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Bridging the Gap?
Corruption, Knowledge and Foreign Ownership

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Abstract

We argue that in addition to host corruption per se, as accounted for by the existing literature, an explanation of inter-country variation in FDI needs to account for the distance between the host and home corruption, which we call relative corruption. We use a large matched home-host firm-level panel data-set for 1998-2006 from CEE transition countries. Year-specific selectivity corrected estimates suggest that, ceteris paribus, higher relative 'grand' corruption lowers foreign ownership as the returns to investment tends to be lower in more corrupt environment. However, after controlling for the selectivity bias, knowledge-intensive parent firms are found to hold controlling ownership, as the difficulty of successful joint venture looms large in more corrupt environment. Results are robust to alternative specifications.

Keywords: FDI, Grand corruption, Relative Corruption, Knowledge intensity, Eastern Europe

JEL classification codes: F23, G32, L24, O17, P33, P36, P37

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1. Introduction

There is now a widespread recognition that the international transfer of technology is an important source of domestic productivity growth, and ultimately higher living standards. Foreign direct investment (FDI) is one of the crucial vehicles by which technology transfer occurs (see for example Borensztein et al. 1998, Barrell and Pain (1997)). However, despite early optimism, the data suggests that not only are rates of FDI flows into Central and Eastern Europe (hereafter CEE countries) lower than had been envisaged, (see Figure 1) but international technology transfer that accompanies FDI is also very low. As yet, very little has been written on why this is the case. In order to address this, we seek to make a more specific contribution in the context of the literature on FDI and corruption. This is an important question in the context of CEE countries, who have relatively low savings and investment rates, combined with outdated indigenous manufacturing technology. Foreign investment is thus seen as a solution to this problem. However, institutions in the region tend to be weak, retaining many characteristics inherited from the command economy period. Typically, the literature focuses on corruption, which has been extended to related (and highly correlated) institutional measures of rule of law, property rights and political freedom. The general consensus is that weaker institutions tend to undermine the prospect of FDI in the region.

{Figure 1 about here}

Corruption may impose significant direct and indirect costs to firms. Direct costs typically take the form of "petty corruption" that is monetary payments or bribes extracted primarily by low level government officials, reducing the transaction costs associated with weak formal institutions, including the costs of delayed transactions through excessive power in the hands of local officials. However, the important point here is that while this type of corruption may in some cases decrease the difficulty of doing business, it still indicates higher transaction costs compared with the optimum case of functional formal institutions and no corruption. The petty corruption contrasts with what Rose –Ackerman

(1999) terms "grand corruption", which in our context relates to nature of the interactions between inward investors and high-level government officials. This may for example involve assessments of the value of investment to the host country, and the nature of the incentives that may be offered. In turn this may be influenced by the degree of ownership the inward investment wishes to retain. In either case, the essential effect is that higher corruption indicates the underlying uncertainty of returns to foreign investment, which in turn deter FDI.

While most studies find an inverse relationship between corruption and FDI, some suggest a positive impact of corruption on FDI, as for example, Egger and Winner (2005). We argue that these contradictions in the literature occur due to the failure for previous research to consider host country corruption, not merely in isolation, but also relative to home country corruption. For example, compared to Italian parent firms, Swedish parent firms may be more wary of investing in Romania because Sweden is significantly less corrupt than Italy (see Figure 1). Thus the degree of unfamiliarity of running a business in corrupt Romania is much higher for Swedish rather than Italian parent firms, which in turn result in lower returns to investment for Swedish firms. It may thus be possible that Italian parent firms may respond positively to host corruption in Romania while Swedish parent firms would do so negatively. In other words, a distinction between host corruption per se and the distance between host and home corruption[1] is essential to understand the variation in FDI across the CEE countries. Using a large firm-level panel data-set from a sample of CEE host countries, the present paper examines the effects of corruption, absolute as well as relative, on foreign investment and, as such, departs from the existing literature.

A related issue is that parent firms with greater knowledge intensity can be wary of protecting its knowledge advantage in a host country with greater corruption, as the probability of settling any dispute with a host partner (in a joint venture) fairly is rather low in a more corrupt environment. As a result, knowledge-intensive parent firms are likely to secure a controlling ownership when investing in more corrupt host countries (relative to home countries) in a bid to protect their knowledge. The latter allows us to address another

[1] See section 3 for discussion about the choice of corruption indices.

gap in the literature and that is the interaction between relative corruption and technology transfer.

Using matched information on parent firms and their foreign subsidiaries in CEE host countries for the period 1998-2006, the paper examines the empirical validity of these two hypotheses. Most existing studies exploring the impact of institutions on FDI (e.g., Kaufman et al. 1999; Henisz, 2000; Globerman and Shapiro, 2003; Bevan and Estrin 2004; Merlevede and Schoors, 2009) focus on the FDI flows, and primarily use country-level data-sets, so say little directly about the motivation of firms to engage in FDI in a given location. In contrast to much of the existing literature in this area (with the exception of Hines (1995), Javorcik and Wei (2009) [2]), we use data from about 58,000 host firms with some foreign investment drawn from 11 CEE countries spanning over 1998-2006; this allows us to update 1996 study of Javorcik and Wei (2009) as the process of economic reform has deepened in the region. Further, we include characteristics of both host and parent firms, but also unlike most existing studies we include measures of both absolute and relative host corruption. We not only consider parent firm's entry decision, but also focus on the level of foreign ownership in host firms in our sample, after controlling for various firm-, industry-, and country level characteristics. Since corruption is difficult to measure, we experiment with a number of possible corruption measures including ICRG indices of freedom from corruption, bureaucratic quality and law and order (see further discussion in section 2 for choice of indices). We use Wooldridge (1995) selection model that controls for year-specific selectivity bias among host firms attracting foreign investment; our estimates provide some support to our central hypotheses and are robust to alternative specifications (see section 4).

Building on Straub (2008)[3] we contrast the importance of grand corruption with that of petty corruption (measured by bureaucratic quality) in the propensity of a given CEE firm to attract foreign investors. , other things remaining unchanged, greater relative corruption lowers foreign investment in a host country. Second, there is evidence of some heterogeneity among sample firms as relative corruption has a different effect on foreign

[2] To the best of our knowledge, Javorcik (2004) and Javorcik and Wei (2009) are the only papers, which use multiple-country firm-level data to analyse the role of corruption on an outward investor's entry mode in transition countries (see further discussion in section 4).

[3] Note that empirical analysis of Straub (2008) makes use of cross-country data from all countries (not firm-level data from CEE countries as in our case).

investment by knowledge intensive firms who are likely to secure controlling stake in a bid to protect their knowledge advantage in a more corrupt environment (relative to their country of origin), once we control for the potential selectivity bias. Taken together, our results highlight the adverse effects of relative 'grand corruption' in our sample.

The rest of the paper is organized as follows. Section 2 explains the econometric model while Section 3 describes the data set used in the analysis and presents descriptive statistics. Section 4 presents the results while the final section concludes.

2. Data and some descriptive statistics

The dataset used in this paper has primarily been drawn from *ORBIS* which is a comprehensive and rich firm-level dataset and has been widely used (e.g. Helpman et al. 2004; Budd et al. 2005; Konings and Murphy 2006). It is provided by Bureau van Dijk (BvD)[4], a leading electronic publisher of annual account information on several million private and public firms around the world.[5]

Compiling the information described above produces a large data-set spanning the period 1998-2006. Table 1 shows the frequency distribution of firms across the sample countries. Our sample of CEE host countries consists of Bulgaria, the Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Russia, Slovakia and Ukraine.[6]

{Table 1 about here}

About 15% of sample host firms had some foreign investment. Table 2 shows the distribution of percentage of foreign ownership in our sample. In general average percentage of foreign ownership is high, the lowest being 58% in Ukraine. Significant inter-country variation in foreign ownership is noteworthy too: the average is as high as 89% in Czech Republic closely followed by Poland (87%), Estonia (83%), Slovakia and Romania (82%), Latvia (81%) and Hungary (81%). This is further reflected in the percentage distribution of firms with some foreign ownership: about 63% of all firms with

[4] BvD is best known for databases, such as BANKSCOPE and FAME, which are widely subscribed to by UK Universities. It can also be compared with COMPUSTAT which is extensively used in the US.
[5] For further details of the data, see Temouri et al. (2008)
[6] We did not include countries where we would had less than 5 firms (e.g. Macedonia, Moldova etc.). The smallest country in our sample has at least 100 firms at some point in the panel period.

positive foreign ownership have 90% or higher foreign ownership while as high as 56% of sample firms with positive foreign ownership have sole foreign ownership.

{Table 2 about here}

There is a wide range of home countries in our sample. The list is dominated by foreign investors from the US and also the old EU countries including France, Germany, Italy, Netherlands, UK, Denmark and Sweden. There are also parent firms from other OECD (e.g., Australia, Canada, Japan), newly emerging (e.g., Brazil, China, India and Russia) countries as well as those from the middle-east (e.g., Israel, Lebanon, Syria, Turkey). Table 3 shows the distribution of the most important home countries (in terms of highest frequency) in our sample. While Baltic countries tend to have major investment from parent firms from Scandinavian countries, German firms are key investors in Central Europe (Czech Republic, Hungary, Poland), and Italian firms are major investors in Romania. The latter seems to highlight the aspect of physical proximity in foreign investment, important exception being the US firms are visible in all the sample countries, most notably in Latvia, Ukraine, Slovakia and Bulgaria.

{Table 3 about here}

Knowledge intensity of parent firms is central to an understanding of the nature of foreign investment in host countries. Hence, we use share of intangible assets (in total assets) to classify parent firms into high-tech and low-tech categories. Firms, whose share of intangible assets are greater than or equal to the 90th percentile value in the sample, are classified as high-tech knowledge-intensive firms.[7] The distribution of percentage of foreign ownership for high-tech and low-tech firms are shown in Table 4. It follows that there is practically no difference between high/low tech firms when we consider majority foreign ownership>50%. Yet the distribution of partial ownership, i.e., when foreign ownership<50% is rather different for high tech firms; generally a lower proportion of high-tech firms tend to have minority ownership. The latter justifies our decision to focus on continuous foreign ownership pattern rather than a distinction between sole/joint foreign ownership as some of the previous studies have done.

[7] We did robustness checks taking lower thresholds, down to 75th percentile of the share – the results were not affected. Similar results are obtained when we substitute our measure of high technology profile with the use of OECD industry classification to distinguish high-tech firms from others. These results are available on request.

{Table 4 about here}

Our analysis of the impact of institutions on foreign ownership primarily focuses on the role of corruption. This has two advantages. First, as already argued corruption can be seen as a key single indicator of institutional quality as it reflects the impact of underlying institutional inputs (including poor protection of property rights, excessive and arbitrary regulation, and weak informal institutions that is norms and values shaping human behaviour) into one output indicator that describes the quality of the interface between businesses and public administration. Moreover, unlike most other institutional indicators, corruption indicators are not expert-assessment based but result from survey data based on experience of businesses. While those data capture the perceptions of business environment, the issue of subjectivity is more apparent than real, as the real life business decisions are driven by the same perceptions of the decision makers.

Corruption is multi-dimensional and difficult to quantify. We primarily rely on data on corruption (see footnote to Table 5 for the variable definition) from International Risk Country Guide compiled by Political Risk Services Group, which are consistent with measures available either directly from Transparency International or from Heritage Foundation/ Wall Street Journal.[8] A high value of the index suggests that the high government officials are likely to demand high payments and illegal payments are expected throughout the lower level of the government in the form of bribes connected with import and export licenses, exchange control, tax assessment, policy protection or loans. The means and standard deviations of absolute and relative corruption indices in home and host countries are summarised in Appendix Table A1. On average, both absolute and relative corruption indices are higher for host countries (relative to home countries), with the important exception of Italy.

Other corruption measures, e.g. Kaufmann et al. (1999) (which became Worldwide Governance Indicators project by World Bank) are also used (e.g., see Javorcik and Wei, 2009). Given the panel nature of our data, we could not use Kaufmann et al. (1999) measures as the time dimension is a particular problem. Kaufmann et al. standardise distributions for each year (with mean zero and standard deviation of one), so data is not

[8] Using a sample of 32 developing countries, Morisset and Lumenga-Neso (2002) showed that higher costs and delays associated with various administrative barriers are strongly correlated with the prevailing level of corruption as captured by Transparency International Index.

comparable over time (see methodological description in Kaufmann et al., 2009). As possible alternative to the ICRG corruption index, we experiment with bureaucratic quality (e.g., see Straub, 2008) and the rule of law. This choice has been dictated by our focus on the extent to which measures of corruption impose higher transaction costs, and therefore induce businesses make certain decisions regarding ownership or control of certain assets. [9]As with the direct measure of corruption, our analysis includes both absolute and relative law and order and also those for bureaucratic quality while determining foreign ownership in our sample.

3. An empirical model of corruption and FDI

There is a relatively large empirical literature that seeks to model FDI flows. For example, Markusen (2001), Helpman (1993) and Glass and Saggi (2002) examine the extent to which technology transfer is mitigated or enhanced by intellectual property rights (IPR) protection, but the findings of this literature essentially focus on the extent to which innovation is based on either direct or indirect mechanisms for international technology transfer. Then there is relatively limited firm-level analysis focusing on the impact of corruption on FDI (e.g., Hines, 1995; Javorcik 2004; Javorcik and Wei 2009). We update (using data for 1996-2007) and extend Javorcik and Wei (2009) with a broader perspective: instead of merely explaining the 100% foreign ownership, we examine the precise percentage of equity held by inward investors. This allows us to exploit the full variation in share of foreign ownership across a large sample of firms.

Unlike most existing studies, we observe the exact share of foreign ownership in host firms. Accordingly, we can distinguish between the discrete act of FDI and the actual degree of foreign ownership in a host firm. In order to explain variation in foreign ownership, we employ Wooldridge (1995) estimator, essentially because this method allows us not only to select the firms that have attracted foreign investors, but also to

[9] A high score for bureaucratic quality indicates "an established mechanism for recruitment and training," "autonomy from political pressure," "strength and expertise to govern without drastic changes in policy or interruptions in government services". The rule of Law index instead reflects the government's administrative capacity to enforce the law, as well as the potential for rent seeking associated with weak legal systems and insecure property rights. While bureaucratic quality or rule of law is related to the corruption index, the link to corruption is rather indirect.

explain the share of foreign ownership in these firms after controlling for the year-specific selectivity bias; the latter is important in the analysis of panel data at our disposal. In contrast, the standard Heckman method (1979) leads to inconsistent estimates when applied to panel data. This is because the problems of selectivity and unobserved heterogeneity may occur simultaneously in the equation of interest, in which case the Heckman method can deal with the former but not the latter estimation bias. Wooldridge (1995) proposes an alternative estimator that tests and corrects for both potential sources of bias by allowing individual specific effects in both the selection equation and the outcome equation as well as considering the non-random nature of the sample over which the outcome equation is defined (Dustmann and Rochina-Barrachina, 2007). It is similar to the Heckman selection model in that it starts by estimating the selection equation for each year t by standard probit, which in turn generates the inverse Mills ratio λ_t for year t for the sample MNE firms. Taken together, we obtain the matrix of inverse Mills ratios (IMR). The selection bias corrected estimates are then obtained by including the matrix Λ_{it} of inverse Mills ratios (i.e., the selection correction terms) for the whole sample period. A Wald test for the joint significance of Λ_{it} is robust to arbitrary serial correlation and heterogeneity, which also provides a test for sample selection bias. Appropriate standard errors and t-statistics are obtained using the standard bootstrapping approach suggested by Wooldridge (1995).[10] Moreover, following Petersen (2006), we cluster the errors by firms at the second stage such that the standard errors are robust to arbitrary within-firm residual correlation.

Suppose in a given year the foreign ownership in the i-th host firm operating in the j-th sector is denoted by a binary variable F_{ijc}* where $F_{ijc}{}^{*}$is determined as follows:

$$F_{ijc}{}^{*} = \alpha_0 + \alpha_x X_{ijct-1} + \gamma_j + \gamma_c + \varepsilon_{ijc}$$

For a given year t, t=1998……2006, we use this ownership information $F_{ijc}{}^{*}$ to construct the following binary foreign entry variable F_{ijc} indicating whether the i-th host firm operating in the j-th sector in country c has been successful to get some foreign investment:

$F_{ijc} = 1$ if $F_{ijct}{}^{*} > 0$

$F_{ijc} = 0$ if otherwise

[10] Wooldridge (1995) has the added advantage in that it not only corrects for selection bias (as in Heckman, 1979), but also control for the unobserved heterogeneity as in a standard fixed effects model. Further, it allows for unbalanced panels, thus removing potential survivor bias, which does not affect the residual correlation property of this kind of model.

i.e. $\text{Prob}(F_{ijc} = 1)$

$= \text{Prob}(F^*_{ijct} > 0)$

$= F(\alpha_0 + \alpha_x X_{ijct-1} + \gamma_{j+} \gamma_{c)}$ (1)

Equation (1) thus provides an underlying structural model for the determination of the probability of foreign investment in a host firm. X is the set of one-period lagged explanatory variables explaining this probability, namely, total factor productivity (TFP), firm size, intangible to total assets ratio and also the volume of cash available to the firm. Given the multi-level data at our disposal, we also allow for sector-specific (γ_j) and country-specific (γ_c) effects that capture common unobserved shocks at the respective level. The remaining errors are included in the independently and identically distributed error term ε. Estimation of equation (1) for each year t in the sample allows us to determine the inverse Mill's ratios λ_t for the t-th year in our sample, t= 1998, …., 2006.

Subsequently, after selecting the firms with some foreign ownership (F=1), we estimate a second model (see equation 2 below) to determine the actual level of foreign ownership FO_{ijct} in i-th host firm in sector j, country c and year t as follows:

$$F^*_{ijct} = \beta_0 + \beta_z Z_{ijct-1} + \beta_H H_{ijct-1} + \beta_c C_{ct} + \delta_j + \delta_t + \Sigma_t \lambda_t + \nu_{ijct} \quad (2)$$

where Z is the set of host firm characteristics, incorporating a subset of X from (1), H captures the home firm characteristics while C refers to the country-level characteristics, namely, measures of absolute and relative corruption, as defined earlier. While absolute corruption captures the underlying costs of running business in a host country, relative corruption captures the extent of unfamiliarity of the parent firm with a host environment. In equation (2), industry specific fixed effects are denoted by δ_j while year-specific fixed effects are δ_t. Note that λ_t's account for the selectivity corrections in terms of inverse-Mill's ratios, one for each year t obtained from estimation of equation (1) above. The remaining errors are included in the independently and identically distributed error term ν.

Following Amiti and Wakelin (2003) we argue that characteristics of the host firms, namely, lagged values of firm size (medium and large), total factor productivity as well as cash, all play a crucial role for the probability in investing abroad. Note however that the cash variable is not included in equation (2) and thus serves as an important exclusion restriction for equation (2). Further equation (2) includes an index of market share that controls for competition, if any, from domestic firms in the industry, which is not included

in (1). The determination of the share of foreign ownership (i.e., equation 2) depends, in addition, on characteristics (namely, size and intangible assets share) of parent/home firms (H) and also the corruption measures: absolute and relative (distance) corruption indices, both of which are excluded from the estimation of equation (1). A further important distinction between (1) and (2) is the inclusion of the set of year-specific inverse Mills ratios (λ_t).

Among the characteristics of home firms H we include assets-based size measures (medium and large) and also a binary measure of their knowledge intensity called 'high-tech' derived from the share of intangible assets in total assets of the firm. The binary variable 'high-tech' is equal to one if the parent firm's intangible assets is above the 90 percentile value of its distribution and zero otherwise. We also examine the robustness of our measures by focusing on OECD definition of high-tech sectors. Accordingly, we define an alternative measure OECD_HT=1 if the firm belongs to manufacture of office machinery and computers, manufacture of electronic machinery and apparatus n.e.c., manufacture of radio, television and communication equipment and apparatus and manufacture of medical, precision and optical instruments, watches and clocks as high-tech industries.[11] (see further discussion in section 4.2).

Our central hypotheses correspond to the estimated coefficients β_c's of absolute corruption and relative corruption. In a bid to test our second hypothesis relating to the protection of knowledge advantage of high-tech firms, we augment equation (2) by including two more interaction terms, namely, high-tech*absolute corruption and high-tech*relative corruption in an alternative specification and examine the signs and significance of these coefficients, ceteris paribus.

Finally, we estimate an extended model that includes additional country-level explanatory variables with a view to eliminate competing hypotheses, if any. This includes GDP growth per capita (that measures the size of market activity), inflation rate (which may deter foreign investment as assets in the host country become devalued relative to the home country), openness to trade (greater openness may encourage more FDI) and corporate tax rates (tax incentives may encourage greater inward foreign investment) in the host country. The lack of familiarity with the host environment is likely to increase with the

[11] OECD_HT=1 if the firms belong to OECD industry classification 16, 18, 19 and is zero otherwise.

physical distance, thus the costs associated with undertaking FDI are likely to be higher for more distant host countries. To this end we include a binary variable indicating whether the home country shares a common border with the host country. Inclusion of these additional variables allows us to identify the pure effect of absolute and relative corruption, after controlling for all possible factors that may also influence foreign ownership.

Means and standard deviations of all regression variables are shown in Table 5.

{Table 5 about here}

4. Empirical Results

Estimates of the first stage foreign entry selection equation (1) are shown in Appendix Table A2. Our primary focus in this paper is however on results derived from the estimation of equation (2) that determines the share of foreign ownership among host firms attracting some foreign investment. To this end, we estimate different specifications of equation (2). We first obtain the full sample Wooldridge estimates of equation (2), which implies we cannot include any characteristics of parent firms. Estimates of equation (2) using the full sample of observations are summarised in Table 6. This then allows us to test the effect of absolute corruption (using our panel data) on foreign ownership, much in line with the existing literature that overwhelmingly uses single cross-section data (section 5.1).

Next we use home-host matched sample and include various characteristics of parent firms (see Table 7) with a view to test the importance of both absolute and relative corruption (section 5.2), after controlling for all other possible factors. This is a more interesting case as we are also able to control for some characteristics of home firms and home-host institutional differences (while it comes at cost of losing some observations). These estimates are shown in Table 7.

We also check the robustness of our estimates in a number of ways: (i) we include a number of additional host country controls like GDP growth, common border, corporate taxes, inflation and index of trade liberalisation to see if the central result still holds. (ii) We examine the validity of our results in two sub-samples, namely, CEE countries who joined EU by 2004 and 2007. (iii) We test the validity of our central hypothesis for sole foreign

proprietorship in the CEE region. (iv) We also estimate the effect of corruption on investment in host CEE countries by selected home countries.

Finally, we assess the specific implications of institutions (both absolute and relative corruption) for knowledge intensive high-tech parent firms. In doing so, we include interaction between high-tech dummy and the two measures of corruption (Table 8). We also check the robustness of these estimates by focusing on an alternative definition of high-tech industries, using the OECD classification (see section 3).

4.1. Discussion of results: the role of absolute corruption

We start our analysis with full sample estimates of equation (2) determining the percentage of foreign ownership in the CEE host countries as shown in Table 6 (the corresponding first stage probit estimates of equation (1) are shown in Appendix Table A2).

{Table 6 about here}

This is the simplest specification, and can be thought of as the baseline model, focusing on characteristics of host firms that explain the probability of a given firm to attract foreign investment, and subsequently the scale of that investment, allowing for the selection effect discussed above. Selectivity corrected Wooldridge estimates of percentage of foreign ownership is in conformity with the existing literature that corruption is inversely related to FDI flows. That is, ceteris paribus, the host firms in more corrupt countries tend to have significantly lower foreign ownership, compared with similar firms in countries with less corruption.

Other results too are very much as expected. Larger firms are visible internationally and are more likely to attract foreign investment at a larger scale in terms of percentage ownership compared with both medium and small size companies (Bishop et al., 2002). Coefficient of market share of the host firm however is negative, which matches the results reported elsewhere for China (Du et al. 2007) and India (Bhaumik et al. 2010). Equally interesting is that performance in terms of total factor productivity is more important in explaining investment in CEE countries than are intangible assets. It is clear, and not surprising, that the best performing firms attract greater foreign investment; in contrast, the motivation for investing in CEE countries does not appear to be knowledge acquisition.

This is reflected in the insignificant coefficient of intangible assets of the host country firms in Table 6.

4.2. Role of absolute and relative corruption

It is however more interesting to consider the estimates presented in Table 7 where we include variables relating to both host and home firms/countries. By construction, this focuses only on those firms that for some point in the period had foreign investment. The results are corrected to allow for the obvious selectivity bias that would ensue from treating this sample as a random sample from the wider population (corresponding first-stage probit selection estimates are shown in Appendix Table A2). In this respect, we consider estimates for four specifications (1)-(4) of Table 7.

{Table 7 about here}

Specification (1) includes only host country characteristics (including host country corruption index) with control for industry and year specific fixed effects; these estimates are rather comparable to those shown in Table 6 though obtained from a different sample. Specification (2) supplements specification (1) by two variables indicating parent firm size, namely, medium and large and also a dummy variable indicating if the parent firm is a high-tech one (as defined above). Specification (3) augments specification (2) by the measure of relative corruption while specification (4) includes EBRD infrastructure index; access to local public infrastructure could boost foreign investment, as it may lower the costs of new investment (a la Aschauer, 1989, Barro, 1990).

Wald test for the joint significance of the inverse Mill's ratios in each specification is significant, thus justifying the use of Wooldridge (1995) model.

Results of specification (1), presented in Table 7 are rather similar to those in Table 6. So we start with the analysis of specification (2) that includes parent firm size (medium and large) and also the indicator if the parent firm is high-tech or not; other variables are the same as shown in Table 6. Intangible assets of the host firms are still marginally insignificant, but it appears that the high-tech parent firms (knowledge-intensive firms with very high level of intangible assets) tend to have lower foreign ownership in the sample countries. The result remains unchanged when we augment specification (2) by including additional arguments in specifications (3) and (4). It is interesting to note how the estimates

of specification (3), for example, change from specification (1) or for that matter from those shown in Table 6. The size of host firm turns insignificant as we control for the size of the home firm and its technological profile. More interestingly, estimates from specifications (3) and (4) highlight a significant effect of relative corruption on foreign investment: other things remaining unchanged, greater relative corruption between host and home country is associated with lower foreign ownership in our sample.

In order to assess the robustness of our corruption results, next we consider estimates of specifications (5) and (6) that replace absolute and relative corruption measures by (a) absolute and relative law and order and (b) absolute and relative bureaucratic quality respectively. The signs on the bureaucratic quality terms are as expected, and the same as for grand corruption, but the effect of poor bureaucratic quality is much weaker. This suggests that while lower bureaucratic quality does deter FDI, but is less important than grand corruption. Building on Straub (2008) these differences are highlighted when considering not just corruption levels but relative corruption. Poor law and order also deters FDI, however law and order measures the need to protect physical property rather than investment capital or technology, and so while poor law and order deters FDI, it has no differential effect on FDI by level of technology of the parent (see further discussion in section 4.3 below).

4.2.1. Robustness checks

To gain more confidence in our central results, we performed a series of additional robustness checks. First, we included additional control variables with a view to eliminate competing hypotheses. Significant negative effect of relative corruption holds even when we include additional host country controls, namely, common border with the parent country, corporate taxes, inflation, GDP growth (see Table A3 in the Appendix). Next, we use the same specification to estimate the percentage of foreign ownership equation for all firms where there has been no change of foreign ownership over the period and obtain the same negative effect of relative corruption, again confirming our central result.

Second, we consider two sub-samples to test the robustness of our results: (a) all CEE countries that joined the EU by 2004 (this excludes Bulgaria, Romania, Russia and Ukraine) and (b) also all CEE countries who joined the EU by 2007 (which excludes Russia

and Ukraine).[12] Validity of a negative effect of greater relative corruption on foreign investment in host countries is found for both subsamples.

One advantage of using firm level data, compared with the macro level studies discussed above, is that one can examine different degrees of FDI, in terms of the level of foreign ownership. We therefore examine specifically the relationship between relative corruption and the propensity for 100% foreign ownership. Considering the firms with some foreign investment, we run both a probit and a logit regressions. These results summarised in Table 8 further confirm the pronounced effect of relative corruption on 100% foreign ownership, suggesting that greater degree of relative corruption would enhance the likelihood of a joint venture.

In order to further explore the role of relative corruption on foreign investment in our sample, we next obtain the effects of host corruption on foreign investment by selected home countries in our sample, after controlling for the same set of explanatory variables (naturally using specification (2) of Table 7). These results summarized in Table 9 highlight the varying effect (positive and negative) of host corruption depending on the country of origin of the parent firm. While the effect is significant and negative for firms from the US, Norway and Sweden (low corruption countries), it is positive and significant for the Spanish and Italian parent firms (relatively higher corruption countries) investing in the CEE region. In this context, it is interesting to compare the US case with the Italian case as their corruption profiles are rather different (see Table A1). These results are in line with much of the management literature concerning FDI and corruption, although typically this is not tested. US firms, with a large domestic market and the lowest level of domestic corruption are those most deterred by corruption abroad. At the other end of the scale, Italian firms are well versed in operating in a weak institutional environment, and one of their firm specific advantages is in operating in such countries. Italian firms seem therefore to be attracted to such locations, where others may fear to tread. To the best of our knowledge, this is the first result that highlights large inter-country differences in the relationship between corruption (both absolute and relative) and FDI.

4.3. Protection of advanced knowledge

[12] These results are not shown, but will be available on request.

Technology transfer remains central to explaining foreign investment. There is however an additional dimension to technology transfer when we consider corruption in host countries in relation to that in home countries. The latter relates to our second hypothesis pertaining to the protection of parent firms' knowledge intensity in more corrupt host countries (relative to home countries). Accordingly, we augment specification (3) of Table 7 by including two interaction terms, namely, high-tech*absolute corruption and high-tech*relative corruption. These augmented estimates are shown in Table 10, illustrating the estimates from two specifications.[13] Column 1 of Table 10 shows the estimates using our definition of high-tech, i.e., when parent firms' intangible assets is greater than the 90 percentile value of the variable in our sample. We also show the alternative estimates using OECD definitions of high-tech (OECD_HT) industries as defined in section 3 (column 2).

While the high-tech dummy (pertaining to parent firms) and also its interaction with host corruption cease to be significant in this case, its interaction with the relative corruption measure turns out to be positive and highly significant. In other words, high-tech parent firms are likely to secure a controlling stake if the relative corruption is high in the host country. Next we examine the robustness of this result by focusing on OECD definition of high-tech firms (i.e., OECD_HT). We also have two interactions between this high-tech variable and absolute and relative corruption respectively. Note that the interaction term between OECD_HT and relative corruption is significant and positive, as before.

However when we replace absolute and relative corruption by the alternative absolute and relative law and order indices, the interaction terms between high-tech dummy and absolute/relative law and order indices cease to be significant.[14] While law and order as such helps protect property, it does not protect technology. As such, it does impact on the foreign firms' decision to invest, and the stake to hold, but does not impact differentially on technology. Thus insignificance of law and order index in fact backs up our previous result, that it is 'grand' corruption which not only affects FDI, but also knowledge advantage high-tech parent firms.

[13] These estimates remain unchanged even when we use specification (4) of Table 7.

[14] As before, Bureaucratic quality indices (absolute and relative) fail to have any perceptive effect on knowledge intensive firms. For brevity we do not show these results, which are available on request.

Taken together, there is evidence that in a bid to protect their knowledge advantage, high-tech parent firms' tend to secure a controlling stake in a host country with a more corrupt environment (relative to the home country). This is because costs of joint ventures arising from disagreements between partners, diffusion of proprietary information may be rather high (e.g., see Gomes-Casseres, 1987); these costs may be even higher in more corrupt environment as the possibility of settling any dispute fairly would be rather low in this context.

It is also interesting to calculate the marginal effect of absolute and relative corruption using estimates shown in column (1) of Table 10. The total marginal effect of absolute corruption turns out to be negative and is equal to -0.799, since the corresponding effect for high-tech firms remains insignificant. In addition, the effect of relative corruption is significant not only for all firms, but also for high-tech firms. Accordingly, the net effect of relative corruption on foreign ownership at the mean value of relative corruption turns out to be positive 2.069 (i.e., -0.523+2.592*1) for high-tech firms while it is -0.523 for other firms in our sample. In other words, ceteris paribus a unit increase in relative corruption, i.e., the corruption in host countries relative to that in home country, tends to increase foreign ownership by about 2 percentage point for knowledge-intensive high-tech firms in our sample. The latter seems to be an adoption mechanism for high-tech parent firms in a bid to protect their knowledge advantage when relative corruption is high in a host country. Our country-specific estimates, as presented in Table 9 also corroborate this result.

4.4. Comparison with existing literature

The present paper contributes to the existing literature in a number of ways. A relevant reference point is Javorcik and Wei (2009), who use 1996 cross-section data from 451 parent firms drawn from a number of eastern European transition countries to analyse the incidence of joint venture as opposed to sole proprietorship. Using a more recent panel data 1998-2006, we argue that while an analysis of sole/joint venture is important on its own right, it is also essential to understand the actual level of participation of a foreign firm in a host transition country, especially from a policy point of view. This in turn allows us to exploit the full variation in the continuous foreign ownership variable. We have over

58,000 host firms with some foreign investment drawn from 11 countries spanning over a period of more than 10 years (the sample size, however, gets somewhat smaller when we consider the matched sample of home-host firms). Thus our analysis is broader in scope as we not only include characteristics of both host and parent firms, but also unlike most existing studies include measures of both absolute and relative corruption (and other related indices) and also their interactions with knowledge advantage of high-tech parent firms in host countries.

Our analysis distinguishes market entry of foreign firms (first stage) from the actual level of foreign ownership (second stage); thus we are able to control for the potential selection bias in determining the level of foreign ownership in the sample. We make use of Wooldridge (1995) that allows us to generate year-specific selectivity parameters from the first stage market entry equation, which are then included in the determination of foreign ownership (see further discussion in section 5).[15] There is evidence from our analysis that the percentage of foreign shares held in a host firm depends on both absolute and relative corruption in our sample. Other factors remaining unchanged, relative corruption, i.e., the distance in corruption between home and host countries, tends to lower foreign ownership and encourages joint venture. The effect is however different for high-tech parent firms who tend to secure controlling stakes while investing in more corrupt environment. These estimates are robust to alternative specifications and also use of alternative sub-samples. There is however confirmation that it is the relative 'grand' corruption, rather than law and order or bureaucratic quality, that discourage foreign investors to increase investment in CEE sample countries.

5. Conclusions

There are high costs of corruption for foreign investment. While much of the existing literature takes account of absolute corruption in the host country, the present paper argues that it is also important to take account of the host corruption in relation to the home corruption, which we label as relative corruption. The latter is taken to be a measure of

[15] In order to check the robustness of Wooldridge estimates, we compare these estimates with available alternatives like tobit and quantile regressions; however the sample results generally highlight the superiority of Wooldridge estimates.

home firms' unfamiliarity of host environment, which may particularly pose obstacles to firm performance. Knowledge-intensive parent firms are however likely to behave differently: once decided to invest, they are likely to secure a controlling stake with a view to protect their knowledge advantage, as the stakes in a joint venture are too high especially in more corrupt environment.

Using Orbis host-home matched firm-level panel dataset for the period 1998-2006 from a group of CEE emerging countries, the paper tests the validity of these hypotheses. After controlling for all other factors, results suggest validity of our central hypotheses: (i) percentage of foreign shares held in host firms decline with greater relative corruption and also (ii) knowledge intensive high-tech parent firms behave differently from other firms in that, once decided to invest, they are more likely to secure controlling stakes in more corrupt host CEE countries. The latter can be attributed to the sensitivity of high-tech parent firms to share their knowledge advantage with host firms in a more corrupt environment. This is because the probability of settling any dispute with a host partner fairly is rather low in such an environment. Results are robust to various alternative specifications and sub-samples used. There is also suggestion that it is the relative 'grand' corruption rather than weak rule of law or bureaucratic quality, that discourages foreign investment in sample host countries.

An important policy implication of the inverse relationship between relative corruption and foreign ownership is that, ceteris paribus, a host economy with greater corruption and therefore weak institutions is more likely to attract foreign investors from countries with similar institutional set up, which minimises the institutional distance between host and home countries . This conclusion is consistent with the global trends of the recent growth of foreign investors from emerging economies investing in various emerging host countries. We thus believe that our results have wider implications, reaching beyond the region defined by our sample boundaries.

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Table 1 Distribution of host firms in the sample (1998-2006)

Country	Frequency	% of total observations
Bulgaria	1,682	2.80
Croatia	1,149	1.91
Czech Republic	4,025	6.70
Estonia	1,857	3.09
Hungary	121	0.20
Lithuania	1,427	2.38
Latvia	827	1.38
Poland	6,986	11.63
Romania	15,648	26.05
Russia	22,113	36.81
Slovakia	105	0.17
Ukraine	4,138	6.89
Total	60,078	100.00

Table 2. Distribution of foreign ownership

Host countries	(1) % Foreign holding Mean (std dev)	Percentage of firms when (2) 25%<= Foreign holding<50 %	(3) Foreign holding >=50%	(4) Foreign holding =100%
Bulgaria	61.87 (36.39)	19.48	63.78	30.19
Croatia	74.26 (35.32)	5.21	75.72	49.74
Czech Rep.	88.73 (21.88)	8.42	92.40	67.86
Estonia	83.12 (26.95)	13.53	86.02	61.55
Hungary	79.62 (30.40)	11.95	84.06	48.21
Lithuania	75.67 (29.39)	14.50	83.55	45.60
Latvia	80.99 (29.03)	14.49	81.28	57.70
Poland	86.61 (24.84)	7.02	89.37	61.14
Romania	81.50 (27.84)	11.94	86.29	54.36
Russia	74.45 (33.13)	14.91	76.22	45.37
Slovakia	82.40 (25.33)	7.06	94.06	53.13
Ukraine	58.00 (32.38)	22.36	58.54	14.03

Table 3 Distribution of home countries among the CEE host countries

	Netherlands	France	UK	Italy	Germany	US	Others
Host – CEE:							
Bulgaria	3.74	2.90	3.32	12.07	9.80	10.34	57.82
Croatia	4.56	2.08	2.28	11.65	19.14	4.43	55.86
Czech Rep.	13.56	8.07	4.14	2.52	32.60	9.16	29.95
Hungary	7.06	12.27	2.60	5.20	24.91	4.09	43.87
Poland	9.86	8.65	4.08	5.62	29.37	8.87	33.54
Romania	4.39	5.06	3.15	30.20	15.82	3.76	37.62
Russia	5.48	2.75	5.54	3.91	14.00	7.48	60.84
Slovakia	13.24	14.19	3.35	2.87	14.67	15.15	36.52
Ukraine	3.49	1.84	8.85	2.10	7.46	10.46	65.81
	Germany	Denmark	Finland	Sweden	Norway	US	Others
Host - Baltics:							
Estonia	6.16	4.62	39.50	23.89	4.80	3.68	17.35
Lithuania	9.87	10.52	8.90	14.24	15.37	4.21	36.89
Latvia	9.12	14.23	9.51	15.80	1.65	14.94	34.75

Table 4. Percentile distribution of foreign ownership if foreign ownership>0

Percentile	High-tech	Low-tech
1%	2	5.83
5%	33.56	37
10%	50	51
25%	88.87	90
50%	100	100
75%	100	100
90%	100	100
95%	100	100
99%	100	100
Mean	86.96	88.29
Observations	1,395	12,541

Table 5. Summary Statistics of regression variables

Variable (definition)	No of Obs.	Mean	Std. Dev.	Min	Max
Host firm size: small	369291	.249998	.4330121	0	1
Host firm size: medium	369291	.5000041	.5000007	0	1
Host firm size: large	369291	.249998	.4330121	0	1
Host total factor productivity	293203	14.07085	103.9635	.0000275	29662.87
Host intangible/tangible assets (IATA)	368417	.0058332	.2291399	0	134.0892
Host firm Market share	362622	.000634	.005898	0	.9090915
Absolute corruption[16]	385542	3.763695	.8062952	1	5
Relative corruption	63473	-1.42580	1.25523	-5	4
Absolute law and order	385542	4.044914	.5048834	3	6
Relative law and order	63473	-.9593548	.8906618	-3	3.5
Absolute Bureaucratic quality	385542	1.521872	.8395015	1	4
Relative Bureaucratic quality	63473	-1.722241	1.012365	-3	3
Host EBRD infrastructure indicator	387831	2.775338	.4576038	1.7	3.7
Parent firm size: small	14576	.25	.4330276	0	1
Parent firm size: medium	14576	.5	.5000172	0	1
Parent firm size: large	14576	.25	.4330276	0	1
Parent firm high-tech	14347	.1000209	.3000383	0	1
Absolute difference in IATA	13508	.1100426	.3157898	0	30.59237
Diff. in IATA* corruption	13418	.2364209	1.40966	-152.961	4.113893
Diff. in IATA* relative corruption	13416	.1590978	.5160478	-40.7898	3.521779
Common border	64057	0.146713	0.353822	0	1
GDP growth per capita	387831	5.094573	3.494519	-6.1	12.23
Taxes on profits and capital gains	271066	10.88915	4.745271	4.45	23.71
Inflation rate	387831	20.07	45.70815	-1.18	1058.37
Index of trade liberalisation	387831	3.971646	0.301469	3.22	4.33
Cash flow	350453	-1168.75	817442.1	-4.8e+08	515850.3

Source: Authors' calculations using Orbis database. All monetary values are deflated and in thousands of US dollars.

[16] ICRG's corruption index indicates the opinion of analysts on each country regarding the extent to which high government officials are likely to demand special payments, and illegal payments generally expected throughout lower levels of government in the form of bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans. It ranks nations on a scale from 0 to 6. A score of 0 represents maximum corruption level, while 6 indicates minimum corruption level. In our analysis ICRG's corruption index is rescaled by subtracting country scores from 6 so that higher values correspond with higher levels of corruption.

Table 6 – Full sample Wooldridge estimates of % share of foreign ownership

	Selection-corrected (Wooldridge) Firms with foreign ownership (percentage)
Explanatory variables	
Host firm size: medium	4.195***
	(0.204)
Host firm size: large	12.49***
	(0.347)
Total factor productivity	4.022***
	(0.177)
Host intangible/tangible assets (IATA)	0.0597
	(6.191)
Host firm Market share	-0.584***
	(0.0775)
Host country corruption	-4.674***
	(0.156)
Industry Dummies	Yes
Year Dummies	Yes
Inverse Mills Ratios	Yes
Constant	26.23***
	(1.383)
Observations	230,180
R-squared	0.112
Chi2	25,088.22***

Notes:
(A) Corresponding first stage probit estimates are shown in Appendix A2.
(B) Bootstrapped standard errors in parentheses (1000 repetitions);
(C) Corrected for clustering for host countries.
(D) ***, **, * denote significance at the 1, 5, and 10 per cent level, respectively.
(E) All regressors are lagged one period.

Table 7 – Absolute and Relative Corruption: Selection corrected Wooldridge estimates of % share of foreign ownership (host-home matched sample)

	(1)	(2)	(3)	(4)	(5)	(6)
Host firm size: medium	1.613***	-0.696	-0.562	-0.57	-0.604	-0.717
	(0.457)	(1.484)	(1.481)	(1.476)	(1.472)	(1.476)
Host firm size: large	1.341**	-0.534	-0.339	-0.967	-1.124	-1.063
	(0.656)	(1.692)	(1.687)	(1.677)	(1.680)	(1.684)
Host TFP	3.008***	2.859***	2.865***	2.466***	2.424***	2.467***
	(0.265)	(0.408)	(0.408)	(0.403)	(0.403)	(0.404)
Host IATA	1.105	0.321	0.339	0.290	0.261	0.264
	(5.759)	(3.706)	(3.726)	(3.496)	(3.504)	(3.559)
Host Market share	-1.303***	-1.061***	-1.113***	-1.201***	-1.208***	-1.149***
	(0.132)	(0.222)	(0.222)	(0.222)	(0.221)	(0.235)
Host infrastructure				7.671***	8.045***	7.248***
				(1.178)	(1.137)	(1.200)
Host law and order				3.343***	4.135***	
				(0.651)	(0.686)	
Relative Law and Order					-0.624**	
					(0.272)	
Absolute Host corruption	-7.240***	-2.940***	-3.038***	-0.975*		
	(0.339)	(0.549)	(0.552)	(0.588)		
Relative Corruption			-0.369*	-0.363*		
			(0.205)	(0.204)		
Absolute Bureaucratic Quality						0.695
						(0.480)
Relative Bureaucratic Quality						0.103
						(0.390)
Parent firm High-tech		-5.758***	-5.752***	-5.470***	-5.473***	-5.485***
		(0.966)	(0.965)	(0.973)	(0.971)	(0.977)
Parent firm: medium		6.263***	6.260***	6.034***	6.029***	6.143***
		(0.715)	(0.715)	(0.710)	(0.706)	(0.707)
Parent firm large		6.502***	6.513***	6.040***	5.986***	6.181***
		(0.978)	(0.978)	(0.980)	(0.975)	(0.973)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Inverse Mills Ratios	Yes	Yes	Yes	Yes	Yes	Yes
Constant	91.944***	83.867***	82.906***	39.07***	31.49***	50.54***
	(2.581)	(4.402)	(4.416)	(7.208)	(6.177)	(5.582)
Observations	42,668	9,313	9,313	9,313	9313	9313
R-squared	0.047	0.048	0.049	0.056	0.056	0.053
Chi2	2085.10***	501.46***	503.50***	558.38***	558.63***	528.50***

Notes: (A) Selection-corrected (Wooldridge) estimator;
(B) Corresponding first stage probit estimates are shown in Appendix Table A2.
(C) Bootstrapped standard errors in parentheses (1000 repetitions);
(D) Corrected for clustering for host countries.
(E) ***, **, * denote significance at the 1, 5, and 10 per cent level, respectively.
(F) All regressors are lagged one period.

Table 8. Probit maximum likelihood estimates of 100% foreign ownership

	(1)	(2)
	100% foreign ownership	
VARIABLES	**Probit**	**Logit**
Host firm size: medium	0.160*	0.250*
	(0.0893)	(0.150)
Host firm size: large	0.165	0.254
	(0.102)	(0.170)
Host TFP	0.282***	0.473***
	(0.0283)	(0.0483)
Host IATA	0.0511	0.0829
	(0.0771)	(0.137)
Host Market share	-0.130***	-0.218***
	(0.0139)	(0.0234)
Absolute corruption	-0.279***	-0.458***
	(0.0338)	(0.0564)
Relative corruption	-0.109***	-0.180***
	(0.0131)	(0.0216)
Parent high-tech	-0.273***	-0.443***
	(0.0544)	(0.0890)
Parent firm: medium	0.316***	0.527***
	(0.0383)	(0.0633)
Parent firm large	0.427***	0.711***
	(0.0527)	(0.0868)
Industry Dummies	Yes	Yes
Year Dummies	Yes	Yes
Inverse Mills Ratios	Yes	Yes
Constant	-1.919***	-3.184***
	(0.328)	(0.541)
Observations	9400	9400
R-squared	0.0518	0.0520
Chi2	636.37***	638.75***

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 9. Marginal effect of host corruption by home country

home country	Effect of absolute corruption Estimate (se)	Observations
US	-9.74** (3.96)	582
Germany	-1.51 (1.93)	1061
UK	3.56 (3.03)	469
Spain	9.26* (4.96)	164
Italy	5.73** (2.73)	1,195
Finland	0.69 (1.91)	725
Norway	-13.13** (4.75)	168
Sweden	-3.82** (1.33)	759

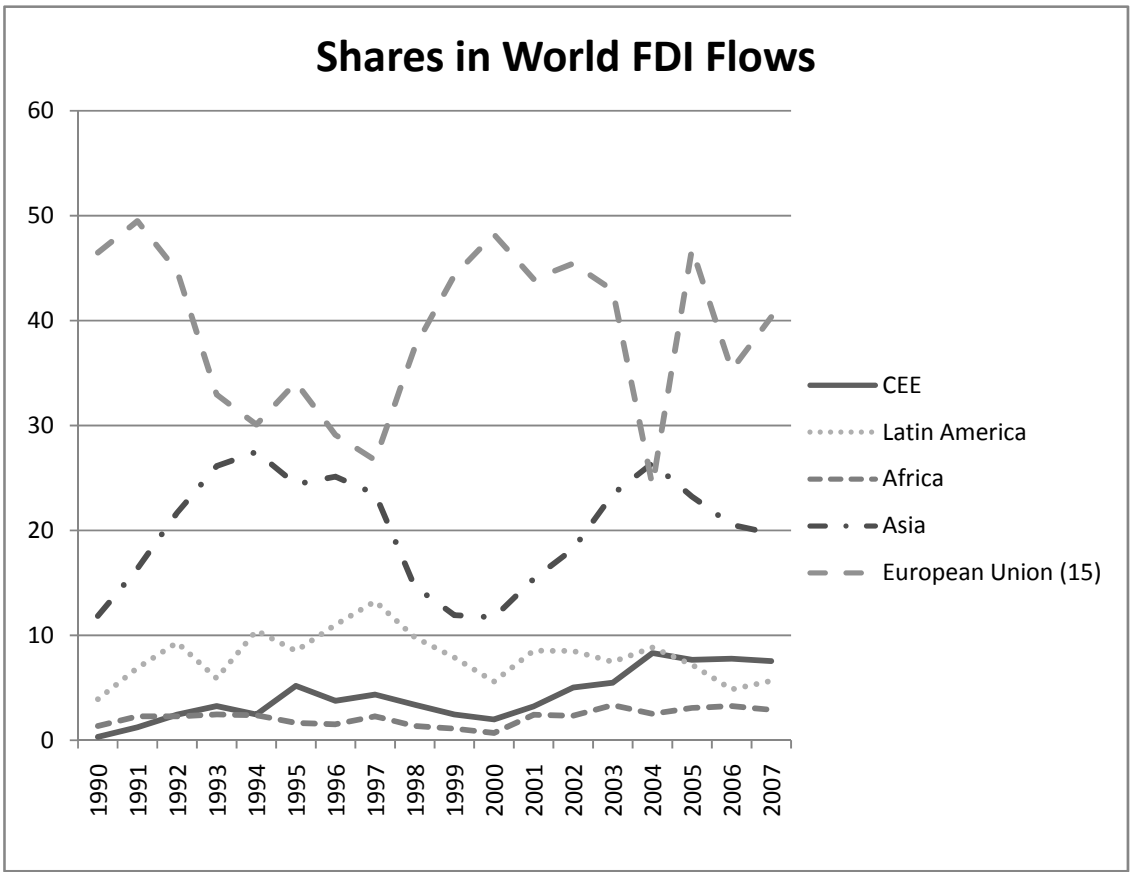
Note: Other explanatory variables are as included in specification (2), Table 7.

Table 10. Protection of advanced knowledge: Selection-corrected Wooldridge estimates of % share of foreign ownership

VARIABLES	(1)	(2)
Host firm size: medium	-0.625	-1.141
	(1.482)	(1.309)
Host firm size: large	-0.498	-1.478
	(1.687)	(1.544)
Host TFP	2.787***	2.497***
	(0.406)	(0.407)
Host IATA	0.369	0.390
	(3.697)	(4.082)
Host market share	-1.077***	-0.933***
	(0.222)	(0.222)
Absolute Host corruption	-2.831***	-3.350***
	(0.562)	(0.538)
Relative Corruption	-0.540**	-0.491**
	(0.212)	(0.210)
Parent High-tech	6.209	
	(6.066)	
Parent firm OECD High-tech		-5.200
		(7.507)
Parent firm: medium	6.238***	6.418***
	(0.714)	(0.702)
Parent firm large	6.489***	4.489***
	(0.979)	(0.893)
Parent High-tech*absolute corruption	-1.963	
	(1.826)	
Parent High-tech*relative corruption	2.704***	
	(0.923)	
Parent OECD High-tech* absolute corruption		2.021
		(2.135)
Parent OECD High-tech*relative corruption		1.715*
		(0.990)
Industry Dummies	Yes	Yes
Year Dummies	Yes	Yes
Inverse Mills Ratios	Yes	Yes
Constant	82.37***	86.84***
	(4.427)	(4.154)
Observations	9313	9747
R-squared	0.050	0.044
Chi square (LR statistic)	506.11***	447.48***

Notes: (A) Selection-corrected (Wooldridge) estimator;
(B) Corresponding first stage probit estimates are shown in Appendix Table A2.
(C) Bootstrapped standard errors in parentheses (1000 repetitions);
(D) Corrected for clustering for host countries.
(E) ***, **, * denote significance at the 1, 5, and 10 per cent level, respectively.
(F) All regressors are lagged one period.

Figure 1. Regional distribution of World FDI flows in 2007



Source: UNCTAD

Appendix

Table A1. Absolute and relative corruption by home and host countries

	Absolute corruption		Relative corruption	
	Mean	Std. Dev.	Mean	Std. Dev.
Home countries				
US	1.8166	0.3904	1.7707	0.8947
UK	1.3125	0.2673	2.1835	0.7548
France	2.675	0.4090	0.7977	0.4569
Germany	1.4833	0.4419	1.8402	0.7536
Netherlands	0.5167	0.5118	2.7029	0.6479
Italy	3.0958	0.5429	0.2403	0.3417
Spain	1.8917	0.5497	0.8458	0.5433
Denmark	0.3083	0.2665	2.8777	0.7839
Sweden	0.4083	0.4521	2.5022	0.8147
Norway	1.0	0.0	2.1431	0.8867
Host countries				
Bulgaria	3.275	0.9607	0.5719	0.5979
Croatia	3.181	0.4797	1.2313	1.1110
Czech Rep.	2.7291	0.7436	0.9789	0.7418
Estonia	2.3229	0.9516	1.4043	0.8357
Hungary	2.1917	1.0092	1.0491	0.6939
Latvia	3.6458	0.4915	0.8096	0.6531
Lithuania	3.3594	0.2929	0.7763	0.5457
Poland	2.9958	1.1796	0.6685	0.5247
Romania	3.3375	0.3559	0.3822	0.4306
Russia	4.4458	0.4739	1.0969	0.9448
Slovakia	2.9583	0.6517	0.8198	0.6352
Ukraine	4.1250	0.7971	0.7642	0.5859

Source: ICRG

Appendix Table A2: Probit estimates of whether a firm has any foreign investment

Variables	1998	1999	2000	2001	2002	2003	2004	2005	2006
TFP	0.029***	0.026***	0.023***	0.042***	0.070***	0.054***	0.042***	0.053***	0.060***
	(0.008)	(0.005)	(0.005)	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Medium-size	0.131***	0.157***	0.181***	0.178***	0.179***	0.118***	0.116***	0.130***	0.115***
	(0.015)	(0.013)	(0.012)	(0.010)	(0.009)	(0.006)	(0.005)	(0.005)	(0.005)
Large-size	0.357***	0.349***	0.397***	0.414***	0.419***	0.341***	0.354***	0.380***	0.375***
	(0.034)	(0.030)	(0.026)	(0.023)	(0.021)	(0.016)	(0.015)	(0.014)	(0.013)
Host IATA	0.399***	0.307**	0.369***	0.245***	-0.001	0.223***	0.140***	0.130***	0.113**
	(0.125)	(0.124)	(0.104)	(0.080)	(0.005)	(0.053)	(0.049)	(0.051)	(0.053)
Cash	0.033***	0.034***	0.033***	0.028***	0.024***	0.016***	0.015***	0.010***	0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,390	14,310	17,324	22,189	25,588	42,968	48,098	48,758	44,287
R-squared (pseudo)	0.125	0.120	0.125	0.127	0.138	0.191	0.186	0.175	0.167
F-stat (Wald)	1515.42	1880.00	2382.97	3047.52	3829.52	7465.10	8028.21	7730.36	6672.66

Note: These are the estimates of equation (1) determining the likelihood of foreign investment. Coefficients are the marginal effects.

Appendix Table A3. Wooldridge estimates of an extended model

VARIABLES	(1) All firms with FO FO_percentage	(2)All firms with stable FO FO_percentage
host_medium	1.445	3.480**
	(1.683)	(1.766)
host_large	1.204	3.442*
	(1.886)	(2.015)
log_tfp	2.580***	3.062***
	(0.492)	(0.539)
Host_IATA	3.648	-4.276
	(6.996)	(7.784)
log_mkt_share	-1.308***	-1.555***
	(0.246)	(0.275)
Absolute corruption	-2.300***	-1.520*
	(0.740)	(0.851)
Relative corruption	-0.453*	-0.566**
	(0.246)	(0.275)
Parent_HT	-5.912***	-7.128***
	(0.936)	(1.115)
Parent_medium	6.498***	7.231***
	(0.685)	(0.759)
Parent_large	6.979***	8.950***
	(0.921)	(1.049)
Common border	3.300***	3.533***
	(0.767)	(0.875)
GDP growth per capita	-0.0934	0.207
	(0.161)	(0.182)
Share of corporate taxes	0.162***	0.287***
	(0.0373)	(0.0431)
Inflation rate	0.156**	0.212**
	(0.0737)	(0.0834)
Index of trade liberalisation	13.11***	15.34***
	(2.612)	(2.907)
Industry Dummies	Yes	Yes
Year Dummies	Yes	Yes
Inverse Mills Ratios	Yes	Yes
Constant	-25.71*	-19.77
	(14.55)	(15.70)
Observations	7807	6520
R-squared	0.064	0.086

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. See definitions of additional variables in Appendix Table A4.

Table A4. Definitions of Additional Variables

EBRD Trade and foreign exchange index is taken to be a measure of liberalisation and is defined on a scale of 1-4+ as follows:

1 Widespread import and/or export controls or very limited legitimate access to foreign exchange.

2 Some liberalisation of import and/or export controls; almost full current account convertibility in principle, but with a foreign exchange regime that is not fully transparent (possibly with multiple exchange rates).

3 Removal of almost all quantitative and administrative import and export restrictions; almost full current account convertibility.

4 Removal of all quantitative and administrative import and export restrictions (apart from agriculture) and all significant export tariffs; insignificant direct involvement in exports and imports by ministries and state-owned trading companies; no major non-uniformity of customs duties for non-agricultural goods and services; full and current account convertibility.

4+ Standards and performance norms of advanced industrial economies: removal of most tariff barriers; membership in WTO.

Common border is a dummy that takes a value 1 if Foreign-investor-country is bordering Host-country; it is 0 otherwise.

GDP per capita growth (annual %); source: World Development Indicators

Share of corporate taxes on profits and capital gains (% of total taxes); source: World Development Indicators

Inflation, consumer prices (annual %); source: World Development Indicators