

WORKING PAPER

Foreign Direct Investment: Leader or Follower?

Margaret McMillan
Department of Economics
Tufts University

Discussion Paper 99-01
Department of Economics
Tufts University

Department of Economics
Tufts University
Medford, MA 02155
(617) 627-3560

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Paper prepared for a conference in South Africa, February, 1998, sponsored by USAID's collaborative agreement on Equity and Growth through Economic Research (EAGER).

Dr. Margaret McMillan
Department of Economics
Tufts University
617 627 3137
mmcmill@emerald.tufts.edu

1. Introduction

Can foreign direct investment (FDI) stimulate private domestic investment in Sub-Saharan Africaⁱ? Or, will private investment by Africans signal profitable opportunities and stable conditions thus stimulating FDI? Similar questions apply to the relationship between FDI and public domestic investment. Will FDI stimulate public investment in Africa by providing additional tax revenue? Or, is public investment in infrastructure necessary to make both private domestic investment and FDI profitable? These questions and the role of FDI in financing development have been debated by economists for years.ⁱⁱ However, they are increasingly relevant as equity financing to developing countries overtakes concessional and non-concessional bank lending. In this paper, I use data from the International Monetary Fund (IMF), the United Nations Commission on Trade and Development (UNCTAD) and the United Nations Statistical Office (UNSO) to provide answers to these questions.

Why is determining the timing of FDI, private and public domestic investment important? Because, economic policy can influence investment decisions and because investment is critical to the growth process and hence social welfare. Specifically, recent work by Sachs and Warner (1998) indicates that at least 1% of the 3.4% difference in growth rates between East Asia and Africa is explained by low investment. In addition, evidence suggests that private domestic investment plays a much larger role than public domestic investment in the growth process (Greene and Villanueva, 1991). Yet, private domestic investment has been heavily taxed in Sub-Saharan Africa, both directly and indirectly.ⁱⁱⁱ And finally, while private domestic investment is taxed, special incentives designed to attract FDI are common in Sub-Saharan Africa.^{iv}

Using the Generalized Method of Moments (GMM) techniques developed and implemented by Arellano and Bond (1998) for dynamic panel data, I establish empirically both the direction and the magnitude of causality between FDI, private domestic investment and public domestic investment.^v This methodology is attractive for two reasons. First, it provides efficient and consistent estimates even in the presence of

lagged dependent variables without having to rely on several time periods for consistency. Hence, I am able to estimate both short-run relationships using annual data and long-run relationships using period averages. And second, by using the optimal instrument matrix, I am also able to correct for the biases specific to panel data introduced by measurement error.

Evidence from annual data for 86 countries from all regions of the world suggests that lagged foreign direct investment has a quantitatively significant impact on total domestic investment. This impact is strongest for developing countries where a one percent increase in FDI as a percent of GDP increases domestic investment as a percent of GDP by as much as 1.17% (Latin America) while in developed countries the increase is only .54 %. By disaggregating total domestic investment into its private and public components, I show that lagged FDI stimulates private domestic investment and not public domestic investment. Conversely, none of the components of domestic investment appear to be good predictors of future foreign investment. Finally, unlike FDI, lagged public investment does not appear to be a stimulus for private domestic investment.

Using five year averages, I examine the long-run relationship between FDI and domestic investment. I do this because investment tends to be volatile and so I would like to check the robustness of the results over the long term. I also do this because sustained investment is required for growth. Again FDI is a strong stimulus for private domestic investment in all developing regions. However, in the OECD countries, there is a negative relationship between FDI and private domestic investment over the long term perhaps indicating some kind of specialization.

Although the evidence presented in this paper is not based on a structural model, the results obtained are interesting for four reasons. First, they suggest a strong dichotomy between the behavior of FDI and domestic investment. Second, by distinguishing between public and private domestic investment, I am able to show that the behavioral difference is coming from the relationship between FDI and private

domestic investment. Third, by distinguishing between industrialized and developing countries, I am able to show that the relationship between FDI and private domestic investment holds only in developing countries. Hence, any more subjective interpretation of the results must be able to explain these 3 facts. And fourth, at the very least, these facts allow us to rule out hypotheses that link FDI to domestic investment in a negative way.

One way to interpret these facts is to argue that FDI provides positive spillovers to developing countries that make private domestic investment more profitable. The plausibility of this argument is strengthened by the fact that these benefits are only present in less developed countries where the potential for technological and managerial spillovers are greatest. An alternative interpretation might be that FDI is primarily undertaken by multinationals that have greater access to information and financial resources than most private investors in developing countries. Hence, they are able both to identify and take advantage of profitable opportunities more quickly than domestic investors. In order to nail down the "true" explanation more detailed analyses using case studies and/or firm level data are required.

The remainder of this paper is organized as follows. Section 2 outlines the related theoretical and empirical work. Section 3 describes the data. Section 4 describes the methodology and presents the results. Implications of the findings and concluding remarks are presented in Section 6.

2. Background

Table 1 highlights three important facts. First, FDI as a percent of total investment is miniscule when compared with private and public domestic investment. While there is some variation in the relative magnitude of FDI across regions, this is generally true for all regions of the world both developed and under-developed. Whatever the reason for this, the fact remains that the majority of investment is domestic investment. Second, what distinguishes the developed regions from the underdeveloped regions is the percent of private domestic investment as a percent of total investment. For example, private domestic investment accounts for 53% of total investment in Africa while it accounts for 79% of total investment in the OECD countries. And third, the fastest growing developing region, East Asia, stands out for two reasons. Total investment as a percent of GDP is higher in East Asia than in any other developing region and public investment as a percent of total investment is lower in East Asia than in any other developing region.

Table 1

How Important is FDI as a Source of Capital?
(1970-1996)

	Total Investment as % GDP	Foreign Direct. as % total	Private Domestic as % total	Public Domestic as % total
Africa	.18	.03	.53	.44
South Asia	.17	.01	.64	.35
East Asia	.28	.07	.65	.28
Latin America	.21	.05	.62	.33
OECD	.21	.05	.79	.16

Sources: International Financial Statistics Tape, 1997. World Investment Directory, Volume V, Africa, 1996. Adam and O'Connell, 1997.

So, why all the special attention to FDI? It is possible that FDI acts as a catalyst for domestic investment. For example, several economists have argued that foreign investment was responsible for the surge in domestic investment in the garment industries in Mauritius and Bangladesh.^{vi} If this is the case, then the numbers in Table 1 above understate the importance of FDI.^{vii} Others argue that foreigners will not invest in Africa until the Africans have proven that investment in Africa can be profitable.^{viii} In other words, it is domestic investment that will act as a catalyst for foreign investment. Hence, policy should be designed primarily to encourage domestic investment.^{ix} In this section, I will summarize both the theoretical and empirical evidence surrounding the links between FDI and domestic investment.

Why Would FDI Stimulate Domestic Investment?

Economic theory points to at least two distinct channels through which FDI may affect both private and public domestic investment in the recipient country. First, FDI may have an impact on the profitability of domestic investment. For example, foreign investors may be directly involved in providing infrastructure such as transportation and telecommunications thus increasing the profitability of domestic investment. In contrast, FDI may reduce domestic investor's profits by taking market share away. Second, FDI may alter the ownership structure of total investment in the host country and/or make domestic investment possible by providing additional funding. For example, a privatization sale to a foreign firm will have no impact on total investment and a negative impact on domestically financed investment. These potential links between FDI and domestic investment are summarized in Table 2.1.

Table 2.1

Inward Foreign Direct Investment and Domestic Capital Formation: The Theory

<u>Impact on Domestic Investment</u>	<u>Mechanism</u>	<u>Source(s)</u>
(+) Increase Profitability	◆ build infrastructure (roads, tele-communications etc.)	Cardoso & Dornbusch 1988
	◆ supply scarce inputs	Helleiner 1988
	◆ demand creation (local input suppliers, labor income, complements)	Cardoso & Dornbusch 1988
	◆ positive externalities (training, managerial skills, technology, access to overseas markets, market information)	Blomstrom 1989
	◆ additional tax revenue invested in public goods	Cardoso & Dornbusch 1988
(-) Reduce Profitability	◆ increase wages and/or cost of other locally supplied inputs	Lall & Streeten 1977
	◆ worsen terms of trade	Bhagwati, Brecher, Findlay 1981, 1983
	◆ stifle domestic competition	Helleiner 1988
	◆ negative externalities (tariff-jumping FDI, corruption)	Brecher & Diaz-Alejandro 1977
(0) New Financing	◆ New projects financed by FDI have no impact on existing domestic	Fry 1993
(-) Replacement Financing	◆ Privatisation and/or buyouts replace domestic with foreign	Fry 1993

Empirical evidence can be grouped into two broad categories: macroeconomic studies and microeconomic studies. The macroeconomic studies typically use aggregate measures of investment to study either one particular country or a panel of countries. For example, Fry (1993) uses macroeconomic data for a sample of 16 countries to show that FDI can have a positive or a negative impact on domestic investment depending on the level of trade barriers and financial regulations imposed by the host country. The microeconomic studies include case studies and studies that use firm level panel data for specific countries. One particularly interesting paper along these lines is Aitken and Harrison's "Do Domestic Firms Benefit from Foreign Direct Investment?", March 1997. Using a panel of more than 4,000 Venezuelan firms, they show that the impact of FDI on domestic investment depends on the ownership structure. In particular, FDI that participates with domestic firms in a joint venture arrangement enhances the profitability of the domestic investment. By contrast, FDI negatively affects the productivity of firms with 100% domestic ownership. On balance, they find that FDI has a positive impact on domestic investment. Evidence from this and other empirical work is summarized in Table 2.2.

One thing that these tables should make clear is that neither the theoretical work nor the empirical evidence provides a definitive answer as to the impact of FDI on domestic investment. On balance, however, the empirical work seems to suggest that FDI has a positive impact on domestic investment. Also clear from these tables is the fact that several of the ways in which FDI affects domestic investment have little to do with the "foreign" component of the investment. For example, most of the demand and supply side linkages could just as easily be a result of an increase or decrease in domestic investment. Imagine an economy that experiences an exogenous increase in the price of its exported good. This will increase the exportables sector's demand for labor, increase wages and reduce domestic investment in other sectors of the economy. The areas in which FDI seem to make a unique contribution related to its "foreignness" as compared to domestic investment are: technology, management, market-access and financing. This is important because it suggests very specific reasons for encouraging FDI relative to domestic investment.

Table 2.2
Inward Foreign Direct Investment and Domestic Capital Formation: Empirical Evidence (1975 - present)¹

Date	Author(s)	Data	Methodology	Results
1997	K.K. Mbekeani	South Africa Macro	2SLS Error Corr. Model	+
1997	Brian Aitken Ann Harrison	Venezuela Firm level data	Time Series Panel & Fixed Effects	+ Joint Venture - No local partner
1997	Maxwell Fry	46 country panel	Time Series Structural Model 3SLS	+
1993	Louis T. Wells	East Asia	Case Studies	+
1993	Wells & Warren	Indonesia	Case Study	+
1993/94	Maxwell Fry	Macro 16 countries 1966-88	Time Series Structural Model 3SLS	+/- depends on policies in place ²
1992	Katikati	Ghana	Time Series Granger Causality	-
1992	Faroque & Bougrine	Morocco	Structural Model Time Series	-
1989	Rhee & Belot	Asia & Africa Latin America	11 country case studies	+
1986	Encarnation & Wells	Asia	Case Studies	+/- depends on policies in place ²
1977	Matos	Venezuela	Case Study	-

Notes: (1) Prior to 1975, several studies were done on the impact of MNCs in Latin America. Most of these are case studies and it would be impossible to list all of them in this table. For a good summary of these see Grieco, 1986. (2) For example, Encarnation & Wells find that where FDI substitutes for imports because it is "tariff-jumping", the overall impact on the host country is negative.

Why Would Domestic Investment Stimulate FDI?

So little has been written about the impact of domestic investment on FDI that I am able to summarize it in a couple of paragraphs without resorting to tables. In theory, there appear to be several ways in which domestic investment might act as a catalyst for FDI. One obvious channel is public investment in physical and human infrastructure. The better the infrastructure, the more profitable FDI, therefore *ceteris paribus*, we would expect to see FDI follow increases in public domestic investment. Another plausible argument is that private domestic investors have more accurate information about the local business climate than do foreign investors. When information is incomplete, domestic investment acts as a signal about the state of the economy to foreign investors. Thus, we would expect to see domestic investment lead foreign direct investment.^x

To be fair, several studies that look at the determinants of FDI include market size and/or expected GDP growth. Hence, to the extent that domestic investment determines GDP growth and/or market size, these papers indirectly include total domestic investment as a signal about the future profitability of foreign direct investment. Harrison and Revenga (1995) explicitly include domestic investment as an explanatory variable but find that compared with the size of the local market and openness to trade domestic investment has no impact on FDI. Fry (1993) in an empirical study of FDI in South Asia, argues that the best way to encourage FDI is to implement policies that generally improve the investment climate. According to Fry, "Where domestically financed investment is booming, FDI will seek to participate." Hence, he argues that as a general principal, policies that encourage domestic investment will also stimulate foreign direct investment.

3. The Data

All data are annual. Data on total domestic investment, FDI and GDP come from the IMF's Balance of Payments Statistics Tape. Data on FDI for Africa were cross-checked with UNCTAD's data on foreign direct investment published in the

World Investment Directory, Volume V, 1996. This was done because UNCTAD's data are more recent, accurate and complete. Data on public and private domestic investment come from UNSO's National Accounts tape. A complete definition of each of the series used is provided below. Summary statistics are provide in Table 3.

Technically, the definition of FDI includes equity capital, reinvested earnings and intra-company loans. However, there is a serious lack of comparability of the FDI data of different countries. This lack of comparability may result in discrepancies between total outflows and total inflows or between outward stocks and inward stocks. There are three main reasons for the lack of comparability and discrepancies. First, most countries depart in one way or another from the definitional conventions recommended by the IMF or OECD. Second, countries differ in their methods of data collection and, often rely on Central Bank records compiled for Balance of Payments purposes as opposed to company surveys. Thus, many countries are unable to account for reinvested earnings. Third, corporate accounting practices and valuation methods differ between countries.

Gross Fixed Capital Formation (GFCF) is the measure of total investment for each country and includes both private and public sector investment and excludes changes in stocks. This series was obtained from the international financial statistics tape for all countries for which the data was available. Domestic investment is obtained by subtracting FDI from GFCF. Private & Public Gross Fixed Capital Formation is investment by ownership and also excludes changes in stocks. These series were obtained from the United Nations National Accounts database.

Table 3
Descriptive Statistics

Variable	Mean	Standard Deviation	Number of Observations
(all figures are as a percent of GDP)			
Foreign Direct Investment ¹			
Africa	.01	.03	638
East Asia	.03	.04	120
South Asia	.002	.004	116
Latin America	.01	.02	374
OECD	.01	.01	542
Total Domestic Investment ²			
Africa	.18	.12	638
East Asia	.28	.06	120
South Asia	.17	.05	116
Latin America	.17	.06	374
OECD	.21	.04	542
Private Investment ³			
Africa	.17	.06	115
East Asia	.23	.05	36
South Asia	.15	.04	67
Latin America	.17	.07	98
OECD	.19	.04	433
Public Investment ⁴			
Africa	.05	.03	115
East Asia	.04	.01	36
South Asia	.04	.02	67
Latin America	.03	.02	98
OECD	.03	.02	433

sources:(1) International Monetary Fund (IMF) and United Nations Commission on Trade and Development. Series is Inward Direct Investment meaning that it does not include FDI by host country nationals in foreign countries. (2) Source is IMF and series is gross fixed capital formation minus FDI. (3) & (4) Source is United Nations National Accounts.

4. Determining the Direction of Causality

In this section, I will briefly outline the econometric theory used to derive the results. Only the special problems associated with performing causality tests on a panel are highlighted. A definition of the Granger causality test is provided in an appendix. The theory below is presented using general notation to keep the presentation as simple as possible and to keep the focus of the discussion on the methodology rather than the notation. Next, I specify the estimating equation based on the econometric theory. The results are discussed and a summary table of the main results is presented. Details of the estimation are provided in an appendix. Finally, I discuss some of the limitations of this analysis.

Econometric Theory

Performing causality tests on a panel introduces a unique set of problems (Holtz-Eakin, Newey and Rosen, 1988). First, there are the usual complications associated with pooling data from different cross-sectional units. At least, we must control for unobserved country-specific heterogeneity. Second, when lagged dependent variables appear as explanatory variables, as they do in this case, the maximum likelihood estimator, even under the fixed effects formulation, is no longer consistent in the typical situation in which a panel involves a large number of individuals, but over only a short period of time.^{xi} The problem arises because estimation of the coefficients by the least squares dummy variable (LSDV) approach eliminates the unknown individual constant from each observation. This in turn creates a correlation of order $(1/T)$ between the explanatory variables and the residuals in the transformed model. Obviously, as T goes to infinity, this problem goes away. However, when the series is short, not correcting for this will bias the estimates downward.

To address the first set of issues, I use the following general model,

$$(5) \quad \begin{bmatrix} x_{it} \\ y_{it} \end{bmatrix} = \begin{bmatrix} d(L) & e(L) & \mathbf{a}_3 \\ a(L) & b(L) & \mathbf{b}_3 \end{bmatrix} \begin{bmatrix} x_{it} \\ y_{it} \\ f_i \end{bmatrix} + \begin{bmatrix} \mathbf{e}_{it} \\ \mathbf{d}_{it} \end{bmatrix}$$

$$(i = 1, \dots, N; t=1, \dots, T),$$

where N stands for the number of cross-sectional units observed over T periods, and f_i is the unobserved heterogeneity of the cross-section units assumed to be fixed.

To address the problem created by the presence of lagged dependent variables, I use the generalised method of moments technique (GMM). The first step of this procedure involves taking first differences to eliminate the unknown fixed effect. The result of first-differencing is shown in equation (6). Here we see that first-differencing to eliminate the original problem creates a new problem i.e. the regressors are now correlated with the error term,

$$(6) \quad \begin{bmatrix} x_{it} - x_{it-1} \\ y_{it} - y_{it-1} \end{bmatrix} = \begin{bmatrix} d(L) & e(L) \\ b(L) & a(L) \end{bmatrix} \begin{bmatrix} x_{it-1} - x_{it-2} \\ y_{it-1} - y_{it-2} \end{bmatrix} + \begin{bmatrix} \mathbf{e}_{it} - \mathbf{e}_{it-1} \\ \mathbf{d}_{it} - \mathbf{d}_{it-1} \end{bmatrix}$$

$$(i = 1, \dots, N; t=1, \dots, T-1).$$

Consistent estimates of the parameters of this equation can be obtained by using either $x_{it-2}-x_{it-3}$ and $y_{it-2}-y_{it-3}$ or x_{it-3} and y_{it-3} or both as instruments. However, in practice, using only the second lags of the first differences as instruments provides unsatisfactory results since the first-differencing introduces noise and reduces fit significantly. The technique pioneered by Arellano and Bond combines the moment conditions for equations in first differences and the equation in levels. This approach is an extension of Arellano and Bond (1991) and Arellano and Bover (1995) and is implemented in the revised version of the Dynamic Panel Data (DPD) program by Arellano and Bond (1998). This technique is also attractive because it provides

consistent estimates even in the presence of measurement error (Griliches and Hausman (1986)).

Empirical Specification and Results

Using both annual data and five year averages for the period 1970 to 1996^{xii}, I estimate the following system of equations:

$$(9) \quad F_{it} = \mathbf{a}_0 + \sum_{j=1}^4 \sum_{L=1}^m \mathbf{a}_{Lj} R_j F_{it-L} + \sum_{j=1}^4 \sum_{L=1}^m \mathbf{b}_{Lj} R_j \mathcal{D}_{it-L} + \sum_{i=1}^n \mathbf{h}_i cdum_i + \sum_{t=70}^{96} dum_t + u_{it}$$

$$D_{it} = \mathbf{d}_0 + \sum_{j=1}^4 \sum_{L=1}^m \mathbf{d}_{Lj} R_j F_{it-L} + \sum_{j=1}^4 \sum_{L=1}^m \mathbf{g}_{Lj} R_j \mathcal{D}_{it-L} + \sum_{i=1}^n \mathbf{p}_i cdum_i + \sum_{t=70}^{96} dum_t + v_{it}$$

where j denotes the region, m denotes the lag length and is chosen to ensure that the u_t and v_t are white noise error terms. The α 's, β 's, δ 's and γ 's are the coefficients of the linear projections of F and D on a constant and past values of F and D . F and D represent foreign and domestic investment and are computed as a percent of GDP.

^{xiii}Unobservable, time-invariant country characteristics are denoted by $cdum$ and dum controls for year to year cyclical fluctuations.

All estimates are computed with time dummies and regional slope dummies. Although not reported, it is possible to reject the hypothesis that slope dummies across regions are the same and it is possible to reject the hypothesis that the year dummies are jointly insignificant. Two sets of results are reported in each table. The first set of results (LSDV) controls for unobserved country heterogeneity and are based on equation (9). The second set of results (GMM) is based on first differences of equation (9) and instruments the lags to control for measurement error and the possible bias arising from the presence of lagged dependent variables. The two sets of results are reported as a robustness check and also to show the magnitude of the difference in coefficients between LSDV and GMM.

Correcting for the biases caused by measurement error and the presence of lagged dependent variables is particularly important for the estimations using 5 year averages. This is to be expected since the averaging significantly reduces the number of time periods aggravating the bias caused by the presence of the lagged dependent variable. Hence, all of the results discussed below are based on the GMM estimates. Regional estimates are computed to test the hypothesis that FDI might have a differential impact on domestic investment depending on the policies in place in the host country.^{xiv}

Table 4 on the following page summarizes the main results from appendix tables A.1-A.4. "Short-run" refers to results obtained using annual data, and "long-run" refers to results obtained using five year averages. Point estimates reported in Table 4 are obtained from the tables in the appendix by adding the differential slope coefficient for each region to the coefficient on OECD. Only those estimates that are significant at or above the 90% level are reported in Table 4. Also, none of the results for the variables' own lag are reported in Table 4. This is because all four measures of investment are persistent in all regions as expected.

Table 4
**Impact of a One Percent Increase in Lagged Investment on Current Investment,
by dependent variable/explanatory variable**

(all figures are % change in investment as a percent of GDP)

A. Does FDI ↑ total domestic investment?	short-run	long-run*
Africa	0.80	2.78
Asia	0.91	2.28
Latin America	1.17	2.19
OECD	0.54	no
B. Does FDI ↑ private domestic investment?	short-run	long-run
Africa	no	3.71
Asia	5.06	16.32
Latin America	1.01	2.52
OECD	no	no
C. Does FDI ↑ public domestic investment?	short-run	long-run
Africa	no	1.27
Asia	no	2.27
Latin America	no	1.04
OECD	no	no
D. Does Total Domestic Investment ↑ FDI?	short-run	long-run
Africa	no	no
Asia	no	no
Latin America	no	no
OECD	-0.02	-0.12
E. Does Private Domestic Investment ↑ FDI?	short-run	long-run
Africa	no	-0.02
Asia	no	0.03
Latin America	0.46	-0.05
OECD	no	-0.21
F. Does Public Domestic Investment ↑ FDI?	short-run	long-run
Africa	no	no
Asia	-0.44	no
Latin America	-0.26	no
OECD	no	no

sources: FDI is from International Monetary Fund (IMF) and United Nations Commission on Trade and Development. Series is Inward Direct Investment meaning that it does not include FDI by host country nationals in foreign countries. Investment is from IMF and series is gross fixed capital formation minus FDI. Private and public are from United Nations National Accounts. Short-run results based on annual data, long-run results based on 5 year averages and no means not significant at or above the 90% level.

Does FDI stimulate domestic investment?

Generally speaking, the answer to the above question is yes. Table 4 shows that a one percent increase in FDI as a percent of GDP is followed by as much as a 1.17 percent increase in future domestic investment as a percent of GDP in Latin America. In fact, there is an interesting asymmetry between the OECD countries and the developing countries. In the OECD countries, lagged FDI and lagged domestic investment have a similar impact on current domestic investment. A one percent increase in either domestic investment or FDI as a percent of GDP increases future domestic investment as a percent of GDP by about .5%. For the developing regions however, the impact of lagged FDI on domestic investment is more than two times the impact of lagged domestic investment on domestic investment. For example, a 1% increase in FDI as a percent of GDP increases the following years' domestic investment as a percent of GDP by 1.17% in Latin America, .91% in Asia and .80 % in Africa.

These results are even more pronounced when 5 year averages are used. In all regions, a one percent increase in lagged domestic investment as a percent of GDP increases next years domestic investment as a percent of GDP by about .5%. On the other hand, lagged FDI is now inversely related to domestic investment in the OECD countries. And, in the developing countries, lagged FDI has a positive and large impact on current domestic investment. An average one percent increase in FDI as a percent of domestic investment over a five year period increases domestic investment as a percent of GDP by an average of about 2% of GDP over the next five year period.

To understand what is driving these results, I break domestic investment into its private and public components. This reduces the sample to 46 countries because for many countries the breakdown between public and private investment is not available. Panel B of Table 4 shows that lagged FDI has a strong positive effect on private domestic investment in developing countries. This is true both in the short-run and long-run however, the effects are more pronounced in the long-run. An average one percent increase in FDI as a percent of domestic investment over a five year period

increases private domestic investment by between 16.32% (Asia) and 2.52% (Latin America) of GDP over the next five year period. Panel C of Table 4 shows that lagged FDI also has an impact on public investment in the long-run. On the other hand, FDI has no impact on public or private investment in the OECD countries.

Does Domestic Investment Stimulate FDI?

Here the answer to the above question appears to be no. This is true for both the developing countries and the OECD countries. But, again there is an asymmetry between the OECD countries and the developing countries. Panel D of Table 4 shows that in the developing countries domestic investment has no impact on FDI. For the OECD countries, the relationship between lagged domestic investment and FDI is negative both in the short-run and in the long-run. Using the annual data, I find that a one percent increase in domestic investment as a percent of GDP reduces FDI as a percent of GDP by .02 percent in the following year. The effect is magnified using the 5 year averages where a one percent increase in domestic investment as a percent of GDP reduces FDI as a percent of GDP in the next five year period by .26%. Looking at the breakdown between private and public, we see that the results are coming from the relationship between private domestic investment and FDI. Panel E shows that an average one percent increase in private domestic investment as a percent of domestic investment over a five year period reduces FDI as a percent of GDP by an average of about -.21% of GDP over the next five year period. The negative sign probably reflects the substitution of foreign capital for domestic capital rather than a reduction in the profitability of domestic capital in the OECD countries.

In addition, and somewhat surprisingly, panel F shows that public investment is not a catalyst for FDI in any region of the world in the short or long-run. Although not shown in Table 4, public investment is also not a catalyst for private domestic investment, in any region of the world over either time horizon. In fact, in developing countries, there is a slightly negative relationship between public investment and FDI

which may reflect the privatization of public enterprises. This runs counter to what we might have thought about the importance of government investment in infrastructure.

6. Conclusion

In summary, I conclude that FDI is a strong catalyst for domestic investment in developing countries. The fact that lagged FDI has a stronger impact on private domestic investment than lagged private domestic investment itself suggests that FDI brings with it technological and managerial capabilities that make private domestic investment more profitable. This evidence is strengthened by the asymmetry between the developing countries and the OECD countries. The majority of FDI in developing countries is done by multinationals from technologically advanced countries. The majority of FDI in the OECD countries is also done by multinationals however, the overall level of technological advancement between host and recipient tends to be similar for the OECD countries. Hence, the scope for making private domestic investment more profitable via technological and managerial spillovers is limited in the OECD countries.

ENDNOTES

ⁱ For the remainder of the paper, I will use Africa to refer to Sub-Saharan Africa.

ⁱⁱ Hirschmann called these "forward and backward" linkages.

ⁱⁱⁱ Christopher S. Adam and Stephen A. O'Connell, 1997.

^{iv} World Investment Directory, Volume V, Sub-Saharan Africa, 1996.

^v Several papers, both theoretical and empirical have examined the impact of foreign direct investment on domestic investment. However, to my knowledge, nobody has looked specifically at the impact of domestic investment on FDI.

^{vi} Rhee & Belot, 1989.

^{vii} It is also possible that foreigners have "deeper pockets" and are able to pay higher rents.

^{viii} Ridell et al, 1991.

^{ix} Ibid.

^x A recent paper by Razin et al. argues just the opposite. In the presence of asymmetric information, FDI actually acts as a catalyst for domestic investment.

^{xi} The bias is caused by having to eliminate the unknown individual constant from each observation, which creates a correlation of order $1/T$ between the explanatory variables and the residuals in the transformed model. When T is large, the RHS variables become asymptotically uncorrelated.

^{xii} For some countries, data is available for a longer time period (Canada for example has data on both types of investment all the way back to 1948) but the majority of countries do not have data on FDI prior to 1970.

^{xiii} This was done mostly out of concerns about stationarity of the time series data on investment measured in levels. Estimates of the dollar impact of investment today on future dollars of investment may be derived using the following approximation, $\partial d_t / \partial f_{t-1} = \delta (y_t / y_{t-1}) = \delta(1+g_t)$, where g is growth of gdp, y is gdp and d and f are domestic and foreign investment.

^{xiv} Of course different countries in different regions pursue different policies. But, as a first approximation, one could argue that regions with higher growth like East Asia generally had better policies in place.

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Table 4

DOES FDI STIMULATE DOMESTIC INVESTMENT?*(Investment as a Share of Gross Domestic Product - annual data 1970-1996)*

Dependent Variable:	Total		Private		Public	
	<u>Domestic Investment</u>		<u>Domestic Investment</u>		<u>Domestic Investment</u>	
Regressors:	LSDV	GMM	LSDV	GMM	LSDV	GMM
Foreign Direct Investment (-1)						
Africa	0.46 (1.81)	0.26 (3.21)	0.85 (2.63)	0.55 (0.87)	0.06 (0.77)	-0.13 (0.69)
Asia	0.52 (2.38)	0.37 (3.12)	2.14 (1.96)	5.06 (2.42)	0.26 (0.51)	1.04 (0.77)
Latin America	0.47 (1.97)	0.63 (3.51)	0.38 (1.14)	1.01 (1.69)	0.09 (0.68)	-0.07 (0.58)
OECD	0.05 (0.36)	0.54 (8.89)	-0.07 (0.41)	-0.28 (0.56)	-0.03 (0.47)	0.11 (0.99)
Domestic Investment (-1)						
Africa	-0.03 (0.65)	-0.04 (6.79)				
Asia	0.05 (0.74)	-0.05 (3.99)				
Latin America	-0.17 (1.33)	-0.07 (7.96)				
OECD	0.82 (19.92)	0.46 (11.28)				
Private Domestic Investment (-1)						
Africa			-0.27 (2.97)	-0.92 (3.86)	0.05 (1.93)	0.05 (0.71)
Asia			0.09 (0.91)	-0.56 (2.08)	0.07 (1.71)	0.04 (0.41)
Latin America			-0.06 (0.58)	-0.87 (1.22)	0.04 (1.17)	-0.19 (0.66)
OECD			0.83 (18.19)	0.93 (4.04)	0.00 (0.01)	-0.01 (0.09)
Public Domestic Investment (-1)						
Africa			-0.52 (1.14)	-0.52 (1.14)	-0.17 (0.95)	-0.16 (0.67)
Asia			0.26 (0.36)	0.26 (0.36)	-0.03 (0.16)	0.21 (0.77)
Latin America			-0.82 (1.45)	-0.82 (1.45)	0.09 (0.68)	-0.02 (0.12)
OECD			0.41 (1.19)	0.41 (1.19)	0.68 (6.43)	0.38 (4.91)
n	1704		677		677	
R ²	0.85		0.85		0.93	
Sargan Test		57.71				

Data Source: All data come from International Financial Statistics tapes. Data on foreign direct investment for Sub-Saharan Africa was updated using the United Nations Commission on Trade and Development Investment Directory Volume V, published in 1997. Notes: (1) Year dummies are included in all three sets of estimations. (2) Values in parentheses are absolute t-statistics. (3) Standard errors are robust to heteroscedasticity.

Table 5

DOES FDI STIMULATE DOMESTIC INVESTMENT?*(Investment as a Share of Gross Domestic Product - five year averages)*

Dependent Variable:	Total		Private		Public	
	<u>Domestic Investment</u>		<u>Domestic Investment</u>		<u>Domestic Investment</u>	
Regressors:	LSDV	GMM	LSDV	GMM	LSDV	GMM
Foreign Direct Investment (-1)						
Africa	2.78 (2.35)	2.89 (2.67)	0.82 (0.55)	3.71 (2.52)	0.19 (0.53)	1.27 (2.93)
Asia	-0.28 (0.25)	2.18 (2.35)	7.89 (2.77)	16.32 (8.11)	1.87 (2.64)	2.27 (4.22)
Latin America	2.19 (2.18)	1.99 (2.89)	0.85 (0.72)	2.52 (1.28)	0.07 (0.19)	1.04 (2.31)
OECD	-1.76 (1.83)	-4.21 (3.08)	0.25 (0.28)	-2.29 (1.47)	-0.26 (1.07)	-0.71 (1.66)
Domestic Investment (-1)						
Africa	0.06 (0.24)	0.07 (0.56)				
Asia	-0.43 (1.38)	-0.23 (1.45)				
Latin America	-0.15 (0.45)	-0.11 (0.35)				
OECD	0.45 (1.78)	0.51 (2.69)				
Private Domestic Investment (-1)						
Africa			-0.39 (1.29)	-0.66 (4.39)	-0.09 (0.99)	-0.01 (0.21)
Asia			-0.01 (0.04)	-1.19 (1.61)	0.12 (1.27)	-0.15 (1.25)
Latin America			-0.41 (0.88)	0.17 (0.58)	0.12 (1.02)	0.09 (1.45)
OECD			0.48 (2.67)	0.45 (3.09)	0.09 (1.49)	0.04 (0.62)
Public Domestic Investment (-1)						
Africa			0.32 (0.39)	0.39 (0.37)	-0.42 (1.52)	-0.51 (3.22)
Asia			-0.34 (0.49)	-0.61 (0.26)	-0.53 (2.01)	-0.44 (1.23)
Latin America			-1.69 (2.21)	-0.66 (0.72)	-0.62 (1.79)	-0.82 (4.86)
OECD			0.69 (1.79)	0.91 (0.91)	0.28 (1.65)	0.38 (2.59)
n	283		146		146	
R ²	0.83		0.76		0.92	
Sargan Test				4.59		13.45

Data Source: All data come from International Financial Statistics tapes. Data on foreign direct investment for Sub-Saharan Africa was updated using the United Nations Commission on Trade and Development Investment Directory Volume V, published in 1997. Notes: (1) Year dummies are included in all three sets of estimations. (2) Country specific time trends are included in the within and gmm estimations. (3) Values in parentheses are absolute t-statistics. (4) Standard errors are robust to heteroscedasticity.

Table 6
DOES DOMESTIC INVESTMENT STIMULATE FDI?
(Investment as a Share of GDP - Annual Data 1970-1996)

Dependent Variable:				
	<u>Foreign Direct Investment</u>		<u>Foreign Direct Investment</u>	
Regressors:	LSDV	GMM	LSDV	GMM
Domestic Investment (-1)				
Africa	0.03 (1.43)	0.01 (12.75)		
Asia	0.04 (1.08)	0.01 (2.32)		
Latin America	0.01 (0.65)	0.01 (9.96)		
OECD	-0.03 (1.79)	-0.02 (8.81)		
Private Domestic Investment (-1)				
Africa			0.04 (1.81)	0.05 (0.95)
Asia			0.04 (0.21)	0.07 (1.31)
Latin America			0.01 (0.39)	0.46 (2.16)
OECD			-0.003 (0.26)	-0.04 (0.76)
Public Domestic Investment (-1)				
Africa			0.04 (0.61)	-0.17 (1.42)
Asia			0.09 (1.47)	-0.44 (1.96)
Latin America			-0.09 (0.99)	-0.26 (2.04)
OECD			-0.08 (1.46)	0.14 (1.46)
Foreign Direct Investment (-1)				
Africa	-0.24 (1.02)	-0.19 (49.43)	-0.27 (2.03)	-0.47 (1.96)
Asia	0.06 (0.44)	-0.02 (0.09)	0.25 (1.22)	-0.46 (0.79)
Latin America	-0.02 (0.07)	-0.27 (19.73)	-0.13 (0.66)	-0.35 (0.96)
OECD	0.56 (7.63)	0.11 (12.29)	0.59 (7.13)	0.47 (1.96)
n	1704		674	
R ²	0.47		0.73	
Sargan Test		76.29		5.19

Data Source: All data come from International Financial Statistics tapes. Data on foreign direct investment for Sub-Saharan Africa was updated using the United Nations Commission on Trade and Development Investment Directory Volume V, published in 1997. Notes: (1) Year dummies are included in all three sets of estimations. (2) Country specific time trends are included in the within and gmm estimations. (3) Values in parentheses are absolute t-statistics. (4) Standard errors are robust to heteroscedasticity. A23

Table 7
DOES DOMESTIC INVESTMENT STIMULATE FDI?
(Investment as a Share of GDP - five year averages)

Dependent Variable:	Foreign Direct Investment		Foreign Direct Investment	
	LSDV	GMM	LSDV	GMM
Regressors:				
Domestic Investment (-1)				
Africa	0.09 (1.83)	0.11 (1.99)		
Asia	0.12 (1.19)	0.14 (1.45)		
Latin America	0.06 (1.09)	0.09 (1.54)		
OECD	-0.12 (2.48)	-0.76 (1.97)		
Private Domestic Investment (-1)				
Africa			0.02 (0.45)	0.19 (2.37)
Asia			0.13 (2.43)	0.24 (2.11)
Latin America			0.04 (0.70)	0.26 (3.15)
OECD			-0.07 (1.42)	-0.21 (2.45)
Public Domestic Investment (-1)				
Africa			0.06 (0.33)	0.11 (0.56)
Asia			0.25 (1.77)	-0.01 (0.04)
Latin America			-0.04 (0.18)	-0.19 (0.81)
OECD			-0.17 (1.42)	-0.12 (0.65)
Foreign Direct Investment (-1)				
Africa	-0.67 (2.54)	-0.71 (3.04)	-0.53 (1.38)	-0.24 (0.46)
Asia	-0.44 (1.09)	-0.42 (1.56)	0.51 (1.44)	-0.16 (0.36)
Latin America	-0.77 (2.03)	-0.79 (2.73)	-0.24 (0.91)	-1.61 (3.52)
OECD	0.39 (2.09)	0.41 (3.28)	0.41 (1.59)	0.93 (2.76)
n	283		145	
R ²	0.77		0.77	
Sargan Test		13.79		13.71

Data Source: All data come from International Financial Statistics tapes. Data on foreign direct investment for Sub-Saharan Africa was updated using the United Nations Commission on Trade and Development Investment Directory Volume V, published in 1997. Notes: (1) Year dummies are included in all three sets of estimations. (2) Country specific time trends are included in the within and gmm estimations. (3) Values in parentheses are absolute t-statistics. (4) Standard errors are robust to heteroscedasticity.

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