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INSTITUTIONAL EFFICIENCY, MONITORING COSTS, AND THE INVESTMENT SHARE OF FDI

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ABSTRACT

This paper models and tests the implications of costly enforcement of property rights on the pattern of foreign direct investment (FDI). We posit that domestic agents have a comparative advantage over foreign agents in overcoming some of the obstacles associated with corruption and weak institutions. We model these circumstances in a principal-agent framework with costly ex-post monitoring and enforcement of an ex-ante labor contract. Ex-post monitoring and enforcement costs are assumed to be lower for domestic entrepreneurs than for foreign ones, but foreign producers enjoy a countervailing productivity advantage. Under these asymmetries, multinationals pay higher wages than domestic producers, in line with the insight of efficiency wages and with the evidence about the 'multinationals wage premium.' FDI is also more sensitive to increases in enforcement costs.

We then test this prediction for a cross section of developing countries. We use Mauro's (2001) index of economic corruption as an indicator of the strength of property right enforcement within a given country. We compare corruption levels for a large cross section of countries in 1989 to subsequent FDI flows from 1990 to 1999. We find that corruption is negatively associated with the ratio of subsequent foreign direct investment flows to both gross fixed capital formation and to private investment. This finding is true for both simple cross-sections and for cross-sections weighted by country size.

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1. Introduction

The large increase in FDI in recent decades has stimulated a growing empirical and theoretical literature.[1] The salient empirical regularities emerging from this literature include the finding of a hefty "multinational wage premium" – multinationals' wages exceed the wages paid by domestic producers by a significant margin, and multinationals' productivity tends to be higher than that of domestic producers.[2] The purpose of this paper is to outline and to test a model that provides an interpretation to these findings. Specifically, we identify situations where it is in multinational's self interest to pay a wage premium relative to domestic producers.

A number of previous papers have concentrated on knowledge spillovers as an argument for a multinational wage premium. Fosfuri, et al (2001) introduce a model where a multinational pays its trained workers a higher wage to induce it to resist moving to a local competitor. Our analysis focuses on the role of weaknesses in the enforcement of property rights, as measured by the domestic level of corruption, on the pattern and behavior of multinationals. Weak property rights, and corruption in particular, have been identified as a major obstacle to development, potentially reducing both FDI and domestic investment.[3]

Despite efforts to limit such behavior, corruption and bribery appear to be prevalent features of foreign direct investment activities. For example, Hines (1995) examines the impact of the Foreign Corrupt Practices Act of 1977 forbidding foreign bribery by American firms on subsequent FDI growth in corrupt nations originating in the United States. Hines finds that the law put US firms at a competitive disadvantage in those states as growth in FDI

[1] See Markusen (2002) and Feenstra (2002, Chapter 11) for overview of multinationals, and Lipsey (2002) for a review of the empirical evidence.

[2] See Blomström (1983b), Haddad and Harrison (1993), Okamoto and Sjöholm (1999), Lipsey and Sjöholm (2001) and the references in Lipsey (2002).

[3] See Markusen (2001), Wei (1997a, b), and Smarzynska and Wei (2000) .

originating in the US in corrupt states was significantly lower than in non-corrupt states subsequent to the law's passage.

We conjecture that in countries where the enforcement of property rights is limited and costly, domestic entrepreneurs will have an advantage, i.e. that they have access to cheaper means of enforcing property rights. This may be due to multitude of reasons, like better familiarity of the court system and the government, better knowledge of the key people that should be bribed and of local networks that help in resolving disputes, etc. Thus, one expects domestic agents to have comparative advantage relative foreign agents in overcoming some of the obstacles associated with corruption and weak institutions. This in turn would suggest that FDI would be more sensitive to weakening of property rights versus domestic investment. Our model focuses on the implications of this presumption on employment and investment patterns of domestic versus foreign entrepreneurs.[4]

Specifically, we model such circumstances in a principle agent framework with costly ex-post monitoring and enforcement of an ex-ante contract with domestic labor. The home advantage is manifested in the assumption that the ex-post monitoring and enforcement cost of the labor contract is lower for domestic entrepreneurs than for foreign ones. Under these disadvantages, foreign producers require a countervailing productivity advantage to compete. Given circumstances where both multinationals and domestic producers exist side-by-side, we show that multinationals pay higher wages than domestic producers, in line with the insight of efficiency wages and with the evidence about the 'multinationals wage premium.' We also show that multinational investments are more sensitive to weakness (or more costly enforcement of) property rights.

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[4] The literature has dealt with other possible dimensions associated with home advantages and disadvantages of domestic versus foreign entrepreneurs. For example, Razin, Sadka and Yuen (1999) studied the implication of multinationals having access to cheaper cost credit and possibly inferior information about the quality of domestic projects relative to domestic entrepreneurs on the patterns of FDI. Our approach abstracts away from these issues, assuming equal financial costs for both domestic and foreign agents. This allows us to identify the implications of the home advantage associated with contract enforcement on the patterns of investment. An

A growing literature also exists concerning the impact of corruption on foreign direct investment. Wheeler and Mody (1992) estimate a cross-country panel of manufacturing and electronics investment in which a principal component they label "Risk" includes such socio-economic factors as the Business International indicators of corruption and bureaucratic red tape. They find no significant impact of this component on capital expenditures by U.S. multinationals. Similarly, Hines (1995) finds no measurable impact of corruption on total inward FDI in host nations after 1977.

However, later studies find robust evidence that corruption reduces the level of FDI entering into a country. Wei (2000) examines a panel of bilateral stocks of FDI from 12 source countries to 45 host countries and finds a large and statistically significant negative impact of corruption on inward FDI. His point estimates indicate that the increase in corruption from the level of Singapore's to that of Mexico is the equivalent of a 20 percentage point increase in the tax rate on multinationals. Similarly, Wei (1997) finds that uncertainty in corruption levels also has a measurable negative impact on inward FDI.

While these studies establish a negative relationship between corruption and FDI, their results do not imply that FDI flows are more sensitive to host country corruption levels than domestic investment. The possibility that corruption is especially harmful to FDI, i.e. relative to its adverse impact on domestic investment, is important in terms of the general consensus that FDI plays an important role in transferring technology to developing countries.[5]

Below, we directly examine the impact of corruption on the share of FDI in a host country's overall investment portfolio. In particular, we estimate the impact of an index of domestic corruption on the ratio of average FDI flows to both gross fixed capital formation and private domestic investment over the following ten years. We find that corruption is

implication of our assumptions is that, unlike in Razin et. al. (1999), FDI unambiguously improves the host county's welfare.

robustly negatively correlated with the ratio of FDI to total domestic investment. This suggests that corruption discourages foreign direct investment more severely than it does domestic investment, as predicted by our theoretical model. We then demonstrate that this result is robust to the inclusion of a number of conditioning factors, as well as treatment for simultaneity issues.

This paper is organized into five sections. Section 2 introduces a simple principal-agent model of foreign direct investment with imperfect property right protection. Section 3 discusses the empirical methodology and data used in the paper. Section 4 reviews our results. Section 5 concludes.

2. A Simple Model of FDI with Imperfect Property Right Enforcement

In this section, we introduce a simple model of FDI with imperfect property right enforcement. We assume that there is a sector containing two firms, a multinational subsidiary and a domestic firm. Both of these firms are assumed to face a principal-agent problem vis-à-vis their laborers, with costly ex-post monitoring and enforcement of an ex-ante contract. FDI is assumed to co-exist with domestic production, where the technological superiority of foreign subsidiaries and the relative superiority of domestic firms concerning the agency problem lead to an interior solution for the share of FDI in host-country investment.

The production functions of the domestic and foreign firms are assumed to be Cobb-Douglas in capital, K, and labor, L. We distinguish the foreign firm with stars. The production function of the domestic firm is assumed to satisfy

$$Y = zAK^{\alpha}L^{\beta} \tag{1.1}$$

[5] For example, see Barrel and Pain (1997). However, see Aitken and Harrison (1999) for an opposing view.

where z is the effective productivity shock, the outcome of labor's effort and the realized exogenous state of nature, ε :

$$z = \begin{cases} 1+\varepsilon \quad with \quad L \quad effort \\ \\ \chi(1+\varepsilon) \quad no \quad L \quad effort \end{cases} \tag{1.2}$$

Labor's effort therefore contributes $1-\chi$ to output.

Similarly, the foreign firm production function is assumed to satisfy

$$Y^* = z^* A^* K^{*\alpha} L^{*\beta} \tag{1.3}$$

where z^* satisfies

$$z^* = \begin{cases} 1+\varepsilon^* \quad with \quad L \quad effort \\ \\ \chi(1+\varepsilon^*) \quad no \quad L \quad effort \end{cases} \tag{1.4}$$

We assume that ε and ε^* are independently distributed uniform on the interval $\left[-\bar{\varepsilon},\bar{\varepsilon}\right]$.

We start the analysis with the simplest benchmark by ignoring the possibility of random monitoring and random shirking. In the absence of spending monitoring and verification costs, the representative entrepreneur in the domestic and foreign sector observes only the effective productivity shocks, z and z^* respectively. Verification of labor effort can be done only ex-post, after the realization of output. The cost of verifying labor's effort is assumed to equal proportions c and c^* of the labor inputs, cL and c^*L^* respectively. Since the cost is likely to be highly correlated within a country, we assume that $c^* = \psi c$. Moreover, we assume that the domestic firm enjoys a low cost of verifying and enforcing effort, such that $\psi > 1$. However, we assume that the foreign subsidiary enjoys a countervailing productivity advantage over its domestic counterpart, so that $A^* \geq A$.

The opportunity cost of labor's time is assumed to equal ω.[6] There are two possible labor types, differing in the amount of effort e needed to yield the high output [alternatively, two possible qualities of matches between labor and capital, differing in the effort input needed]:

$$e = \begin{cases} e_a & \text{with probability } a \\ e_b & \text{with probability } b \end{cases} \tag{1.5}$$

where $e_a < e_b$ and $a + b = 1$.

Labor's utility satisfies

$$U = C - [\omega + e]L \tag{1.6}$$

where C is labor consumption and $\omega \geq 0$ is the shadow price of leisure. With perfect information, labor is paid the sum of $(\omega + e_i)L \ (i = a, b)$ with effort, and ωL with no effort. Labor knows its type, and its effort decision is endogenous. The entrepreneurs observe only the effective productivity shock [$(1+\varepsilon)\chi$ or $1+\varepsilon$, depending on labor's effort]. Ex-post, the entrepreneur may decide to pay the verification and enforcement cost in order to reveal labor's effort. In the absence of verification **and enforcement**, labor's compensation is not contingent on effort.

The labor contract sets the compensation rule ex-ante. It has the following dimensions

- A threshold ϕ of the effective productivity shock z that will trigger the costly verification and enforcement.
- In the absence of verification, or if the verification will reveal no shirking, labor would be paid $w_n L$. If shirking is detected, labor would be paid zero.[7]

[6] The opportunity cost of labor could be alternatively interpreted as leisure or as the prevailing wage in a traditional sector.

[7] Maximizing the penalty associated with shirking (i.e., paying zero when shirking is detected), is optimal.

We assume that the various parameters induce a separating equilibrium, where the more efficient type (*a*) would supply effort, and the less efficient type (*b*) would shirk.

In rational-expectation equilibrium, labor would prefer putting effort to shirking if the penalty for shirking exceeds the cost of effort. Under the assumptions above, this condition satisfies

$$\frac{\phi+\bar{\varepsilon}}{2\bar{\varepsilon}} w_n > e_i \tag{1.7}$$

and

$$w_n \geq \omega + e_i \tag{1.8}$$

Henceforth, we assume that

$$\omega + e_b > w_n \geq \frac{2\bar{\varepsilon} e_a}{\phi+\bar{\varepsilon}} \geq \omega + e_a \tag{1.9}$$

This implies that the density function of effective productivity shock z is

$$f(z) = \begin{cases} \dfrac{b}{2\bar{\varepsilon}\chi} & for \;\; (1-\bar{\varepsilon})\chi < z < 1-\bar{\varepsilon} \\ \dfrac{b}{2\bar{\varepsilon}\chi} + \dfrac{a}{2\bar{\varepsilon}} & for \;\; 1-\bar{\varepsilon} < z < (1+\bar{\varepsilon})\chi \\ \dfrac{a}{2\bar{\varepsilon}} & for \;\; (1+\bar{\varepsilon})\chi < z < 1+\bar{\varepsilon} \end{cases} \tag{1.10}$$

The decision problems faced by the domestic and foreign entrepreneurs are identical. The domestic entrepreneur sets the contract in order to maximize the expected profits *V,* where

$$V = [1-(1-\chi)b] AK^{\alpha} L^{\beta} - (1+\rho)K - LE(lc) \tag{1.11}$$

where the cost of capital is equal to $1+\rho$ and $E(lc)$ represents the expected cost per worker, which satisfies

$$E(lc) = w_n\left[1 - \int_{(1-\bar{\varepsilon})\chi}^{\phi} \frac{b}{2\bar{\varepsilon}\chi}dz\right] + c\int_{(1-\bar{\varepsilon})\chi}^{\phi} f(z)\frac{1}{2\bar{\varepsilon}}dz \tag{1.12}$$

The first term on the RHS of equation (1.11) represents expected output. The second term is the cost of capital; the third is the expected cost of labor. The cost of employing a worker, $E(lc)$, takes into account that the wage payment to shirking labor will be zero when the worker shirks, and that employing labor is associated with the expected cost of monitoring and enforcement [the second term of $E(lc)$].[8]

Henceforth we focus on the case where the entrepreneur pays labor the reservation wage that just induces laborers of type *a* to supply effort:

$$w_n = \frac{2\bar{\varepsilon}e_a}{\phi+\bar{\varepsilon}} \tag{1.13}$$

Optimizing V with respect to ϕ, *K,* and *L,* we infer:

CLAIM 1: *An internal separating equilibrium (i.e., where type b would shirk, and type a would supply the needed effort) is characterized by*

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[8] Note that the support on the second term begins at $\left(1-\bar{\varepsilon}\right)\chi$. For analytic simplicity, we combine the labor monitoring and enforcement costs together. However, in the range $\left(1-\bar{\varepsilon}\right)\chi \le z \le \left(1-\bar{\varepsilon}\right)$, the entrepreneur would optimally choose only to pay the enforcement costs and not monitor, since monitoring is not needed to establish that a worker is of type b in that range. Similarly, within the range $\left(1-\bar{\varepsilon}\right) \le z \le \phi,$ the entrepreneur would always need to monitor to establish labor's type, but would only face enforcement costs when the laborer turned out to be of type b. While this is clearly a simplification, it drives none of the qualitative results. We return to this simplification in the conclusion.

$$\frac{dL}{dc} < 0;\ \frac{dK}{dc} < 0;\ \frac{d\phi}{dc} < 0;\ \frac{dw_n}{dc} > 0 \tag{1.14}$$

and

CLAIM 2: *The capital labor ratio and the optimal investment levels depend negatively on the expected cost of labor,* $E(lc)$.

Proof: see the appendix.[9]

Our results follow the logic of efficiency wages. Higher monitoring costs would induce lower incidence of monitoring and enforcement, leading the entrepreneur to pay higher wages. The net outcome is higher wage, needed to keep the penalty associated with shirking high enough despite the drop in the incidence of monitoring. A by-product of it is that investment and employment will drop.

Finally, the level of monitoring and enforcement costs will affect the relative levels of domestic and foreign investment, as noted in the following claim:

CLAIM 3: *Higher enforcement costs (maintaining constant the relative cost disadvantage of the foreign producer,* ψ*) reduce the ratio of multinational investment to domestic investment at a rate that increases with the enforcement cost gap.*

Proof:

[9] The comparative static are simplified considerably by the observation that around the optimum $V''_{K,\phi} = V''_{L,\phi} = V''_{K,c} = 0$.

Denoting the optimal stock of capital in the domestic firm by $\tilde{K}$, and the probability of enforcing and monitoring in the domestic industry by Q, we demonstrate in the appendix that

$$d\left\{\frac{cQ}{E[lc]}\right\}/dc > 0 \qquad (1.15)$$

and

$$\frac{d\log[\tilde{K}^*/\tilde{K}]}{dc} = \frac{\beta}{1-\alpha-\beta}\frac{1}{c}\left\{\frac{cQ}{E[lc]} - \frac{c^*Q^*}{E[lc^*]}\right\} < 0 \qquad (1.16)$$

as predicted in Claim 3.

The intuition behind Claim 3 is that higher enforcement costs increase the ratio of expected enforcement costs to total worker cost, which is $cQ/E(lc)$ for the domestic firm and $c^*Q^*/E(lc^*)$ for the foreign firm.[10] The decrease in the ratio of foreign to domestic investment resulting from an increase in enforcement costs will then be proportional to the difference in the monitoring and enforcement cost ratios of domestic and foreign producers. The observation that the enforcement cost ratio increases with the level of enforcement cost implies that the greater is the cost gap, the larger is the drop of the relative capital share induced by a given increase in the monitoring and enforcement costs, c.

Our model therefore predicts that multinationals characterized with higher productivity and higher cost of monitoring and enforcement will opt to pay higher wages. Moreover, the greater is the cost of domestic enforcement *c*, the lower will be the ratio of foreign direct investment to domestic investment. In the following section, we test the latter empirical prediction.

[10] The higher cost c induces a relatively small drop in the probability of monitoring and enforcement, *Q*, such that the net effect is increasing $\frac{cQ}{E[lc]}$.

3. Empirics

3.1 Methodology

The theoretical model above implied that foreign direct investment would constitute a smaller share of the overall investment package in countries that had inferior property rights protection. In this section, we test this theory empirically for a cross-section of countries using data on government corruption.

We first estimate the following specification

$$\frac{FDI}{GFCF}_i = \alpha + \beta_1 Corrupt_i + \beta_2 Dev_i + \beta_3 Ores \,\&\, Metals_i + \varepsilon_i \qquad (1.17)$$

where $FDI/GCFC_i$ represents the average ratio of inward foreign direct investment to gross fixed capital formation from 1990 through 1999, $Corrupt_i$ represents the index of corruption from Mauro (1995), discussed in more detail below, Dev_i represents a zero-one dummy indicating a developed country, $Ores \,\&\, Metals_i$ represents the share of exports comprised of ores and metals, and ε_i represents a disturbance term that is assumed to be independently and identically distributed normal.

We estimate equation (1.16) with and without the $Ores \,\&\, Metals_i$ variable, which is introduced to identify countries that are intensive in activities traditionally associated with high levels of foreign direct investment.[11] We also estimate equation (1.16) with and without weighting our observations by country size, as measured by gross domestic product in 1989. Finally, we report our results with developed and developing countries pooled with the Dev_i dummy included as well as the two samples separated.

[11] The oil industry is also commonly associated with high shares of foreign direct investment. Using the set of oil-exporting countries identified in Mankiw, Romer and Weil (1992), two of the countries in our data set, Gabon and Iran, can be considered oil-exporting. We re-ran the regressions with these two countries omitted and obtained very similar results. These are available upon request.

Our coefficient of interest is β_1, the impact of the corruption index in 1989 on subsequent inward foreign direct investment as a share of gross fixed capital formation. The model is estimated using ordinary least squares with White's heteroscedasticity-consistent standard errors below.

Since heterogeneity in government investment may add noise to the denominator in the dependent variable in our specification above, we repeat our estimation using the ratio of average inward foreign direct investment to private domestic investment, FDI / PVT_i, from 1990-1999. This specification results in a smaller sample, but provides a good check of the robustness of the results we report for the larger sample.

3.2. Data

Corruption data was obtained from Mauro (1995). The data are from Business International's index of institutional efficiency, and reflect the reports of analysts concerning the functioning of the domestic bureaucracy, with a grade of 10 indicating a "smoothly functioning, efficient bureaucracy" while a grade of 4 indicates "constant need for government approvals and frequent delays." Note that our index is negatively related to domestic corruption, so that a positive coefficient on this variable is expected in the specification above.

Remaining data, including foreign direct investment flows, gross fixed capital formation, the share of private investment in total domestic investment, and the shares of ores and metals in total exports, were obtained from the *World Development Indicators.* Countries were designated as "developed" on the basis of membership in the OECD in November 1988.

Summary statistics are shown in Table 1. Our sample includes 97 countries, 76 of which are designated as developing and 21 of which are designated as developed. It can be seen that the inclusion of the $Ores \& Metals_i$ variable reduces our sample size to 71, while using the FDI / PVT_i dependent variable instead of $FDI / GCFC_i$ reduces the sample size to 52 countries, only 10 of which are developed. Consequently, we do not report results for the developed countries alone with this dependent variable.

Unsurprisingly, the developing nations score poorly relative to the developed nations in the $Corrupt_i$ index, with the developing nations' mean index at 4.67 while the developed nations' index has a mean of 8.874. Nevertheless there is a fair amount of disparity within both samples, with the developing nations ranging from 0 to 8.33 while the developed nations range from 6.67 to 10.

One might expect that the developing nations would have a higher share of inward foreign direct investment. However, the data show that that is not necessarily the case. In fact, the mean ratio of foreign direct investment to gross fixed capital formation is slightly larger for the developed nations. In contrast, the mean ratio of FDI to private domestic investment is larger for the developing nations, as we might expect. Nevertheless, neither difference is statistically significant.

The simple correlations between our $Corrupt_i$ index and levels of investment relative to gross domestic product for our developing nation sample are shown in Figure 1. It can be seen that there is a modest positive raw relationship between property rights protection and both FDI and domestic investment as measured by gross fixed capital formation. This confirms the results found in Wei (2000).[12] We plot the simple correlation between the $Corrupt_i$ index and the $FDI / GCFC_i$ and FDI / PVT_i ratios in Figure 2 for our developing country sample. We observe a modest positive relationship between protection of property

[12] The full sample also displayed a modest positive relationship. However, as developed countries tend to have much lower corruption scores, we include a dummy to identify the developed nations in our parametric analysis with the full sample below.

rights protection and these ratios, as predicted by our theory. We next turn towards testing these hypotheses formally.

4. Results

Results with $FDI / GCFC_i$ as the dependent variable are shown in Table 2. It can be seen that the performance of the $Corrupt_i$ variable is very robust. With the sample weighted by country size, the variable enters positively and significantly either with or without controlling for the share of ores and metals exports. The point estimate of slightly over 0.02 implies an economically significant 2 percent increase in the ratio of FDI to gross fixed capital formation for each point increase in the corruption index.

With the unweighted sample, the variable enters positively and significantly after controlling for ores and metals exports, but is insignificant without this control. However, we focus primarily on the weighted results to avoid results dominated by small outliers. The very small R-squared results we obtain in all of the unweighted regressions reported suggest that the weighted samples contain far less noise.

The control variables enter as would be expected. The Dev_i variable is negative and statistically significant for the weighted samples. The $Ores \,\&\, Metals_i$ variable enters positively and significantly at least a ten percent confidence level with either the weighted or un-weighted specifications.

We then break the sample up into its developed and developing nation sub-samples and obtain similar results. For both sub-samples, the $Corrupt_i$ variable enters positively and significantly for both specifications with a weighted sample, and after controlling for ores and metal exports with the un-weighted sample. There is a notable difference in the point estimates between the two sub-samples, although this difference is not statistically significant.

Table 3 displays the results with FDI / PVT_i as the dependent variable. As noted above, the use of this variable significantly reduces our sample size. Indeed, the data is available for this reduced sample for only ten of the developed nations, so we do not report regression results for that sub-sample with this dependent variable.[13] Nevertheless, our results for the $Corrupt_i$ variable of interest appear to be robust in the full sample. As was the case for the ratio to gross fixed capital formation, the $Corrupt_i$ variable enters positively and significantly in both of the specifications with the weighted sample and with the un-weighted sample after controlling for the share of ores and metals exports. The coefficient values are also quite similar to those we obtained in the gross fixed capital formation regressions.

The results with the developed country sample alone are also similar. The $Corrupt_i$ variable enters significantly in the weighted specification without controlling for ores and metals, and is close to a 10 percent confidence level with the control included. As above, the $Corrupt_i$ variable also enters significantly with its expected positive coefficient with the $Ores \,\&\, Metals_i$ control included.

5. Conclusion

This paper introduced a model of foreign direct investment with costly enforcement of property rights. We demonstrated that when foreign direct investment suffered from a relative disadvantage in property rights protection, it economized on its physical capital investment and paid its laborers a higher wage premium. This premium induced a separating equilibrium where the relatively productive workers refrained from shirking, while the less productive workers shirked. Finally, we demonstrated that the ratio of multinational investment to domestic investment would be increasing in the security of property rights.

[13] For completeness, we did run the specification with this sub-sample. Unsurprisingly, everything was very insignificant, including all of the control variables.

We then tested this prediction for a cross-section of countries using data on corruption. Our results demonstrated a robust negative relationship between the level of corruption and the ratio of FDI flows to domestic investment flows.

It should be noted that a number of our simplifying assumptions above do not drive our results. For example, our assumption of a uniform distribution for the productivity shock resulted in a widening of the tails of the distribution, where monitoring is not required to identify the worker's type. Using a more standard distribution, such as a normal, the probability space where monitoring was required would be likely to increase, and thereby increase the property rights advantage of the domestic firm in a corrupt environment.

Another simplification noted earlier was the implicit combination of monitoring and enforcement activities. While the domestic entrepreneur is likely to enjoy advantages in both of these activities, as specified above, one could imagine a situation where relative advantages in monitoring may differ by industry. Holding enforcement costs equal, we may see multinational investment relatively specialized in industries in which foreign firms enjoy relative advantages in monitoring costs. For example, multinationals may enjoy managerial advantages in some industries, which may correspond to reduced monitoring costs, but may suffer from the enforcement disadvantages alluded to above.

Finally, the wage premium result above came from the specification of property rights limitations concerning the enforcement of labor effort. However, one could easily imagine a scenario where the employment of capital also resulted in enforcement problems. In future work, we will also allow for property right limitations to arise in this dimension.

Appendix

This Appendix summarizes the derivation of the claims discussed in the paper.

1. Proof of Claims 1 and 2

The first order conditions corresponding to the entrepreneur's problem are:

$$\frac{dV}{dL} = \beta \frac{E(Y)}{L} E(lc) = 0$$

(A.1) $$\frac{\partial V}{\partial K} = \alpha \frac{E(Y)}{K} - (1+\rho) = 0$$

$$\frac{\partial V}{\partial \phi} = -L \frac{\partial E(lc)}{\partial \phi} = 0$$

Note that around the equilibrium

(A2) $$V''_{L,\phi} = -\frac{\partial E(lc)}{\partial \phi} = 0\,,$$

where the last equality follows from the first order condition (A1) determining the threshold in order to minimize the expected cost of employing a worker. In addition, note that

(A3) $$V''_{K,c} = V''_{K,\phi} = V''_{\phi,L} = V''_{\phi,K} = 0\,.$$

It is easy to confirm that

(A4) $$V''_{\phi,\phi} < 0; \quad V''_{\phi,c} < 0; \quad V''_{L,c} < 0\,.$$

The comparative static of the system are determined by

(A5)
$$\begin{bmatrix} V''_{K,K} & V''_{K,L} & 0 \\ V''_{L,K} & V''_{L,L} & 0 \\ 0 & 0 & V''_{\phi,\phi} \end{bmatrix} \begin{bmatrix} dK/dc \\ dL/dc \\ d\phi/dc \end{bmatrix} = -\begin{bmatrix} 0 \\ V''_{L,c} \\ V''_{\phi,c} \end{bmatrix}.$$

It is easy to confirm that the second order conditions for maximization hold, and the determinate of the system is negative.

Hence,

$$sign[dK/dc] = -sign\begin{vmatrix} 0 & V''_{K,L} & 0 \\ -V''_{L,c} & V''_{L,L} & 0 \\ -V''_{\phi,c} & 0 & V''_{\phi,\phi} \end{vmatrix} = -sign\left[V''_{\phi,\phi} V''_{K,L} V''_{L,c}\right] < 0.$$

Applying similar methodology, we infer that part A of proposition 1 follows from (A5) and (A4).

Applying the first order conditions (A1), and the Cobb-Douglas output specification (1), it follows that the optimal capital and labor levels, denoted by $\tilde{K}$ and $\tilde{L}$, is

(A6)
$$\tilde{K} = \left\{ [1-(1-\chi)b] \frac{A\alpha^{1-\beta}}{(1+\rho)^{1-\beta}} \frac{1}{[E(lc)]^{\beta}} \right\}^{1/(1-\alpha-\beta)}$$

$$\tilde{L} = \tilde{K} \frac{\beta(1+\rho)}{\alpha E(lc)}$$

Note that, applying the envelope theorem, (A7) $$\frac{dE(lc)}{dc} = \frac{\partial E(lc)}{\partial \phi}\frac{d\phi}{dc} + \frac{\partial E(lc)}{\partial c} = \int_{1-\bar{\varepsilon}}^{\phi} (\frac{b}{\chi} + a)\frac{1}{2\bar{\varepsilon}} d\varepsilon + \int_{(1-\bar{\varepsilon})\chi}^{1-\bar{\varepsilon}} \frac{b}{\chi 2\bar{\varepsilon}} d\varepsilon > 0 .$$

Hence, higher enforcement costs would increase the expected cost of employing labor, reducing thereby the optimal investment, hence

(A8) $$\frac{d\tilde{K}}{dc} < 0 .$$

Similar analysis implies that $\frac{d\tilde{L}}{dc} < 0$.

Note that Claim 2 then follows directly from equation (A.6).

2. Proof of Claim 3

By equation (A6) if follows that

(A9) $$\frac{\tilde{K}*}{\tilde{K}} = \left\{\frac{[E(lc)]}{[E(lc*)]}\right\}^{\beta/(1-\alpha-\beta)}$$

Hence, given that $c^* = \psi c$

(A10) $$\frac{d\log\left(\frac{\tilde{K}*}{\tilde{K}}\right)}{dc} = \frac{\beta}{1-\alpha-\beta}\left\{\frac{Q}{E(lc)} - \frac{\psi Q*}{E(lc*)}\right\}$$

or

(A11) $$\frac{d\log\left(\frac{\tilde{K}*}{\tilde{K}}\right)}{dc} = \frac{\beta}{1-\alpha-\beta}\frac{1}{c}\left\{\frac{cQ}{E(lc)} - \frac{c*Q*}{E(lc*)}\right\}$$

Note that

(A12) $$\frac{d\left[\frac{cQ}{E(lc)}\right]}{dc}=\frac{Q}{\left[E(lc)\right]^{2}}\left[E(lc)-cQ\right]>0\,.$$

Applying (A12) to (A11) we can infer that

(A13) $$\frac{d\log\left(\frac{\tilde{K}*}{\tilde{K}}\right)}{dc}<0\,.$$

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Table 1. Summary Statistics

1. Developing Nations

	Mean	Minimum	Maximum	Standard Deviation	# of Countries
$Corrupt_i$	4.6684	0	8.3333	1.7595	76
$FDI / GFCF_i$	0.1049	-0.0930	0.3811	0.0957	76
FDI / PVT_i	0.1861	-0.0019	0.7056	0.1613	42
$Ores \& Metals_i$	10.178	0.03	61.18	16.0499	50

2. Developed Nations

	Mean	Minimum	Maximum	Standard Deviation	# of Countries
$Corrupt_i$	8.8794	6.6667	10	1.0998	21
$FDI / GFCF_i$	0.1107	0.0021	0.3347	0.0900	21
FDI / PVT_i	0.1262	0.0027	0.3833	0.1047	10
$Ores \& Metals_i$	4.8495	0.95	16.98	4.0513	21

Note: $Corrupt_i$ is corruption index from Mauro (2000). Note that index is *decreasing* in domestic corruption level. $FDI / GFCF_i$ represents average ratio of inward foreign direct investment to gross fixed capital formation, while FDI / PVT_i represents ratio of inward foreign direct investment to private domestic investment. $Corrupt_i$ and $Ores \& Metals_i$ values are for 1989. $FDI / GFCF_i$ and FDI / PVT_i values are averages from 1990-1999.

TABLE 2. Impact of Corruption on FDI/GFCF.

I. *Full Sample*

	Weighted		Unweighted	
□	-0.029	-0.052	0.071**	0.030
	(0.038)	(0.041)	(0.029)	(0.022)
Corruption	0.023**	0.022**	0.007	0.014**
	(0.007)	(0.008)	(0.005)	(0.005)
Developed	-0.098**	-0.078**	-0.025	-0.049
	(0.029)	(0.029)	(0.030)	(0.033)
Ores and Metals		0.004**		0.001*
		(0.002)		(0.001)
# of obs	97	71	97	71
R-squared	0.15	0.22	0.02	0.09

II. *Developed Nations*

	Weighted		Unweighted	
□	-0.207*	-0.179	-0.104	-0.110
	(0.108)	(0.116)	(0.130)	(0.130)
Corruption	0.032**	0.026*	0.024	0.028*
	(0.013)	(0.015)	(0.015)	(0.015)
Ores and Metals		0.007		-0.005
		(0.006)		(0.004)
# of obs	21	21	21	21
R-squared	0.16	0.23	0.09	0.14

III. *Developing Nations*

	Weighted		Unweighted	
□	0.019	0.001	0.079**	0.035
	(0.024)	(0.029)	(0.031)	(0.031)
Corruption	0.013**	0.014**	0.006	0.013**
	(0.004)	(0.005)	(0.006)	(0.005)
Ores and Metals		0.002**		0.001*
		(0.001)		(0.001)
# of obs	76	50	76	50
R-squared	0.13	0.25	0.01	0.11

Note: Estimation by ordinary least squares. White's heteroskedasticity-adjusted standard errors in parentheses. ** indicates significance at a 5 percent confidence interval. * indicates significance at a ten percent confidence level.

TABLE 3. Impact of Corruption on FDI/PVT.

I. Full Sample

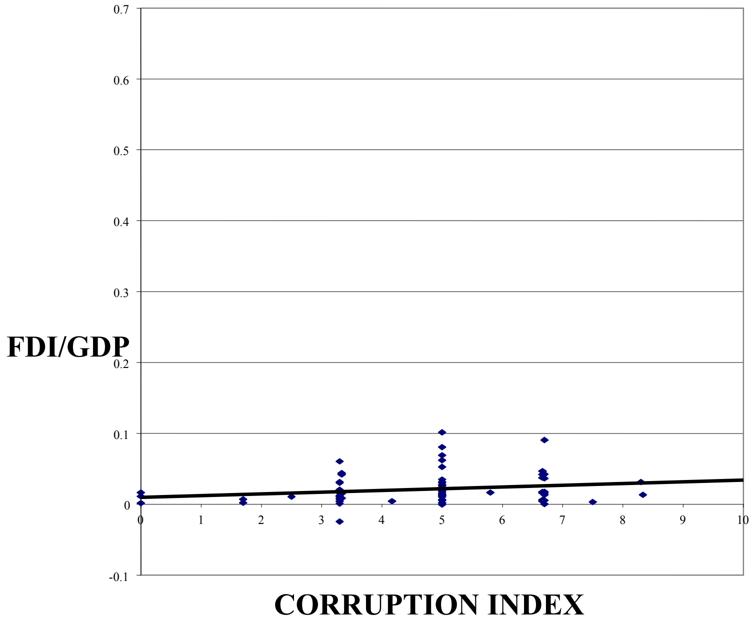
	Weighted		Unweighted	
	-0.004	-0.017	0.152*	0.077**
	(0.054)	(0.058)	(0.077)	(0.036)
Corruption	0.028**	0.025*	0.008	0.014*
	(0.012)	(0.014)	(0.013)	(0.008)
Developed	-0.180**	-0.157*	-0.094	-0.098
	(0.078)	(0.087)	(0.063)	(0.060)
Ores and Metals		0.003*		0.003
		(0.002)		(0.002)
# of obs	52	43	52	43
R-squared	0.26	0.31	0.03	0.18

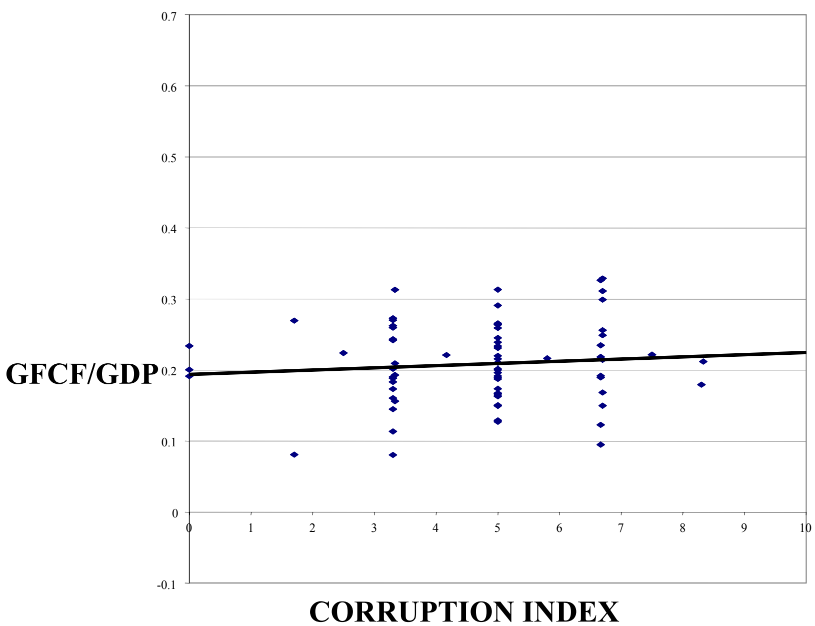
II. Developing Nations

	Weighted		Unweighted	
	0.003	-0.008	0.147*	0.066*
	(0.056)	(0.067)	(0.078)	(0.035)
Corruption	0.026**	0.026	0.009	0.016*
	(0.013)	(0.016)	(0.014)	(0.008)
Ores and Metals		0.002		0.003
		(0.002)		(0.002)
# of obs	42	33	42	33
R-squared	0.18	0.20	0.01	0.21

Note: Estimation by ordinary least squares. White's heteroskedasticity-adjusted standard errors in parentheses. ** indicates significance at a 5 percent confidence interval. * indicates significance at a ten percent confidence level.

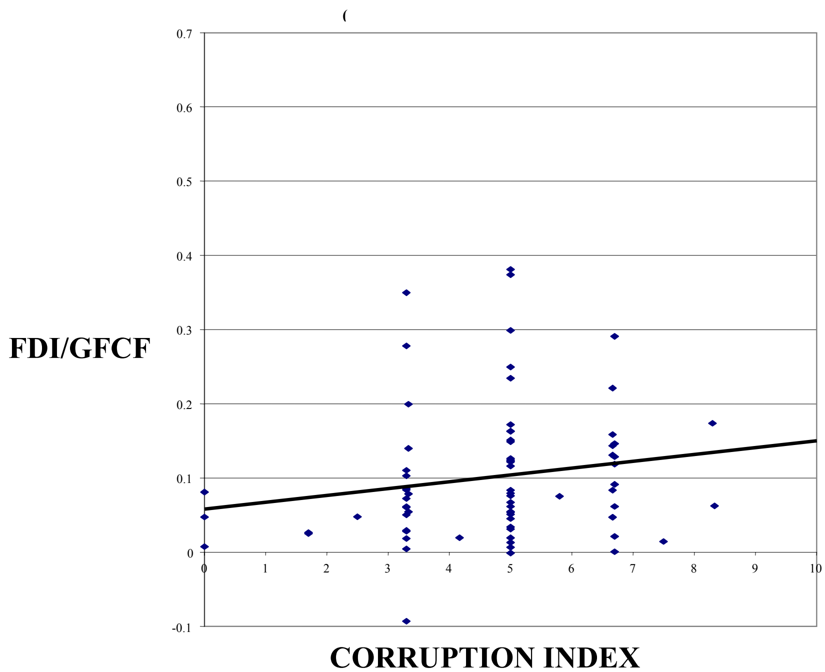
Figure 1. Investment Flows vs. Corruption.

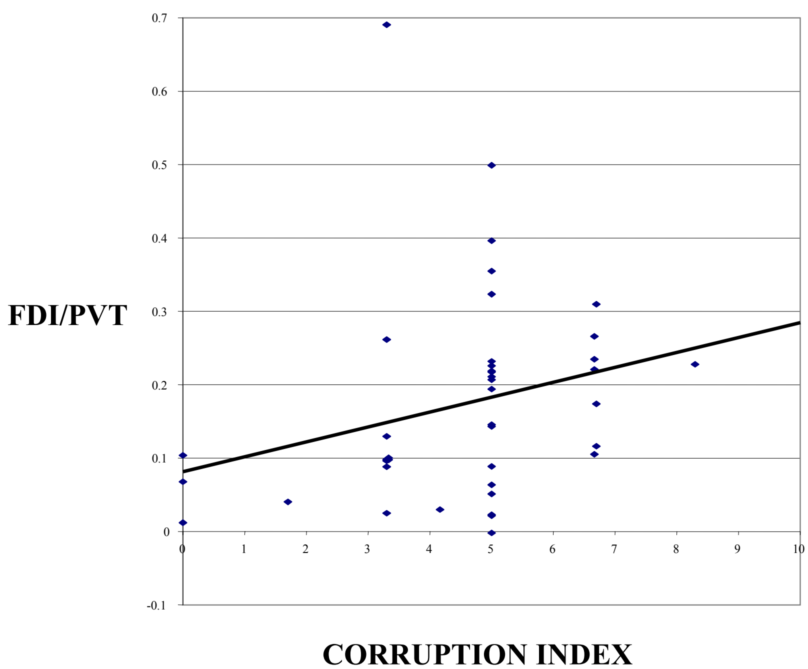




Note: Developing country sample. Corruption index based on a scale of 1 to 10, with 10 representing *lowest* level of corruption. Data are averages of flows from 1990-1999. GFCF represents gross fixed capital formation.

Figure 2. FDI Ratios vs. Corruption.





Note: Developing country sample. Corruption index based on a scale of 1 to 10, with 10 representing *lowest* level of corruption. Data are averages of flows from 1990-1999. GFCF represents gross fixed capital formation. PVT represents private investment flows. See text for details.