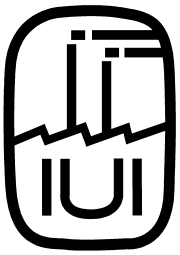

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Asymmetric Effects of Corruption on FDI: Evidence from Swedish Multinational Firms

by Katariina Hakkala, Pehr-Johan Norbäck and Helena Svaleryd

IUI, The Research Institute of Industrial Economics
P.O. Box 5501
SE-114 85 Stockholm
Sweden

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Evidence from Swedish Multinational Firms*

Katariina Hakkala†, Pehr-Johan Norbäck‡and Helena Svaleryd§

Abstract

We examine the effect of corruption on foreign direct investments. Our model shows that corruption may have different effects on investments aimed at *selling to* a local market, in comparison to investments aimed at *selling from* the corrupt market. Using Swedish firm-level data, we find that affiliate local sales decrease with corruption, while affiliate exports increase. Finally, corruption has a negative effect on the probability that a foreign firm will invest in a country. These results are consistent with theory when bribing reduces production costs and local firms have an advantage in bribing vis à vis foreign firms.

Keywords: FDI, corruption, multinational firm

JEL classification: D73, F21, F23

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†The Research Institute of Industrial Economics, P.O. Box 5501, SE-114 85 Stockholm, Sweden, phone +46-8-665 4534. Corresponding author, E-mail KatariinaH@iui.se

‡The Research Institute of Industrial Economics, P.O. Box 5501, SE-114 85 Stockholm, Sweden, phone +46-8-665 4522. E-mail PJN@iui.se

§The Research Institute of Industrial Economics, P.O. Box 5501, SE-114 85 Stockholm, Sweden, phone +46-8-665 4529. E-mail HelenaS@iui.se

1. Introduction

In the public debate, corruption is generally portrayed as an important barrier to foreign direct investments (FDI) that has a negative effect on the business environment. Economic theory proposes several mechanisms explaining why corruption is detrimental to investments. For example, corruption can act as a tax on investments, or may increase the insecurity about costs and thereby deter foreign direct investments FDI (e.g. Shleifer and Vishny, 1993, and Wei, 1997). On the other hand, it has also been suggested that bribery may be an efficient way of circumventing regulations and ineffective legal systems and may, in fact, help foreign investors enter a market (e.g. Lui, 1985, and the discussion in Bardhan, 1997).

In this paper, we re-examine the relationship between foreign direct investments and corruption. Our contribution is to show, both theoretically and empirically, that corruption may have a non-uniform effect on different affiliate activities. We present a stylized model where, through acts of local officials, corruption affects the production costs of local and foreign firms. With the model, we show that the impact of corruption on different types of investment varies depending on whether bribing leads to an increase or a decrease in marginal costs and whether local or foreign firms have an advantage in bribing.

We evaluate the effect of corruption on affiliate activities, using unique firm-level data on Swedish multinational firms (MNEs). In the empirical analysis, we split total affiliate sales into three sub-components: exports back to the home country, exports to third countries and local sales to the host-country market. Using a host of control variables associated with explaining FDI, we find (i) that corruption decreases the probability of investing in a country. However, given that an investment takes place, we find (ii) that local sales of affiliates decrease with corruption; while (iii) affiliate exports to Sweden, and, to some extent, exports to third markets

increase with corruption.

These results are robust to a number of different specifications of the empirical model and consistent with the theoretical model when assuming that paying bribes leads to a reduction in marginal costs and local firms receive a more favorable treatment and larger cost reducing benefits than the investing firms. This could, for instance, be due to local firms' knowledge or links to a network of corrupt officials.

In terms of the terminology used in the literature on FDI, our results thus illustrate that market-seeking horizontal investments, measured as local sales, may be deterred by corruption. On the other hand, vertical investments, primarily made to get access to lower production costs and measured as exports to the home country may benefit from corruption. In our theoretical framework, corruption unambiguously increases affiliate profits from exporting back to the home country, when paying bribes leads a reduction in production costs. In contrast, the affiliate production for local sales decreases in corruption, despite the lower production costs, since competition on the product market is intensified due to local firms' relative advantage in bribing. How corruption affects the entry decision of a firm then depends on the balance of these two opposing effects and the size of the bribes (net any fixed cost savings due to bribes) commanded by the corrupt officials.

Previous empirical studies investigating the effect of corruption on FDI have generally found corruption to be detrimental to investment. For instance, Wei (2000) examines the effect of taxation and corruption on FDI using a sample covering bilateral stocks of FDI. He shows that an increase in either tax rate or level of corruption reduces inward foreign direct investment. Negative effects are also found in Hines (1995) when studying the effects of a law criminalizing bribery to foreign officials on investments conducted by U.S. multinational firms. Smarzynska and Wei (2000) use firm-level data for investments in Eastern Europe and the former Soviet

Union and show that corruption in a host country reduces the probability of an investment. In this paper, we provide new insights into the effects of corruption on FDI by dividing the investments into different types of affiliate activities. Moreover, our paper is the first to study the effect of corruption both on the probability that a firm will invest and the level of affiliate production, once an investment takes place.

We also present some results indicating that firm characteristics can influence the impact of corruption on FDI, both the probability of investing in a country and the size of the investment. In particular, R&D-intensive firms are less deterred in corrupt countries relative to other firms when deciding whether to invest. Given that R&D intensity translates into more power to refuse to pay bribes, this suggests the bargaining power of a firm to influence the cost of corruption. This result is in line with Svensson (2003), who shows that public officials demand less bribes from firms with greater bargaining strength. Moreover, a firm's experience of the market seems to reduce the negative effect of corruption on local sales, suggesting that MNEs' bribing disadvantage relative to local firms decreases with experience.

Some limitations of the analysis should be mentioned. While we have very detailed firm-level and affiliate level information on Swedish MNEs, in terms of variables such as R&D or sales flows, our corruption measure builds on different types of available indexes. As noted by Wei (2000), these indexes provide less detailed information than what is used in models of corruption such as Shleifer and Vishny (1993) and indeed also in the modelling framework employed here.

To the best of our knowledge, the theoretical papers on corruption and FDI focusing on product market interaction are very few. An exception is Fields et al. (2003) who investigate the effect of alternative anti-corruption policies on FDI in a setting where firms' decision on FDI entry depends on the bribes paid to corrupt officials and the competition in the local market. Their analysis shows corruption in the host country to distort a foreign firm's entry decision

by affecting the competition in the local market through its differential impact on the costs of foreign and local firms. Our paper makes an important extension to the literature by showing that host country corruption may have *differential* effects on horizontal investments, seeking to serve the local market, and vertical investments, primarily seeking lower production costs to serve external markets.[1]

This paper is structured as follows: the next section develops a model which highlights that the effects of corruption on different investment flows may not be uniform. In Section 3, we present the empirical model and discuss the choice of proxies and the data. The results are presented in Section 4, while Section 5 concludes.

2. Corruption and FDI - a theoretical framework

Consider a (potentially) multinational firm m, which can sell a homogenous good on two segmented markets: in its home country, labeled Country 1, and in a foreign country, labeled Country 2. We assume that firm m has a monopoly in Country 1 and in Country 2, firm m faces Cournot competition from n_2 symmetric local firms, which we label $l_1, l_2, ..., l_{n_2}$. Firm m has existing production facilities in Country 1, but faces the option of investing abroad by setting up a production facility, which may serve local demand in Country 2 as well as home demand in Country 1. The interaction is as follows: in stage one, firm m chooses whether to invest in an additional plant in Country 2 at a fixed cost G. Due to corruption, the firm must also pay a fixed bribe B to a corrupt official. In stage two, product market interaction takes place.

To highlight the effects of corruption on firm m's investment decision, we will make a number of simplifying assumptions. First, if firm m invests in Country 2, all production is located to the foreign plant. To ensure this, Country 2 has prohibitive tariffs on imports ruling out direct

[1] Our work is also related to Kugler et. al (2005) in the respect that we focus on product-market effects and corruption, although their paper deals with organized crime and corruption.

exports as an alternative for firm m to serve this market. Production costs in Country 2 are also lower than in Country 1, while Country 1 has zero tariffs on imports, providing an incentive to offshore the production sold in the home market. Second, local firms in Country 2 can neither invest into nor export to Country 1 due to, for instance, lack of knowledge or capacity, or high fixed costs in opening such operations. These assumptions are taken for expositional reasons. In the Appendix, we show that the model can, for instance, be extended by allowing for exports by Country 2 firms while not qualitatively affecting the results.

The resulting possible locations for production and sales are illustrated in Figure .1. Let $q_{i,jk}$ denote the sales by firm i in market j produced in country k. When investing (FDI), firm m locates its entire production to a plant in Country 2 and sells to the home Country 1 (labeled $q_{m,12}$) as well as the local market in Country 2 (labeled $q_{m,22}$). For further use here, we will refer to $q_{m,22}$ as "affiliate local sales" and $q_{m,12}$ as "affiliate export sales". If no investment takes place (No FDI), firm m only produces and sells on the home market ($q_{m,11}$). Sales and production in by the n_2 (symmetric) local firms only occur in Country 2 (labeled $q_{l,22}$) .

[Figure 1 here]

Referring to the theoretical literature on FDI, the investment by firm m has a horizontal motive, through establishing market access (by avoiding the trade costs in Country 2 when producing and selling locally), as well as a vertical motive in reducing production costs (by relocating production to foreign Country 2 with lower production costs and exporting back to the home market in Country 1).

Let us now discuss in which ways corruption may have an impact on FDI. The most common form of corruption directly met by business is financial corruption in the form of demands for

special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or other public services.[2] Such corruption implies additional costs for a firm in the form of bribes, but it may also be cost-reducing given that bribing leads to advantages such as a preferential tax treatment, reduced costs for licenses and permits or a faster handling of bureaucratic procedures. Firms may thus reduce both their fixed and marginal costs in exchange for bribes to corrupt officials.

Another aspect of corruption, previously discussed by e.g. Fields et al. (2003), is that corruption may have a different impact on multinational and indigenous firms. In fact, some evidence indicates that indigenous or local firms are more likely to pay bribes than foreign firms.[3] This might imply that indigenous firms are advantaged in bribing relative to foreign firms, due to their local knowledge or links to a network of corrupt officials. But there are also examples where multinationals might get better treatment. For instance, some developing countries offer foreign firms special treatment in terms of lower start-up costs and tax holidays to attract FDI. Local officials may have less bargaining power over multinationals, since they have better outside options and can use laws in their own countries as a binding constraint of the bribe they offer.[4]

As is evident from the discussion above, it is not clear how corruption affects firms' costs. To generate testable predictions on how corruption affects a firm's decision to invest in a country, we will adopt a general approach and examine the investment decisions for a variety of ways in which corruption may affect firms' costs. Thus, we define corruption in Country 2 as follows:

Definition 1. *Corruption is a quadruple* $(B, \Gamma, \Delta, \rho)$*, where* $B > 0$ *measures bribes as a fixed*

[2] Svensson (2003) finds that Ugandian firms which do not pay graft operate in sectors with little or no contact with the public sector, where they receive less public services, are less involved in foreign trade and pay fewer types of taxes.

[3] The Transparency International Bribe Payers Index, calculated for 15 countries in 2002, covers how common it is that companies from leading export countries pay bribes to leading officials. This index shows that local firms have a very high propensity to pay bribes and that this propensity is higher than any propensity of the foreign firms active in these countries.

[4] An example of such constraints is the US Foreign Corrupt Practices Act of 1977.

cost of corruption, $\Gamma > 0$ *measures fixed cost savings due to bribing,* Δ *measures how corruption affects firms' marginal costs and* $\rho > 0$ *measures if corruption has a differential effect on marginal costs in firm* m *and the set of local firms* $l_1, ...l_{n_2}$.

If firm m invests in Country 2, it needs to pay a corrupt official a fixed bribe, B. We assume that without bribing, firm m cannot invest because the official can otherwise stall or terminate the investment. For simplicity, the size of bribe B is exogenously fixed according to some focal point or norm among corrupt officials.[5] We also abstract from the risks associated with bribing in terms of potential sanctions, if corruption is revealed. Finally, to highlight the effect of corruption on the FDI decision, corruption is absent in the home market in Country 1.[6]

If firm m invests in Country 2, it will locate its entire production into this country, which gives us the following total profit function:

$$\Pi_m^{FDI} = \underbrace{[P_2(Q_2) - c_{m,2}]\, q_{m,22}}_{\text{Variable profit: affiliate local sales}} + \underbrace{[P_1(q_{m,12}) - c_{m,2}]\, q_{m,12}}_{\text{Variable profit: affiliate export sales}} - B - [G - \Gamma], \qquad (2.1)$$

where $P_j(Q_j)$ is the inverse demand in market j and Γ is any savings in fixed costs associated with bribing. Corruption affects firm $m's$ marginal costs $c_{m,2}$ in Country 2 in the following way:

$$c_{m,2} = \bar{c}_2 - \Delta > 0, \qquad (2.2)$$

where $\bar{c}_2$ captures the general cost levels for inputs in Country 2. Note that $\Delta > 0$ implies that paying bribes yields cost reductions, whereas $\Delta < 0$ implies that corruption is "taxing" of production.

[5] Extensions to a bargaining framework is discussed in section 4.4.

[6] In the empirical analysis, we shall use outward investments for Swedish MNEs. Since Sweden is ranked as one of the least corrupt countries (Transparency International, 2003), this assumption is consistent with the data we will use.

The total profits for the symmetric local firms are:

$$\Pi_l = [P_2(Q_2) - c_{l,2}]\, q_{l,22}. \tag{2.3}$$

We shall take bribing as well as investments by local firms as given. This can be considered as if local firms have already established a relationship with corrupt officials, and sunk investments into bribes (and production capacity) before firm m's investment decision in stage 1. Local firms' marginal costs are given by:

$$c_{l,2} = \bar{c}_2 - \rho\Delta > 0. \tag{2.4}$$

Comparing (2.2) and (2.4), note that parameter $\rho > 0$ allows for an asymmetry between the local firms and the multinational firm in terms of how corruption affects their marginal costs. The asymmetry may be due to a differential treatment by corrupt officials, as discussed above.

Finally, when firm m does not invest in Country 2, it will only produce and sell in the non-corrupt home market and get the profits:

$$\Pi_m^{NoFDI} = [P_1(Q_1) - c_{m,1}]\, q_{m,11}. \tag{2.5}$$

The marginal cost when producing and selling in Country 1 is:

$$c_{m,1} = \bar{c}_1, \tag{2.6}$$

where $\bar{c}_1$ captures the general cost levels for inputs in the home country.[7] We now proceed to solve the model by backward induction.

[7] From (2.2) and (2.6), our assumption of firm m locating its entire production in Country 2 when investing implies that $\bar{c}_1 > \bar{c}_2$.

2.1. Stage 2: Corruption and affiliate sales

For simplicity, let inverse demand in market j be linear, i.e.:

$$P_j(Q_j) = a_j - \frac{Q_j}{s_j} \tag{2.7}$$

where s_j is the size of the market and a_j is the willingness to pay.

Let us first characterize the product market competition when firm m invests in Country 2.

Bribes associated with marginal cost reductions. Start with the case when paying a bribe B reduces a firm's marginal costs, i.e. $\Delta > 0$. As noted above, this could arise when the corrupt official/or officials can reduce taxation or costly regulations. To explore the effects of bribes on affiliate local sales, use (2.1)-(2.4) and (2.7) to derive the Nash-equilibrium in market 2:

$$q^*_{m,22}(\Delta) = s_2 \frac{\Lambda_2 + \Delta(n_2 + 1 - \rho n_2)}{n_2 + 2}, \qquad q^*_{l,22}(\Delta) = s_2 \frac{\Lambda_2 + \Delta(2\rho - 1)}{n_2 + 2}, \tag{2.8}$$

where $q^*_{m,22}(\Delta)$ is affiliate local sales by firm m in the host market in Country 2 (while $q^*_{l,22}(\Delta)$ is local sales by each of the n_2 symmetric indigenous firms) and where $\Lambda_2 = a_2 - \bar{c}_2$.

We then have the following Lemma:

Lemma 1. *Let bribes B reduce the marginal costs, $\Delta > 0$. (i) Affiliate local sales by firm m increase in corruption, if the advantage for local firms of obtaining cost reductions from bribing is limited in size, i.e. $\frac{dq^*_{m,22}(\Delta)}{d\Delta} > 0$ iff $\rho < \hat{\rho} = \frac{n_2+1}{n_2}$. (ii) Affiliate local sales by firm m decrease in corruption, if local firms obtain a sufficiently advantageous cost reduction from bribing, i.e. $\frac{dq^*_{m,22}(\Delta)}{d\Delta} < 0$ iff $\rho > \hat{\rho} = \frac{n_2+1}{n_2}$.*

Lemma 1 has a simple intuition. For instance, if firm m receives a symmetric cost-reduction

as compared to local firms (i.e. if $\rho = 1$), both types of firms will face an increase in marginal profitability of sales and expand their output from (2.8). However, if local firms obtain a better treatment in terms of larger cost reductions, these firms can commit to a larger increase in sales. If this advantage is small (i.e. if $\rho \in (1, \hat{\rho})$), affiliate local sales by firm m still increase. But when the advantage is sufficiently large (i.e. $\rho > \hat{\rho}$), firm m will now reduce its affiliate local sales, despite the cost reduction from bribing, to dampen the associated reduction in price on the local market.

Now, turn to the effect of bribes on sales to the home country. Thus, use (2.1), (2.2) and (2.7) to derive *affiliate export production,* that is, the production for sales of firm m destined to the home market in Country 1, as:

$$q^*_{m,12}(\Delta) = s_1 \frac{\Lambda_{12} + \Delta}{2}, \tag{2.9}$$

where $\Lambda_{12F} = a_1 - \bar{c}_2$. Hence, affiliate exports will always increase when the cost reduction from bribes (Δ) increases.[8]

To summarize, for the case when corruption induces either a fairly symmetric or advantageous cost reductions for firm m, both affiliate sales $q^*_{m,22}$ and affiliate export sales $q^*_{m,12}$ increase in corruption. This is indicated by specification (i) in Table 1. When corruption delivers a sufficiently biased cost-reduction favoring local firms, the effect on affiliate sales is non-uniform. While affiliate local sales decrease in corruption due to stiffer competition, affiliate exports back

[8]Note that if local firms could also export to Country 1, the affiliate export production would also decrease in corruption (Δ). However, in a more realistic setting, there would be firms in Country 1 without capabilities of selling into foreign markets. Indeed, as shown by Helpman, Mellitz and Yeaple (2004), firms in a country will typically differ in production capabilities and only the most productive firms are able to invest abroad. If extending the model such that only a subset of the firms in each country are able to sell abroad (while maintaining all other assumptions), it is easily shown that (i) Lemma 1 still applies for affiliate local sales by firm m, while (ii) affiliate export sales by firm m will increase in corruption (Δ), unless the cost advantage (ρ) for local firms in Country 2 is not extremely large. Thus, the results in specification (ii) in table 1 will hold, even when allowing for exports by local firms in Country 1. Proof is available upon request.

to the home country increase, since the costs for exporting are still reduced. These effects are indicated by specification (ii) in Table 1.

[Table 1 here]

Bribes associated with marginal cost increases. Corruption can also increase firms' marginal costs implying that $\Delta < 0$ in (2.2) and (2.4). From (2.9), affiliate exports always decrease in $|\Delta|$ due to the associated increase in production costs. Using (2.8), if the marginal cost increase from corruption is fairly symmetric or smaller for the indigenous firms (i.e. if $\rho < \hat{\rho} = \frac{n_2+1}{n_2}$), affiliate local sales decrease. These effects are summarized in specification (iii) in Table 1.

In contrast, affiliate sales on the local market will increase when firm m has a an advantage over local firms (i.e. if $\rho > \hat{\rho} = \frac{n_2+1}{n_2}$). This is summarized in specification (iv) in Table 1. Since affiliate exports decrease in $|\Delta|$, corruption once more has an asymmetric effect on different types of investments, with reversed signs as compared to specification (ii).

No investment by firm m. Now, turn to the case when firm m does *not* invest in Country 2, and only sells and produces in its home market in Country 1. Use (2.5), (2.2) and (2.7) to derive:

$$q^*_{m,11}(0) = s_1 \frac{\Lambda_1}{2}, \tag{2.10}$$

where $\Lambda_1 = a_1 - \bar{c}_1$. By our assumption of Country 1 being non-corrupt, sales $q^*_{m,11}$ are unaffected by corruption.

2.2. Stage 1: Corruption and the Investment Decision by firm m

To characterize the investment decision, it is convenient to derive reduced-form profits. From the linear demand (2.7), it follows that the reduced-form *variable* product market profits for firm m in terms of affiliate local sales, affiliate exports and home production for home sales can be written as:

$$\pi^*_{m,jk} = \frac{1}{s_j}[q^*_{m,jk}]^2, \tag{2.11}$$

where optimal affiliate sales $q^*_{m,jk}$ are given by (2.8), (2.9) and (2.10).

The investment decision of firm m is then:

$$\begin{aligned} Max \quad &: \quad \left\{\Pi_m^{FDI}, \Pi_m^{NoFDI}\right\} \\ st \quad &: \quad \Pi_m^{FDI} = \pi^*_{m,22} + \pi^*_{m,12} - B - [G - \Gamma] \\ st \quad &: \quad \Pi_m^{NoFDI} = \pi^*_{m,11}. \end{aligned} \tag{2.12}$$

Firm m will invest if the profits from investing Π_m^{FDI} are larger than the profits from producing and selling on the home market Π_m^{NoFDI}, i.e. when the profits from the host market in Country 2, $\pi^*_{m,22}$, plus the net profit from less costly home sales, $\pi^*_{m,12} - \pi^*_{m,11}$, are larger than the net fixed cost of establishing production abroad $B + [G - \Gamma]$.

Assume the parameter values to be such that $\Pi_m^{FDI}(\mathbf{z}) = \Pi_m^{NoFDI}(\mathbf{z})$ holds where $\mathbf{z}$ is the vector of exogenous variables in the model. The upper part of Table 1 then summarizes the effects of a comparative statics exercise on firm m's investment decision, using the components of corruption in Definition 1. From (2.12), it directly follows that an investment is less likely when a corrupt official demands more bribes in terms of the fixed bribing cost B, and more likely

when bribes incur a larger fixed cost reduction Γ. The result when bribes affect marginal costs through parameter Δ is less clear-cut.

Start with the case when bribing reduces marginal costs, i.e $\Delta > 0$. If firm m receives a similar or more advantageous cost reduction than local firms (specification (i) in Table 1), it follows from Lemma 1, (2.9) and (2.11) that firm m will face larger profits from both affiliate local sales and exports when Δ increases, and FDI thus becomes more likely. However, if local firms are put at an advantage (specification (ii) in table 1), it follows that affiliate local sales decrease, while affiliate export sales increase, making the total effect on the investment decision ambiguous. The total effect on the investment decision will then be related to the relative importance of affiliate local sales and affiliate exports.[9]

Then, turn to the case when corruption is associated with increased marginal costs, i.e $\Delta < 0$. If firm m gets a similar or worse treatment than local firms (specification (iii) in Table 1), firm m will face lower profits from both affiliate local sales and exports, and FDI is less likely. If local firms are disadvantaged (specification (iv) in Table 1), affiliate local sales and affiliate export sales are once more inversely affected, making the total effect on the investment decision ambiguous.

We now turn to the empirical analysis.

3. Econometric Analysis

The theoretical framework has shown that corruption may have non-uniform effects on different types of FDI. The rather clear predictions on output flows are summarized in Table 1. The

[9] For instance, differentiation $\Pi_m^{FDI}(\Delta)$ with respect to Δ under the assumption specification (i), we have:

$$\frac{d\Pi_m^{FDI}(\Delta)}{d\Delta} = -2\underbrace{\frac{\rho n_2 - (n_2+1)}{n_2+2}}_{\substack{(+)\\ \text{Specification (ii)}}} q^*_{m,22} + q^*_{m,12} \gtreqless 0.$$

The sign of the derivative will depend on the size of affiliate local sales $q^*_{m,22}$ and affiliate export sales $q^*_{m,12}$ which, in turn, are related to size, willingness to pay and size in the two countries, at the level of product market competition and the size of parameters ρ and Δ.

prediction on the probability of an investment is, however, ambiguous for most specifications. In the econometric analysis, we will study the impact of corruption on both the probability of a firm investing and the level of different types of investments, using a sample of Swedish multinational firms.

3.1. Econometric Model

The empirical analysis includes the two stages defined in the theoretical framework as illustrated by the predictions from Table 1. In the first empirical model, we thus study the effect of corruption on firms' decisions to invest in a country by estimating the likelihood of a country receiving investments from our sample firms:

$$DFDI_{ij} = \alpha_0 + \alpha_1 Corruption_j + \boldsymbol{\alpha}_2' \mathbf{x}_i + \boldsymbol{\alpha}_3' \mathbf{x}_j + \varepsilon_{ij} \tag{3.1}$$

$$\text{where: } \begin{cases} DFDI_{ij} = 1 & \text{if the firm } i \text{ has FDI in country } j \\ DFDI_{ij} = 0 & \text{otherwise,} \end{cases}$$

where $\mathbf{x}_i$ is a vector of the firm-specific variables, $\mathbf{x}_j$ is a vector of the country-specific variables and ε_{ij} is the usual error term. Corruption enters as a country-specific factor influencing the firms' choice of host countries.

In the second empirical model, we estimate the effect of corruption on affiliate sales given that investment has taken place, using a log-linear gravity equation. For firm i with affiliate sales in host country j, q_{ij}, we have:

$$q_{ij} = \beta_0 + \beta_1 Corruption_j + \boldsymbol{\beta}_2' \mathbf{x}_i + \boldsymbol{\beta}_3' \mathbf{x}_j + u_{ij}, \tag{3.2}$$

where $\mathbf{x}_i$, $\mathbf{x}_j$ and u_{ij} are defined as above. All variables in (3.1) and (3.2) except corruption are defined in logs (i.e. $x_{ij} = \ln(X_{ij})$) and all specifications use clustered standard errors since country-specific variables are repeated over firms. Corruption is proxied by index variables. We further discuss the other firm- and country-specific factors affecting FDI,[10] the choice of proxies and the data in the sections below. Correlation tables, a detailed description of the variables used and data sources are given in the Appendix.

3.2. Dependent Variables

We use data for Swedish multinational firms in manufacturing industries compiled by the Research Institute of Industrial Economics (IUI) from a questionnaire sent to all Swedish MNEs. The data has been collected approximately every fourth year since 1965. The survey covers almost all Swedish multinational firms in the manufacturing sector, their operations abroad, and detailed information on variables such as R&D, employment, production and internal and external trade flows.[11] Here, we use data for 1998. We use cross-section analysis since corruption measures are only available from the beginning of the 1990s, and show very little time variation.

Following the predictions from our stylized model, we decompose *total affiliate sales* into *affiliate exports back to Sweden*, and *affiliate local sales* to the host-country market.[12] As recent theories on FDI have expanded the standard two-country models to include more countries, we also use a third category, *affiliate exports to third countries*. This type of investment is interesting since it adds up to almost a quarter of all affiliate total sales.[13] As this represents sales to an external market, we expect the effect of corruption on exports to third markets to be similar to that of corruption on exports to the home market. Following Braconier et al. (2004), these

[10] For an exhaustive discussion, see Barba Navaretti and Venables (2004).

[11] Foreign affiliates of the multinational firms are included in the survey. In 1998, 97 out of 119 multinational firms reported the information required in this study for operations at the affiliate level.

[12] For firms with more than one affiliate in the same country, we compute sums over the affiliates.

[13] See, for instance, Ekholm et. al (2003) and Yeaple (2003).

different categories can broadly be considered as traditional vertical, horizontal and platform FDI. The largest part of affiliate sales is sales on the local market (64 percent of total sales), while the smallest category is sales back to Sweden (11 percent of total sales). Thus, investments appear to be predominantly horizontal in type.[14]

We use all four affiliate sales measures to estimate the OLS regression (3.2). In the probit estimation (3.1), the dependent variable takes on the value of one, if a firm has an affiliate in the host country and zero otherwise.

3.3. Measuring Corruption

In the theoretical model, corruption is defined by four components (see Definition 1): B (measuring fixed cost bribes to the official), Γ (measuring the fixed cost reduction from bribing), Δ (marginal cost increases or reductions due to bribes) and ρ (measuring whether the effect differs between local and investing firms). Since detailed measures of these factors do not exist, we must rely on the available measures of corruption which are typically indexes. All measures of corruption suffer from the limitation that they are based on subjective observations and/or surveys of respondents. Our primary measure of corruption is from the International Country Risk Group (ICRG). The ICRG measure is preferred to other corruption measures, because of its widespread country coverage. The measure is an assessment of corruption within the country's political system, which may be a threat to foreign investment, since it distorts the economic and financial environment and reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability. For robustness, we also use another measure of corruption: Transparency International Corruption Perception Index (TI)

[14] The situation is similar for affiliate sales from US MNEs. Local sales are somewhat less important, accounting for 56 percent of total sales. Exports back to the US account for 16 percent, while 28 percent are exports to other countries in 1998 (computed from BEA statistics).

from 1997. The TI is a composite index, making use of surveys of business people and assessments of country analysts. The ICRG and TI indexes give a higher value, the less corrupt is the country. For expositional reasons, we invert each index to derive measures which increase in corruption.[15]

Note that we cannot perfectly identify the channels by which corruption affects investing firms' costs. Our corruption variable *Corruption* on the probability of investing in (3.1) measures the aggregate effect of fixed and variable costs of corruption on the firm's investment choice. Inspecting Table 1, the theoretical model shows the aggregate effect to be ambiguous in sign. However, the effect of *Corruption* on affiliate sales in (3.2) should pick up the components of corruption, which affect firms' variable costs, i.e. Δ and ρ in Definition 1. Thus, in the latter estimate, we should be able to discriminate between the different effects of corruption as described in specifications (i)-(iv).

3.4. Additional Explanatory Variables

The literature on FDI have identified a number of factors that may influence investments abroad.[16] Theory on FDI suggests that host country market size should increase horizontal investments, while being less important for vertical investments. As can be verified in our theoretical framework, a large host market size should increase affiliate local sales, while affiliate sales back to Sweden should be less affected. We use two proxies of market size: gross domestic production of the host country (*GDP*), and a measure of market potential in the neighboring countries (*Market pot.*) developed by Harris (1954) and based on data on gross domestic production.[17]

[15] ICRG is re-calculated as *Corruption*=(6-ICRG)/6, where 6 is the maximum value of the ICRG index. The TI index is inverted in the same way.

[16] For a thorough discussion of the determinants of FDI and the proxies used in the literature, see Barba Naveretti and Venables, 2004.

[17] Country i's market potential is measured as $MP_i = \sum \frac{x_j}{d_{ij}}$, where x_j is the GDP of country j and d_{ij} a measure of the geographical distance between countries i and j. We have measured d_{ij} as the greater circle distance between capitals when $j \neq i$. The data is from Penn World Tables 6.

The latter is mainly hypothesized to increase affiliate sales to third countries.

Factor costs are expected to be most important for vertical FDI and hence, to affect affiliate exports most. Data for labor costs is not available for a large sample of countries and therefore, we proxy factor cost differentials by endowments of labor with primary or secondary education (*Labor*). More specifically, the measure of labor endowments is the percentage of the population aged 25 and above that attained primary or secondary education in 1999. We also include GDP per capita (*GDP / capita*) as a measure of labor productivity and general level of development. While having a smaller country coverage, we also make use of a direct measure for labor costs, with the hourly wage cost of a toolmaker (*Wage costs*). Wage costs are from Union Bank of Switzerland (UBS) and have previously been used in Braconier et al. (2004).

We will also take into account plant- and firm level economics of scale and trade costs as the previous literature has suggested them to be important determinants of FDI. Firm-level scale economies are likely to promote FDI, while plant-level economies of scale promote concentration of activity and discourage the breaking up of production into several plants. Plant-scale economies in the industry of the FDI activity (*Scale*) is defined as the average plant-level sales in four-digit industries according to Swedish Industry Classification (SNI). As proxies for firm-level scale economies we use firm size in terms of total sales (*Size*) and R&D expenditure in the total sales of the firm (*R&D*). R&D is identified as a firm-specific asset typically promoting FDI. However, this might not be the case among firms having already decided to produce abroad. An explanation is that technology transfer costs may be detrimental, particularly for horizontal FDI (Norbäck, 2001). We consider two components of trade costs: trade barriers and transportation costs. A greater circle distance between Sweden and a foreign country is used to proxy transportation costs (*Distance*). Distance is typically included in gravity models explaining the geographical pattern of trade, but it has been found to also have a negative effect on FDI (e.g.

Ekholm, 1998). Distance may proxy other barriers including cultural differences in addition to transportation costs. To construct measures of trade barriers, we use data on tariffs produced by UNCTAD.[18] Since trade barriers may have a different impact on vertical, horizontal and platform FDI, we aggregate tariffs differently, depending on the type of investment (*Tariff_hor,* *Tariff_ver* and *Tariff_plat*).[19] Tariffs are hypothesized to deter sales back to Sweden since they increase costs, but to increase investments for local sales since the motive for investment may be tariff-jumping.

In section 2, corruption is hypothesized to affect production costs in the host country. To isolate the effect of corruption, we need to control for other host country-specific factors determining costs. One such factor is the cost of investing in a country due to regulation. Although this is not easily measured, we make use of measures of the cost of entry presented in Djankov et. al. (2002). *Time* is the official time it takes to start-up a new firm in the country and *procedures* is the number of procedures required to go through before the entry of a new firm. Another factor that may be important for the firm's investment choice is local taxes. That taxes are important has been shown by, for example, Wei (2000) who finds host country taxes to deter aggregate investment. Moreover, Mutti and Gruber (2004) show that taxes may have asymmetric effects on FDI, with larger effects on investments geared toward export markets than other types of investment. We use the average corporate tax rate on profits (*Tax*) as a measure of tax.

[18] We also compute trade barrier variables for non-tariff barriers (*NTB*). The aggregation of NTBs is, however, rather ad hoc since NTB is a dummy variable solely indicating whether a certain type of NTB exists, without giving an indication of how extensive is its use. Regression results for NTBs are therefore not reported.

[19] Tariffs on exports to the home country are defined as those that firms encounter when exporting from the host country to Sweden (*Tariff_ver*). Tariffs affecting sales to the host market are the tariffs on exports from Sweden to the foreign country, since local sales are regarded as a substitute for exports from the home country (*Tariff_hor*). Finally, a firm producing abroad and exporting to a third country is affected by tariffs encountered in the third country. Since the third country, to which the exports are destined, is not reported by the affiliate firms, we compute aggregate tariffs encountered by the host country in the rest of the world (*Tariff_plat*). To compute the tariffs, we use a data set put together by Haveman that includes, for a particular year and country, tariff, non-tariff barriers and trade data at the six-digit HS industry level for 103 countries. All tariff variables are computed as unweighted or weighted averages at the level of a four-digit industry where the largest share of the affiliate production takes place. For a number of affiliates, the industry codes are available only at the two- or three-digit levels. We only report results for the unweighted mean tariffs.

Since the quality of the infrastructure may also affect local production costs, we include electricity consumption per capita (*Electricity*) and fixed and mobile phone subscribers per capita (*Telephones*).

A major problem with our measures of corruption is that they are subjective indexes. It is possible that, in fact, they measure the general level of institutional quality in the country and not only corruption. To control for this and the risk associated with investments in the country, we use other indexes from the International Country Risk Guide. These measure respect for law and order and bureaucracy quality. As expected, the correlations with our measures of corruption are high.

Another country characteristic that may have an impact on inward FDI is the existence of export processing zones, offering firms located in them free trade conditions and liberal regulatory environment, often including generous tax concessions. Although the zones have not always been successful as engines of growth, in many countries they may have attracted FDI and, in particular, vertical and platform FDI. Furthermore, we use a dummy variable to indicate whether a country has any export processing zones (*EPZ*). We also use region dummy variables based on free trade agreements, capturing ASEAN, EU/EFTA, NAFTA and MERCOSUR. Finally, we also add another set of geographical dummies for OECD, Sub-Saharan countries, Southeast and East Asia, and South America.

4. Results

4.1. Corruption and the Probability of Investment

First, we turn to the question of whether corruption affects the probability of a firm investing in a country by estimating (3.1). As can be seen in the first column of Table 2, corruption has

a negative impact on the FDI decision when controlling for other important factors. However, when we include the variable *Time* which describes how long it takes to start up a firm, the effect of corruption disappears. Thus, it seems to be the time it takes to start a firm that is of importance, rather than the corruption level.[20] This result is very interesting, given that the previous literature finds a negative effect of corruption on the probability that a firm will invest in a country (Smarzynska and Wei, 2000). The conclusion may change if start-up costs are included. However, Djankov et al (2002) show start-up costs and corruption to be positively correlated and suggest that countries with much corruption develop more regulation to get more bribes. In other words, start-up costs may be an indicator of corruption.

So far, we have implicitly assumed that the level of corruption in 1998 has an effect on the probability of the firm having affiliates in a particular country the same year. However, many investments were initially made decades earlier, thereby suggesting that it would be more appropriate to use the corruption level at the time when the decision was taken to conduct the initial investment. The problem is that none of the corruption measures are available for a longer period of time. Instead, we construct a sample where we only include countries where the firm did not have any investment in 1988, and study the effect of the corruption level in 1988 on the probability that the firm invested in a country in the following ten years. The other country-specific variables, except the tariff measures and *time*, are from the beginning of the period. As can be seen in the third column, the negative effect of corruption is highly significant. In the fourth column, we include firm start-up costs (*time*) and the result does not change. Thus, if we only study new investments, corruption deters investments and start-up costs have no impact.

Turning to control variables, the size of the foreign market seems to attract investments, but proximity to other larger markets (*Market Pot*) has no effect on the probability that the firm

[20] Using the number of procedures required to start up a firm yields similar results. Variables describing the cost in dollars of opening up a firm developed in Djankov et. al. (2002) are not as important.

will invest. This suggests that firms invest to sell on the local market. Distance to Sweden deters investments, as do the tariffs Sweden imposes on imports from a particular country. The last result is supportive of the view that firms invest abroad to sell back to Sweden. Firms in industries with large plant-level economies of scale are less prone to conduct FDI, which is consistent with the view of there being a horizontal motive for the investment. As is often found in studies of FDI, the size of the firm is important for the decision to invest. Interestingly, R&D-intensive firms seem to invest less when studying the whole sample, but this effect disappears when we only study new investments. Noticeable is also that our measure of human capital endowment has no effect and GDP per capita has a negative impact on the probability to invest.

In the last column, we add more control variables. A concern is that corruption may be a proxy for other country-specific factors, such as infrastructure. To control for this, the last column adds the variables *Electricity* and *Telephones* and region dummy variables based on free trade agreements. The inclusion of these variables has virtually no impact on the estimated effects in the basic specification. The result is also robust to the inclusion of other variables proxying quality of institutions (law and order and bureaucracy) and the average corporate tax rate on profits (*Tax*). However, when we exchange our corruption index for the Transparency International Corruption Perception Index (TI), the negative effect of corruption is no longer significant. It should be noticed, though, that this index is highly correlated with GDP per capita.[21]

[Table 2 here]

The general picture emerging from the above results is that the aggregate effect of corruption on the investment decision is negative. To further explore the impact of corruption, we now turn to

[21] All results are, of course, available upon request.

study the effect on different types of investments, given that the firm invests in the country.

4.2. Corruption and Affiliate Sales

Table 3 shows the results from estimating (3.2) for levels of FDI in logs for our four different FDI measures: total affiliate sales production; local sales; exports to Sweden; and exports to third countries. The results show that corruption has a differential impact on the different types of FDI. Corruption significantly increases exports to Sweden, but decreases local sales. Similar to Wei (2000), we find that the estimates produce surprisingly large effects. An increase of one grade in the corresponding ICRG measure from zero to six is associated with a 57 percent increase in exports to Sweden, and a 21 percent decrease in local sales. However, since local affiliate sales are, on average, about five times larger than affiliate exports to Sweden, these estimates imply a mere five-percent decrease in affiliate total sales.[22] Hence, when aggregating the negative effect of corruption on local sales and the positive effect of corruption on export sales, these roughly cancel out. This is also consistent with the negative, but not statistically significant, point estimate of corruption on total sales in the first column of Table 3.

[Table 3 here]

In comparison with the theoretical predictions in Table 1, the results are consistent with bribing leading to a reduction in marginal costs and that local firms have an advantage in bribing (specification (ii)). With the negative effect of corruption on affiliate local sales and the positive effect of corruption on affiliate export sales roughly cancelling out, the reluctance of firms investing in corrupt countries found in the probit equation (3.1) would then primarily stem

[22] From (3.2), we can derive $\frac{\Delta q_{ij}}{q_{ij}} = e^{\alpha \Delta Corruption} - 1$, where Δq_{ij} is the associated change in affiliate sales and $\Delta Corruption$ is the the change in corruption. Inserting the regression coefficient α from the different specification of (3.2) and noting that a change of one grade in our rescaled index is equal to 0.17 provides these estimates.

from bribes B (net of any fixed cost savings due to bribes Γ) paid to corrupt officials, which increase the investment costs.

Table 3 reveals some other interesting results for control variables. As expected from the theoretical framework, the market size of the host country (GDP) has a positive effect on local sales, but has no effect on exports to Sweden or exports to third countries. The market potential of the neighboring countries (*Market Pot.*) only has an effect on exports to third countries. The positive sign of GDP per capita clearly suggests that richer countries attract more investments aimed at producing for the local and neighboring markets. Furthermore, we find a higher average corporate tax (TAX) to significantly decrease local sales, while not affecting our other measures of FDI.[23] Our estimated tax elasticity of about -0.8 is close to that mentioned in Hines (1999), whose survey reports an elasticity of -0.6 to be a typical result in the literature. High trade costs, proxied by *Distance,* deter local sales, but high tariff barriers have a positive effect on local sales. The latter suggests that this type of investment is motivated by tariff jumping. Neither tariff variables nor distance have any significant effect on the other types of FDI activities. Endowments of labor with low or intermediate skills, proxied by Labor, have no significant effect on any type of FDI. In this sample, when the firm has already decided to invest, economies of scale at the plant level will lead to more local sales. Our firm-specific variables yield the expected results. The size of firms (*Size*) is extremely important for all types of FDI. The results indicate that larger firms invest more in foreign countries. R&D intensity ($R\&D$), in turn, is negatively related to local sales. The result is in line with Norbäck (2001), who interprets the negative relationship as evidence of high technology transfer costs, discouraging foreign production.

[23] This is the reverse result to Mutti and Grubert (2004) who find that investments geared toward export markets is particularly sensitive to country taxation.

4.3. Robustness Issues

The results indicate that there are asymmetric effects of corruption in FDI. Specifically, corruption decreases affiliate local sales and increases affiliate exports back to Sweden. The first result is in line with the previous literature on FDI and corruption. The second result, on the other hand, is the opposite and will be thoroughly scrutinized here. The concern is that the results may be driven by omitted variables or a selection bias. For example, in the case when vertical FDI is driven by access to lower factor costs, and poor countries with low factor costs are more corrupt, we have an omitted variable problem. While including our measure on labor endowments and GDP per capita in all specifications should control for this problem, we do further checks as described below.

We first add the control variables on start-up costs, infrastructure, trade regions and export zones used in the previous section and a direct measure for labor costs. As can be seen in Table 4, these additional variables reinforce the results on corruption, leading to larger point estimates.[24] Start-up costs, being a fixed cost on entry, have no effect on FDI, once a firm has invested. As expected, higher wage costs decrease all our measures of affiliate sales. In terms of point estimates, the largest effect is on affiliate exports back to Sweden, which is also expected as this activity is closest to vertical FDI.

[Table 4 here]

It might still be the case that these additional variables are inadequate in controlling for unobserved country characteristics, associated with the low development level. Therefore, we split the sample into two at the mean GDP per capita of the sample countries. Table 5 shows

[24] Some of the variables are highly correlated with each other and therefore, the signs of the coefficients on the infrastructure variables are not always as expected.

the results for the two sub-samples.[25] The number of observations is smaller in the sample with lower income levels, since some of the richer countries receive FDI from several of the sample firms. Surprisingly, the positive effect of *Corruption* on exports to Sweden is still positive and significant in both sub-samples. The negative effect of *Corruption* on local sales is significant only in the sub-sample with higher income levels. However, it should be noted that the lower statistical significance in the low-income sub-sample may be due to the small number of observations. Another interesting finding is that *Corruption* now increases exports to third countries in the sample with higher income levels. These results suggest that our results are not driven by insufficient control of country characteristics, and a problem of omitted variables. The results presented are robust to the inclusion of a number of different country-specific factors.

[Table 5 here]

Yet another concern is selection bias. Since corruption has a negative effect on the probability that a firm will invest in a country, the observed values of FDI will be upward biased for corrupt countries, leading to a positive bias in the estimated coefficients on corruption. Thus, the true negative impact of corruption on local sales is larger and the positive effect of corruption on sales back to Sweden is overestimated. Table 6 presents results from using the Heckman procedure to correct for selection bias when estimating (3.1) and (3.2). There is no qualitative change to the results found earlier in the paper, which indicates that they are not due to a selection bias. The estimated coefficient on the effect of corruption on sales back to Sweden is smaller than in Table 4 specification (i). However, contrary to expectations, if there is a selection bias problem,

[25] The low-income group consists of Argentina, Brasilia, China, Columbia, Czech Republic, Estonia, Hungary, India, Indonesia, Lithuania, Kenya, Mexico, Malaysia, Peru, Poland, Portugal, Romania, Russia, Slovakia, South Africa, South Korea, Thailand, Turkey, Zambia and Zimbabwe; while the high-income group consists of Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Singapore, Spain, Switzerland, UK and the US.

the effect on local sales is also smaller (as compared to specification (i) Table 4), when using the Heckman procedure

Although this is an attractive method to use to correct for possible selection bias, we would like to raise two concerns. The first problem is that there are no variables strongly affecting the probability of an observation, but not the size of the investment. In principle, the model is identified when the variables are the same, but the identification exclusively depends on the functional form. This is almost certainly too fragile a foundation on which to base inference. The second concern, already raised in the previous section, is that the corruption level at the time of the initial investment may be more important than the corruption level in 1998 for the probability of an investment. Here, all the data for the explanatory variables in the selection equation is from 1998. Therefore, employing the Heckman estimation method may create more problems than it solves, and we will refrain from further using it in the analysis.

[Table 6 here]

As an additional robustness check, we have also defined dependent variables as shares of a certain FDI in total FDI in the country to control for interdependency between the flows. In these regressions, *Corruption* emerges with the same asymmetry between FDI types as in the level regressions. Furthermore, we use the Transparency International Corruption Perception Index (TI) as a measure of corruption. A problem with the TI measure is that it is highly correlated with GDP per capita (-0.763). The asymmetric pattern in terms of the effect of corruption once more appears, the results are also statistically significant and qualitatively the same in other respects when GDP per capita is excluded. When GDP per capita is included, the negative effect of corruption on horizontal FDI is no longer significant (the results are not

reported here, but available on request).

We also add the indexes proxying institutional quality. Adding these variables does not change our results, however. The effect of corruption on both local sales and exports to home country is generally reinforced and more significant. These results are obtained both when including each of the institutional variables individually, or all together at the same time. We also test another set of geographical dummies (for OECD, Sub-Saharan countries, Southeast and East Asia and South America), which do not change our results either.[26] Finally, it may be claimed that the general corruption level in a country may be affected by FDI and thus, we might have an endogeneity problem. We argue that this is not a major problem, since the impact of a Swedish firm on the corruption level in a country should be negligible.[27]

4.4. Corruption, FDI and Firm Characteristics

So far, we have assumed the effect of corruption to be the same for all firms. However, if bribes were determined in a bargaining framework, the effect of corruption may depend on the firm's bargaining power.[28] This is suggested by Svensson (2003), who shows that public officials demand less bribes from firms with greater bargaining strength. Firm-specific factors that may affect its bargaining strength are size and R&D-intensity. Large firms may make larger investments, giving them a stronger position, and R&D-intensive investments may be attractive to the foreign country, thereby rising the firms' bargaining power vis-à-vis the local officials.

[26] The results are not presented here, but are available upon request.

[27] If the actions taken by Swedish firms are correlated with other firms, then the question is whether total investments conducted by foreign firms have an impact on the corruption level. But it is not obvious that FDI should affect country corruption and if it does, in which direction the effect may go. Moreover, it is difficult to find valid instruments for corruption when studying FDI. Factors identified in the literature to determine the corruption level, such as ethnic fractionalization and religion, are also likely to affect trade patterns and production structure, which, in turn, have an impact on FDI.

[28] It is straigthforward to extend the model in Section 2 into a framework where the corrupt official and firm m bargain over the size of the bribe, B. Such an extension will not qualitatively affect the theoretical predictions in table 1, since the bribe B would be determined by a measure variable $\alpha \in (0, 1)$, which would measure the parties' bargaining power.

In the first two columns of Table 7, we interact firm size and R&D intensity with corruption using the full sample of investments. The interaction with *size* is not statistically significant on conventional levels, while it seems like R&D intensive firms react differently in corrupt countries. R&D intensive firms are, on average, less likely to conduct FDI, but in corrupt countries the effect of R&D intensity is smaller, indicating stronger bargaining power. The results suggests that firms' bargaining power may be of importance when analyzing the effects of corruption.

If firms and local officials would also bargain over fixed and marginal costs, firms with a stronger bargaining position could also obtain more favorable cost reductions. To check this, we included the above interaction terms in the regressions on levels. Once more, we find the asymmetry in FDI that corruption increases affiliate exports sales and decreases affiliate local sales, which suggests that bribes reduce costs with a bias towards local firms. We do not, however, find any significant effects of the firms' bargaining power on the impact of corruption.[29] One interpretation is that the firms' bargaining power only affects the fixed cost of corruption and not the possible cost reductions.

We also investigate the hypothesis that more experienced firms are less disadvantaged as compared to local firms. To explore if knowledge of the local market influences the effect of corruption on affiliate sales, we interacted *Corruption* with the number of years the firm has had affiliates in the country. As shown in the last three columns, experience indeed increases sales. Interestingly, the effect differs across the different types of investments. Sales back to Sweden increases with experience, but there is no difference between corrupt and less corrupt countries. In contrast, experience only affects local sales in corrupt countries. This result suggests that experience of the local market reduces the disadvantage of the MNEs versus the local firms.[30]

[29] The results are not displayed here.

[30] This would amount to decreasing parameter ρ in expression (2.2).

[Table 7 here]

5. Discussion and Conclusions

Our empirical analysis shows the effect of corruption on FDI to be asymmetric: decreasing affiliate sales to local market, but increasing affiliate exports to the home country. In the theoretical model, we obtain the same results when bribing leads to a reduction in marginal costs that is larger for local than for foreign firms. The effect of corruption on affiliate local sales is then negative, since the differential cost reductions distort competition on the local market, treating foreign firms less beneficially. In contrast, the effect on exports to the home country is positive**,** since exporting foreign firms may benefit from lower marginal costs without facing tougher competition.

One could, of course, think of other ways corruption has asymmetric effects on FDI. For example, suppose that dealing with corrupt bureaucrats increases the marginal costs and that investments aimed at producing to the local market imply a greater involvement in bureaucratic procedures than investments aimed at exporting to other markets. In this case, horizontal investments would be relatively more deterred by corruption than other types of investments. Or, it might be easier for local officials to provide tax cuts and access to public utilities to MNEs producing for export than to those producing for the local market. Also in this case would the impact of corruption be non-uniform. Empirical research on the effects of corruption on firms is an important area for future research to understand the impact of corruption on firm behavior. Svensson (2003) and Fisman and Svensson (2000) are among the contributions in this direction.

When only studying recent investments, we find a negative effect of corruption on the probability of firm investing, which is in line with previous research. Some specifications show that

factors determining firm start-up costs rather than corruption deter FDI. Djankov et. al. (2002) suggest that corrupt countries adopt more procedures for firms starting up, so that officials may extract more rents. Thus, the time it takes to start up a firm may be another proxy for corruption. In any case, this is an interesting contribution to the FDI literature, where these types of variables are seldom used.

Previous studies such as Wei (2000) explore the impact of corruption on the aggregate level of FDI flows. By showing corruption to be detrimental for investments aiming at selling to the local market, we may explain why this effect is found to be negative. Substantial evidence suggests that foreign affiliate sales are heavily dominated by local sales, leading to the conclusion that access to foreign markets through foreign affiliates is a strong motive for FDI and that horizontal FDI is more important than vertical FDI (e.g. UNCTAD, 1998). Given the fact that aggregate FDI data is dominated by horizontal investments, we thus expect the effect of corruption on aggregate FDI to be negative.

Our results raise the question of whether corruption should be regarded as something beneficial for certain countries. The answer to that question must be no. In the theoretical model, there are several important negative effects of corruption on the economic activity in the host country. First of all bribing is costly, reducing the probability that MNEs will invest in the country. Furthermore, corruption may distort competition on the local market by favoring local firms with an advantage in bribing. In any case where corruption encourages FDI through reduced marginal costs, it would be better for the country to attract more investment by abolishing costly regulations and increasing transparency to avoid the anti-competitive effect on the local market. However, such a change might prove politically difficult to implement as local officials would lose out on bribes and local firms would face increasing competition from foreign firms. Thus, not only the local officials would have a reason to oppose anti-corruption measures, but also the local

firms.

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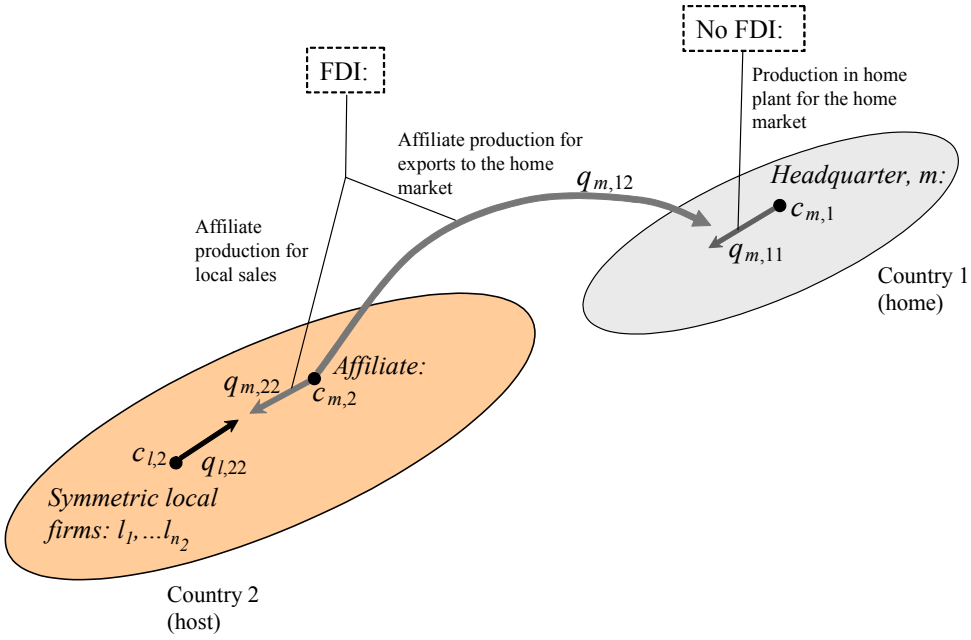

Figure .1: Investment and production under direct investment (FDI) and no investment (No FDI) by firm m.

Table 1. Comparatives statics.

	Paying a fixed bribe B is associated with:			
	Reduction in marginal costs ($\Delta > 0$)		*Increase in marginal costs* ($\Delta < 0$)	
Specification:	(i)	(ii)	(iii)	(iv)
Assumption:	$\rho < \hat{\rho} = \frac{n_2+1}{n_2}$	$\rho > \hat{\rho} = \frac{n_2+1}{n_2}$	$\rho < \hat{\rho} = \frac{n_2+1}{n_2}$	$\rho > \hat{\rho} = \frac{n_2+1}{n_2}$
Interpretation:	Limited advantage for local firms, symmetric effect or advantage for firm m	Strong advantage for local firms	Limited advantage for firm m, symmetric effect, or advantage for local firms	Strong advantage for firm m
Stage 1:				
	Effect on the investment decision by firm m by:			
An increase in bribe B	$(-)$	$(-)$	$(-)$	$(-)$
An increase in fixed cost savings Γ	$(+)$	$(+)$	$(+)$	$(+)$
An increase in $\lvert\Delta\rvert$	$(+)$	?	$(-)$	?
Stage 2:				
	Effect on affiliate production by firm m from an increase in $\lvert\Delta\rvert$:			
Affiliate local sales, $(q^*_{m,22})$	$(+)$	$(-)$	$(-)$	$(+)$
Affiliate exports to the home market, $(q^*_{m,12})$	$(+)$	$(+)$	$(-)$	$(-)$

Table 2. Probit estimations.

Dependent Variable	Basic specification	Adding start-up time	Only new investments	Adding start-up time	Adding infrastructure
Corruption	-0.814*	-0.523	-1.601***	-1.535***	-1.315**
	(0.448)	(0.462)	(0.448)	(0.503)	(0.594)
GDP / capita	-0.129	-0.212	-0.338**	-0.118	-1.067***
	(0.155)	(0.153)	(0.161)	(0.251)	(0.206)
GDP	0.405***	0.386***	0.338**	0.463***	0.391***
	(0.043)	(0.041)	(0.161)	(0.103)	(0.075)
Market pot.	-0.075	-0.110	-0.348	-0.207	-0.563
	(0.133)	(0.115)	(0.313)	(0.327)	(0.357)
Labor	0.152	0.082	0.583	-0.286	0.433
	(0.244)	(0.249)	(0.446)	(0.394)	(0.417)
Distance	-0.450***	-0.491***	-0.568***	-0.575***	-0.717***
	(0.082)	(0.074)	(0.194)	(0.181)	(0.260)
Tariff_ver	-0.049*	-0.064**	-0.120	-0.136**	-0.208*
	(0.028)	(0.029)	(0.076)	(0.065)	(0.081)
Tariff_hor	0.054	0.039	0.026	0.039	-0.044
	(0.035	(0.036)	(0.052)	(0.055)	(0.053)
Scale	-0.130***	-0.133***	-0.110*	-0.120*	-0.131*
	(0.030)	(0.030)	(0.061)	(0.067)	(0.069)
Size	0.324***	0.329***	0.351***	0.374***	0.404***
	(0.024)	(0.025)	(0.055)	(0.062)	(0.056)
R&D	-2.945***	-2.981***	-0.988	-0.802	-0.966
	(0.904)	(0.912)	(1.614)	(1.682)	(1.823)
Time		-0.116***		0.154	
		(0.041)		(0.214)	
Telephones					0.247
					(0.349)
Electricity					0.206
					(0.265)
Constant	-8.213***	-5.825***	-5.333	-8.546*	1.969
	(1.777)	(1.685)	(4.555)	(5.699)	(5.747)
Trade area dummies	No	No	No	No	Yes
No. obs	6746	5180	4883	3352	4515
Pseudo R2	0.37	0.34	0.40	0.39	0.45

Note: Clustered standard errors in parenthesis, *** significant at the one,** at the five and * at the ten percent level.

Table 3. OLS estimations with levels.

Dep. Var.	Total affiliate sales	Sales to home country	Local sales	Sales to 3^{rd} countries
Corruption	-0.439	2.710***	-1.381*	-1.116
	(0.907)	(0.733)	(0.721)	(0.739)
GDP / capita	0.713**	0.242	0.416*	0.987***
	(0.282)	(0.238)	(0.227)	(0.259)
GDP	0.370**	0.202	0.770***	0.232
	(0.139)	(0.232)	(0.134)	(0.171)
Market pot.	0.074	0.110	-0.125	0.950***
	(0.197)	(0.407)	(0.178)	(0.286)
Labor	-0.437	1.260	-0.057	-1.051
	(0.492)	(0.655)	(0.497)	(0.635)
Distance	-0.360**	-0.407	-0.535***	-0.139
	(0.174)	(0.268)	(0.085)	(0.192)
Tariff_ver	-0.099	0.073		
	(0.096)	(0.095)		
Tariff_hor	0.148		0.178**	
	(0.094)		(0.085)	
Tariff_plat				-0.159
				(0.357)
Tax	-0.014	-0.420	-0.757*	1.071
	(0.387)	(0.717)	(0.375)	(0.763)
Scale	0.171***	-0.022	0.186***	0.281***
	(0.048)	(0.048)	(0.056)	(0.087)
Size	0.540***	0.383***	0.569***	0.569***
	(0.065)	(0.060)	(0.065)	(0.082)
R&D	-0.929	4.406	-7.284**	3.607
	(1.728)	(3.740)	(2.738)	(4.890)
Constant	12.374	11.630	18.284	-26.884
	(4.321)	(7.491)	(5.085)	(6.283)
No.obs	290	181	264	234
R2	0.57	0.27	0.60	0.49

Note: Clustered standard errors in parenthesis, *** significant at the one, ** at the five and * at the ten percent level.

Table 4. OLS estimations with levels adding control variables.

Dependent Variable	Total affiliate sales			Local sales			Sales to home country		
	(i)	(ii)	(iii)	(i)	(ii)	(iii)	(i)	(ii)	(iii)
Corruption	-0.958	-0.502	-0.963	-2.026**	-2.022***	-2.316***	2.788***	4.125***	2.956***
	(1.129)	(0.866)	(0.853)	(0.853)	(0.696)	(0.652)	(0.773)	(0.555)	(0.712)
Time	0 .174			0.221			-0.027		
	(0.088)			(0.079)			(0.091)		
Electricity		0.975**	0.966***		0.918***	0.834***		-1.180***	-0.897***
		(0.398)	(0.297)		(0.283)	(0.234)		(0.309)	(0.279)
Telephones		-0.978	-0.717*		-1.823***	-1.239***		2.995***	2.726***
		(0.705)	(0.414)		(0.513)	(0.358)		(1.051)	(0.835)
EPZ		0.380	-0.017		0.372*	-0.119		0.419*	-0.202
		(0.250)	(0.290)		(0.212)	(0.261)		(0.214)	(0.295)
Wage cost			-0.677*			-0.758**			-1.089**
			(0.378)			(0.343)			(0.444)
Trade area dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
No. obs	290	290	292	264	264	266	181	181	184
R2	0.57	0.60	0.60	0.61	0.63	0.63	0.27	0.35	0.36

Note: Clustered standard errors in parenthesis, *** significant at the one,** at the five and * at the ten percent level.
Not reported are all other variables in Table 2, except GDP per capita in specification (iii).

Table 5. OLS estimations for sub-samples with levels.

Dependent Variable	High-income sub-sample				Low-income sub-sample			
	Total affiliate sales	Sales to home country	Local sales	Sales to 3^{rd} countries	Total affiliate sales	Sales to home country	Local sales	Sales to 3^{rd} countries
Corruption	-0.512	2.450***	-0.731*	1.545***	-4.879*	8.651*	-3.628	-3.699
	(0.614)	(0.416)	(0.398)	(0.500)	(2.735)	(4.302)	(2.146)	(3.739)
GDP / capita	0.323	1.546	0.472*	0.910	0.967	2.648	1.213*	1.017
	(0.918)	(1.064)	(0.606)	(0.996)	(0.925)	(1.113)	(0.714)	(0.920)
GDP	0.276**	0.048	0.707***	0.182	1.019***	-0.190	1.472***	0.607
	(0.119)	(0.066)	(0.112)	(0.149)	(0.276)	(0.728)	(0.309)	(0.395)
Market pot.	-0.094	-0.256	-0.141	0.834***	-1.616	2.495	-3.610***	1.383
	(0.239)	(0.182)	(0.209)	(0.272)	(1.340)	(2.173)	(1.028)	(1.372)
Labor	-1.194**	0.755	0.098	-1.199	0.629	-0.440	1.109	-0.262
	(0.465)	(0.435)	(0.441)	(0.641)	(0.757)	(2.037)	(0.843)	(1.123)
Distance	-0.599**	-0.426***	-0.445**	-0.286	-0.902	0.063***	-2.442***	-1.029
	(0.203)	(0.145)	(0.166)	(0.189)	(0.788)	(1.404)	(0.750)	(0.802)
Tariff_ver	-0.091	0.039			0.131	0.280		
	(0.105)	(0.108)			(0.281)	(0.254)		
Tariff_hor	0.177		0.146		0.194		0.460***	
	(0.146)		(0.109)		(0.168)		(0.146)	
Tariff_plat				-0.259				0.400
				(0.316)				(1.357)
Tax	0.258	0.191	-0.544	2.017***	-0.747	-0.812	-0.806	-1.444
	(0.475)	(0.226)	(0.346)	(0.560)	(1.155)	(2.053)	(1.017)	(1.344)
Scale	0.148**	-0.010	0.126**	0.213**	0.308**	0.167	0.419**	0.669**
	(0.055)	(0.108)	(0.052)	(0.081)	(0.110)	(0.381)	(0.171)	(0.276)
Size	0.585***	0.485***	0.552***	0.617***	0.405***	-0.105***	0.603***	0.255
	(0.069)	(0.048)	(0.074)	(0.086)	(0.123)	(0.239)	(0.144)	(0.206)
R&D	-0.889	4.163	-8.045**	3.906	-3.134	4.587	-13.355	-7.889
	(2.095)	(5.830)	(2.824)	(5.281)	(2.706)	(3.329)	(12.286)	(30.955)
Constant	-1.175	-18.238*	-9.289	-25.417*	-11.270	-39.500*	-2.016	-42.751*
	(9.740)	(10.009)	(7.134)	(11.429)	(13.762)	(38.968)	(11.841)	(21.922)
No. obs	221	145	205	187	69	36	59	47
R2	0.58	0.36	0.59	0.55	0.63	0.38	0.73	0.39

Note: Clustered standard errors in parenthesis, *** significant at the one,** at the five and * at the ten percent level.

Table 6. Heckman estimations

Dep. Var.	Total affiliate sales	Sales to home country	Local sales
Corruption	-1.304	1.757*	-1.941***
	(1.098)	(1.002)	(0.742)
GDP/capita	0.890***	0.105	0.621***
	(0.301)	(0.395)	(0.230)
GDP	0.525***	0.703***	0.666***
	(0.113)	(0.233)	(0.143)
Market pot.	0.151	0.373	-0.247
	(0.213)	(0.579)	(0.159)
Labor	-0.045	2.149**	-0.159
	(0.475)	(1.038)	(0.427)
Distance	-0.341*	-0.901**	-0.440*
	(0.202)	(0.383)	(0.257)
Tariff_ver	-0.103	0.044	
	(0.104)	(0.123)	
Tariff_hor	0.193**		0.170**
	(0.093)		(0.078)
Tax	-0.191	-1.495*	-0.191
	(0.468)	(0.906)	(0.422)
Scale	0.171***	-0.187	0.226***
	(0.054)	(0.112)	(0.080)
Size	0.626***	0.771***	0.512***
	(0.079)	(0.129)	(0.137)
R&D intensity	-2.277	2.347	-8.190***
	(1.666)	(2.692)	(3.060)
Time	0.173**	-0.099	0.155
	(0.077)	(0.124)	(0.103)
Constant	-21.300***	-24.479**	-19.410***
	(4.032)	(11.138)	(4.414)
Selection equation.			
Corruption	-0.508	-0.581	-0.543
	(0.462)	(0.585)	(0.403)
Time	-0.116***	-0.052	-0.108***
	(0.041)	(0.042)	(0.038)
No.obs	5180	5675	5186
Independent eq (rho=0)	5.10	13.87	0.09
Wald test (p-value)	(0.024)	(0.000)	(0.765)

Note: Clustered standard errors in parenthesis, *** significant at the one, ** at the five and * at the ten percent level. The selection equation includes the same variables as the second stage equation.

Table 7. Interaction effects

Estimation method	Probit		OLS		
Dependent var.	Investment		Total affiliate sales	Sales to home country	Local sales
Interaction	Size	R&D-intensity		Experience	
Corruption	-1.133*	-0.688	-0.749	2.128*	-2.383***
	(0.808)	(0.467)	(0.777)	(1.141)	(0.756)
Time	-0.111***	-0.116***			
	(0.042)	(0.041)			
GDP/capita	-0.296	-0.210	0.432**	-0.069	0.161
	(0.157)	(0.153)	(0.205)	(0.298)	(0.255)
GDP	0.392***	0.386***	0.309**	0.221	0.708***
	(0.044)	(0.041)	(0.113)	(0.242)	(0.150)
Market pot.	-0.101	-0.110	0.232	0.7463	0.003
	(0.116)	(0.115)	(0.180)	(0.470)	(0.215)
Labor	0.093	0.084	-0.086	1.587	-0.001
	(0.252)	(0.250)	(0.489)	(0.961)	(0.549)
Distance	-0.480***	-0.491***	-0.187	-0.335	-0.355*
	(0.073)	(0.074)	(0.154)	(0.305)	(0.184)
Tariff_ver	-0.064**	-0.065**	-0.078	0.079	
	(0.030)	(0.029)	(0.075)	(0.108)	
Tariff_hor	0.040	0.040	0.049		0.091
	(0.037)	(0.036)	(0.079)		(0.084)
Tax			0.052	-1.082	-0.607
			(0.405)	(0.813)	(0.406)
Scale	-0.132***	-0.133***	0.283***	0.090	0.267***
	(0.030)	(0.031)	(0.058)	(0.116)	(0.066)
Size	0.292***	0.329***	0.394***	0.248***	0.448***
	(0.035)	(0.025)	(0.058)	(0.059)	(0.061)
R&D intensity	-2.998***	-5.233***	-0.290	5.203	-6.130**
	(0.922)	(1.379)	(1.554)	(3.546)	(2.599)
Experience			0.021*	0.261*	-0.000
			(0.010)	(0.015)	(0.010)
Corruption*Size	0.133				
	(0.085)				
Corruption*R&D		7.978***			
		(2.832)			
Corruption*Exp			0.064*	0.038	0.095**
			(0.037)	(0.053)	(0.032)
Constant	-6.041***	-5.824***	-12.234***	-11.659	-17.130***
	(1.640)	(1.687)	(4.470)	(10.611)	(5.834)
No.obs	5180	5180	252	151	227
Pseudo R2/ R2	0.34	0.34	0.57	0.28	0.56

Note: Clustered standard errors in parenthesis, *** significant at the one,** at the five and * significant at the ten percent level.

A Appendix: Tables

Table 1: Independent variables.

Variable name	Definition	Source
Corruption	(6-ICRG index)/6, Scale of ICRG index: 0-6, 1997	International Country Risk Group
	(10-TI index)/10, Scale of TI index: 0-10, 1998	Transparency International
GDP	ln(GDP)	WDI, World Bank
Market Pot.	ln($\sum \frac{GDP_{ij}}{distance}$), where distance is the greater circle distance between capitals.	PennWorld Tables 6
Distance.	ln(the greater circle distance between capitals)	PennWorld Tables 6
Tariff_ver	ln(industry average tariffs on exports from the host country)	Haveman
Tariff_hor	ln(industry average tariffs on exports from Sweden to the host country)	Haveman
Tariff_plat	ln(industry average tariffs on exports from the host country to other countries)	Haveman
Labor	ln(share of population aged 25 and over attained primary or secondary education)	Barro and Lee
Wage_costs	ln(average hourly wage of a toolmaker)	UBS
Tax	ln(average corporate tax rate on profits)	PricewaterhouseCoopers
GDP / capita	ln(GDP per capita)	WDI, World Bank
Electricity	ln(electricity consumption per capita)	WDI, World Bank
Telephones	ln(fixed and mobile phone subscribers per capita)	WDI, World Bank
Size	ln(total corporate sales)	IUI
R&D	ln(1+$\frac{R\&D}{sales}$)	IUI
Scale	ln(average plant sales in four-digit industry)	Statistics Sweden
Time	ln(number of business days it takes to obtain legal status to operate a firm), 1999	Djankov et al. (2002)
Bureaucracy	(4-(Bureaucracy Quality index)/4, Index:0-4, 1997	International Country Risk Group

Table 2: Descriptive statistics.

	Mean	Std. Dev.	Min/Max	No obs.
Dep variables (Mill. USD):				
Total sales	108.5033	440.0479	0.00013/5388.186	318
Exports to home country	19.0495	202.3726	0.0013/2834.627	196
Local sales	60.7378	317.5500	0.0053/4725.806	283
Exports to 3rd countries	47.8982	149.3996	0.0063/1322.407	249
Indep variables:				
Corruption (ICRG)	4.5325	1.1338	1/6	308
GDP/capita	19052.72	8272.344	720/40640	316
GDP	1.13e+12	2.25e+12	3.24e+09/8.72e+12	317
Market pot.	11125.75	5321.561	2242.046/22093.47	313
Labor	36.8682	11.0149	12.1/56.3	299
Distance	3071.978	3464.229	379.216/15600.58	315
Tariff_ver	1.2685	2.3498	0/12.2681	313
Tariff_hor	3.5727	8.0596	0/44.04	302
Tariff_plat	13.2808	4.0391	5.4350/23.4198	310
Tax	36.755	8.4271	19.4/58	300
Scale	123.5036	234.0604	0.8491/1146.021	318
Size	3981.351	7156.16	5.3612/28051.27	318
R&D intensity	0.0204	0.0316	0/0.2628	318
Electricity	6744.343	5156.608	127.4455/24693.14	316
Telephones	682.6236	310.0577	9.7407/1102.148	317
Wage cost	29.2205	14.6922	1.7663/54.7526	301
Time	35.1039	25.9305	2/128	308
Bureaucracy	3.5162	0.6333	1.3333/4	308

Note: All value variables are measured in USD.

Table 3: Descriptive statistics.

Dep variables:		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Corruption (ICRG)	(1)	1.000																	
Corruption (TI)	(2)	0.793	1.000																
GDP/capita	(3)	-0.528	-0.769	1.000															
GDP	(4)	0.232	-0.002	0.281	1.000														
Market pot.	(5)	-0.499	-0.408	0.366	-0.324	1.000													
Labor	(6)	-0.511	-0.357	0.232	-0.534	0.505	1.000												
Distance	(7)	0.643	0.531	-0.378	0.377	-0.786	-0.716	1.000											
Tariff_ver	(8)	0.371	0.189	-0.162	0.182	-0.689	-0.365	0.638	1.000										
Tariff_hor	(9)	0.559	0.548	-0.611	0.129	-0.750	-0.557	0.783	0.675	1.000									
Tariff_plat	(10)	-0.200	-0.090	-0.065	-0.256	0.115	0.235	-0.222	0.022	-0.014	1.000								
Tax	(11)	0.033	0.028	0.158	0.482	0.114	-0.071	-0.033	-0.143	-0.137	-0.170	1.000							
Scale	(12)	0.066	0.045	-0.029	-0.005	-0.053	-0.085	0.085	0.080	0.103	-0.155	-0.010	1.000						
Size	(13)	0.157	0.146	-0.134	-0.055	-0.114	-0.128	0.242	0.126	0.209	-0.096	-0.005	0.467	1.000					
R&D intensity	(14)	0.098	0.118	-0.081	0.005	-0.107	-0.024	0.115	0.063	0.139	-0.110	0.023	-0.022	0.052	1.000				
Electricity	(15)	-0.535	-0.756	0.896	0.144	0.256	0.285	-0.376	0.026	-0.494	0.026	-0.005	-0.046	-0.163	-0.081	1.000			
Telephones	(16)	-0.594	-0.781	0.958	0.159	0.422	0.381	-0.468	-0.239	-0.676	-0.022	0.036	-0.042	-0.155	-0.091	0.900	1.000		
Wage cost	(17)	-0.424	-0.747	0.896	0.284	0.239	0.069	-0.258	-0.074	-0.471	-0.087	0.140	-0.005	-0.083	-0.075	0.796	0.836	1.000	
Time	(18)	0.509	0.776	-0.723	-0.312	-0.214	-0.142	-0.112	-0.167	0.389	-0.012	0.128	0.013	0.070	0.040	-0.567	-0.721	-0.743	1.000
Bureaucracy	(19)	-0.592	-0.758	0.835	0.253	0.535	0.153	-0.497	-0.078	-0.634	-0.011	0.247	-0.052	-0.156	-0.049	0.476	0.744	0.785	-0.381

Note: Number of observations 286. All value variables are measured in USD.