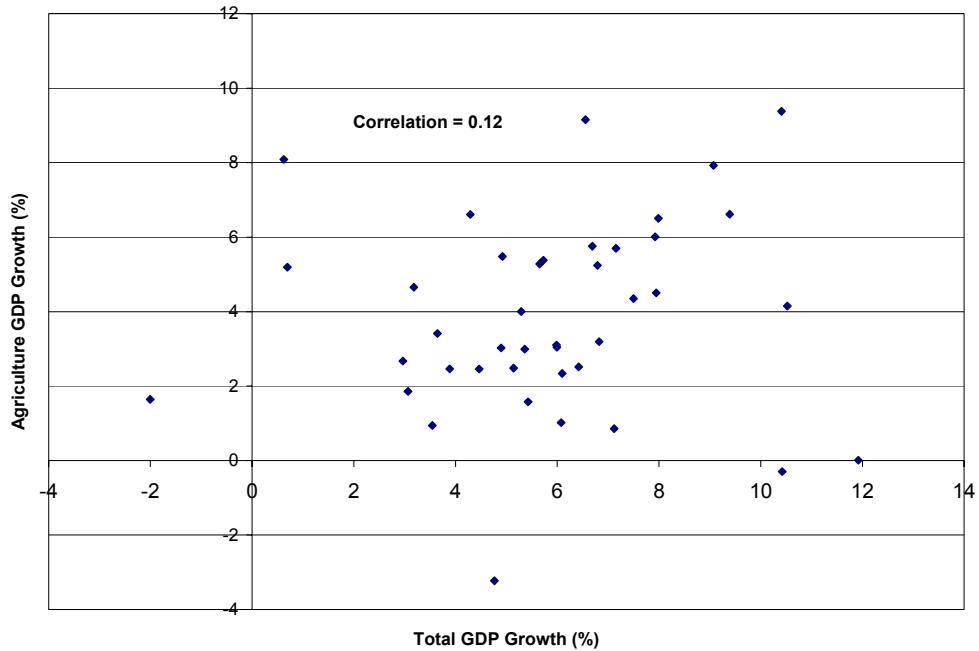
Notes: Plot includes all 47 countries in the sample. See Data Appendix for countries included in the sample, sources, and definitions.

Figure 4: FDI in the Service Sector and Growth (1981-1999)
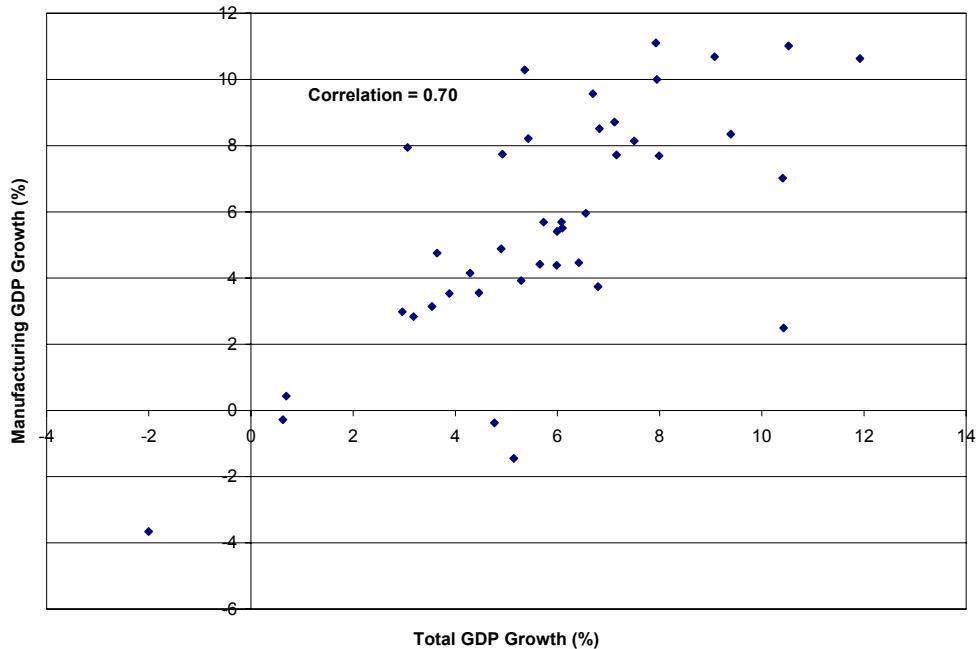
Notes: Plot excludes 3 countries with a sector FDI as a percentage of GDP exceeding 10%. See Data Appendix for countries included in the sample, sources, and definitions.

Figure 5: Correlation between GDP Growth and the Agriculture Sector Growth (1981-1999)
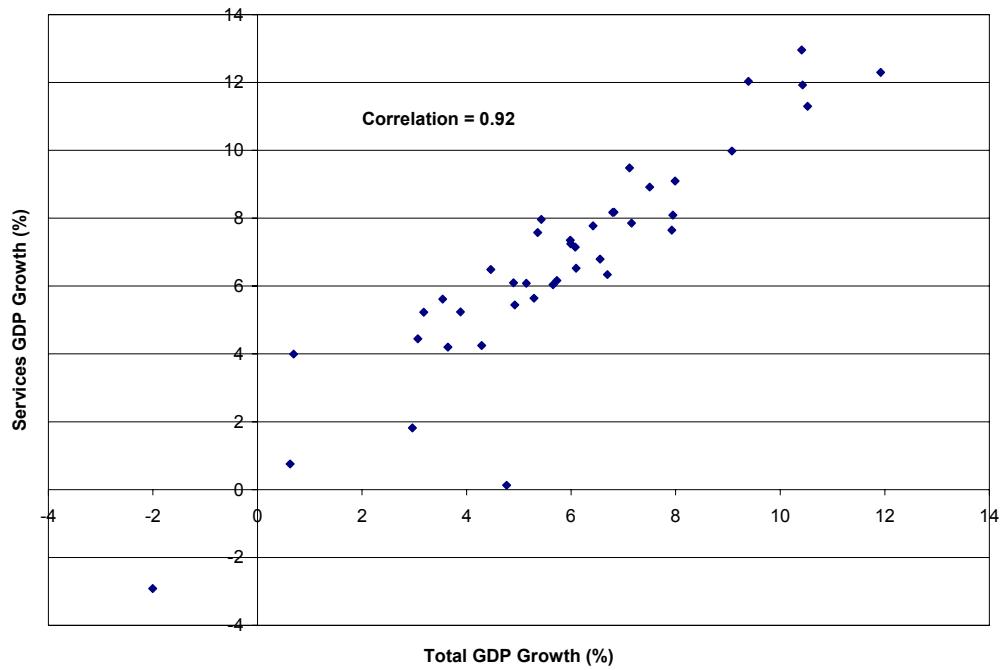
Source: World Bank's Development Indicators.

Figure 6: Correlation between GDP Growth and the Manufacturing Sector Growth (1981-1999)

Source: World Bank's Development Indicators.

Figure 7: Correlation between GDP Growth and the Service Sector Growth (1981-1999)

Source: World Bank's Development Indicators.

Table 1: Descriptive Statistics

Sample: 47 Countries (1981-1999)	Mean	Std. Dev.	Minimum	Maximum
Per Capita GDP Growth	2.06%	2.34%	-2.64%	8.47%
Initial GDP	11,002	10,990	338	42,177
Schooling	1.68	1.17	0.11	4.90
Inflation	42.6	163.0	0.8	1080.6
Gov. Spending	15.48	5.24	7.35	27.25
Openness	29.62	12.35	8.72	61.66
Private Credit	47.34	34.18	4.85	164.68
Investment/GDP	22.69	5.25	12.99	37.98
Institutional Quality	5.84	1.00	3.98	7.30
FDI_Primary/GDP	0.54%	2.44%	-0.07%	16.65%
FDI_Manufacturing/GDP	1.03%	1.58%	-0.19%	6.90%
FDI_Services/GDP	2.00%	6.60%	0.001%	44.96%
FDI/GDP	3.57%	8.36%	0.003%	51.55%

Notes: Schooling is the average years of secondary schooling of the total population. Openness is defined as the average of exports and imports as a percentage of GDP. Private Credit (PRCREDBANK) is the value of credits by financial intermediaries to the private sector as a percentage of GDP; Institutional Quality (INSTQUAL) is measured as the average of the 12 sub-indices of Political Risk as measured by the International Country Risk Guide. See data appendix for countries in the sample, sources, and definitions.

Table 2: Growth and FDI

Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Initial GDP	-0.0154	-0.0058	-0.0157	-0.0069	-0.0240	-0.0483	-0.0082	-0.0388	-0.0128	-0.0501
	(-2.131)	(-1.486)	(-2.441)	(-0.797)	(-4.042)	(-4.926)	(-1.442)	(-3.469)	(-2.831)	(-5.695)
Schooling	0.0312							0.0001		
	(1.367)							(0.009)		
Investment		0.1354						0.0833	0.1288	
		(4.137)						(2.343)	(4.284)	
Inflation			-0.0186					-0.0095	-0.0166	
			(-3.673)					(-1.356)	(-3.067)	
Gov. Spending				-0.0060				-0.0149		
				(-0.192)				(-0.505)		
PRCREDBANK					0.0448			0.0086		0.0296
					(3.556)			(0.595)		(2.544)
INSTQUAL						0.0266		0.0183		0.0207
						(5.194)		(3.348)		(3.413)
Openness							-0.0082	-0.0040		
							(0.506)	(-.246)		
FDI	0.1422	0.1032	0.1262	0.1361	0.1860	0.0254	0.1250	0.0538	0.0971	0.0832
	(1.410)	(1.303)	(1.303)	(1.347)	(2.238)	(0.372)	(1.239)	(0.755)	(1.286)	(1.059)
Observations	47	47	47	47	47	47	47	47	47	47
R^2	0.123	0.392	0.244	0.100	0.360	0.441	0.103	0.640	0.508	0.538

Notes: All regressions include a constant term and are estimated by OLS with White's correction of heteroskedasticity. t-values are in parentheses. The Initial GDP variable is the log of the real GDP per capita at the beginning of the period. The Schooling variable is the log of (1+average years of secondary schooling) for the period of the regression. Inflation is the log of (1+ average inflation of the period). Government Spending is log (average share of government spending/GDP) over the period. Openness is log (average of Exports + Imports as a share of GDP) for the period. PRCREDBANK is log (private credit in Banks/GDP). Investment is log (Gross Capital Formation/GDP). Institutional quality is measured by the average score in the ICRG Institutional Quality Indicators. FDI is log (1+Total FDI inflows/GDP). See data appendix for countries in the sample, sources, and definitions.

Table 3: Growth and FDI in Primary Sector
Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Initial GDP	-0.0194	-0.0276	-0.0082	-0.0497	-0.0409	-0.0155	-0.0533	-0.0393
	(-3.009)	(-4.272)	(-2.032)	(-5.823)	(-4.978)	(-3.156)	(-6.864)	(-4.828)
Inflation	-0.0192				-0.0087	-0.0170		-0.0108
	(-3.668)				(-1.544)	(-3.020)		(-2.516)
PRCREDBANK		0.0425			0.0065		0.0277	
		(3.277)			(0.585)		(2.584)	
Investment			0.1365		0.0934	0.1291		0.1005
			(4.197)		(3.133)	(4.273)		(3.300)
INSTQUAL				0.0268	0.0179		0.0219	0.0180
				(5.520)	(3.283)		(4.080)	(3.396)
FDIPRIM	-0.2858	-0.2089	-0.0914	-0.1826	-0.1371	-0.1585	-0.1830	-0.1395
	(-2.571)	(-2.121)	(-1.033)	(-2.163)	(-2.017)	(-1.616)	(-2.681)	(-2.105)
Observations	47	47	47	47	47	47	47	47
R^2	0.235	0.320	0.379	0.446	0.635	0.499	0.535	0.632

Notes: All regressions include a constant term and are estimated by OLS with White's correction of heteroskedasticity. t-values are in parentheses. FDIPRIM is log(1+Average FDI inflows in Primary Sector/GDP). See notes to Table 2 for definitions of remaining variables.

Table 4: Growth and FDI in Manufacturing Sector
Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Initial GDP	-0.0098	-0.0177	-0.0023	-0.0384	-0.0325	-0.0093	-0.0428	-0.0310
	(-1.843)	(-2.728)	(-0.643)	(-3.803)	(-3.715)	(-2.358)	(-4.489)	(-3.545)
Inflation	-0.0175				-0.0096	-0.0162		-0.0113
	(-3.989)				(-1.784)	(-3.441)		(-2.735)
PRCREDBANK		0.0364			0.0052		0.0265	
		(3.061)			(0.465)		(2.534)	
Investment			0.1153		0.0880	0.1098		0.0936
			(3.428)		(2.934)	(3.608)		(3.072)
INSTQUAL				0.0225	0.0148		0.0182	0.0148
				(4.283)	(2.609)		(3.112)	(2.716)
FDIMANUF	1.6595	1.4278	1.2393	0.9517	0.7441	1.1838	0.8711	0.7557
	(4.081)	(4.267)	(3.415)	(1.968)	(2.599)	(3.384)	(2.472)	(2.591)
Observations	47	47	47	47	47	47	47	47
R^2	0.401	0.441	0.471	0.490	0.661	0.580	0.571	0.659

Notes: All regressions include a constant term and are estimated by OLS with White's correction of heteroskedasticity. t-values are in parentheses. FDIMANUF is log(1+Average FDI inflows in Manufacturing Sector/GDP). See notes to Table 2 for definitions of remaining variables.

Table 5: Growth and FDI in Service Sector

Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Initial GDP	-0.0166	-0.0252	-0.0066	-0.0489	-0.0396	-0.0135	-0.0504	-0.0380
	(-2.533)	(-4.815)	(-1.627)	(-5.170)	(-4.782)	(-2.861)	(-6.033)	(-4.383)
Inflation	-0.0188				-0.0079	-0.0168		-0.0108
	(-3.709)				(-1.357)	(-3.084)		(-2.488)
PRCREDBANK		0.0467			0.0090		0.0306	
		(3.579)			(0.665)		(2.531)	
Investment			0.1363		0.0922	0.1295		0.1019
			(4.155)		(3.082)	(4.293)		(3.353)
INSTQUAL				0.0268	0.0174		0.0206	0.0178
				(5.333)	(2.990)		(3.415)	(3.249)
FDISERV	0.1322	0.2411	0.0966	0.0134	0.0582	0.1039	0.1148	0.0332
	(1.443)	(3.265)	(1.201)	(0.223)	(0.793)	(1.408)	(1.568)	(0.661)
Observations	47	47	47	47	47	47	47	47
R^2	0.237	0.363	0.386	0.440	0.634	0.504	0.540	0.630

Notes: All regressions include a constant term and are estimated by OLS with White's correction of heteroskedasticity. t-values are in parentheses. FDISERV is log(1+Average FDI inflows in Service Sector/GDP). See notes to Table 2 for definitions of remaining variables.

Table 6: Growth and FDI by Sector

Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Initial GDP	-0.0111	-0.0187	-0.0030	-0.0390	-0.0324	-0.0101	-0.0429	-0.0316
	(-1.987)	(-2.756)	(-0.794)	(-3.825)	(-3.593)	(-2.454)	(-4.392)	(-3.477)
Inflation	-0.0178				-0.0105	-0.0164		-0.0115
	(-4.009)				(-1.721)	(-3.435)		(-2.733)
PRCREDBANK		0.0381			0.0033		0.0271	
		(2.756)			(0.234)		(2.198)	
Investment			0.1121		0.0872	0.1062		0.0905
			(3.236)		(-2.819)	(3.375)		(2.864)
INSTQUAL				0.0223	0.0146		0.0179	0.0147
				(4.277)	(2.552)		(2.911)	(2.651)
FDIPRIM	-0.3246	-0.2918	-0.1451	-0.1960	-0.1737	-0.2142	-0.2332	-0.1713
	(-3.223)	(-3.632)	(-2.358)	(-2.018)	(-3.176)	(-3.565)	(-2.911)	(-3.114)
FDIMANUF	1.8255	1.3118	1.3777	1.1579	0.8497	1.2895	0.8555	0.8801
	(3.797)	(3.193)	(3.237)	(2.407)	(2.737)	(2.978)	(2.226)	(3.060)
FDISERV	-0.0759	0.0748	-0.0622	-0.1001	-0.0374	-0.0390	0.0263	-0.0502
	(-1.237)	(0.902)	(-1.137)	(-1.889)	(-0.508)	(-0.675)	(0.352)	(-1.718)
Observations	47	47	47	47	47	47	47	47
R^2	0.426	0.457	0.478	0.506	0.667	0.589	0.580	0.667

Notes: All regressions include a constant term and are estimated by OLS with White's correction of heteroskedasticity. t-values are in parentheses. FDIPRIM is log(1+Average FDI inflows in Primary Sector/GDP). FDIMANUF is log(1+Average FDI inflows in Manufacturing Sector/GDP). FDISERV is log(1+Average FDI inflows in Service Sector/GDP). See notes to Table 2 for definitions of remaining variables.

Table 7: Growth and FDI by Sector - Robustness
Selected Comparative Regressions Excluding Outliers and/or Latin America
Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Initial GDP	-0.0514	-0.0443	-0.0462	-0.0425	-0.0381	-0.0309	-0.0336	-0.0282
	(-5.230)	(-4.446)	(-4.362)	(-4.165)	(-2.968)	(-2.610)	(-2.632)	(-2.408)
PRIVCRED	0.0315	0.0253	0.0268	0.0249	0.0280	0.0207	0.0237	0.0189
	(2.506)	(1.975)	(2.057)	(1.867)	(1.748)	(1.217)	(1.411)	(1.174)
INSTQUAL	0.0201	0.0190	0.0190	0.0177	0.0110	0.0104	0.0105	0.0082
	(2.965)	(3.041)	(2.847)	(2.774)	(1.370)	(1.400)	(1.309)	(1.215)
FDIPRIM	-3.0679			-4.9073	-4.2255			-7.8023
	(-1.002)			(-2.356)	(-0.749)			(-1.827)
FDIMANUF		1.0124		1.3467		0.9253		1.3960
		(2.871)		(2.032)		(2.373)		(2.022)
FDISERV			0.9379	-0.1957			0.7277	-0.0169
			(0.833)	(-0.135)			(0.695)	(-0.134)
Observations	44	44	44	44	36	36	36	36
R2	0.529	0.558	0.529	0.591	0.348	0.383	0.339	0.451

Notes: All regressions include a constant term and are estimated by OLS with White's correction of heteroskedasticity. t-values are in parentheses. FDIPRIM is log(1+Average FDI inflows in Primary Sector/GDP). FDIMANUF is log(1+Average FDI inflows in Manufacturing Sector/GDP). FDISERV is log(1+Average FDI inflows in Service Sector/GDP). Regressions 1 to 4 exclude the 3 countries with a Sector FDI / GDP exceeding 10% (Papua New Guinea, Laos, and Vietnam). Regressions 5 to 8 exclude also Latin American countries (8) for which FDI information was available from the 1980s only. See notes to Table 2 for definitions of remaining variables.

Table 8: Growth and FDI by Sector - Robustness: Human Capital
Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	(2)	(3)	(4)
Initial GDP	-0.0163	-0.0105	-0.0162	-0.0119
	(-2.561)	(-1.891)	(-2.747)	(-2.046)
Schooling	0.0051	0.0136	0.0233	0.0239
	(0.254)	(0.745)	(1.013)	(1.069)
Investment	0.1270	0.1080	0.1343	0.1064
	(4.066)	(3.466)	(4.486)	(3.152)
Inflation	-0.0174	-0.0162	-0.0176	-0.0182
	(-2.931)	(-3.191)	(-2.887)	(-3.198)
FDIPRIM	0.4979			0.6780
	(0.624)			(0.917)
FDIMANUF		1.6464		1.4027
		(3.134)		(1.943)
FDISERV			0.7349	0.5682
			(1.296)	(0.848)
Schooling * FDIPRIM	-7.9968			-1.2336
	(-0.813)			(-1.327)
Schooling * FDIMANUF		-2.1158		-0.6110
		(-1.229)		(-0.243)
Schooling * FDISERV			-3.6155	-3.1467
			(-1.143)	(-1.326)
Observations	47	47	47	47
R^2	0.510	0.587	0.526	0.632

Notes: All regressions include a constant term and are estimated by OLS with White's correction of heteroskedasticity. t-values are in parentheses. FDIPRIM is log(1+Average FDI inflows in Primary Sector/GDP). FDIMANUF is log(1+Average FDI inflows in Manufacturing Sector/GDP). FDISERV is log(1+Average FDI inflows in Service Sector/GDP).

Table 9: Growth and FDI -- Endogeneity (IV)
Dependent Variable—Average real annual per capita growth rate (1981-1999)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Initial GDP	-0.0135	-0.0182	0.0008	-0.0165	-0.0067	-0.0223	-0.0495	-0.0119	-0.0391
	(-1.978)	(-2.338)	(0.178)	(-1.357)	(-1.266)	(-1.879)	(-7.285)	(-2.144)	(-4.808)
Inflation	0.0319				-0.0156	-0.0214		-0.0190	-0.0112
	(-2.556)				(-1.118)	(-1.578)		(-2.144)	(-2.530)
PRCREDBANK		0.0399					0.0447		
		(2.766)					(3.544)		
Investment			0.1199		0.1065	0.0928		0.1390	0.1089
			(3.079)		(2.479)	(2.042)		(-3.222)	(3.656)
INSTQUAL				0.0104		0.0092	0.0200		0.0206
				(1.469)		(1.451)	(3.212)		(4.207)
FDIMANUF	1.299	0.9447	0.8115	1.0797	0.9369	0.9772			
	(3.050)	(2.874)	(2.131)	(3.948)	(1.844)	(2.231)			
FDI SERV							0.2124	0.0725	0.0401
							(3.338)	(1.474)	(0.817)
Observations	30	30	30	30	30	30	36	36	36
R^2	0.368	0.485	0.590	0.311	0.604	0.627	0.699	0.589	0.735

Notes: All regressions have a constant term. p-values are in parentheses. In columns (1) to (6), FDI in the Manufacturing sector in the remaining period is instrumented by lagged FDI in the Manufacturing sector for the first 4 periods. Countries without enough years to split the series were dropped (17 countries). In columns (7) to (9), FDI in the Service sector in the remaining period is instrumented by lagged FDI in the Service for the first 4 periods. Countries without enough years to split the series were dropped (11 countries). See notes to Table 2 for definitions of remaining variables.