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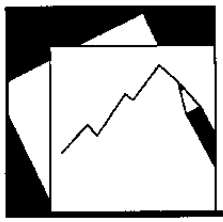

IMF Working Paper

FDI Spillovers, Financial Markets, and Economic Development

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FDI Spillovers, Financial Markets, and Economic Development

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Abstract

This paper examines the role financial markets play in the relationship between foreign direct investment (FDI) and economic development. We model an economy with a continuum of agents indexed by their level of ability. Agents can either work for the foreign company or undertake entrepreneurial activities, which are subject to a fixed cost. Better financial markets allow agents to take advantage of knowledge spillovers from FDI, magnifying the output effects of FDI. Empirically, we show that well-developed financial markets allow significant gains from FDI, while FDI alone plays an ambiguous role in contributing to development.

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Contents

I. INTRODUCTION

The last two decades witnessed both a shift in the composition of capital flows, with an increased share of foreign direct investment (FDI) in total capital flows and a shift in emphasis among policymakers in developing countries toward attracting more FDI. These shifts coincided with the post-1980s debt crises and were reinforced following the East Asian financial crises. During this period, studies focused on the relative volatility of different types of capital flows and on how that volatility negatively influenced economic output. Such studies contributed to strengthening the importance of long-term investment, including FDI, which tends to be much less volatile than commercial bank loans and portfolio flows.[2]

More importantly, the rationale for such increased efforts to attract more FDI stems from the belief that FDI has several positive effects, which include productivity gains; technology transfers; the introduction of new processes, managerial skills and know-how to the domestic market; employee training; international production networks; and access to markets.[3] Domestic firms may benefit from accelerated diffusion of new technology if foreign firms introduce new products or processes to the domestic market.[4] In some cases, domestic firms may benefit solely from observing these foreign firms.[5] In other cases, technology diffusion may occur from labor turnover as domestic employees move from foreign to domestic firms. These benefits, together with the direct capital financing it provides, suggest that FDI can play an important role in modernizing the national economy and promoting economic development.

However, both plant- and aggregate-level empirical evidence remain ambiguous, which suggests that positive knowledge spillovers cannot be presumed. For example, looking at plant-level data in Venezuela, Aitken and Harrison (1999) find that the net effect of FDI on productivity is quite small—FDI raises productivity within plants that receive the investment while lowering that of domestically owned plants. National-level studies by Borensztein, De Gregorio, and Lee (1998) and Carkovic and Levine (2000), using cross-country growth regressions, also provide little support for the hypothesis that FDI has an exogenous positive effect on economic growth.

This evidence seems to suggest that while it may seem natural to argue that FDI can convey greater knowledge spillovers, a country's capacity to take advantage of these externalities might be limited by local conditions. These conditions include—but are not limited to—the policy environment of the local country, productive assets available,

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[2] See Fernandez-Arias et al. (2000) and World Bank (2000a), showing the lower volatility of FDI during the period 1992–97.

[3] See Caves (1996) for a discussion on technology transfers.

[4] For technology diffusion models see Grossman and Helpman (1991) and Barro and Sala-i-Martin (1995, 1997).

[5] See Blomstrom and Kokko (1997).

infrastructure, and institutions. In line with the recent emphasis on the role of institutions in the growth literature, we examine the intermediary role played by local financial institutions in channeling the contributions of FDI to economic development. In particular, we argue that the lack of development of local financial markets can adversely limit the economy's ability to take advantage of potential FDI spillovers.

The importance of well-functioning financial institutions in augmenting technological innovation, capital accumulation, and economic development has been recognized and extensively discussed in the literature for almost a century. Starting with Schumpeter, Goldsmith (1969), McKinnon (1973), and Shaw (1973), followed by Boyd and Prescott (1986), Greenwood and Jovanovic (1990), and King and Levine (1993b), among others, have shown that well-functioning financial markets, by lowering the costs of conducting transactions, ensure capital is allocated to the projects that yield the highest returns and therefore enhances growth rates. Furthermore, as McKinnon (1973) stated, the development of capital markets is "necessary and sufficient" to foster the "adoption of best-practice technologies and learning by doing." In other words, limited access to credit markets restricts entrepreneurial development. If entrepreneurship allows greater assimilation and adoption of best technological practices made available by FDI, then the absence of well-developed financial markets limits the potential positive FDI externalities.

Although the benefits of FDI, as a form of capital market integration, did not receive much attention until recently, empirical evidence on the theoretical framework of the interaction between financial markets and economic growth is ample. Providing evidence at the country level, King and Levine (1993a,b) and Beck, Levine, and Loayza (2000a,b) suggest that financial systems are important for both productivity growth and development. Levine and Zervos (1998) show that although development of all financial types of financial institution positively predict growth, the type of financial institutions (including stock markets and banks) have different magnitudes of impacts owing to the provision of different services. At the industry level, Rajan and Zingales (1998) find that enhanced financial development reduces the cost of external finance to firms, thereby promoting growth. Combining industry- and country-level research, Wurgler (2000) shows that even if financial development does not lead to higher levels of investment, it seems to allocate existing investment better and, hence, promote economic growth.

Notwithstanding the widespread agreement about the role of financial markets in enhancing spillovers and economic growth, the literature on FDI seems to have ignored its importance altogether. As Caves (1999) notes, the constraints faced by local firms in reaping such spillovers are not mentioned at all in the four volumes of *The Handbook of Development Economics*. Generally speaking, the roles of not just financial markets but also other factors – including potential shortages of skills, knowledge, and infrastructure in the recipient countries – have been neglected in the development literature. Only recently have these issues been addressed. For example, Borensztein, de Gregario, and Lee (1998) and Xu (2000), using data on FDI flows from industrialized countries to 69 developing countries and data on U.S. multinational enterprises (MNEs), respectively, show that FDI allows for transferring technology and for higher growth only when the host country has a minimum threshold stock of human capital. Most developing countries do not meet this threshold.

The World Bank's 2001 edition of *Global Development Finance* discusses the importance of "absorptive capacities" and the success of FDI.[6] Absorptive capacities here include macroeconomic management (as captured by inflation and trade openness), infrastructure (telephone lines and paved roads), and human capital (share of labor force with secondary education and percentage of population with access to sanitation). Financial markets are not mentioned. Indeed, Figure 1, which shows data on FDI and financial development, provides motivation for including financial markets among the relevant "absorptive capacities." As Figure 1 depicts, data for the period 1975–95 suggests a positive relationship between FDI, measured as a share of GDP, and financial markets, measured by financial development indicators introduced by Beck and others (2000). However, given their interaction with one another, it is also apparent that a wide variation exists in both variables. Indeed, if financial development plays an important role in influencing the effects of FDI on output, one can expect countries with the same levels of FDI to have very different outcomes in terms of income levels.

In this paper, we formalize this mechanism through which the trickle-down effect of FDI depends on the extent of the development of the financial sector. We model an economy populated by agents who are differentiated by their ability levels. Agents have two choices. They can work for the foreign company in the FDI sector and use their inherited wealth to earn a return. Or they can set up their own firms, which will benefit from a spillover from foreign direct investment. However, starting a firm requires a setup cost, which must be financed partly through borrowing from financial institutions. Owing to inefficiencies in the financial sector, the borrowing rate is assumed to be higher than the lending rate. Under this scenario, more developed financial institutions make it easier for entrepreneurs to set up a business. This not only spurs entrepreneurial activity but also, and more importantly, enables entrepreneurs to reap the benefits of spillovers from foreign direct investment. This implies that FDI will have effects on the local economy beyond the direct increase in capital from abroad.

The model provides a benchmark for empirical analysis. We find that the development of local financial markets must reach a certain level if these positive effects are to be realized. Using growth regressions, we study the impact of the interaction of a range of financial market variables that exist in the literature with FDI on economic growth. The results suggest that although FDI alone plays an ambiguous role in contributing to economic growth, well-developed financial markets alter the results significantly. Countries with well-developed financial markets seem to gain significantly more from FDI. This is consistent with the results of Carkovic and Levine (2000).

The rest of the paper is organized as follows. Section II develops the benchmark which is used to motivate the empirical testing. The data are defined in Section III. The empirical results are discussed in Section IV, and Section V concludes.

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[6] The discussions demonstrate how some countries with low absorptive capacities, such as Morocco, Uruguay and Venezuela (the last based on Aitken and Harrison, 1999), failed to reap spillovers whereas countries with higher absorptive capacities such as Malaysia and Taiwan Province of China fared well. See World Bank (2001), page 62.

II. A Conceptual Framework

We present a simple model to illustrate how improvements in the financial markets influence the effects of FDI on domestic production. The model provides a benchmark for the empirical analysis. We assume a small, open economy with no adjustment costs. The economy is populated with a continuum of agents of total mass 1. Each agent lives for one period. There are two sectors in the economy, Y^{FDI} and Y^{DOM}, the foreign production and domestic production sector respectively.

A. Production

Sectors are distinguished by ownership, technology and inputs used. The foreign production sector, denoted Y^{FDI}, is owned wholly by foreign investors and uses foreign capital and domestically supplied labor. We assume, following Razin et al. (1999), that home investors who lack access to foreign capital markets cannot challenge the foreign direct investors in this sector.[7] We assume that FDI is attracted to the country because of cost of capital differences.[8]

Production is perfectly competitive and technology is assumed to be a Cobb-Douglas constant returns to scale,

$$Y_t^{FDI} = AL_t^{\beta}\left(K_t^{FDI}\right)^{1-\beta} \tag{1}$$

where $0<\beta<1$, L_t denotes the domestic labor, $K^{FDI}{}_t$ is the stock of foreign capital, and A is a productivity parameter. Optimality, conditions in the foreign production sector imply that foreign capital is paid its marginal product, which is given by the international rate of interest, r,

$$r = (1-\beta)AL_t^{\beta}\left(K_t^{FDI}\right)^{-\beta} \tag{2}$$

Rearranging we get an expression for the stock of foreign capital,

$$K_t^{FDI} = \left(\frac{(1-\beta)A}{r}\right)^{\frac{1}{\beta}} L_t \tag{3}$$

The foreign firm hires workers up to the point where the marginal productivity of an extra worker equals the wage, w,

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[7] Alternatively, foreign firms can be thought of as owning the technology to produce in this sector and because of its special characteristics (asset specific) they choose to directly produce in the country rather than to license the technology.

[8] Our objective is to understand the effect of foreign production on local output and the role of financial markets and not the decision to invest abroad.

$$w = \beta A^{\frac{1}{\beta}} \left(\frac{(1-\beta)}{r} \right)^{\frac{1-\beta}{\beta}} \tag{4}$$

The second sector, Y^{DOM}, is composed of a number of firms, each of which is owned by a local entrepreneur. Production in each firm requires a fixed capital investment. In addition to the fixed capital investment, output is positively affected by the entrepreneur's ability and by the amount of foreign capital in the economy.[9]

Local entrepreneurs benefit from spillovers from the FDI sector. This assumption is central to the model.[10] Potential entrepreneurs can take advantage of better managerial practices, networks, access to markets, and other spillovers from the foreign firms located in the domestic country. The foreign firm does not internalize these positive effects. Output in this sector is given by:

$$Y_t^{DOM} = \int_{\varepsilon_i}^{1} Y_t^i \, d\varepsilon \tag{5}$$

where Y_t^i is the amount produced by entrepreneur i :

$$Y_t^i = \varepsilon_{i,t} \beta \left(K_t^{FDI} \right)^{\theta} S^{\gamma} \tag{6}$$

where $0<\gamma<1$, $0<\theta<1$, is associated with an entrepreneur of ability level ε_i, S is the fixed capital investment. We assume that the fixed investment S exceeds the resources owned by any single individual at any point in time. Local entrepreneurs can borrow the difference between their endowment and S in the local market.[11] In the financial market, there is a wedge -δ- between the lending rate, r and the borrowing rate i. The difference δ reflects the inefficiencies in the financial sector.[12] This wedge could reflect taxes, interest ceilings, required reserve policies, as King and Levine (1991) mention, or in general high intermediation costs due to labor regulation, high administration costs, low technology, etc.

B. Household and Occupational Choice

The economy is populated by a continuum of agents of total mass 1, who live for one time period. They are all endowed with one unit of labor but they differ in their ability level.

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[9] The assumption of entrepreneurial ability is important to rule out corner solutions as will be evident later.

[10] Blomstrom and Kokko (1997) mention three different means of such spillovers from the MNF to the local markets. The first one is due to linkages in the market. Backward and forwards linkages between the foreign and domestic firms create an environment where the foreign processes can be easily learned by the domestic firms. Training of the local workers in the FDI industry also allows such spillovers. Finally, they define "demonstration effects", which are possible due to the competition between the domestic firms and the MNF. Similar effects are mentioned in Aitken and Harrison (1999).

[11] Due to information asymmetries plus sovereign risk it is costly or impossible for entrepreneurs to finance abroad or directly through the stock market.

[12] Galor and Zeira (1993) adopt a similar strategy to allow for capital market imperfections.

For example, upon birth, individual i at time t is endowed with ability level ε^i_t, where ε^i_t is i.i.d., uniformly distributed over $\varepsilon^i_t \in (0, 1)$. ε^i_t is realized at the beginning of the period. Agents are all endowed with some initial wealth b^i_{t-1}, on which they can earn the international return r at the end of the period should they choose to invest it in capital markets. Initially, we assume that $b^i_{t-1}=b_{t-1}$ for all i. All individuals consume and leave bequests b^i_{t-1}, at the end of the period t. At the beginning of period t, each agent faces two choices. They can work for the foreign firm in the FDI sector. Alternatively, the agent can become an entrepreneur and work in the domestic-production sector.

If agents choose to work for the foreign company, they inelastically supply their labor endowment and earn a wage w. The wage w is independent of the agent's ability level. Agents who choose to work for the foreign company earn an income stream equal to the wage plus the return on their level of assets, $w+(1+r)b_{t-1}$. Those who choose to produce must pay their loans at the end of the period and therefore earn a net income of $Y^i_t-(1+i)(S-b_{t-1})$. An individual chooses to work for the foreign company if the income he or she earns is higher than that in the entrepreneurial sector:

$$w+(1+r)b_{t-1} > Y^i_t-(1+i)(S-b_{t-1}) \tag{7}$$

alternatively, he or she chooses to start a firm if

$$w+(1+r)b_{t-1} < Y^i-(1+i)(S-b_{t-1}) \tag{8}$$

An agent is indifferent between working for the foreign firm and starting its own firm if

$$w+(1+r)b_{t-1} = Y^i_t-(1+i)(S-b_{t-1}) \tag{9}$$

The above equation characterizes the break-even level of ability and therefore also the measure of people that work for the foreign sector. Substituting for output, Y^i_t, using equation (3), we obtain:

$$w+(1+r)b_{t-1} = \varepsilon_{i,t}B\left(K^{fdi}_t\right)^{\beta} S^{\gamma}-(1+i)(S-b_{t-1}) \tag{10}$$

With a uniform distribution for the ability level, we obtain the following expression for ε^i_t,

$$\varepsilon_{i,t} = \frac{(1+i)(S-b_{t-1})+w+(1+r)b_{t-1}}{B\left(K^{FDI}_t\right)^{\beta} S^{\gamma}} \tag{11}$$

Let ε^*_t denote the value of ability that satisfies the above condition. This means that the total amount of labor employed in the FDI sector will be:

$$L_t = \int_0^{\varepsilon^*} \varepsilon_{i,t}di = \varepsilon_t\ ^* \tag{12}$$

From equations (2) and (12), we can rewrite the amount of foreign capital as

$$K^{FDI}_t = \left(\frac{(1-\beta)A}{r}\right)^{\frac{1}{\beta}} \varepsilon^*_t \tag{13}$$

Substituting this expression into equation (11) and rearranging provides an explicit form for the threshold level of entrepreneurial ability,

$$\varepsilon_t^* = \left[\frac{(1+i)(S-b_{t-1}) + \beta A^{\frac{1}{\beta}} \left(\frac{(1-\beta}{R} \right)^{\frac{1-\beta}{\beta}} + (1+r)b_{t-1}}{B\left(\frac{A(1-\beta)}{r} \right)^{\frac{\theta}{\beta}} S^{\gamma}} \right]^{\frac{1}{1+\theta}} \tag{14}$$

C. Comparative Statics

The above model allows us to understand how FDI will impact output, and how this effect depends on the local financial market conditions. More FDI generates higher output via two channels: increased production in the FDI sector and increased production in the domestic sector. Note that the total output in the economy is:

$$Y_t = Y_t^{FDI} + \int_{\varepsilon_t^*}^{1} Y_t^i d\varepsilon \tag{15}$$

which implies,

$$Y_t = Y_t^{FDI} + (1-\varepsilon_t^*) B\left(K_t^{FDI}\right)^{\theta} S^{\gamma} \tag{16}$$

The total effect of FDI on output is therefore the sum of the private marginal product of FDI in its own sector plus the difference between the social and the private marginal product:

$$\frac{\partial Y_t}{\partial K_t^{FDI}} = \frac{\partial Y^{FDI}{}_t}{\partial K_t^{FDI}} + \frac{\partial \left[(1-\varepsilon_t^*) B\left(K_t^{FDI}\right)^{\theta} S^{\gamma} \right]}{\partial K_t^{FDI}} \tag{17}$$

which is equivalent to,

$$\frac{\partial Y_t}{\partial K_t^{FDI}} = r + \left(1-\varepsilon_t^*\right) B\theta \left(K_t^{FDI}\right)^{\theta-1} S^{\gamma} > 0 \tag{18}$$

Financial intermediation in this model affects the social marginal product of FDI. The total effect therefore is,

$$\frac{\partial^2 Y_T}{\partial K_t^{FDI} \partial \delta} = -B\theta\left(K_t^{FDI}\right)^{\theta-1} S^{\gamma} \frac{\partial \varepsilon_t^*}{\partial \delta} + \left(1-\varepsilon_t^*\right) B\theta(\theta-1)\left(K_t^{FDI}\right)^{\theta-2} S^{\gamma} \frac{\partial K_t^{FDI}}{\partial \varepsilon_t^*} \frac{\partial \varepsilon_t^*}{\partial \delta} \tag{19}$$

equivalently,

$$\frac{\partial^2 Y_T}{\partial K_t^{FDI} \partial \delta} = -B\theta\left(K_t^{FDI}\right)^{\theta-1} S^{\gamma} \frac{\partial \varepsilon_t^*}{\partial \delta} \left[1 + \frac{\left(1-\varepsilon_t^*\right)(1-\theta)}{\varepsilon_t^*} \right] < 0 \quad \text{if } \frac{\partial \varepsilon_t^*}{\partial \delta} > 0 \tag{20}$$

In order to fully analyze the above equation we need to study how financial market inefficiencies affect the decision of becoming an entrepreneur. Observe that higher the value of the parameter δ, which denotes higher inefficiencies in the financial sector, the less attractive entrepreneurial activity becomes. Using the definition of δ, $i = r+\delta$, we can rewrite equation (8) as,

$$\varepsilon_t^* = \left[\frac{(1+r+\delta)(S-b_{t-1}) + \beta A^{\frac{1}{\beta}} \left(\frac{(1-\beta)}{r} \right)^{\frac{1-\beta}{\beta}} + (1+r)b_{t-1}}{B \left(\frac{A(1-\beta)}{r} \right)^{\frac{\theta}{\beta}} S^{\gamma}} \right]^{\frac{1}{1+\theta}} \tag{21}$$

From this expression it follows that $\frac{\partial \varepsilon_t^*}{\partial \delta} > 0$. As expected, higher financial costs reduce the number of entrepreneurs. Conversely, an improvement in the efficiency of the financial sector tends to reduce the threshold level of entrepreneurship, thereby leading to an increase in the number of entrepreneurs in society. This implies that an improvement in the efficiency of the financial sector increases the social marginal product of foreign capital. As is evident in equation (9), essentially two effects are working here. First, an improvement in the financial sector increases the number of entrepreneurs in society. This increase raises the social marginal product of FDI since the two are complementary. Second, there is a direct effect of the number of entrepreneurs on the amount of foreign capital stock. As the number of entrepreneurs rise, the number of laborers fall. The decline in the number of laborers implies that the stock of foreign capital will decline. Overall, higher efficiency of the local markets raises the social marginal product of foreign capital in the domestic sector.[13] The model above shows, in a very simplified form, how better financial markets can lead to greater effects of foreign direct investment on output. In practice, however, financial markets affect not only the financing of investment, but also the day-to-day to conduct of business. This important channel often neglected in the literature. In the appendix, we work out a more complete version of the model where such effects are also incorporated, and where the qualitative results of the model do not change. The appendix also includes a numerical analysis of the complete version of the model. It shows that for reasonable parameter values, a better-developed financial market encourages increased entrepreneurial activity, domestic output and attracts more FDI; altogether showing that better financial markets magnify the effects of FDI on output.

The overall results suggest that higher levels of FDI generates more output in the economy, and the magnitude of this positive effect is influenced by the financial market inefficiencies. In the following sections, an empirical analysis based on these findings is carried out in order to understand the interaction between FDI, local capital markets and growth.

[13] Improvements in the financial markets have a positive effect on the marginal product of FDI capital for $1 - \theta + \theta\varepsilon > 0$. The assumption of $\theta < 1$ clearly helps remove any ambiguity in this condition. However, this restriction is necessary only for $\varepsilon = 0$. Further, empirically, a value of $\theta > 1$ seems highly implausible. For example, estimates of R&D spillovers by Coe, Helpman and Hoffmaister (1995) show that a $100 increase in the U.S. or Japanese R&D domestic capital stock increases real GDP of developing countries by almost 25 dollars.

III. DATA

The data used in the empirical analysis is described in detail in Appendix 2. This section discusses the data for the two most significant variables: the measures of foreign direct investment and financial market development.

An important source for the FDI data is the IMF publication *International Financial Statistics* (IFS) which reports the Balance of Payments statistics on FDI. The net FDI inflows, reported in IFS, measures the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. The gross FDI figures reflect the sum of the absolute values of inflows and outflows accounted in the balance of payments financial accounts. Our model focuses on the inflows to the economy, therefore we prefer using the net inflow measure.[14] Alternative data sources include UNCTAD and OECD publications, however the IMF data allows a more comprehensive analysis by availability of data for a larger set of countries.

Following King and Levine (1993), Levine and Zervos (1998), and Levine et al. (2000a) we construct several financial market series, ranging from the stock market to the rate of monetization of the economy. It is very difficult to construct accurate and comparable measures of financial services data for a broad cross-section of countries over several decades. Following Levine and Zervos (1998), stock market liquidity is measured as the value of stock trading relative to the size of the economy, labeled as "value traded" (henceforth SVALT). In order to capture the relative size of the stock market we use the average value of listed domestic shares on domestic exchanges in a year as a share of the size of the economy (the GDP), in similar vein to Levine and Zervos (1998). This series is labeled as "capitalization" (henceforth SCAPT).

We further draw on variables introduced by Levine et al. (2000), which in turn build on King and Levine (1993a). The data associated with the former are available from the World Bank Financial Structure Database.[15] Four variables are included in our work. First, *Liquid Liabilities of the Financial System* (*henceforth, LLY*): equals currency plus demand and interest-bearing liabilities of banks and nonfinancial intermediaries divided by GDP. It is the broadest measure of financial intermediation and includes three types of financial institutions: the central bank, deposit money banks, and other financial institutions. Hence, LLY provides a measure for the overall size of the financial sector without distinguishing between different financial sectors. Second, *Commercial-Central Bank Assets (henceforth, BTOT):* equals the ratio of commercial bank assets divided by commercial bank plus central bank assets. BTOT measures the degree to which commercial banks versus the central bank allocate society's savings. King and Levine (1993a) and Levine et al. (2000), as well as others, have used this measure, which provides a relative size indicator, i.e., the importance

[14] This is the data used by Soto (2000) as well, while Borensztein et. al. (1998) use inflows only from OECD countries.

[15] The URL for the database is http://www.worldbank.org/research/projects/finstructure/database.htm.

of the different financial institutions and sectors relative to each other. Third, *Private Credit (henceforth, PRIVCR):* equals the value of credits by financial intermediaries to the private sector divided by GDP. The two previous measures do not differentiate between the end users of the claims of financial intermediaries, i.e., whether the claims are in the public or the private sector. This and the following measure focus solely on the claims on the private sector. Fourth, *Bank Credit (henceforth, BANKCR):* equals the credits by deposit money banks to the private sector as a share of GDP (it does not include non-bank credits to the private sector and therefore may be less comprehensive than PRIVCR for some countries). The number of countries for which we have these financial market variables and FDI shares is 71.[16]

These variables are classified into two broad categories: those relating to the banking sector (or loosely, credit markets) and those relating to the stock market (or equity markets). The first data set, relating to the "credit market indicators," includes 20 OECD countries and 51 non-OECD countries. The second data set, concentrating on "equity market indicators" consists of 20 OECD countries and 29 non-OECD countries.[17]

IV. Empirical Analysis

Table 2 presents descriptive statistics for investment, growth, and financial development data. There is considerable variation in the share of FDI in GDP across countries, ranging from -0.15% in Sierra Leone (1975-1995) to 10% in Singapore (1980-1995). GDP growth also shows variation, ranging from -4% for Guyana to 7% for Korea (both for 1975-1995). Financial development variables also range extensively; capitalization of the stock market ranges from 1% for Uruguay to 126% for South Africa; and value traded ranges from close to 0% for Uruguay to 130% for Switzerland. Finally, the liquidity measure (M2/GDP) ranges from 16% for Argentina to 161% for Japan. The private credit variable ranges from 3% for Ghana to 164% for Switzerland. Ghana and Switzerland also form the two ends of the spectrum for the bank credit variable. Ghana also has the lowest value for the share of Commercial-Central Bank Assets; Austria records the highest.

A. Growth and FDI: Financial Markets as a Channel

The purpose of our empirical analysis is to examine the financial markets channel through which FDI may be beneficial for growth, as shown in section 2. The theoretical model shows that improvements in financial markets increase output by increasing the marginal product of FDI. This result suggests that one should observe transitional growth effects. In an influential paper, Mankiw, Romer and Weil (1992) (MRW) derived an empirical specification based on the assumption that countries were unlikely to be at their steady states and therefore transitional dynamics should be more important. We employ a

[16] In keeping with the literature, we use the logarithm of the financial sector variables.

[17] Here OECD countries refer to those that were "early" members and therefore exclude newer members, such as Mexico and Korea among others. For Value Traded, we also have Ireland in the sample, taking the number of OECD countries to 21.

specification similar to theirs. We look at the direct effect of FDI on economic growth and based on MRW, estimate the following equation:

$$GROWTH_i = \beta_0 + \beta_1 INITIAL\ GDP_i + \beta_2 FDI_i + \beta_3 CONTROLS_i + \nu_i \qquad (22)$$

Table 3 shows results for a selection of control variables that include initial income, human capital, population growth, government consumption, and a sub-Saharan Africa dummy variable. For the sample of 71 countries, it is clear that FDI is not significant at all, whereas in the smaller sample it clearly is. The results could be driven by the composition of the two samples; approximately 28 % of the first sample (column (1)) and approximately 41 % of the second sample (column (3)) consist of developed countries.

In columns (2) and (4), we have an expanded set of control variables that include the black market premium, institutional quality (captured by the ICRG measure called "risk of expropriation"), rate of inflation, and trade volume. Now the FDI share no longer is significant in either of the samples. This nicely summarizes the problem that exists in the literature: whereas on theoretical grounds there is a strong basis for expecting FDI to have a positive role in growth, the empirical evidence is fragile, to say the least.[18] This ambiguous effect of FDI is what forms part of the motivation for this research.

The regressions in Table 4 examine the role of FDI on growth through financial markets. Following the model developed in section 2, we interact FDI with financial markets and use this as a regressor. To ensure that the interaction term does not proxy for FDI or the level of development of financial markets, both of the latter variables were also included in the regression independently. Thus, we run the following regression:

$$GROWTH_i = \beta_0' + \beta_1' FDI_i + \beta_2' (FDI_i * FINANCE_i) + \beta_3' FINANCE_i + \beta_4' CONTROLS_i + \nu_i \qquad (23)$$

As shown in Table 4, the interaction term turns out to be positive and significant in all columns. Each regression uses a different indicator for financial market development and hence, samples may differ from one regression to another. Column (1) uses BTOT, column (2) uses BANKCR, column (3) uses LLY, column (4) uses PRIVCR, column (5) uses SCAPT and column (6) uses SVALT.[19] The main result is that the interaction term is significant at the 10% level for the entire range of financial sector variables used. Moreover, the interactions with LLY, PRIVCR, and BANKCR are significant at the 1% level. On the other hand, financial market indicators by themselves are insignificant and even negative for the non stock market variables.[20] This may in part be due to the interaction term capturing an important allocation function that the financial sector performs – having a well-developed financial sector is a means to an end and not an end in itself. Interestingly, the coefficient of FDI displays considerable variation even within the same sample of countries as the financial

[18] We repeated these regressions by adding the financial market variables as well. Although these variables were significant and positive, they did not alter the insignificance of FDI.

[19] See the data section for detailed definitions.

[20] The literature that tests the effects of financial development on growth has not considered FDI and its interaction term with financial markets, thus limiting comparisons.

sector variable changes –clearly making the case for looking at the range of financial sector variables rather than a few. Table 4 also reports a) the joint significance test of financial markets with the interaction term and b) the joint significance test of foreign direct investment with the interaction term. For most financial market variables, the tests confirm the importance of both financial markets and FDI. The hypothesis that the coefficients of both FDI and the interaction between FDI and financial markets are zero cannot be rejected outright at the 10% level only in the case of BTOT and SVALT. Not surprisingly the coefficients of the interaction terms in these two regressions also report the lowest t-statistics compared to the counterparts in the other columns. The hypothesis that the coefficients of both financial markets and the interaction between FDI and financial markets are zero is rejected in all regressions.

To get an estimate of how important the financial sector has been in enhancing the growth effects of FDI, one can ask the hypothetical question of how much a one standard deviation increase in the financial development variable would enhance the growth rate of a country receiving the mean level of FDI in the sample.[21] If we use the PRIVCR variable (i.e., column (4)), it turns out that having better financial markets would have allowed countries to experience an annual growth rate increase of 0.60 percentage points during the 20-year period[22].

V. Conclusion

The widespread belief that positive externalities and spillovers owing to new products and processes made possible by FDI and disseminated by learning by doing or observing, networking, and training of the labor force, accompanied by the search for more stable forms of capital flows following the turmoil in the emerging markets since the late 1990s, has induced a change in the attitudes of many countries toward FDI. Several governments in both developing and developed countries have introduced both fiscal and financial incentives to actively pursue foreign investments. Additionally, they have established investment agencies to specifically target multinational firms and have sought to improve the local regulatory environment and the "cost of doing business" (see UNCTAD 1999).

Such policies, however, do not guarantee realization of the potential benefits of FDI that go beyond the "capital" FDI transfers to the host country and the wages it generates. Local conditions in the recipient country can pose binding constraints on such spillovers. In this paper, we study the constraints that could be posed by local financial markets, one among many conditions, on allowing positive spillovers from foreign direct investment to contribute to a country's economic development. In particular, we model how poorly developed financial markets can adversely affect the economy's ability to take advantage of such

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[21] The mean value for FDI is 1.003% in the 71-country sample. Note that the financial development variable here is the log of the financial market indicator.

[22] The net effect being measured here is $(\beta_2 \times meanFDI_i \times \sigma_{\log(privcr)}) + \beta_3 \sigma_{\log(privcr)}$. Here mean FDI is 1.003 percent as mentioned in the earlier footnote. $\sigma_{\log(privcr)}$ is the standard deviation of log PRIVCR and is equal to 0.78.

potential FDI benefits. Cross-country analysis provides supporting empirical evidence that the level of development of financial markets is crucial for the positive effects of FDI on output to be realized.

Two relevant policy results emerge from the analysis. Although FDI flows are less volatile than short–term capital flows, their full benefits may not accrue to the recipient country in the absence of well–functioning financial markets. Hence, as much as bad financial markets render a country too weak to cope with unregulated short-term capital flows, they also limit the benefits that could accrue to the country from long-term stable flows. Second, the net benefit of policies directed at attracting FDI might be significantly lowered owing to the level of development of local conditions. Therefore, countries should weigh the costs of investment incentives targeted at attracting multinational enterprises versus the costs of improving local conditions.

APPENDIXES

I. Technical Appendix

In this section we expand the model worked out in the text to incorporate the effects of financial sector efficiency into production. The foreign sector's production function can now be rewritten as,

$$Y^{FDI} = A(\delta)L^{\beta}\left(K^{fdi}\right)^{1-\beta} \tag{A1.1}$$

Following, Roubini and Sala-i-Martin (1992), $A(\delta)$ is financial sector efficiency parameter, where δ reflects the inefficiencies in the financial sector. We can think that the foreign firm pays wages, local inputs and other local costs as well as receives payments through the local bank system. Thus, the more automatic teller machines, the better and faster the service at the branches; and in general the more financially developed the economy the higher the productivity of the FDI sector. Consequently, we assume that $A'(\delta) < 0$, $A''(\delta) > 0$. Using

$$L = \int_0^{\varepsilon^*} \varepsilon^i di = \varepsilon^* \tag{A1.2}$$

equation (A.1) can be re-written as:

$$Y^{FDI} = A(\delta)(\varepsilon^*)^{\beta}\left(K^{fdi}\right)^{1-\beta} \tag{A1.3}$$

The amount of foreign capital in the country is given by:

$$K^{fdi} = \left(\frac{(1-\beta)A(\delta)(\varepsilon^*)^{\beta}}{r}\right)^{\frac{1}{\beta}} \tag{A1.4}$$

The amount of foreign labor used in the FDI sector is given by:

$$(\varepsilon^*) = \left(\frac{\beta A(\delta)}{w}\right)^{\frac{1}{1-\beta}} k^{fdi} \tag{A1.5}$$

The production function in the entrepreneurial sector is given by:

$$Y^i = \varepsilon_i B(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma} \tag{A1.6}$$

$B(\delta)$, as in the FDI sector, is a financial sector efficiency parameter. We assume $B'(\delta)<0$, $B''(\delta)>0$.

Static Equilibrium

An agent is indifferent between working for the foreign firm or starting its own firm if

$$w+(1+r)b_0 = Y^i - (1+i)(S-b_0) \tag{A1.7}$$

Substituting the output, Y^i equation (A.6), and the wage, equation (A.5), we obtain:

$$\beta A(\delta)(\varepsilon^*)^{\beta-1}\left(K^{fdi}\right)^{1-\beta} + (1+r)b_0 = \varepsilon_i B(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma} - (1+i)(S-b_0) \tag{A1.8}$$

With an uniform distribution, we obtain the following expression for ε_i

$$\varepsilon_i = \frac{(1+i)(S-b_0)+\beta A(\delta)(\varepsilon^*)^{\beta-1}\left(K^{fdi}\right)^{1-\beta}+(1+r)b_0}{B(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma}} \tag{A1.9}$$

For the individual who is indifferent between sectors,

$$\varepsilon_i = \varepsilon_i^* = c \tag{A1.10}$$

Substituting the equation for wages and FDI capital:

$$\varepsilon^* = f(r,\delta,b_0,\beta,\theta,\gamma,S) \tag{A1.11}$$

$$\varepsilon^* = \left[\frac{(1+i)(S-b_0)+\beta A(\delta)^{\frac{1}{\beta}}\left(\frac{(1-\beta)}{r}\right)^{\frac{1-\beta}{\beta}}+(1+r)b_0}{B(\delta)\left(\frac{(1-\beta)A(\delta)}{r}\right)^{\frac{\theta}{\beta}} S^{\gamma}}\right]^{\frac{1}{1+\beta}} \tag{A1.12}$$

Comparative Statics

The model allows us to study several aspects of an FDI recipient economy. The ultimate objective is to show how FDI will impact economic output and how the magnitude of this impact depends on local financial market conditions. To find these results, we first need to solve for how the efficiency of the financial markets affects the critical level of entrepreneurship and the level of foreign capital (FDI). Both channels contribute to the full effect on output. Under certain parameter conditions, better financial markets allow increased output in the entrepreneur sector as well as more FDI, and more importantly, higher marginal productivity of capital and hence more production in the foreign-production sector.

The first link we are interested in is the effect of changes in the efficiency of the financial sector on the allocation of individuals across sectors. In other words, we are interested in the sign of $\frac{\partial \varepsilon}{\partial \delta}$. As mentioned above, this will allow us to find the full effects of local financial markets on output in the economy. Rewriting (A.11), we define F as:

$$F(r,\delta,b_0,\beta,\theta,\gamma,S) = \varepsilon^* - f(r,\delta,S,b_0,\beta,\theta,\gamma) = 0 \tag{A1.13}$$

$$F = (\varepsilon^*)^{\theta+1} B(\delta)\left(\frac{(1-\beta)A(\delta)}{r}\right)^{\frac{\theta}{\beta}} S^{\gamma} - \beta A(\delta)^{\frac{1}{\beta}}\left(\frac{1-\beta}{r}\right)^{\frac{1-\beta}{\beta}} - (1+r+\delta)(S-b_0) - (1+r)b_0 \tag{A1.14}$$

We can use the implicit function to find the effect of changes in the efficiency of the financial sector in the allocation of individuals across sectors $\frac{\partial \varepsilon}{\partial \delta}$:

$$\frac{\partial \varepsilon}{\partial \delta}(r,\delta,b_0,\beta,\theta,\gamma,S) = -\frac{\frac{\partial F(r,\delta,b_0,\beta,\theta,\gamma,S)}{\partial \varepsilon^*}}{\frac{\partial F(r,\delta,b_0,\beta,\theta,\gamma,S)}{\partial \delta}} \tag{A1.15}$$

$$\frac{\partial \varepsilon}{\partial \delta} = \frac{(S-b_0) - B(\delta)(\varepsilon^*)^{\theta+1}\left(\frac{(1-\beta)A(\delta)}{r}\right)^{\frac{\theta}{\beta}} S^{\gamma}\left[\frac{B'(\delta)}{B(\delta)} + \left(\frac{\theta}{\beta}\right)\frac{A'(\delta)}{A(\delta)}\right] + (1-\beta)A(\delta)^{\frac{1}{\beta}}\frac{A'(\delta)}{A(\delta)}\left(\frac{(1-\beta)}{r}\right)^{\frac{1-\beta}{\beta}}}{B(\delta)(\varepsilon^*)^{\theta+1}\left(\frac{(1-\beta)A(\delta)}{r}\right)^{\frac{\theta}{\beta}} S^{\gamma}\frac{(\theta+1)}{\varepsilon^*}} \quad \text{(A1.16)}$$

In the numerator, the term $(S\text{-}b_0)$ is greater than zero by assumption, and it captures the marginal increase in the cost of borrowing due to higher intermediation costs. As this cost increases, fewer agents become entrepreneurs and more people work for the foreign firm.

The term $B(\delta)(\varepsilon^*)^{\theta-1}\left(\frac{(1-\beta)A(\delta)}{r}\right)^{\frac{\theta}{\beta}} S^{\gamma}\frac{B'(\delta)}{B(\delta)}$ reflects how higher financial costs affect the entrepreneurial sector production function. It is negative by assumption, $\beta'(\delta) < 0$. If higher intermediary costs affect the entrepreneurial sector, less people become entrepreneurs and more agents go to the FDI sector.

The term $B(\delta)(\varepsilon^*)^{\theta-1}\left(\frac{(1-\beta)A(\delta)}{r}\right)^{\frac{\theta}{\beta}} S^{\gamma}\left(\frac{\theta}{\beta}\right)\frac{A'(\delta)}{A(\delta)}$ is also negative since $A'(\delta) < 0$. Higher financial costs negatively affect the FDI sector, thus lowering the level of foreign capital and thus the externalities in favor of the entrepreneurial sector. Given this effect, fewer agents become entrepreneurs.

The last term $(1-\beta)\,A(\delta)^{\frac{1}{\beta}}\frac{A'(\delta)}{A(\delta)}\left(\frac{(1-\beta)}{r}\right)^{\frac{1-\beta}{\beta}}$ reflects how higher financial costs affect the FDI sector, and it is negative by assumption. If it becomes more costly to produce in the FDI sector, FDI and wages fall and therefore, the entrepreneurial sector becomes more attractive. The denominator in equation (A.16) reflects the net effect of changes in ε^* in the entrepreneurial sector and it is positive. The following expression summarizes the effects:

$$\frac{\partial \varepsilon}{\partial \delta} = \frac{\begin{array}{cccc} \uparrow \delta: \text{cost to start a firm} \uparrow & \uparrow \delta: \text{entrep. sector less productive} & \uparrow \delta: \text{FDI less eff.} & \uparrow \delta: \text{FDI less efficient} \\ \uparrow \varepsilon: \uparrow \text{workers to FDI sector} & + \uparrow \varepsilon: \uparrow \text{workers to FDI firm} & + \downarrow \text{FDI, less extern.} \uparrow \varepsilon: \uparrow \text{workers to FDI sector} & + \downarrow \varepsilon: \downarrow \text{workers to FDI firm} \end{array}}{\uparrow \varepsilon \text{ entrep sector}}$$

The effect of higher intermediary costs on FDI, $\frac{\partial K^{fdi}}{\partial \delta}$ is:

$$\frac{\partial K^{fdi}(r,\delta,b_0,\beta,\theta,\gamma,S)}{\partial \delta} = \left(\frac{(1-\beta)A(\delta)}{r}\right)^{\frac{1}{\beta}}\left[\frac{\varepsilon^*}{\beta}\frac{A'(\delta)}{A(\delta)} + \frac{\partial \varepsilon^*}{\partial \delta}\right] \quad \text{(A1.17)}$$

The first term is negative, since we assumed $A'(\delta) < 0$. The value of the second term depends on $\frac{\partial \varepsilon^*}{\partial \delta}$. Thus, the value of $\frac{\partial K^{fdi}}{\partial \delta}$ depends on the sum of a negative effect due to higher intermediary costs plus a positive effect due to a higher number of workers. This result depends of course, on the assumption that FDI is attracted by cost of capital considerations.

We are also interested in how changes in the intermediary costs affect the final output. Total output is the sum of the output in each sector:

$$Y = Y^{FDI} + \int_{\varepsilon^*}^{1} Y^i d\varepsilon \tag{A1.18}$$

Substituting (A.1) and (A.6) into (A.18) and using (A.2):

$$Y(r,\delta,b_0,\beta,\theta,\gamma,S) = A(\delta)(\varepsilon^*)^{\beta}\left(K^{fdi}\right)^{1-\beta} + (1-\varepsilon^*)\,B(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma} \tag{A1.19}$$

The effect of higher intermediary costs on the output level, $\frac{\partial Y(r,\delta,b_0,\beta,\theta,\gamma,S)}{\partial\delta}$ is given by

$$\frac{\partial Y\,(r,\delta,b_0,\beta,\theta,\gamma,S)}{\partial\delta} = g(r,\delta,b_0,\beta,\theta,\gamma,S) \tag{A1.20}$$

$$\frac{\partial Y}{\partial\delta} = \left[A'(\delta)(\varepsilon^*)^{\beta}\left(K^{fdi}\right)^{1-\beta} + (1-\varepsilon^*)\,B'(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma}\right] + \left[(1-\beta)A(\delta)(\varepsilon^*)^{\beta}\left(K^{fdi}\right)^{-\beta} + \theta(1-\varepsilon^*)\,B(\delta)\left(K^{fdi}\right)^{\theta-1} S^{\gamma}\right]\frac{\partial K^{fdi}}{\partial\delta}$$
$$+ \left[\beta A(\delta)(\varepsilon^*)^{\beta-1}\left(K^{fdi}\right)^{1-\beta} - B(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma}\right]\frac{\partial\varepsilon}{\partial\delta} \tag{A1.21}$$

The first squared bracket term is the loss in production due to the higher inefficiencies in the financial sector, which has a negative sign. The second squared bracket term is positive and multiplies $\frac{\partial K^{fdi}}{\partial\delta}$. The value of the third term depends on the effect of higher intermediation cost on the allocation of workers, $\frac{\partial\varepsilon}{\partial\delta}$ and the term on the third bracket.

$$\beta A(\delta)(\varepsilon^*)^{\beta-1}\left(K^{fdi}\right)^{1-\beta} - B(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma} \tag{A1.22}$$

Using (A.1), (A.22) is negative if $Y^{FDI} < \varepsilon^* B(\delta)\left(K^{fdi}\right)^{\theta} S^{\gamma}$. Thus, if the production in the "indifferent agent" is higher than in the entrepreneurial sector, then the value of (A.22) is negative.

Our main objective is to understand how the development of financial markets affects the role FDI will have on growth. Technically this means that we are interested on how financial market inefficiency affects the marginal product of foreign capital (FDI). The marginal product of FDI capital is given by:

$$\frac{\partial Y}{\partial K} = MPK^{FDI} = (1-\beta)A(\delta)(\varepsilon^*)^{\beta}\left(K^{fdi}\right)^{-\beta} + \theta(1-\varepsilon^*)B(\delta)\left(K^{fdi}\right)^{\theta-1} S^{\gamma} \tag{A1.23}$$

This equation shows both effects of foreign capital on output. The first effect is the direct effect on production, which is the first term. The second effect, which is captured by the second term, is the spillover effect of foreign capital on the entrepreneurial sector. Both terms are positive, which says FDI has a positive overall effect on output. For our main objective as mentioned above, we need to show the effect of financial development on marginal productivity of FDI. The effect of higher intermediation costs on the marginal product of FDI capital is given by;

$$\frac{\partial\, MPK^{FDI}}{\partial\delta} = h(r,\delta,b_0,\beta,\theta,\gamma,S) \tag{A1.24}$$

$$\frac{\left(MPK^{FDI}\right)}{\partial\delta} = \left[(1-\beta)A'(\delta)(\varepsilon^*)^{\beta}\left(K^{fdi}\right)^{-\beta} + \theta(1-\varepsilon^*)B'(\delta)\left(K^{fdi}\right)^{\theta-1} S^{\gamma}\right]$$

$$+\left(\beta(1-\beta)A(\delta)(\varepsilon^*)^{\beta-1}\left(K^{fdi}\right)^{-\beta}-\theta B(\delta)\left(K^{fdi}\right)^{\theta-1}S^{\gamma}\right)\frac{\partial\varepsilon}{\partial\delta}$$
$$+\left(-\beta(1-\beta)A(\delta)(\varepsilon^*)^{-\beta}\left(K^{fdi}\right)^{-\beta-1}+\theta(\theta-1)(1-\varepsilon^*)B(\delta)\left(K^{fdi}\right)^{\theta-2}S^{\gamma}\right)\frac{\partial K}{\partial\delta} \quad \text{(A1.25)}$$

The first-squared term is negative since we assumed that $A'(\delta) < 0$, $B'(\delta) < 0$. The sign of the second term depends on parameter values and the value of $\frac{\partial\varepsilon}{\partial\delta}$. Finally, the third term inside the brackets is negative.

Numerical Analysis

Since equations $\frac{\partial\varepsilon}{\partial\delta}$, $\frac{\partial K^{fdi}}{\partial\delta}$, $\frac{\partial Y}{\partial\delta}$, $\frac{(MPKFDI)}{\partial\delta}$ do not have a simple close form solution, we plotted equations (A.16), (A.17), (A.21) and (A.25) against different parameter values. The objective of this section is not to completely characterize the domain of these equations, but to show that for reasonable values, $\frac{\partial\varepsilon}{\partial\delta} > 0$, $\frac{\partial K^{fdi}}{\partial\delta} < 0$, $\frac{\partial Y}{\partial\delta} < 0$, and $\frac{(MPKFDI)}{\partial\delta} < 0$.

Figure 2, shows simulations for the following benchmark case: $S = 1; \theta = 0.3; \beta = 0.6; r = 0.01; \gamma = 1$. For the financial sector efficiency functions, $A(\delta)$, $B(\delta)$ we assumed $A(\delta) = \frac{a}{\delta}, a = 1; B(\delta) = \frac{b}{\delta}, b = 1$. Figure 2.1a plots the change in the allocation of workers in the foreign sector due to changes in the intermediation cost (labeled de/dd in the graph) against different values of θ the externality parameter. For the benchmark parameter values, $\frac{\partial\varepsilon}{\partial\delta}$ is always positive. Figure 2.1a plots as well the change in the marginal cost of foreign capital due to changes in the intermediation cost (labeled dmpk/dd in the graph) against θ. For the benchmark parameter values, $\frac{\partial\varepsilon}{\partial\delta}$ is always negative. Figure 2.1b plots the change in total output due to changes in the intermediation cost (labeled dY/dd in the graph), which is always negative for different values of θ. Finally, the change in the level of FDI capital due to changes in the intermediation cost (labeled dK/dd in the graph) is always negative for different values of θ, as seen in Figure 2.1b

Figure 2.2a plots the change in the allocation of workers in the foreign sector due to changes in the intermediation cost $\left(\frac{\partial\varepsilon}{\partial\delta}\right)$ against different values of b_0, the initial asset level. For the benchmark parameter values, $\frac{\partial\varepsilon}{\partial\delta}$ is always positive. The same figure shows that $\frac{\partial K^{fdi}}{\partial\delta}$ is always negative. Figure 2.2b shows that both $\frac{\partial Y}{\partial\delta}$ and $\frac{MPKFDI}{\partial\delta}$ vary inversely with changes in the initial asset level.

Figures 2.3a and 2.3b plot (A.16), (A.17), (A.21) and (A.25) against different values of b, the coefficient in the "financial efficiency" parameter in the foreign production function. For the

benchmark parameter values, $\frac{\partial \varepsilon}{\partial \delta}$ is always positive, and $\frac{\partial K^{fdi}}{\partial \delta}$, $\frac{\partial Y}{\partial \delta}$, $\frac{MPKFDI}{\partial \delta}$ always negative.

Finally, Figures 2.4a and 2.4b plot the different equations against different values of a, the coefficient in the "financial efficiency" parameter in the entrepreneurial sector. For the benchmark parameter values, $\frac{\partial \varepsilon}{\partial \delta}$ is always positive, and $\frac{\partial K^{fdi}}{\partial \delta}$, $\frac{\partial Y}{\partial \delta}$, $\frac{(MPKFDI)}{\partial \delta}$ again always negative.

Figure 3, shows a different simulation for the following benchmark case:
$S = 1; \theta = 0.1; \beta = 0.67; a = 1; b = 3; r = 0.1; \gamma = 1$. We plotted each equation against θ, b_0, a and b. We obtained the desired signs for all equations. In general, the value of $\frac{\partial \varepsilon}{\partial \delta}$, $\frac{\partial K^{fdi}}{\partial \delta}$, $\frac{\partial Y}{\partial \delta}$, and $\frac{(MPKFDI)}{\partial \delta}$ depend on the parameter values chosen. Therefore, we feel that an econometric analysis is essential to understand the interaction between FDI, local capital markets and growth.

II. Data Appendix

Countries in the Samples

Sample of 71 countries for which data on credit markets are available (BANKCR, BTOT, PRIVCR, LLY).
Sample of 49 countries for which data on SCAPT and SVALT are available.
Sample of 53 countries for which SVALT was available but SCAPT was not: Sample of 49 plus Costa Rica, Honduras, Ireland, and Panama.

List: Algeria (1), Argentina (1,2), Australia (1,2), Austria (1,2), Bangladesh (2), Belgium (1,2), Bolivia (1), Brazil (1,2), Cameroon (1), Canada (1,2), Chile (1,2), Colombia (1,2), Congo (1), Costa Rica (1), Cyprus (1,2), Denmark (1,2), Dominican Republic (1), Ecuador (1), Egypt (1,2), El Salvador (1), Finland (1,2), France (1,2), Gambia (1), Germany (1,2), Ghana (1,2), Greece (1,2), Guatemala (1), Guyana (1), Haiti (1), Honduras (1), India (1,2), Indonesia (1,2), Iran (1), Ireland (1), Israel (1,2), Italy (1,2), Jamaica (1,2), Japan (1,2), Jordan (2), Kenya (1,2), Korea (1,2), Malta (1), Malawi(1), Malaysia (1,2), Mexico (1,2), Netherlands (1,2), New Zealand (1,2), Nicaragua (1), Niger (1), Norway (1,2), Pakistan (1,2), Panama (1), Papua New Guinea (1), Paraguay (1), Peru (1,2), Philippines (1,2), Portugal (1,2), Senegal (1), Sierra Leone (1), Singapore (2), South Africa (1,2), Spain (1,2), Sri Lanka (1,2), Sudan (1), Sweden (1,2), Switzerland (1,2), Syria (1), Thailand (1,2), Togo (1), Trinidad Tobago (1,2), Turkey (2), United Kingdom (1,2), United States (1,2), Uruguay (1,2), Venezuela (1,2), Zimbabwe (1,2).

Data Sources and Descriptions

Foreign Direct Investment: The net FDI inflows measure the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. *Source: IMF, International Financial Statistics.*

Output levels and growth: Output level and growth data is the growth of real per capita GDP, constant dollars. *Source: World Bank, (2000b) World Development Indicators (WDI).*

Value traded: Value of stock trading relative to the size of the economy. Source: World Bank Financial Structure Database.
(*http://www.worldbank.org/research/projects/finstructure /database.htm*)

Capitalization: Captures the size of the stock market, measures the average value of listed domestic shares on domestic exchanges in a year as a share of the size of the economy (the GDP). *Source: World Bank Financial Structure Database.*

Liquidity (LLY): Liquid Liabilities of the financial system (currency plus demand and interest bearing liabilities of the financial intermediaries and nonbank financial intermediaries) divided by GDP. *Source: World Bank Financial Structure Database.*

Private credit (PRIVCR): The value of credits by financial intermediaries to the private sector divided by GDP. It excludes credits issued by central and development banks. Furthermore, it excludes credit to the public sector and cross claims of one group of intermediaries on another. *Source: World Bank Financial Structure Database.*

Bank Credit (BANKCR): Credit by deposit money banks to the private sector as a share of GDP. *Source: World Bank Financial Structure Database.*

Commercial-Central Bank (BTOT): Ratio of commercial bank domestic assets divided by central bank plus commercial bank domestic assets. *Source: World Bank Financial Structure Database.*

Domestic Investment: "Gross domestic investment" measuring the outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. *Source: WDI (2000).*

Inflation: Percentage changes in the GDP deflator. *Source: WDI (2000).*

Government Consumption: Total expenditure of the central government as a share of GDP. It includes both current and capital (development) expenditures and excludes lending minus repayments. *Sources: WDI (2000).*

Trade Volume: Exports plus imports as a share of GDP. *Source: WDI (2000).*

Schooling: Human capital measured as the average years of secondary schooling in total population. Source: Barro and Lee (1994). Updated version downloadable from: http://www.cid.harvard.edu/ciddata/ciddata.html

Bureaucratic quality: The institutional strength of the economy. High levels of quality imply that the bureaucracy has the strength and expertise to govern without drastic changes in policy, or interruption to public services. *Source: International Country Risk Guide (ICRG).*

Risk of expropriation: The probability that the government may expropriate private property. *Source: ICRG.*

Black market premium: It is calculated as the premium in the parallel exchange market relative to the official market (i.e., the formula is (parallel exchange rate/official exchange rate-1)*100). The values for industrial countries are added as zero. *Source: World Bank. http://www.worldbank.org/research/growth/GDNdata.htm)*

Table 1. FDI Facts, 1982–1999

	Value (billion dollars)			Annual Growth		
	1982	1990	1999	1986–90	1991–95	1996–99
FDI inflows	58	209	865	24	20	32
FDI inward stock	594	1,761	4,772	18	9	16
Gross product foreign affiliates	565	1,419	3,045	16	7	15

Notes: The data are from UNCTAD, *World Investment Report, 2000*. UNCTAD defines FDI as an investment involving a long-term relationship and reflecting a lasting interest and control of a resident entity in one economy in an enterprise resident in an economy other that that of the foreign direct investor. FDI inflows comprise capital provided by a foreign direct investor to an FDI enterprise. FDI stock is the value of the share of the foreign enterprise capital and reserves (including retained profits) attributable to the parent enterprise plus the net indebtedness of affiliates to the parent enterprise. A parent enterprise is defined as an enterprise that controls assets of other entities in countries other than its home country, usually by owning a certain equity capital stake (10% or more of the equity stake). A foreign affiliate is an incorporated or unincorporated enterprise in which an investor, who is resident in another economy, owns a stake that permits a lasting interest in the management of the enterprise (an equity stake of 10% for an incorporated enterprise or its equivalent for an unincorporated enterprise).

Table 2. Descriptive Statistics

Sample 1: 71 Countries (1975–95)

	Mean	Std. Dev.	Min	Max
Growth	0.01	0.02	-0.04	0.07
FDI/GDP	0.01	0.008	-0.001	0.041
Investment/GDP	0.23	0.06	0.11	0.41
PRIVCR	0.44	0.34	0.03	1.64
BANKCR	0.33	0.24	0.03	1.37
BTOT	0.77	0.19	0.27	0.99
LLY	0.48	0.28	0.16	1.61

Sample 2: 49 countries (1980–95)

	Mean	Std. Dev.	Min	Max
Growth	0.02	0.02	-0.02	0.07
FDI/GDP	0.012	0.015	0.00	0.10
Investment/GDP	0.23	0.05	0.12	0.39
SVALT	0.11	0.21	0.00	1.30
SCAPT	0.27	0.30	0.01	1.26

Table 3. Growth and FDI
Dependent Variable—Average annual per capita growth rate

	(1)	(2)	(3)	(4)
Period	1975-95	1975-95	1980-95	1980-95
Observations	71	71	49	49
log (Initial GDP)	-0.009	-0.011	-0.007	-0.016
	(-2.55)	(-3.87)	(-2.80)	(-3.51)
FDI/GDP	0.16	-0.076	0.347	0.063
	(0.48)	(-0.25)	(2.31)	(0.27)
Schooling	0.014	0.011	-0.006	0.0001
	(3.23)	(2.62)	(-1.41)	(0.02)
Population Growth	-0.805	-0.192	-0.948	-0.265
	(-2.51)	(-0.61)	(-3.59)	(-0.91)
Government Consumption	0.0001	-0.0003	0.008	-0.003
	(0.02)	(-0.07)	(0.98)	(-0.35)
Sub-Saharan Africa Dummy	-0.007	-0.017	-0.021	-0.021
	(-1.15)	(-2.63)	(-4.78)	(-3.80)
Institutional Quality	--	0.005	--	0.011
	--	(2.62)	--	(2.82)
Black Market Premium	--	-0.006	--	0.007
	--	(-1.68)	--	(2.00)
Inflation	--	-0.018	--	-0.003
	--	(-1.86)	--	(-0.25)
Trade Volume	--	0.000005	--	0.008
	--	(0.000)	--	(1.25)
R^2	0.37	0.59	0.34	0.60

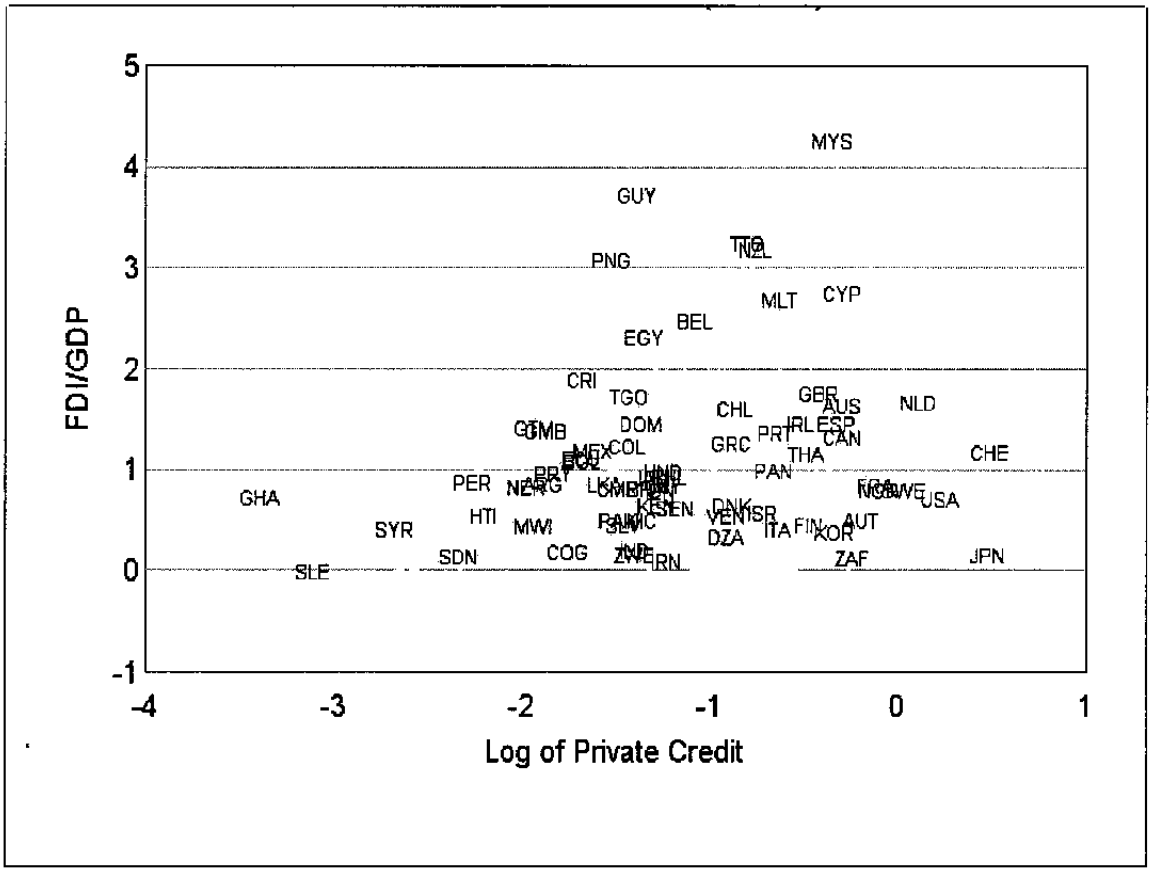
Notes: All regressions have a constant term. t-values are in parentheses. The first two columns refer to the sample of countries for which we have data on Bank Credit (BANKCR), Commercial Bank Assets as a ratio of Total Bank Assets (BTOT), Private Credit (PRIVCR), and Liquid Liabilities (LLY). The second two columns refer to the sample of countries for which we have data on Stock Market Capitalization (SCAPT) and Stock Market Value Traded (SVALT). The Schooling variable is the log of (1+average years of secondary schooling) for the period of the regression. Population Growth is the average growth rate for the period. Government Consumption is log(average share of government spending/GDP) over the period. Institutional quality is measured by the average risk of expropriations. The Black Market Premium is log (1+average BMP) and inflation is log (1+ average inflation rate) for the period. Trade Volume is log (average of Exports + Imports as a share of GDP) for the period.

Table 4. Growth and FDI: The Role of Financial Markets
Dependent Variable—Average annual real per capita growth rate

	(1) BTOT	(2) BANKCR	(3) LLY	(4) PRIVCR	(5) SCAPT	(6) SVALT
Period	1975-95	1975-95	1975-95	1975-95	1980-95	1980-95
Observations	71	71	71	71	49	53
log (Initial GDP)	-0.013	-0.012	-0.01	-0.012	-0.017	-0.017
	(-4.00)	(-3.81)	(-3.18)	(-3.76)	(-3.60)	(-4.22)
FDI/GDP	0.154	0.917	0.504	0.588	0.121	0.341
	(0.45)	(2.01)	(1.67)	(1.56)	(0.68)	(1.83)
(FDI/GDP)*Financ. Markets	0.899	0.893	1.169	0.777	0.335	0.169
	(1.91)	(2.85)	(3.08)	(2.68)	(2.61)	(1.89)
Financial Markets	-0.0003	-0.004	-0.004	-0.002	0.00007	0.0005
	(-0.00)	(-1.00)	(-0.77)	(-0.55)	(0.03)	(0.26)
Schooling	0.012	0.014	0.008	0.009	0.008	0.002
	(2.85)	(2.49)	(1.92)	(2.15)	(0.15)	(0.51)
Population Growth	-0.361	-0.149	0.078	-0.146	-0.561	-0.581
	(-1.24)	(-0.57)	(0.29)	(-0.56)	(-1.70)	(-1.80)
Government Consumption	0.002	0.001	-0.002	0.001	-0.001	0.0004
	(0.48)	(0.27)	(-0.37)	(0.22)	(-0.15)	(0.06)
Sub-Saharan Africa Dummy	-0.016	-0.02	-0.021	-0.02	-0.025	-0.023
	(-2.42)	(-3.14)	(-3.25)	(-3.08)	(-5.08)	(-4.83)
Institutional Quality	0.004	0.004	0.005	0.004	0.008	0.009
	(2.32)	(2.44)	(2.92)	(2.45)	(2.32)	(2.64)
Black Market Premium	-0.005	-0.007	-0.009	-0.008	0.006	0.008
	(-0.88)	(-1.80)	(-2.24)	(-1.72)	(2.15)	(2.81)
Inflation	-0.016	-0.014	-0.011	-0.013	-0.003	-0.003
	(-1.54)	(-1.36)	(-1.11)	(-1.15)	(-0.33)	(-0.39)
Trade Volume	0.0002	0.006	-0.0002	0.001	0.008	0.085
	(0.06)	(0.12)	(-0.06)	(0.20)	(1.27)	(1.56)
R^2	0.62	0.64	0.66	0.64	0.67	0.68
F-statistic for Financial Mkts	2.35	4.31	6.31	3.94	3.67	3.17
(Prob>F)	(0.10)	(0.018)	(0.003)	(0.024)	(0.035)	(0.052)
F-statistic for FDI	2.29	4.37	4.82	3.88	4.08	2.32
(Prob>F)	(0.11)	(0.017)	(0.011)	(0.026)	(0.025)	(0.11)

Notes: All regressions have a constant term. Heteroscedastic consistent t-values are in parentheses. The financial market variable changes with each column. The financial market variables are all logarithms of the actual values. See notes to Table 3 for the definitions of remaining variables. The F-statistics test the joint significance of coefficients. The F-statistic for financial markets test the null hypothesis that the coefficient for financial market and the interaction terms are jointly zero. The F-statistic for FDI tests that the coefficient for FDI and the interaction term are jointly zero. The numbers in parentheses below the test statistics indicate the p-values.

Figure 1. FDI and Financial Markets, 1975–95 [1/]



Source: World Bank (2000b), *World Development Indicators*.

[1/] Countries in this plot are: Algeria (DZA), Argentina (ARG), Australia (AUS), Austria (AUT), Belgium (BEL), Bolivia (BOL), Brazil (BRA), Cameroon (CMR), Canada (CAN), Chile (CHL), Colombia (COL), Congo (COG), Costa Rica (CRI), Cyprus (CYP), Denmark (DNK), Dominican Republic (DOM), Ecuador (ECU), Egypt (EGY), El Salvador (SLV), Finland (FIN), France (FRA), Gambia (GMB), Germany (GER), Ghana (GHA), Greece (GRC), Guatemala (GTM), Guyana (GUY), Haiti (HTI), Honduras (HND), India (IND), Indonesia (IDN), Iran (IRN), Ireland (IRL), Israel (ISR), Italy (ITA), Jamaica (JAM), Japan (JPN), Jordan (JOR), Kenya (KEN), Korea (KOR), Malta (MLT), Malawi (MWI), Malaysia (MYS), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Nicaragua (NIC), Niger (NER), Norway (NOR), Pakistan (PAK), Panama (PAN), Papua New Guinea (PNG), Paraguay (PRY), Peru (PER), Philippines (PHL), Portugal (PRT), Senegal (SEN), Sierra Leone (SLE), Singapore (SGP), South Africa (ZAF), Spain (ESP), Sri Lanka (LKA), Sudan (SDN), Sweden (SWE), Switzerland (CHE), Syria (SYR), Thailand (THA), Togo (TGO), Trinidad Tobago (TTO), Turkey (TUR), United Kingdom (GBR), United States (USA), Uruguay (URY), Venezuela (VEN), Zimbabwe (ZWE).

Figure 2. Simulation Results, Case 1
(benchmark parameter values: S-b_0=1; θ=0.1; β=0.67; r=1, b=3; S^Y=1; ε=0.5; A(δ)=a/δ; a=3, δ=1; B(δ)=b/δ)

Figure 2.a

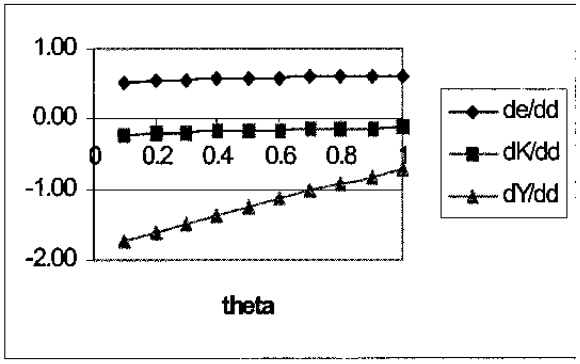


Figure 2.b

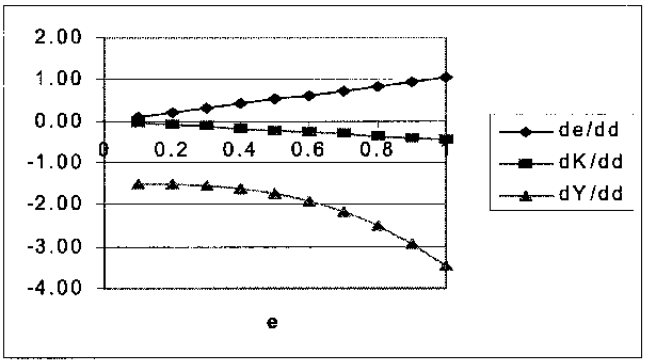


Figure 2.c

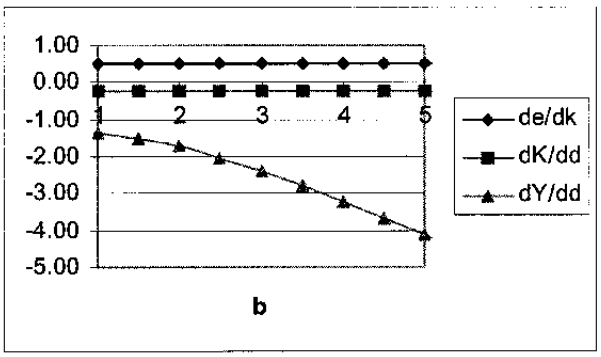
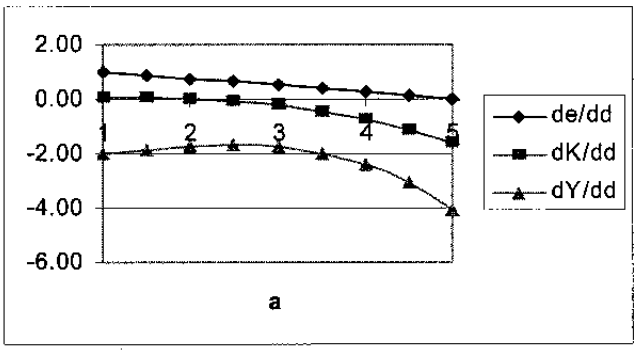


Figure 2.d



Source: Authors' calculations.

Figure 3. Simulation Results, Case 2
(benchmark parameter values: S-b_0=1; θ=0.1; β=0.67; r=0.1; S^Y=1; ε=0.5; A(δ)=a/δ; a=1, δ=1; B(δ)=b/δ; b=1)

Figure 3.a

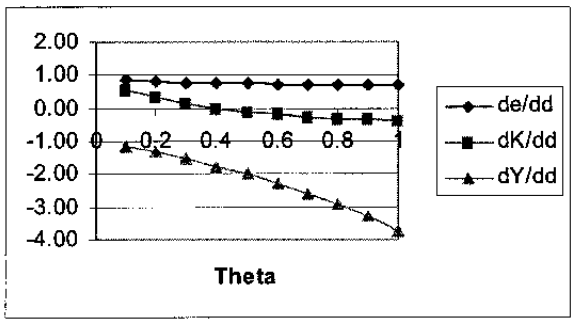


Figure 3.b

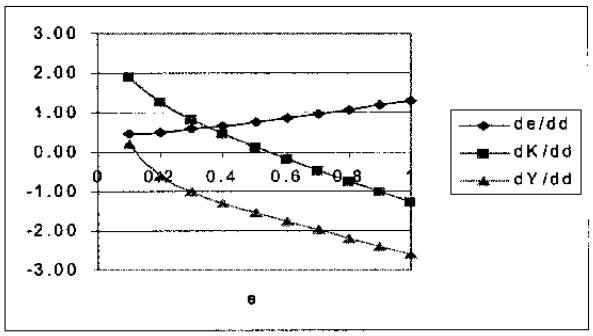
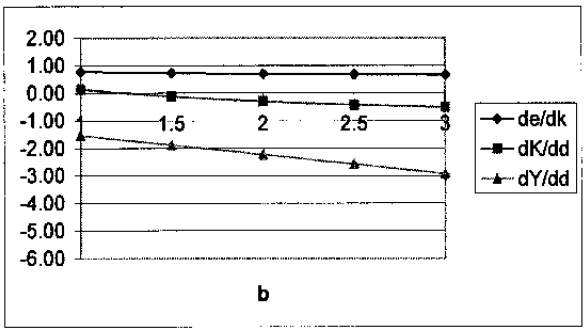


Figure 3.c



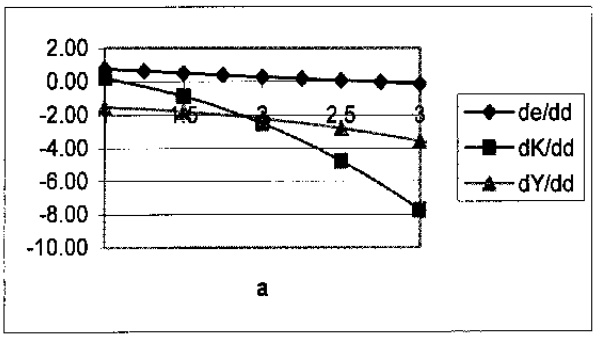


Figure 3.d

Source: Authors' calculations.

REFERENCES

Aitken, B.J. and A. Harrison, 1999, "Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela," *American Economic Review*, Vol. 89, pp. 605–618.

Barro, R., and J-W. Lee, 1996, "International Measures of Schooling Years and Schooling Quality," *American Economic Review*, Vol. 86, pp. 218–23.

Barro, R. and X. Sala-i-Martin, 1995, *Economic Growth* (New York; London and Montreal: McGraw-Hill).

———, 1997, "Technology diffusion, convergence and growth", *Journal of Economic Growth,* Vol. 2, pp. 1–26.

Beck, T., R. Levine, and N. Loayza 2000a, "Finance and the Sources of Growth," *Journal of Financial Economics*, Vol. 58, pp. 261–300.

———, 2000b, "Financial Intermediation and Growth: Causality and Causes", *Journal of Monetary Economics*, Vol. 46:1, pp. 31–77.

Blomstrom, M., and A. Kokko, 1997, "The Impact of Foreign Investment on Host Countries: a Review of the Evidence," *World Bank Research Paper*, 1745.

Borensztein, E., J. De Gregorio, and J-W. Lee, 1998, "How Does Foreign Direct Investment Affect Economic Growth?," *Journal of International Economics*, Vol. 45, pp. 115–35.

Boyd, J. H., and E. Prescott, 1986, "Financial Intermediary-Coalitions", *Journal of Economic Theory*, Vol. 38, pp. 211–32.

Carkovic, M., and R. Levine, 2000, "Does Foreign Direct Investment Accelerate Economic Growth?" *University of Minnesota, Working Paper.*

Caves, R., 1996, *Multinational Enterprise and Economic Analysis*, (Cambridge; New York and Melbourne: Cambridge University Press).

———, 1999, "Spillovers from Multinationals in Developing Countries: Some Mechanisms at Work". Manuscript prepared for the William Davidson Conference on "The Impact of Foreign Investment on Emerging Markets," University of Michigan, Ann Arbor, July 18–19.

Coe, David T., Helpman, E., and A. Hoffmaister, 1995, "North-South R&D Spillovers", *NBER Working Paper*, 5048.

Fernandez-Arias, E., and R. Hausmann, 2000, "Foreign Direct Investment: Good Cholesterol?," *IADB Working Paper*, 417.

Galor, O., and J.Zeira, 1993, "Income Distribution and Macroeconomics," *Review of Economic Studies*, Vol. 60, pp. 35–52.

Goldsmith, R. W., 1969, *Financial Structure and Development* (New Haven, Connecticut: Yale University Press).

Greenwood, J., and B. Jovanovic, 1990, "Financial Development, Growth and Distribution of Income", *Journal of Political Economy,* Vol. 98, pp. 1076–107.

Grossman, G., and E. Helpman, 1991, *Innovation and Growth in the Global Economy* (Cambridge: MIT Press).

International Monetary Fund, 2000, *International Financial Statistics* on CD-ROM (Washington, DC: IMF).

King, R., and R. Levine, 1993a, "Finance and Growth: Schumpeter Might be Right," *Quarterly Journal of Economics*, Vol. 108, pp. 717–38.

———, 1993b, "Finance, Entrepreneurship and Growth: Theory and Evidence," *Journal of Monetary Economics*, Vol. 32, pp. 513–42.

Levine, R., and S. Zervos, 1998, "Stock Markets, Banks and Economic Growth," *American Economic Review*, Vol. 88, pp. 537–58.

Mankiw, G. N., D. Romer, and D. N. Weil, 1992, "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics*, Vol. 107, pp. 407–37.

McKinnon, R.I., 1973, *Money and Capital in Economic Development* (Washington: Brookings Institution).

Rajan, R., and L. Zingales, 1998, "Financial Dependence and Growth," *American Economic Review*, Vol. 88, pp. 559–86.

Razin, A., E. Sadka, and C. Yuen, 1999, "An Information-Based model of FDI: the Gains From Trade Revisited," *NBER Working Paper 6884.*

Roubini, N., and X. Sala-i-Martin, 1992, "Financial Repression and Economic Growth," *Journal of Development Economics*, Vol. 39, pp. 5–30.

Shaw, E. S., 1973, *Financial Deepening and Economic Development* (New York: Oxford University Press).

Soto, M., 2000, "Capital Flows and Growth in Developing Countries: Recent Empirical Evidence," *OECD Development Centre, Technical Papers* No. 160.

UNCTAD, 1999, *Foreign Direct Investment and Developmen*t (New York: United Nations).

———, 2000, *World Investment Report*, (New York: United Nations).

World Bank, 2000a, *World Bank Development Report* (Washington, DC : The World Bank).

———, 2000b, *World Development Indicators* on CD-ROM (Washington, DC : The World Bank).

———, 2001, *Global Development Finance Report*, (Washington, DC : The World Bank).

Wurgler, J., 2000, "Financial Markets and the Allocation of Capital," *Journal of Financial Economics*, Vol. 58, pp. 187–214.

Xu, B., 2000, "Multinational Enterprises, Technology Diffusion, and Host Country Productivity Growth," *Journal of Development Economics*, Vol. 62, pp. 477–93.