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The Role of Information in Driving FDI: Theory and Evidence*

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Abstract

We develop a simple information-based model of FDI flows in which the abundance of "intangible" capital in the source countries, which generates expertise in cream-skimming investment projects in the host countries and enhances FDI flows. Corporate transparency in the host countries, on the other hand, diminishes the value of this expertise and thereby reduces the flow of FDI. Empirical evidence (from a sample of 12 source countries and 45 host countries over the 1980s and 1990s) which is analyzed in a gravity equation model provides some support to our theoretical hypotheses. The gains from FDI in the host country in our model are reflected in a more efficient size of stock of domestic capital and its allocation across firms. These gains depend crucially (and inversely) on the degree of competition among FDI investors.

1 Introduction

Foreign direct investment (FDI) has been growing faster than world GDP, and is becoming a major component of foreign investment.[1] Indeed, empirical studies distinguish this form of capital flows from other forms, such as portfolio-equity and debt flows. We usually observe both one-way flows of FDI, from developed to developing economies, and two-way flows among developed economies. The purpose of this paper is to explore some unique features of FDI associated with information and transparency, that make it stand out among the various forms of capital flows.

We identify from empirical data two main categories of variables that significantly explain FDI inflows. First, a positive correlation between the industry specialization in the source countries and

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[1] See, for example, the case of Australia; The Australian Productivity Commission (2002).

FDI flows into the host countries is shown to exist. Second, countries with higher quality of corporate transparencies and stronger capital market institutions, attract less FDI flows.

We incorporate these new considerations in a gravity model of capital flows. Such models have proved useful in explaining bilateral trade flows and, more recently, cross-border equity flows (Portes and Rey, 2000 and Portes, Rey and Oh, 2001). There has been some initial exploration of the determinants of FDI in gravity models (Wei, 2000), but not focusing on the role of information as we do here.

In this paper we first develop a simple information-based model, that is consistent with empirical findings. We interpret the industry specialization in the source country as providing a comparative advantage to the potential foreign direct investors, in eliciting good investment opportunities in the host country, relative to domestic investors in the latter country. This advantage may stem, for instance, from the ability of FDI investors to apply better industry-specific micro-management standards ("intangible capital"). In our model this element is captured by assuming a lower cost of cream-skimming (of high-productivity firms) on the part of foreign direct investors. This advantage of FDI investors in their cream-skimming skills is less pronounced when corporate transparencies and capital market institutions are of high quality in which case FDI inflows are less abundant.[2] The magnitude of the non-traditional gains from trade that arise in our model depends crucially (and inversely) on the degree of competition among potential FDI investors over the domestic firms. These gains can shrink to zero if there is no such competition altogether.

Our model also suggests that the gains from FDI are reflected in a more efficient size of the stock of domestic capital and its allocation across firms. Domestic firms that are controlled by FDI investors are typically the "cream" (high-productivity firms).The magnitude of the non-traditional gains from trade that arise in our model depends crucially (and inversely) on the degree of competition among potential FDI investors over the domestic firms. These gains can shrink to zero if there is no such competition altogether. Also, FDI inflows enlarge the size of the aggregate stock of domestic capital (under plausible assumptions). This result is consistent with empirical evidence. For instance, Borenzstein, DeGregoris and Lee (1998) and Bosworth and Collins (1999) provide such evidence for a sample of developing countries during the period 1978-1995. More recently, Hecht, Razin and Shinar (2002) find in similar samples that the effect of FDI inflows on domestic investment is significantly larger than either portfolio equity or loan inflows; see table A1 in the appendix. They provide also evidence that FDI inflows promote efficiency: The effect of FDI on GDP growth is higher than the effect of other inflows, after

[2] See also Razin and Sadka (2002).

controlling for the effect of capital accumulation on GDP growth; see table A2 in the appendix.

The organization of the paper is as follows. Section 2 develops a simple information-based model of FDI. Section 3 compares FDI inflows with portfolio equity inflows. Section 4 confronts the theory with evidence. Section 5 concludes.

2 FDI and High-Productivity Skimming

Suppose there is a very large number (N) of *ex-ante* identical domestic firms in a certain industry. Each firm employs capital input (K), in the first period, in order to produce a single composite good in the second period. We assume that capital depreciates at the rate $\delta(< 1)$. Output in the second period is equal to $F(K)(1+\varepsilon)$, where $F(\cdot)$ is a production function exhibiting diminishing marginal productivity of capital and ε is bounded below by -1, so that output is always non-negative; for notational ease we also assume that ε is bounded from above by 1. Suppose that ε is purely idiosyncratic, so that there is no aggregate uncertainty. Consumer-investors are well diversified and will thus behave in a risk-neutral way. We denote by $G(\cdot)$ the cumulative distribution function of ε, and by $g(\cdot) = G'(\cdot)$ the corresponding density function.

At the starting point of the decision process of agents in the first period, the productivity factor (ε) of each firm is not revealed with full accuracy. Rather, each firm receives a signal ε' about its productivity, which is common knowledge.[3] The true ε of the firm is within an interval of $\pm\beta$ around ε'. Formally, given ε' the true value of ε is distributed according to the distribution of the productivity factor, conditional on its being in the interval $(\varepsilon' - \beta,\, \varepsilon' + \beta)$:

$$\varphi(\varepsilon/\varepsilon') = \frac{G(\varepsilon) - G(\varepsilon' - \beta)}{G(\varepsilon' + \beta) - G(\varepsilon' - \beta)}, \tag{1}$$

where $\varphi(\varepsilon \mid \varepsilon')$ denotes the cumulative distribution function of ε, conditional on the signal ε'. We assume that the signal ε' is distributed according to $G(\cdot)$.

After the signal ε' is received, the firm chooses the level of the capital stock (and investment), denoted by $K(\varepsilon')$, so as to maximize its conditional (on ε') expected market value. This maximized value is:

$$V(\varepsilon') = \int_{\varepsilon'-\beta}^{\varepsilon'+\beta} \left\{ \frac{F[K(\varepsilon')](1+\varepsilon) + (1-\delta)K(\varepsilon')}{1+r} - [K(\varepsilon') - (1-\delta)K_0] \right\} d\varphi(\varepsilon/\varepsilon'), \tag{2}$$

[3] One can think of this signal as sort of encapsulated information, provided by up-to-date financial statements.

where δ is the rate of depreciation[4], $(1-\delta)K_0$ is the initial stock of capital, and r is the world rate of interest return. The optimal $K(\varepsilon')$ is implicitly defined by the first-order condition:

$$\int_{\varepsilon'-\beta}^{\varepsilon'+\beta} \left[\frac{F'(K)(1+\varepsilon)+(1-\delta)}{1+r} - 1 \right] d\varphi(\varepsilon/\varepsilon') = 0,$$

which can be simplified to:

$$F' \left[K(\varepsilon') \right] \left[1 + E(\varepsilon/\varepsilon') \right] = r + \delta, \tag{3}$$

where $E(\varepsilon/\varepsilon')$ is the conditional expected value of the productivity factor, given that this factor lies within the interval $(\varepsilon'-\beta, \varepsilon'+\beta)$, that is:

$$E(\varepsilon/\varepsilon') = \int_{\varepsilon'-\beta}^{\varepsilon'+\beta} \varepsilon d\varphi(\varepsilon/\varepsilon'). \tag{4}$$

Suppose that there is a screening (or search) technology that at some fixed cost per firm can elicit the true value of the productivity factor of the firm, ε. A potential buyer can apply the technology after she **acquires and gains control** of the firm. We assume that foreign direct investors have a cutting-edge advantage over domestic investors in extracting information about the true value of the firm. If foreign direct investors acquire a domestic firm, they can apply their superior micro-management skills in order to elicit the true value of ε. This advantage stems from "intangible capital" (specialized knowledge) in this particular industry. The basic idea is that firms get involved in foreign operations to exploit this unique advantage that they have accumulated over time in their base country. This advantage is modelled here as a lower screening cost for foreign direct investors than for domestic investors. Formally, the cost per firm for a foreign direct investor is C_F, which is lower than C_D, the cost for a domestic investor.

If the true value of ε were to be known, then the firm would choose an optimal capital stock, denoted by $K^*(\varepsilon)$, according to the marginal productivity condition:

$$F'[K^*(\varepsilon)](1+\varepsilon) = r + \delta. \tag{5}$$

Given the signal ε', a potential foreign direct investor knows that the true value of ε must lie between $\varepsilon'-\beta$ and $\varepsilon'+\beta$, and that, at a cost C_F, she will be able to elicit the true value of ε if she purchases

[4]Because we assume that there is a single, composite good, which serves both for investment and for consumption, we implicitly allowed the optimal K to be below $(1-\delta)K_0$.

the firm. Therefore, her gross bid price, given the signal ε', is given by:

$$P(\varepsilon') = \int_{\varepsilon'-\beta}^{\varepsilon'+\beta} \left\{ \frac{F[K^*(\varepsilon)](1+\varepsilon) + (1-\delta)K^*(\varepsilon)}{1+r} - [K^*(\varepsilon) - (1-\delta)K_0 \right\} d\varphi(\varepsilon/\varepsilon'). \tag{6}$$

Her net bid price is $P(\varepsilon') - C_F$. Because C_F is lower than C_D, the bid price of the foreign direct investor is higher than that of the domestic investor.

Given the signal ε', the value of information to the FDI investor, that is the value of eliciting the true productivity of firm is $P(\varepsilon') - V(\varepsilon')$. The cost is C_F. In order to incur this cost, the value of information must exceed this cost. Naturally one would expect the value of information to rise with ε'. This is because the deviations of the state $(\varepsilon)-$independent $K(\varepsilon')$ over the interval $(\varepsilon'-\beta, \varepsilon'+\beta)$ from the state-dependent $K^*(\varepsilon)$ over this interval [and, consequently, the deviations of $F(K(\varepsilon'))$ from $F(K^*(\varepsilon))$ over this interval] are magnified by the productivity factor $1+\varepsilon$. We therefore assume indeed that $P(\varepsilon') - V(\varepsilon')$ rises with ε'. Hence, there exists some cutoff level of the signal, denoted by ε'_0, such that for all $\varepsilon' < \varepsilon'_0$, the difference $P(\ \varepsilon') - V(\varepsilon')$ is negative, and for all $\varepsilon' > \varepsilon'_0$, the bid-ask price difference is positive. Thus, all the firms that receive a low-productivity signal will be retained by the original (domestic) owners, and all the firms that receive a high-productivity signal will be acquired by foreign direct investors, who manage to outbid their domestic counterparts. The cutoff level of the signal depends on the screening cost C and is defined by:

$$P[\varepsilon'_0(C)] - C = V[\varepsilon'_0(C)]. \tag{7}$$

With FDI investors who can do the screening at a cost C_F per firm the cutoff level of the signal is $\varepsilon'_{0F} \equiv \varepsilon'_0(C_F)$.

Our assumption that $P(\varepsilon') - V(\varepsilon')$ rises with ε' implies also that as the screening cost (C_F) of the FDI investors falls, the cutoff productivity level (that is ε'_{0F}) declines with ε' as well. This means that with a fall in ε'_{01} more firms will be acquired by FDI investors. Therefore, a lower screening cost of FDI investors gives rise to a larger volume of FDI inflows. By the same token, as the signal becomes more accurate (that is, as β becomes smaller), the benefit of the screening technology, which is $P(\varepsilon') - V(\varepsilon')$, declines. Therefore, the advantage of FDI investors in their cream-skimming skills is less pronounced and FDI inflows are expected to be less abundant.

After the signals are revealed, then a firm with a signal ε', below ε'_{0F}, actually adjusts its capital stock to a signal-dependent, productivity-independent level $K(\varepsilon')$. But a firm which receives a signal ε' above ε'_{0F} expects to adjust its capital stock to a productivity-dependent level $K^*(\varepsilon)$ with a commulative

distribution $\varphi(\varepsilon/\varepsilon')$. The expected value of its capital stock, denoted by $E[K^*(\varepsilon)/\varepsilon']$, is given by:

$$E\left[K^*(\varepsilon)/\varepsilon'\right] = \int_{\varepsilon'-\beta}^{\varepsilon'+\beta} K^*(\varepsilon) d\varphi(\varepsilon/\varepsilon'). \tag{8}$$

Thus, the total expected value of the stock of capital (before signals are revealed) is:

$$K^F = \int_{-1}^{\varepsilon'_{0F}} K(\varepsilon') dG(\varepsilon') + \int_{\varepsilon'_{0F}}^{1} E[K^*(\varepsilon)/\varepsilon'] dG(\varepsilon'). \tag{9}$$

3 Portfolio versus FDI Inflows

To understand the unique role of FDI, suppose now that instead of FDI inflows there are only portfolio inflows. That is, assume that the world rate of interest/return (r) continues to prevail in the home country. Management under portfolio equity ownership, however, may be plagued by a "free-rider" problem. As noted succinctly by Oliver Hart (2000), "If the shareholder does something to improve the quality of management, then the benefits will be enjoyed by all shareholders. Unless the shareholder is altruistic, she will ignore this beneficial impact on other shareholders and so will under-invest in the activity of monitoring or improving management." In our case, we simply assume that foreign portfolio equity buyers will not be willing to incur the cost of eliciting the true productivity of the firm whose equity they purchase.

In this case, domestic investors acquire and gain control of the firms with high-productivity signals. Domestic and foreign portfolio investors acquire all the other firms (with low-productivity signals). The cutoff level of the signal in this case is $\varepsilon'_{0D} \equiv \varepsilon'_0(C_D)$. Because $C_D > C_F$, it follows that $\varepsilon'_{0F} < \varepsilon'_{0D}$ [recall that $P(\varepsilon') - V(\varepsilon')$ is increasing in ε', by assumption]. Thus, the difference in investment between the two regimes lies only in the range of signals between ε'_{0F} and ε'_{0D}. The capital stock of a firm with a signal below ε'_{0F} is the same in the two regimes. The expected capital stock of a firm with a signal above ε'_{0D} will also be the same in the two regimes. But a firm which receives a signal ε' in-between these two cutoff levels, will invest a signal-dependent $K(\varepsilon')$ in the portfolio regime compared to a productivity-dependent schedule, $K^*(\varepsilon)$, with a cummulative distribution $\varphi(\varepsilon/\varepsilon')$, in the FDI regime. Naturally, the latter is more efficient in the sense that it yields a higher expected return.[5]

The economic gains from FDI, relative to portfolio inflows, consist of the efficiency of investment

[5] We have assumed that the only advantage of FDI investors over domestic investors lies in the search/screening cost. Naturally, if we were to assume that FDI investors can also obtain better information about the true ε (we have assumed that both can accurately elicit ε), then the difference between the two regimes expands to the entire range of $[-1, 1]$ of signals.

and the lower screening cost of FDI investors. Note that because it is the same world interest rate (r) that prevails in the home country in the two regimes, it follows that the gains from FDI in our case do not include the traditional gains from opening up the domestic capital market to foreign capital inflows. (These traditional gains are present also in the portfolio regime.) In the FDI regime the firms with signals above the cutoff signal ε'_{0F} are screened; whereas in the portfolio flow regime a small set of firms, namely only the firms with signals above $\varepsilon'_{0D} > \varepsilon'_{0F}$ are screened. Therefore, the gains stemming from the efficiency of investment is:

$$GAIN_E = \int_{\varepsilon'_{0F}}^{\varepsilon'_{0D}} [P(\varepsilon') - C_F - V(\varepsilon')] dG(\varepsilon'). \tag{10}$$

In addition, for the firms that are screened in the two regimes (that is, the firms with signals above ε'_{0D}), the screening cost is lower under the FDI regime than under the portfolio flow regime. This gives rise to a further gain from FDI which is

$$GAIN_C = (C_D - C_F)[1 - G(\varepsilon'_{0D})]. \tag{11}$$

Observe that the entire gain of the lower screening cost of FDI investors is captured by the domestic economy because of assumed perfect competition among these investors over the domestic firms. This is because competition among FDI investors will drive up the price they pay for a domestic firm to their net bid price [that is, $P(\varepsilon') - C_F$] which exceeds the ask price of the domestic owners [that is, $V(\varepsilon')$], except for the cutoff firm (for which the bid price and ask price are equal to each other). Thus, the total gain from FDI is

$$\begin{aligned} GAIN_E + GAIN_C \quad = \quad & \int_{\varepsilon'_{0F}}^{\varepsilon'_{0D}} [P(\varepsilon') - C_F - V(\varepsilon')] dG(\varepsilon') + \\ & (C_D - C_F)[1 - G(\varepsilon'_{0D})]. \end{aligned} \tag{12}$$

Note, however, that in the extreme opposite case of a single FDI investor, she will never offer a price for a domestic firm above the price that will be offered by domestic investors which is $P(\varepsilon') - C_D$, as long as this price is above or equal to the ask price of the domestic owner which is $V(\varepsilon')$. Thus, the price at which the foreign direct investor will buy a domestic firm with a signal ε' is $Max[P(\varepsilon') - C_D, V(\varepsilon')]$. Because $P(\varepsilon'_{0D}) - C_D = V(\varepsilon'_{0D})$, it follows that $P(\varepsilon') - C_D < V(\varepsilon')$ in the interval $(\varepsilon'_{0F}, \varepsilon'_{0D})$. This means that the firms in this interval are purchased by the foreign direct investor at the ask price $V(\varepsilon')$.

Hence, $GAIN_E$, which is the efficiency gain of investment, vanishes. Similarly, firms in the interval $[\varepsilon'_{OD}, 1]$ will be purchased at the price $P(\varepsilon') - C_D$ [rather than $P(\varepsilon') - C_F$ in the competitive case]. Hence, $GAIN_C$ vanishes as well. Thus, as expected, the entire gains from FDI accrue to the single FDI investor. A possible remedy for the host country to retain some of the gains of FDI is to impose some sort of floors to the sale prices of domestic firms. Another partial remedy for the host country is to impose a (source-based) capital gains tax on FDI investors. In the intermediate case of imperfect competition among a few FDI investors, the gains from FDI are split between the host country and the FDI investors.

We have already established that the utilization of the capital stock (its aggregate level and distribution over firms) is more efficient in the FDI regime than in the portfolio regime. Is the capital stock also larger in the former regime than in the latter regime? Recall that the fundamental difference between the two regimes is the screening cost C. Therefore, the above question can be rephrased as whether a decline in the search cost increases the aggregate stock of capital. In order to answer this question, we write the aggregate stock of capital as a function of C, as follows [see equation (9)]:

$$\bar{K}(C) = \int_{-1}^{\varepsilon'_0(C)} K(\varepsilon') dG(\varepsilon') + \int_{\varepsilon'_{0(C)}}^{1} E[K^*(\varepsilon)/\varepsilon'] dG(\varepsilon'), \tag{13}$$

where $\varepsilon'_0(C)$, $K(\varepsilon')$ and $E[K^*(\varepsilon)/\varepsilon']$ are defined by equations (7), (3) and (8), respectively.

Now, differentiate $\bar{K}(C)$ with respect to C to get:

$$\frac{d\bar{K}}{dC} = \left\{K[\varepsilon'_0(C)] - E[K^*(\varepsilon)/\varepsilon'_0(C)]\right\} g[\varepsilon'_0(C)] \frac{d\varepsilon'_0}{dC}. \tag{14}$$

From equations (3) and (5) we can conclude that:

$$K[\varepsilon'_0(C)] = H\{E[\varepsilon/\varepsilon'_0(C)]\}, \tag{15}$$

and

$$K^*(\varepsilon) = H(\varepsilon),$$

where H is defined by:

$$H(t) = (F')^{-1}\left(\frac{r+\delta}{1+t}\right),$$

and $(F')^{-1}$ is the inverse of F'. Thus, we can rewrite equation (14) as:

$$\frac{d\bar{K}}{dC} = \left(H\left\{E\left[\varepsilon/\varepsilon_0'(C)\right]\right\} - E\left[H(\varepsilon)/\varepsilon_0'(C)\right]\right) g[\varepsilon_0'(C)]\frac{d\varepsilon_0'}{dC}. \tag{16}$$

If H is convex, then it follows from Jensen's inequality that $d\bar{K}/\mathrm{dC}$ is negative (because $d\varepsilon_0'/dC > 0$). Indeed, one may plausibly assume that H is convex (for instance, this is the case with a Cobb-Douglas production function), in which case $d\bar{K}/dC < 0$. That is: The aggregate capital stock is larger under the regime of FDI inflows than under the regime of portfolio inflows.

4 Evidence from a Gravity Model

Gravity models postulate that bilateral international flows (goods, FDI, etc.) are positively related to the size of two economies (e.g. population, GDP), and negatively to the distance (physical or other such as tariffs, information asymmetries, etc.) between them.[6] In this section we confront our theoretical findings with evidence provided by a gravity model of bilateral FDI flows. This model attempts to explain the determinants of the mobility of FDI across countries over and above what can be explained by goods trade.

4.1 Specificication of the gravity equation

The FDI gravity equation in our empirical analysis has inward FDI flows as the dependent variable. A key determinant of these flows in our theory is the skimming cost advantage of FDI investors over other investors which stems from "intangible capital" accumulated through industry (or niche) specialization in the source countries. The basic idea is that countries with a high degree of specialization are assumed to have high levels of intangible capital (specialized knowledge) by virtue of the fact that the productive energies of the countries' firms have been focused on a smaller number of activities/industries (niches). Hence a higher degree of specialization in the source countries increases the cost advantage of FDI investors and is expected to generate more FDI flows to the host economies. We therefore include a measure of industry specialization (a proxy for intangible capital) in the source countries as an explanatory variable.

[6] For instance, using population as the size variable, Loungani, Mody and Razin (2002) find that imports are less than proportionately related to the host country population, while they are close to increasing proportionately with the source country population. Correspondingly, FDI flows increase by more than proportionately with both the source and the host country populations.

Note that industry specialization is associated with more trade in goods. The later phenomenon may be associated also with higher FDI flows. For instance, vertical FDI flows by multinationals are naturally associated with more trade (in intermediate goods). We must therefore isolate the additional contribution to FDI flows of industry specialization, over and above what is generated through trade flows. For this purpose, we first estimate an auxiliary gravity equation with imports of goods as the dependent variable and export concentration in the source countries among the explanatory variables. The other explanatory variables and the estimation results are described in Table 1. These results are in line with the existing literature on trade in goods.[7] The coefficients of the scale variables (populations) are significantly positive; the coefficients of the GDP per capita variables (proxies for the degree of development) are significantly positive; the coefficient of the distance variable is significantly negative; the coefficient of the telephone traffic variable (instrumented to take into account a possibility of reverse causality) is positive, and the effects of the source-country export concentration and its interaction with the source-country GDP are insignificant. The residual variable from this auxiliary equation is then taken as an explanatory variable in our gravity FDI equations.

A second explanatory variable provided by our theory has to do with the accuracy of the productivity signals in the host countries. The more accurate are the signals, the less pronounced is the benefit of the cream-skimming advantage of the FDI investors, and the less abundant are FDI flows to the host countries. This explanatory variable is represented in the gravity regression by two measures. One measure is taken from La Porta et al (2000). What we want to represent is the degree of corporate transparency that diminishes the power of the insiders (in eliciting the true productivity factor of the firm and employing a productivity-dependent investment strategy). We employ a measure of creditor rights (on a scale of one to five). We conjecture that such rights go hand-in-hand with corporate transparency. An empirical problem with this measure is that we have only international cross-section variations of this measure. Another measure, that needs some elaboration, is the debt-equity ratio in the host countries: As banks are the main providers of debt capital and they usually conduct rigorous scrutiny of the credit worthiness of their debtors, we conjecture that, ceteris paribus, firms with high debt-equity ratio tend to be more transparent. The data for this measure spans over both time and countries.

The list of the 12 source countries in our sample is given in Panel A of Table 2. All of the source countries are industrialized countries. It is likely that these countries account for an overwhelming

[7] See, for instance, Eaton and Tamura (1994) and Eichengreen and Irwin (1998).

majority of all FDI outward flows. The list of the 45 host countries is given in Panel B of Table 2. These consist of the major industrialized countries, several emerging markets (e.g. Brazil and Malaysia) and some developing countries (e.g. Colombia and Ecuador). There are also a number of oil-producing countries (e.g. Kuwait and Nigeria).

The sample period consists of the 1980s and the 1990s and is split up into six sub-periods of equal length, as listed in Panel C of Table 2. The data on the dependent and independent variables are all averaged over each three-year sub-period. This eliminates some of the noise in the annual data but preserves a sufficient degrere of time series variation.

The dependent variable is the (log of) real FDI flows measured in US dollars from one of the source countries to one of the host countries.

There are three categories of independent (explanatory) variables: (1) a set of "gravity variables" that are commonly used in gravity models; (2) a measure of industry-specialization in the source country, as proxied by its commodity export concentration; (3) the degree of development of the host country's financial markets, as proxied by per-capita GDP.

The "gravity variables" in turn consist of the following: (i) the (logs of) the sizes of the population of the host and source countries; (ii) (log) of the "greater circle distance" between the economic centers in the source-host pair of countries; (iii) instrumented telephone traffic.

4.2 Findings

Our results, based on a panel Tobit estimation, are shown in Table 3. The regression contains source country fixed effects. The estimation results for the gravity FDI equations are presented in columns (1) and (2) of Table 3. The two regression equations are identical, except that in column (2) we include also a measure of the host-country creditor rights as an explanatory variable.

The effects of the gravity variables are more or less as expected. The coefficients of the scale variables (population sizes) are positive and significant at the one-percent level. The effects of distance variables are as expected: (i) the coefficient of the physical distance variable is negative, though insignificant, unlike in the trade equation where it was significant (see Table 1). This suggests that physical distance serves as a stronger barrier for trade in goods than for FDI flows; (2) the coefficient of the instrumented telephone traffic is positive and significant at the one-percent level, pointing to the importance of the ease of communication in overcoming physical distance. Note that this effect was not found significant in the trade equation, possibly because communication is more relevant for information-driven FDI than for trade in goods.

The coefficient of the trade residual variable is positive and significant at the one or five-percent level. This indicates a complementarity between imports of goods and FDI inflows.

The degree of financial development of the host country, as proxied by the host-country GDP per capita, does not seem to play a significant role in attracting FDI, but it is significant for promoting trade in goods.[8] Note that for a given population size, total GDP increases with GDP per capita. Therefore, it is possible that GDP per capita in our trade gravity equation captures the role of total GDP which is expected to be positively correlated with intra-industry trade. The degree of financial development of the source-country has a positive and significant (at the one-percent level) effect on FDI flows.

The main focus of our analysis is the effects of industry specialization in the source countries and corporate transparency in the host countries. The first effect is found to be positive and significant at the one-percent level, as predicted by our theory. The coefficient of the interaction term between industry specialization and source-country GDP is negative and significant at the one-percent level. A possible interpretation is that as the size of the domestic market (as measured by total GDP) in the source-country increases and there are more investment opportunities at home, direct investment is diverted away from foreign markets to the domestic market. The coefficient of the debt-equity ratio in the host country is negative and significant at the five-percent level, when the measure of the host-country creditor rights is not included in the regressions. When this measure is included, the coefficient of the debt-equity ratio variable becomes more negative and significant at the one-percent level. As explained before, the debt-equity ratio may be associated with a higher degree of corporate transparency. As predicted by our theory, this reduces the cost-advantage of FDI investors in screening host-country firms and leads to less FDI inflows. The coefficient of the measure of creditor rights in the host country is negative, as our theory suggests, but is insignificant.

5 Concluding Remarks

We developed a model in which foreign direct investors are better equipped and experienced in skimming the “good" firms than their domestic counterparts. Employing this technology, the foreign direct investors are able to outbid domestic and foreign portfolio investors for the good firms. We emphasize this feature of FDI which is better hands-on management standards that entails a cutting-edge advantage over other investors in reacting in real time to a changing business environment. This feature is more pronounced in high-productivity firms, resulting in “cream-skimming" of domestic firms by FDI

[8] Naturally, GDP per-capita may be a proxy for many other features.

investors. Note that this mechanism applies both to mergers and acquisitions and to greenfield investments. The productivity signal, though, is likely to be coarser in the latter, conveying less information about the true productivity.

We view FDI as distinct from portfolio investment with respect to the quality of management. Foreign direct investors, by definition, acquire some significant control over the firm they invest in. They can then apply hands-on management (micro-management) standards that enable them to react in real time to changing economic environments. This feature may stem from "intangible capital" accumulated through a specialization by the foreign direct investors in a certain niche.[9] Indeed, there is some micro evidence in support of our theory. Djankov and Hoekman (2000) report that foreign direct investors pick the high-productivity firms in transition economies.

We employ a gravity equation in order to shed some empirical evidence on the prediction of our theory. We find that indeed the abundance of "intangible" capital in the source countries (as proxied by export commodity concentration) is positively correlated with FDI flows to the host countries. Also, the degree of corporate transparency in the host countries is negatively correlated with these flows.

[9] See Gopinath (2001) for an interesting application of a search model for a study of FDI flows to developing economies.

Table 1: Gravity Equation for Imports of Goods

Host Population	0.742 (3.98)**
Source Population	0.976 (13.25)**
Host GDP Per Capita	0.643 (2.05)*
Source GDP Per Capita	0.914 (3.99)**
Distance	−0.742 (−11.89)**
Host Debt-Equity Ratio	−0.000 (−0.05)
Instrumented Telephone Traffic	0.544 (1.88)
Source Export Concentration	4.192 (0.77)
(Source GDP) X (Source Export Concentration)	−0.163 (−0.20)
Constant	1.558 (0.75)
Number of Observations	324
R^2 Within	0.88
R^2 Between	0.41
R^2 Overall	0.58

Values of z statistics in parentheses

* Significant at 5%; ** Significant at 1%.

Table 2: Source and Host Country Coverage and Sub-Periods

Panel A: List of Source Countries				
Australia	Austria	Canada	France	
Germany	Italy	Japan	Netherlands	
Norway	Sweden	UK	US	
Panel B: List of Host Countries				
Argentina	Australia	Austria	Belgium	Brazil
Canada	Chile	China	Colombia	Denmark
Ecuador	Egypt	Finland	France	Germany
Greece	Hong Kong	India	Ireland	Israel
Italy	Japan	Korea	Kuwait	Malaysia
Mexico	Netherlands	New Zealand	Nigeria	Norway
Peru	Philippines	Portugal	Saudi Arabia	Singapore
South Africa	Spain	Sweden	Switzerland	Taiwan
Thailand	Turkey	UK	US	Venezuela
Panel C: Sub-periods				
1981-83	1984-86	1987-89	1990-92	1993-95

Table 3: Gravity Equations for Inward FDI Flows

	(1)	(2)
Host Population	1.135 (5.04)**	1.108 (4.56)**
Source Population	1.812 (6.46)**	1.186 (6.50)**
Host GDP Per Capita	−0.058 (−0.09)	−0.308 (−0.45)
Source GDP Per Capita	6.215 (7.35)**	6.218 (7.40)**
Distance	−0.271 (−1.19)	−0.289 (−1.29)
Instrumented Telephone Traffic	2.929 (2.73)**	2.835 (2.68)**
Source Export Concentration	60.389 (2.92)**	61.191 (2.97)**
(Source GDP) X (Source Export Concentration)	−10.202 (−3.28)**	−10.316 (−3.32)**
Trade Residual	0.395 (2.53)*	0.509 (3.06)**
Host Debt-Equity Ratio	−0.013 (−2.10)*	−0.017 (−2.74)**
Host Creditor Rights		−0.362 (−1.54)
Constant	−28.334 (−3.78)**	−25.777 (−3.39)**
Number of Observations	324	324
Log Likelihood	-630.50	-629.15

Values of z statistics in parentheses

* Significant at 5%; ** Significant at 1%

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APPENDIX: FDI, Domestic Investment and Growth

Table A1: Determinants of Domestic Investment

	OLS	TSLS
Foreign Direct Investment (FDI)	0.13 (5.5)	0.23 (6.8)
Loan Inflows (L)	0.14 (4.0)	0.12 (3.0)
Portfolio Inflows (P)	0.02 (0.3)	0.18 (2.0)
Lagged (one year) Domestic Investment	0.83 (99.7)	0.66 (51.2)
GNP Growth	0.2 (15.1)	0.15 (10.9)
Lagged (one year) GNP Growth	0.04 (2.8)	0.06 (4.6)
Government Expenditure	0.03 (2.7)	0.01 (0.5)
Long-run effect of FDI	0.76**	0.68**
Long-run effect of L	0.82**	0.35**
Long-run effect of P	0.12*	0.53*

Notes:

1. Except for GNP growth rates, all other variables are measured as percentages of GNP.
2. Source: Hecht, Razin and Shinar (2000).
3. The second column of coefficients (TSLS) reports the estimation of one equation of a four-equation system; other endogenous variables are FDI, L and P.
4. A double asterisk stands for statistical significance (at the one-percent level).
5. A single asterisk stands for statistical insignificance (at the five-percent level).

Table A2: Determinants of GDP Growth

	OLS	TSLS
Foreign Direct Investment (FDI)	0.09 (3.01)	0.2 (6.02)
Loan Inflows (L)	0.01 (0.24)	0.02 (0.39)
Portfolio Inflows (P)	0.05 (0.62)	0.10 (1.00)
Lagged (one-year) GDP Growth	0.12 (7.68)	0.12 (6.90)
Domestic Investment	0.27 (14.40)	0.24 (11.38)
Lagged (one-year) Domestic Investment	−0.22 (−12.08)	−0.18 (−9.11)
Government Expenditures	−0.019 (−8.39)	−0.019 (−7.92)
Initial GDP	−0.01 (−3.27)	−0.004 (−1.45)
Long-Run Effect of FDI	0.10**	0.23**
Long-Run Effect of L	0.01*	0.01*
Long-Run Effect of P	0.06*	0.07*

Notes:

Notes as for Table A1 apply also to Table A2.