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Does corruption matter for sources of foreign direct investment?

Adiya Belgibayeva and Alexander Plekhanov

Summary

The paper provides a cross-country empirical analysis of the impact of corruption on foreign direct investment flows. The gravity model estimates suggest that if control of corruption in the destination country improves, investment flows from cleaner countries rise more than they do from countries with a higher incidence of corruption. In certain cases, a country – as its institutions improve – may actually attract less investment from countries with widespread corruption. The resulting change in investor mix may further reinforce the strengthening of economic and political institutions that keep corruption in check.

Keywords: corruption, economic institutions, foreign direct investment, gravity model

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Contact details: Alexander Plekhanov, European Bank for Reconstruction and Development, One Exchange Square, London, EC2A 2JN, UK. Email: plekhana@ebrd.com.

Adiya Belgibayeva is an EBRD-Weidenfeld research fellow; Alexander Plekhanov is at the European Bank for Reconstruction and Development.

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1. Introduction

This paper re-examines the relationship between bilateral foreign direct investment flows and the quality of institutions – and in particular control of corruption – in origin and destination countries. This is a topic that has received much attention and the impact of corruption on cross-border investment has been documented in various studies (see, for instance, Wei (2000) and Javorcik and Wei, 2009). In broad terms, corruption imposes additional costs on investors and increases uncertainty surrounding future costs and revenues. Increased costs and higher uncertainty generally lead to less attractive risk-adjusted returns and thus lower investment levels.

The contribution of this paper to the existing literature is to look in particular at the complementarity (joint effects) of corruption in the origin and destination countries and show that the extent of the impact of corruption on investment flows, and whether the overall impact is positive and negative, may depend on the corruption in the origin country.

The paper employs a gravity model of foreign direct investment (FDI) to explain bilateral FDI flows in a large sample of developed and developing countries from 1992 to 2011. The analysis confirms that corruption has a large and significant effect on both inward and outward flows of FDI. The gravity model estimates further suggest that the effect of improving control of corruption (non-incidence of corruption) in the destination country on the size of investment flows increases with the control of corruption in the origin country.

The magnitudes of the coefficients point to the existence of a substitution effect in some cases, whereby as a country's institutions improve, it attracts more investment from countries with low corruption and less investment from countries with widespread corruption. An earlier study by Morrissey and Udomkerdmongkol (2012) found that countries with better governance attract more FDI but additional FDI may come partially at the expense of lower domestic investment and this substitution effect appears to be larger in countries with better governance.

This paper argues that FDI itself is not homogenous: FDI from different countries may increase at different rates, depending on the level of corruption in the host country, and in fact an overall increase in FDI may sometimes represent an increase in FDI from low-corruption countries accompanied by a (smaller) decrease in FDI from high-corruption ones. This change in the volume and mix of FDI may lead to improvements in quality of management, corporate governance and business conduct in the host country and further reinforce the strengthening of institutions that limit corruption (for instance, Long et al. (2015), provide evidence of influence of FDI on economic institutions of China's regions).

The rest of the paper is structured as follows. Section 2 provides a brief review of the existing empirical literature on FDI, focusing on the link between FDI and corruption. Section 3 presents a simple model to illustrate the complementarity of corruption in the origin and destination countries for FDI flows. Section 4 outlines the empirical methodology and presents results. Section 5 concludes.

2. Determinants of foreign direct investment flows

2.1. Gravity model of foreign direct investment

This paper is part of the vast and growing literature seeking to explain bilateral FDI flows using a gravity model (see, for instance, Chakrabarti (2001) and Blonigen (2005) for an overview). A gravity model relates FDI flows to the measures of market size of the home and host countries (GDP per capita and population), various measures that affect physical and information costs (distance between the two countries, existence of common border, existence of common language or common colonial past). Even though the gravity model is better known for its application in the trade context (see Head and Mayer, 2013, for an overview), it has also been widely used to study the determinants of FDI (Bergstrand and Egger, 2011). Brainard (1997) and Head and Ries (2008) provide theoretical foundations for a baseline gravity model of FDI.

Larger markets provide higher demand and allow for economies of scale. Market size is closely linked to the size of GDP and can be decomposed into the level of income (GDP per capita) and the size of population (see, for instance, Chakrabati, 2001). The cost variables are linked to microfoundations in the context of trade (see, for instance, Anderson and Van Wincoop, 2003, 2004) but their role in the context of FDI may be somewhat ambiguous. In a typical model of horizontal FDI, where a firm serves a foreign market, FDI and cross-border trade can be seen as substitutes. A long distance may translate into high transportation costs and thus encourage FDI: building a plant in the destination country may be cheaper than shipping goods from the source country. On the other hand, in a model of vertical FDI, where a firm serves a domestic or international market but places certain stages of production overseas, high transportation costs would discourage FDI. In this case, an advantage of a low factor price abroad will be gradually eroded as transportation costs rise (see, for instance, Ramondo et al., 2013).

Variables that reflect information and communication costs such as common language or colonial relationship would have the same effect on FDI as on trade: lower barriers (common language, common colonial past) are expected to be associated with higher investment flows.

Financial openness in terms of a less restrictive FDI regime or a more open capital account is expected to be associated with lower investment costs and hence higher FDI. Trade openness may in fact have an ambiguous effect, as higher trade openness facilitates vertical FDI, which relies on trade in intermediate goods. In contrast, lower trade openness may encourage horizontal FDI by driving up costs of cross-border trade. On balance, Frenkel et al (2004) found a positive effect of trade openness on FDI.

Incidence of FDI may also be partly shaped by the endowment of natural resources. For instance, Bhaumik and Yap Co (2009) argue that endowment of natural resources is important for determining the destinations of China's overseas investment. Bellos and Subasat (2012) find a positive relationship between a natural resource endowment and FDI in a broader sample.

2.2. Quality of institutions and FDI

Corruption generally raises the costs of investment and increases uncertainty with respect to returns on investment, thus discouraging FDI. If governments are rent-seeking, they may create bottlenecks for investors in a way that enables bureaucrats to obtain the highest possible bribe tolerated by a firm (Kaufmann and Wei, 1999).

Consistent with this view, Wei (2000) found a negative effect of corruption on FDI in a sample of 12 source countries and 45 host countries (mostly OECD members). Wei (1997) further finds that corruption-induced uncertainty also has a negative impact on FDI (the uncertainty is captured by variability of responses to the questions about the level of corruption in the 1997 Competitiveness Report Survey). Javorcik and Wei (2009) find that corruption decreases the likelihood of FDI taking place and increases the likelihood of a foreign investor teaming up with a local investor rather than establishing a fully owned subsidiary. This is because local partners may have advantages in dealing with corrupt officials even though dilution of ownership and potential leakages of knowledge and technology often entail substantial costs. Kinda (2010) shows that poor business environment negatively affects FDI inflows. Globerman and Shapiro (2002) show that the overall quality of economic institutions (or governance infrastructure) is an important determinant of both FDI inflows and outward FDI flows.

At the same time, some studies do not find any significant effect of corruption on FDI. Stein and Daude (2001) find no effect of corruption (captured by the International Country Risk Group Index) on FDI in a sample of 18 source and 58 host countries when, unlike Wei (2000) they control for GDP per capita (control of corruption and per capita income are strongly positively correlated). Henisz (2000) finds no significant impact of corruption on investment by US multinationals. Bellos and Subasat (2012) find empirical evidence of a positive relationship between FDI and corruption in a sample of transition countries in 1995-2003, where corruption, as estimated in the PRS Group International Country Risk Guide. Bellos and Subasat (2013) find a similar effect in a sample of Latin American countries.

This positive relationship may arise due to "greasing the wheels" effect of corruption in an environment where general economic institutions are poor. Corruption may at times help to achieve second-best outcomes by mitigating distortions induced by bad government policies and red tape (see Lui (1985) for a discussion of how corruption can help to optimally jump the queues, and Aidt (2003) for a broader discussion).

A few studies examined the joint effect of the quality of institutions in home and host countries by looking at the difference in the levels of corruption control in pairs of countries**.** Bellos and Subasat (2012) conclude that countries with good institutions tend to invest more in countries with poor institutions. Habib and Zurawicki (2002) found the opposite result, whereby institutional distance, like physical distance, has a negative impact on investment. This approach is, however, fairly restrictive: it implies that the marginal effect of changes in the quality of institutions on investment is the same for a pair of countries where institutions are almost equally good, as for those where institutions are almost equally bad (as institutional distance in both cases is near zero).

This paper relaxes this restriction by introducing additional degrees of freedom in terms of interaction between countries' institutions. It follows the approach of Koczan and Plekhanov (2013) who study the impact of control of corruption in exporting and importing countries on bilateral trade by augmenting standard gravity specifications with an interaction term. Koczan and Plekhanov (2013) find that the marginal effect on trade of reducing corruption is higher in the case of trade with countries with stronger institutions.

The approach of this paper also allows for a negative impact of corruption on FDI in some cases and a positive impact of corruption in other cases. This is consistent with the fact that while perhaps most investors view corruption as an obstacle, some may see it as a helpful tool for getting around the rules and regulations.

3. The model

3.1. Base case

Consider a very simple model of investment decision with a rent-seeking government and an investor, which could be foreign or domestic, with a certain degree of risk-aversion to rent-seeking. Following the approach in Edwards and Keen (1996), a rent-seeking government maximises a weighted average of public utility (output generated by investment) and private rent (bribe), where the weight parameter c ($0 < c < 1$) determines the degree of control of corruption. As c approaches one (full control of corruption), the weight assigned to personal gain approaches zero. Conversely, as c approaches zero (no control of corruption), the government practically stops being concerned about public welfare. It is convenient to define an increasing monotonic transformation of c, as $c^{/} = c/(1 - c)$. By construction, $0 < c^{/} < +\infty$.

The model of investment decision follows a simplified version of the approach adopted by Javorcik and Wei (2009). Investor makes investment I, which, in the absence of corruption, generates a value of $V(I) = \alpha \ln I - \mu I$ ($\mu < \alpha$). This corresponds to a reduced form of a Cobb-Douglas production function where factors of production other than capital are fixed (and thus subsumed in the technology coefficient α), net of investment costs. The government sets a fraction of investment, b, which the investor has to pay as personal rent (bribe) in order for investment to take place. The amount of the bribe is thus bI ($b \geq 0$).

As in Javorcik and Wei (2009), investors incur costs of paying a bribe, assumed to increase proportionally to the size of the bribe. Investors' aversion to paying bribes, denoted γ ($\gamma > 0$), may vary depending on the degree of control of corruption in their home jurisdiction. Specifically, the cost to investor of paying the bribe (bI) is γbI. The private cost of paying a bribe may exceed its face value due to, for instance, the possibility of prosecution in the home jurisdiction or due to general cultural aversion to rent-seeking practices. For instance, Hines (1995) shows that an increased threat of prosecution at home following adoption of anti-corruption legislation in 1976-77 appears to have deterred US investors from investing in more corrupt jurisdictions. With full control of corruption, paying a bribe is prohibitively (infinitely) costly. When control of corruption is low, the cost of paying a bribe may be equivalent to the nominal amount of the bribe. In extreme cases ($0 < \gamma < 1$), political rents could be subsidised by, say, source country government, resulting in a private cost of a bribe payment below its nominal value.

The investor thus takes b (the quality of business environment) as given and chooses the volume of investment I to maximise the return on investment net of investment costs and costs associated with rent-seeking given:

$$\pi(I) = \alpha \ln I - \mu \mathrm{I} - \gamma bI \qquad (3.1)$$

The government takes into account investor's optimal response $I^*(b)$ and sets b, the level of private rents, to maximise its objective function:

$$U(b) = c\alpha \ln I^*(b) + (1 - c)bI^*(b) \qquad (3.2)$$

The following proposition characterises the solution (see Annex 1 for all proofs and derivations):

Proposition 1. $\frac{dI^*}{dc} \geq 0$; $\frac{dI^*}{d\gamma} \geq 0$; $\frac{d^2I^*}{dcd\gamma} \geq 0$

The optimal investment (non-strictly) increases in both the degree of control of corruption of the government (destination country) and that of the investor (source country). Moreover, in this setting the increase in investment in response to rising government control of corruption *c* is greater if the investor in turn is characterised by a higher control of corruption (lower tolerance for paying bribes). This is because corruption is particularly costly to the corruption-averse investor and hence investment by a corruption-averse investor increases more rapidly in response to a reduction in the degree of rent-seeking in the economy compared with investment by a "corruption-neutral" investor.

3.2. Case of an investment tender

In the example above, any investment is non-rival with respect to any other investments. Consider now a similar set-up: a tender involving two potential investors who differ in terms of their aversion to rent-seeking. The control of corruption of the first investor is normalised to $\gamma = 1$. The second investor has a higher aversion to paying bribes $\gamma > 1$.

Suppose that the two investors also differ in terms of their technology, and thus productivity, by a factor of *k* (the first investor has a production function parameter $\alpha_1 = \alpha$, while the second investor has technology with $\alpha_2 = k\alpha$). The interesting case arises when the investor with the higher aversion to corruption is somewhat more productive ($\gamma \geq k > 1$). In this case the rent-seeking government faces a productivity-rent trade-off, choosing between a more productive investor or investor prepared to pay higher rents.

The government approaches each investor with an investor-specific optimal rent request (b_1 or b_2) and receives optimal investment bids from each investor ($I_1^*(b_1)$ and $I_2^*(b_2)$). The government then decides which bid to accept based on its objective function (3.2).

Proposition 2. There exists c'^* ($0 < c'^* < 1/\gamma$) and there exists k^* ($k^* < \gamma$) such that for all higher values of c' ($c'^* < c' < 1/\gamma$) a rent is extracted ($b^* > 0$) and the tender is awarded to a more corruption-averse investor as long as its productivity satisfies $k \geq k^*$. For a given $k = k^*$ the tender is awarded to the less corruption-averse investor whenever $0 < c' < c'^*$.

The proposition implies that as control of corruption increases, at a certain point (c'^*) the government switches from dealing with a less "clean" (and less productive) investor to dealing with a "cleaner" (and more productive) investor. This is because the government faces a trade-off between productivity and rents and as the weight of rents in its objective function decreases the premium placed on productivity rises.

This highly simplified, stylised example illustrates how a "substitution" effect might arise where bilateral investment from a country with weak institutions may actually decrease as institutions in the destination country become stronger. This decrease is offset by rising investment from countries with strong control of corruption. Whether such a substitution effect can be seen in aggregate bilateral flows will depend on the extent to which investments are rival or non-rival, on the variation in productivity levels of different investors and numerous other factors not accounted for in the simple illustration above.

The paper now turns to the empirical analysis of bilateral investment flows and their sensitivity to the quality of institutions of source and destination countries.

4. Results

4.1. Data

Data on foreign direct investment flows are notoriously incomplete. Various available cross-country datasets, such as the ones compiled by the Organisation for Economic Co-operation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD) or Eurostat, provide partial coverage for different sets of countries and time periods. In some instances they may be inconsistent with each other (see Gouel et al. (2012) for further discussion).

For baseline analysis we use data from Eurostat covering the period 1992-2011. It reports data on bilateral inward and outward investments for the EU countries, Turkey and FYR Macedonia in relation to the rest of the world. Eurostat dataset also has the advantage of containing information on FDI by sectors starting from 2008.

As a robustness check we also use UNCTAD data on bilateral FDI flows in a broad sample of developed and developing countries in 2008-11.

Macroeconomic variables such as GDP and population are taken from the IMF World Economic Outlook; various gravity control variables, including the average distance between countries, existence of a common border, common colonial history and common language, are taken from CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) distance dataset.

Capital account openness is captured by the Chinn-Ito Index (Chinn and Ito, 2006). Openness to FDI is measured by the OECD FDI Regulatory Restrictiveness Index available for a subset of 52 countries (OECD members and selected non-member countries). Endowments of natural resources are captured by percentage of commodities in total merchandise exports based on WTO/UNCTAD data or by the ratio of natural resource rents to GDP, as reported in the World Bank's World Development Indicators database.

The quality of institutions limiting corruption is proxied by the World Governance Indicator of control of corruption. This index ranges from -2.5 to 2.5, with higher values corresponding to better quality of institutions. It is available annually for a large number of developed and developing economies (see Kauffmann et al., 2009). Descriptive statistics for selected variables (based on the Eurostat FDI database sample) is reported in Table 1.

Table 1: Descriptive statistics

Variable	Median	Mean	Std. deviation	Min	Max
FDI flows	0	103.8	1339	0	85970
GDP per capita, US$	7209	13639	13648	128.3	67554
Population, million	7.74	32.4	110	0.009	1340
Distance	854	7038	4129	19.13	19586
Common border	0	0.0122	0.110	0	1
Common language	0	0.0682	0.252	0	1
Common colonial history	0	0.0310	0.173	0	1
Capital account openness	2.439	1.250	1.520	-1.864	2.439
Control for corruption	0.347	0.522	1.079	-1.923	2.557
Destination country cost to export	2008	2008	2.291	2004	2011
Origin country cost to import	1020	1139	604.9	295	5902

Source: Authors' calculations.

Note: Descriptive statistics refer to years 2004 to 2011.

4.2. Baseline results

The basic gravity model of FDI can be written as follows:

$$fdi_{ijt} = \alpha + \beta_1 X_{it} + \beta_2 X_{jt} + \gamma Z_{ijt} + \alpha_t + \varepsilon_{\mathrm{ijt}} \qquad (4.1)$$

where fdi_{ij} is the logarithm of the flow of FDI from country i to country j in year t, X is the measure of control of corruption, Z_{ijt} are a set of control variables including logarithms of population and per capita income in the source and destination countries, distance between the countries, existence of common border, common language and colonial history and so on. α_t denotes fixed time effects and $\varepsilon_{\mathrm{ijt}}$ denotes the error term. The model is first estimated by pooled OLS (with standard errors clustered at country-pair level).

The results presented in Table 2 (columns 1 and 2) confirm that corruption has a significant impact on bilateral investment flows. In general, bilateral investment flows strongly depend on the size and level of income of the destination economy and those of the source economy. A 10 per cent increase in source economy income per capita is associated with a 7 to 11 per cent increase in bilateral investment flows; a 10 per cent increase in population is associated with a 3 to 5 per cent increase in bilateral investment. The elasticities are similar, although somewhat smaller, with respect to population and income of the destination economy.

Doubling the distance between the countries is estimated to halve bilateral investment. Bilateral investment flows between countries that share a border are on average 70 to 80 per cent higher than between non-neighbouring countries. Other measures of proximity also have a sizable effect on FDI. Investment between countries with a common language is around 80 per cent higher; having a common colonial history is associated with 30 to 50 per cent higher investment flows.

Investments tend to originate in more financially open countries (the financial openness of destination countries appears to matter less) and restrictive FDI regimes are indeed associated with lower investment. Natural resource wealth in destination countries is associated with higher investment flows, and natural resource rich countries also tend to invest more overseas. At the same time, these effects are not always statistically significant and their magnitude is relatively small.

The quality of institutions is important in both source and destination countries. A one standard deviation increase in control of corruption index (roughly a one unit increase) is associated with an approximately 25 per cent increase in inward FDI (and a 40 per cent increase in outward FDI).

The analysis above assumes that control of corruption is a country characteristic that equally affects investment relationships with all other countries (in the context of trade gravity models such characteristics are also referred to as "multilateral resistance terms"). Yet corruption may introduce bottlenecks in implementation of investment project or raise uncertainty and reduce returns beyond levels acceptable to investors. In this case, addressing bottlenecks in the source country may not be enough to encourage investment if bottlenecks in the destination country remain, and vice versa.

Moreover, businesses in different countries may have different levels of tolerance towards corruption, often based on domestic experience. The effect of reducing corruption may be much higher in terms of attracting investment from corruption-intolerant countries compared with the effect on investment from corruption-tolerant countries. Control of corruption may therefore also be a characteristic of a particular investment relationship, much like distance between countries or sharing a border or a language (in trade gravity models such characteristics are referred to as "bilateral resistance terms").

To account for this, the standard gravity equation can be augmented with an interaction term between source country and destination country control of corruption:

$$fdi_{ijt} = \alpha + \beta_1 X_{it} + \beta_2 X_{jt} + \beta_3 X_{it} X_{jt} + \gamma Z_{ijt} + \alpha_t + \varepsilon_{\mathrm{ijt}} \qquad (4.2)$$

This specification still assumes a linear relationship but the marginal effect of improving control of corruption in a destination country now depends on the quality of institutions in the source country of investment.

The results obtained using the augmented specification are reported in columns 3 to 6. As expected, the coefficient on the interaction term is positive and statistically significant. Estimation results imply that if a country of origin has relatively strong institutions (for instance, control of corruption index of 0.5, as in the case of Korea or Poland), a one standard deviation improvement in a host country's control of corruption is associated with a 14 per cent increase in bilateral investment flows. If control of corruption in a source country is relatively weak (index of -0.5, as in the case of China or Russia), a one standard deviation improvement in control of corruption is actually associated with a decline in bilateral investment flows of around 6 per cent.

The estimates thus suggest that improvements in a country's institutions may help to catalyse investments from countries with less widespread corruption, while FDI from countries with poor institutions may remain unaffected or even contract. Over time, this reconfiguration of investment partnerships may in turn help to strengthen domestic economic institutions through improved business practices, better corporate governance and quality of management (see, for instance, Long et al. (2015) for evidence from China's regions). This could create a virtuous spiral of institution building and higher FDI from countries with strong institutions.

The converse may also be true: a vicious spiral of deteriorating institutions and deficit of investment from less corrupt countries.

Columns 5-6 further examine the robustness of main results by employing the between and random effects panel estimators. The between estimator essentially uses only cross-sectional variation in the panel data (variation between country pairs), by averaging across time the dependent variable ($\bar{y}_i$) and explanatory variables ($\bar{\mathbf{x}}_i$). In this case it may be preferred to the more commonly used fixed effects estimator as institutions evolve slowly and thus the index of control of corruption has very little meaningful variation across time. The estimation results are broadly similar to those obtained by OLS and the coefficients on the interaction terms remain statistically and economically significant.

Accounting for zero investment flows

The analysis above focuses on the changes in volumes of FDI for relationships where investment takes place – an "intensive margin" of foreign investment. At the same time around three-quarters of all pairs of countries have zero investment recorded; this is far more than for trade (where around one-third of possible trade partnerships have no trade, according to the data). The selection of countries into an investment relationship and the establishment of new investment links ("extensive margin" of overseas investment) are arguably not random and thus may lead to biased estimates.[1]

Existence of zeros in a bilateral investment matrix can be accounted for in various ways. One approach is to look at both extensive and intensive margins of investment by using a two-stage Heckman selection model (see Helpman, Melitz and Rubinstein (2008) in the context of trade). The first stage estimation includes a measure of the fixed cost of exporting from the destination country of investment, based on the World Bank *Doing Business* database estimates. Higher exporting costs make a destination less attractive for vertical FDI (that rely on cross-border trade in intermediate goods); they also make a destination less attractive for horizontal FDI seeking to serve regional markets. Conditional on investment taking place, the fixed costs of exporting should not necessarily have a significant impact on the size of investment. This selection variable is conceptually similar to the fixed costs of importing in the case of the trade gravity model with selection. The results of the Heckman selection model are presented in Table 3 (columns 1-4) and confirm the robustness of the earlier findings.

Another approach is to assume a distribution, which, unlike the normal distribution of (logarithm of) investment, can generate a high mass of zero values, such as a Poisson distribution (Silva and Tenreyro, 2006) or, in a more generalised form, a negative binomial distribution characterised by over-dispersion (Burger, van Ort and Linders, 2009).[2] The results using a negative binomial functional form are presented in Table 3 (column 5). Although the estimates of the marginal effects of improvements in control of corruption on investment flows are somewhat lower than in the baseline specifications, and standard errors are somewhat larger, the coefficients on the interaction term remain economically and statistically significant.

[1] Prevalence of zeros in the FDI matrix in part reflects the fact that FDI flows are much smaller than trade flows. But it also reflects lower quality of FDI data, whereby some of the zero values may in fact be missing values. In this regard methods trying to take into account zeros and/or study the "intensive" margin of FDI are less precise and may be also subject to biases.

[2] A number of other approaches have been suggested in the context of trade, for instance a tobit model with truncated distribution of trade values (Eaton and Tamura, 1994).

Sectoral analysis

Tables 4 and 5 show the results obtained for investment in specific sectors based on Eurostat data. Interactions between control of corruption in the source and destination countries appear to matter relatively more in medium- and higher-value-added manufacturing, construction and transport – sectors with a diverse array of potential investors.

In contrast, interaction terms matter less or are not significant in commodities and agriculture and related manufacturing sectors (food and textiles). In these sectors investments are often driven by relative factor endowments of countries and may rely more on highly specialised expertise, which leads to a high proportion of cross-border investments concentrated with a few large multinationals, as for instance in the metal mining industry.

Table 2: Determinants of bilateral investment flows

	POLS	POLS	POLS	POLS	BE	RE
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*Bilateral FDI flow, log*					
Distance, log	-0.4520***	-0.4782***	-0.4597***	-0.6870***	-0.4065***	-0.4189***
	[0.034]	[0.034]	[0.034]	[0.049]	[0.030]	[0.031]
Common border	0.8204***	0.8213***	0.7373***	0.5324***	0.8984***	0.8633***
	[0.136]	[0.135]	[0.136]	[0.182]	[0.155]	[0.136]
GDP per capita, origin, log	1.0637***	0.7619***	0.7247***	1.1301***	0.5688***	0.6751***
	[0.036]	[0.048]	[0.048]	[0.086]	[0.044]	[0.041]
GDP per capita, destination, log	0.6306***	0.4847***	0.4684***	0.3875***	0.4287***	0.4755***
	[0.029]	[0.043]	[0.043]	[0.078]	[0.040]	[0.038]
Population, origin, log	0.4178***	0.4522***	0.4608***	0.8331***	0.3955***	0.4082***
	[0.020]	[0.020]	[0.020]	[0.034]	[0.016]	[0.018]
Population, destination, log	0.4196***	0.4261***	0.4380***	0.6412***	0.3851***	0.4021***
	[0.020]	[0.021]	[0.020]	[0.037]	[0.016]	[0.018]
Common language	0.7732***	0.7718***	0.7838***	0.8794***	0.8383***	0.8198***
	[0.096]	[0.094]	[0.093]	[0.140]	[0.097]	[0.094]
Common colonial past	0.5054***	0.4466***	0.4612***	0.5575***	0.3321***	0.4157***
	[0.114]	[0.113]	[0.112]	[0.192]	[0.118]	[0.111]
Capital account openness, origin	0.0897***	0.0603**	0.0572*	-0.0453	0.0133	0.0637***
	[0.030]	[0.030]	[0.029]	[0.052]	[0.027]	[0.024]
Capital account openness, dest	0.0270	0.0072	0.0054	-0.0627	0.0330	0.0118
	[0.025]	[0.025]	[0.025]	[0.043]	[0.025]	[0.021]
FDI restrictiveness, origin				-1.4745**		
				[0.618]		
FDI restrictiveness, dest				-0.8551		
				[0.584]		
Nat. res. share of exports, origin				0.0075***		
				[0.002]		
Nat. res. share of exports, dest				0.0064***		
				[0.002]		
Control of corruption, origin		0.4278***	0.3180***	0.5128***	0.3869***	0.2492***
		[0.049]	[0.052]	[0.087]	[0.052]	[0.045]
Control of corruption, dest		0.2377***	0.0437	0.2636***	0.0018	-0.0032
		[0.053]	[0.058]	[0.094]	[0.056]	[0.051]
Control of corruption, origin*dest			0.1991***	0.0982**	0.2268***	0.2092***
			[0.028]	[0.044]	[0.028]	[0.025]
Constant	-23.3327***	-20.2004***	-20.0425***	-30.7844***	-16.5602***	-18.1586***
	[0.701]	[0.761]	[0.752]	[1.289]	[0.652]	[0.686]
Observations	13,372	13,372	13,372	2,641	13,372	13,372
R-squared	0.455	0.466	0.471	0.548	0.498	0.495

Source: Authors' calculations.

Note: Year dummy variable is included but not reported. Standard errors are in parenthesis, clustered at country pair level. Values significant at the 10 per cent are marked with *, at the 5 per cent level with **, at the 1 per cent level with ***. POLS refers to pooled ordinary least squares; BE, to the between estimator; and RE, to the random effects.

Table 3: Determinants of bilateral investment flows (accounting for zero values)

	Heckman	Select	Heckman	Select	NBREG
	(1)	(2)	(5)	(6)	(9)
Dependent variable	*FDI*	*select*	*FDI*	*select*	*FDI*
Distance, log	-0.8006***	-0.2877***	-0.7248***	-0.2659***	-0.6105***
	[0.047]	[0.016]	[0.046]	[0.016]	[0.057]
Common border	1.1730***	0.4187***	1.1608***	0.4201***	1.2791***
	[0.187]	[0.095]	[0.182]	[0.098]	[0.189]
GDP per capita, origin, log	1.1991***	0.3960***	1.2313***	0.4076***	1.2277***
	[0.063]	[0.017]	[0.064]	[0.017]	[0.122]
GDP per capita, destination, log	0.7426***	0.2339***	0.7576***	0.2470***	0.9401***
	[0.049]	[0.014]	[0.052]	[0.015]	[0.066]
Population, origin, log	0.7518***	0.2490***	0.7208***	0.2437***	0.4963***
	[0.029]	[0.008]	[0.030]	[0.008]	[0.037]
Population, destination, log	0.7254***	0.2460***	0.7066***	0.2465***	0.5911***
	[0.029]	[0.007]	[0.031]	[0.008]	[0.046]
Common language	0.8683***	0.1042**	0.8337***	0.1208**	0.8445***
	[0.109]	[0.043]	[0.114]	[0.048]	[0.235]
Common colonial past	1.0915***	0.4875***	1.0252***	0.4481***	0.7921***
	[0.143]	[0.057]	[0.143]	[0.063]	[0.180]
Capital account openness, origin	0.0391	-0.0006	0.0157	-0.0073	0.0391
	[0.035]	[0.011]	[0.035]	[0.011]	[0.070]
Capital account openness, dest	0.0843***	0.0570***	0.0869***	0.0627***	0.1260**
	[0.031]	[0.010]	[0.032]	[0.010]	[0.052]
Control of corruption, origin	0.3589***	0.0276	0.3000***	0.0222	0.2522**
	[0.060]	[0.020]	[0.061]	[0.021]	[0.109]
Control of corruption, dest	-0.0892	-0.0894***	-0.1520**	-0.1319***	-0.1161
	[0.063]	[0.019]	[0.068]	[0.021]	[0.110]
Control of corruption, origin*dest	0.2846***	0.0783***	0.2806***	0.0765***	0.1061*
	[0.033]	[0.010]	[0.034]	[0.011]	[0.058]
Destination country cost to export				-0.0001***	
				[0.000]	
athrho		1.0688***		0.9320***	
		[0.089]		[0.085]	
lnsigma		0.8469***		0.7986***	
		[0.036]		[0.035]	
lnalpha					2.2947***
					[0.039]
Constant	-35.5731***	-12.1933***	-35.4359***	-12.4191***	-29.6023***
	[1.314]	[0.294]	[1.376]	[0.311]	[1.163]
Observations	79,540	79,540	56,965	56,965	51,291

Source: Authors' calculations.

Note: Year dummy variable is included but not reported. Standard errors are in parenthesis, clustered at country pair level. Values significant at the 10 per cent are marked with *, at the 5 per cent level with **, at the 1 per cent level with ***. NBREG refers to the negative binomial regression.

Table 4: Determinants of sectoral bilateral investment flows

Dependent variable: Bilateral FDI flows, log	Agriculture and commodities	Manufacturing	Utilities	Construction	Retail, wholesale, hotels and catering	Transport	Information and communication	Finance Services and Real Estate	Other Services
Distance, log	-0.4110***	-0.4837***	-0.6434***	-0.2627***	-0.5027***	-0.1821**	-0.5086***	-0.4439***	-0.3968***
	[0.118]	[0.051]	[0.140]	[0.088]	[0.050]	[0.086]	[0.089]	[0.066]	[0.072]
Common border	-0.5931*	0.3257*	-0.2982	-0.1708	0.4326**	0.6859***	0.3091	0.4095*	0.5675**
	[0.081]	[0.037]	[0.094]	[0.060]	[0.036]	[0.066]	[0.058]	[0.049]	[0.050]
GDP per capita, origin, log	0.635	0.5032***	0.3621	0.7949***	0.8872***	0.1196	0.4907*	0.7492***	0.7023**
	[0.469]	[0.175]	[0.407]	[0.298]	[0.176]	[0.300]	[0.291]	[0.249]	[0.284]
GDP per capita, destination, log	0.8942**	0.1451	0.1854	0.5494**	0.6375***	0.5483**	0.5928**	0.5564**	0.2266
	[0.307]	[0.190]	[0.332]	[0.257]	[0.179]	[0.255]	[0.284]	[0.239]	[0.251]
Population, origin, log	1.2670***	1.0544***	0.1757	0.4775***	0.8855***	0.1716	0.4642***	0.7743***	0.3357**
	[0.267]	[0.106]	[0.376]	[0.166]	[0.102]	[0.146]	[0.167]	[0.152]	[0.157]
Population, destination, log	0.1258	0.5383***	0.0957	-0.0292	0.4130***	-0.0727	0.2701*	0.3704***	0.2354*
	[0.230]	[0.093]	[0.254]	[0.144]	[0.095]	[0.137]	[0.159]	[0.130]	[0.120]
Common language	0.3795***	0.7093***	0.2866***	0.1956***	0.6240***	0.2731***	0.5386***	0.5643***	0.6274***
	[0.099]	[0.037]	[0.095]	[0.057]	[0.038]	[0.061]	[0.069]	[0.051]	[0.055]
Common colonial past	0.4266***	0.5135***	0.5445***	0.1528**	0.4184***	0.1619**	0.3468***	0.4076***	0.5194***
	[0.442]	[0.188]	[0.381]	[0.272]	[0.181]	[0.253]	[0.254]	[0.247]	[0.314]
Capital account openness, origin	-0.0033	0.049	0.3659**	0.1151	0.1833***	0.114	0.3211**	0.2188**	0.5182***
	[0.195]	[0.069]	[0.172]	[0.096]	[0.063]	[0.081]	[0.130]	[0.102]	[0.098]
Capital account openness, dest	0.1083	-0.0923*	0.1822	0.0308	0.0297	0.0732	0.0314	-0.075	0.1783**
	[0.116]	[0.051]	[0.168]	[0.074]	[0.055]	[0.084]	[0.097]	[0.079]	[0.076]
Control of corruption, origin	-0.4633***	0.1628*	0.0682	-0.4825***	0.1552*	0.1827	0.2292	0.1575	0.3408***
	[0.162]	[0.096]	[0.278]	[0.138]	[0.092]	[0.128]	[0.145]	[0.125]	[0.123]
Control of corruption, dest	0.6535**	0.0261	0.3222	-0.0662	0.1823*	0.2606**	0.3224*	0.1204	0.2822**
	[0.257]	[0.103]	[0.244]	[0.180]	[0.102]	[0.122]	[0.175]	[0.131]	[0.131]
Control of corruption, origin*dest	-0.137	0.1593***	0.0402	0.2539***	0.0932*	0.2333***	0.0306	0.1069*	-0.0237
	[0.110]	[0.050]	[0.149]	[0.085]	[0.048]	[0.065]	[0.086]	[0.065]	[0.065]
Constant	-22.5326***	-29.8078***	-10.7921***	-6.2699***	-23.3432***	-6.0110**	-17.7207***	-21.4060***	-21.2584***
	[3.603]	[1.624]	[4.120]	[2.362]	[1.620]	[2.564]	[2.468]	[2.216]	[2.222]
Observations	517	2,260	539	787	2,580	915	892	1,756	1,446
R-Squared	0.287	0.447	0.226	0.157	0.442	0.246	0.295	0.354	0.354

Source: Authors' calculations.

Note: Year dummy variable is included but not reported. Standard errors are in parenthesis, clustered at country pair level. Values significant at the 10 per cent are marked with *, at the 5 per cent level with **, at the 1 per cent level with ***.

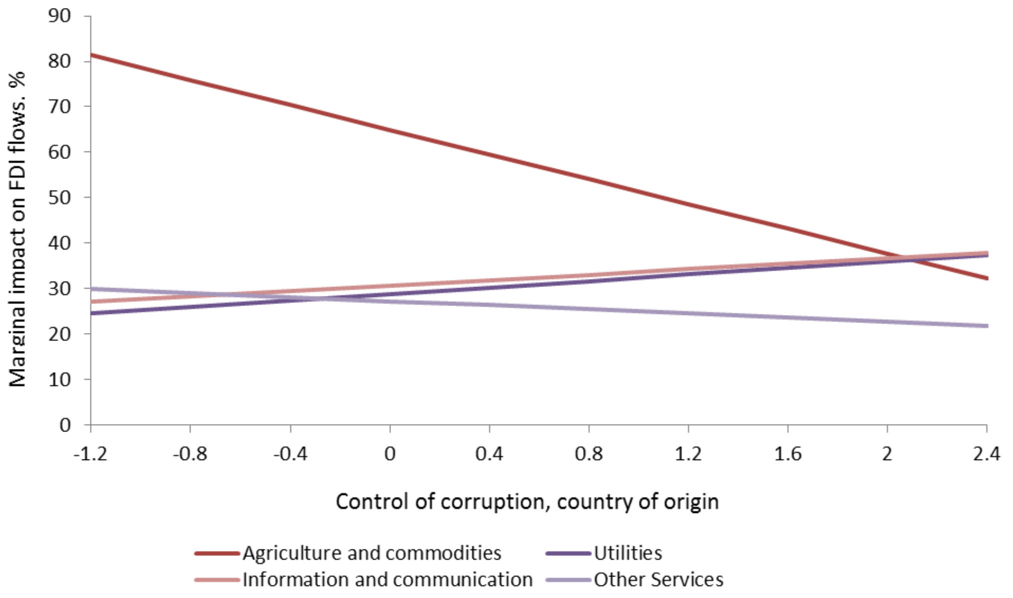
Table 5: Determinants of manufacturing bilateral investment flows

Dependent variable: Bilateral FDI flows, log	Manufacturing of food, textile and wooden products	Manufacturing of basic metals and fabricated metal products, petroleum, chemical, pharmaceutical, rubber, plastic products	Manufacturing of metal and machinery products, electronic, computers and vehicles
Distance, log	-0.4329***	-0.3967***	-0.2296***
	[0.135]	[0.067]	[0.078]
Common border	0.0909	0.3038	0.3395
	[0.077]	[0.051]	[0.057]
GDP per capita, origin, log	0.8067**	0.4486	0.3492
	[0.348]	[0.287]	[0.311]
GDP per capita, destination, log	-0.3928	-0.0819	-0.2046
	[0.362]	[0.259]	[0.269]
Population, origin, log	0.6345**	0.5831***	0.6425***
	[0.303]	[0.139]	[0.189]
Population, destination, log	0.6075***	0.5803***	0.4770***
	[0.214]	[0.113]	[0.166]
Common language	0.3513***	0.5026***	0.6232***
	[0.093]	[0.049]	[0.063]
Common colonial past	0.3027***	0.3879***	0.4981***
	[0.306]	[0.296]	[0.274]
Capital account openness, origin	0.1103	0.0976	0.1321
	[0.187]	[0.087]	[0.121]
Capital account openness, dest	-0.0438	-0.0648	-0.0573
	[0.175]	[0.068]	[0.085]
Control of corruption, origin	0.3337	0.1838	0.1672
	[0.210]	[0.114]	[0.149]
Control of corruption, dest	0.0395	-0.1085	-0.053
	[0.183]	[0.125]	[0.166]
Control of corruption, origin*dest	-0.026	0.1753***	0.1215*
	[0.091]	[0.066]	[0.072]
Constant	-18.0384***	-21.4627***	-26.0444***
	[2.894]	[2.220]	[2.824]
Observations	499	1,452	1,268
R-Squared	0.279	0.305	0.282

Source: Authors' calculations.

Note: Year dummy variable is included but not reported. Standard errors are in parenthesis, clustered at country pair level. Values significant at the 10 per cent are marked with *, at the 5 per cent level with **, at the 1 per cent level with ***.

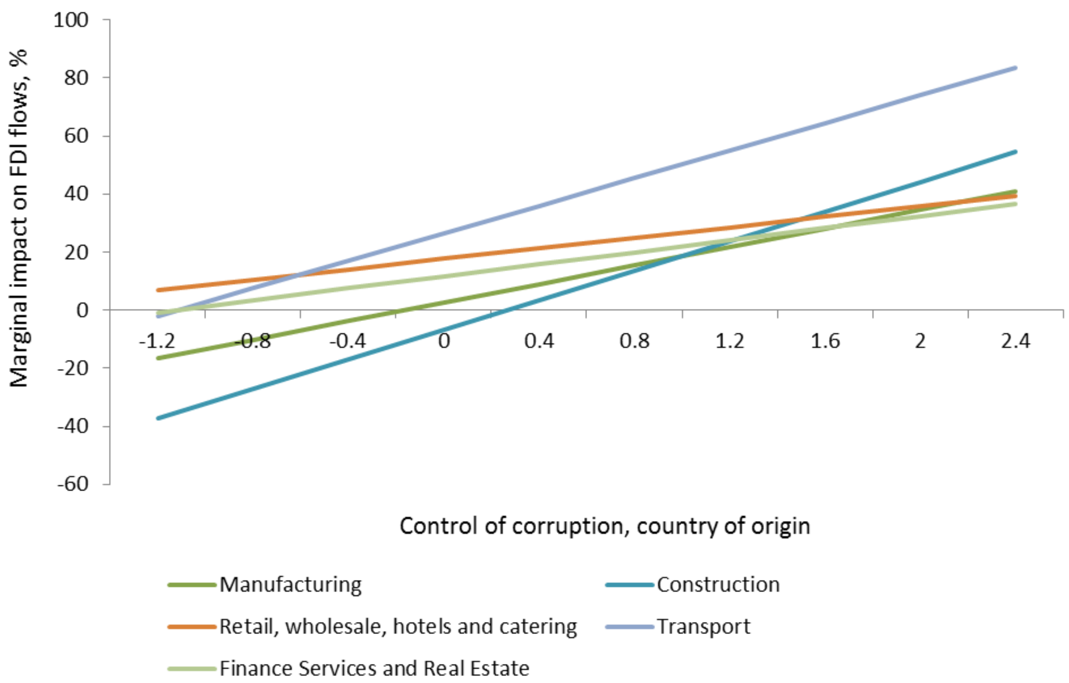
Chart 1: The impact of better corruption control in a destination country



Source: Authors' calculations.

Note: The chart shows the impact of one standard deviation improvement in control of corruption in the destination country as a function of control of corruption in the country of origin**.**

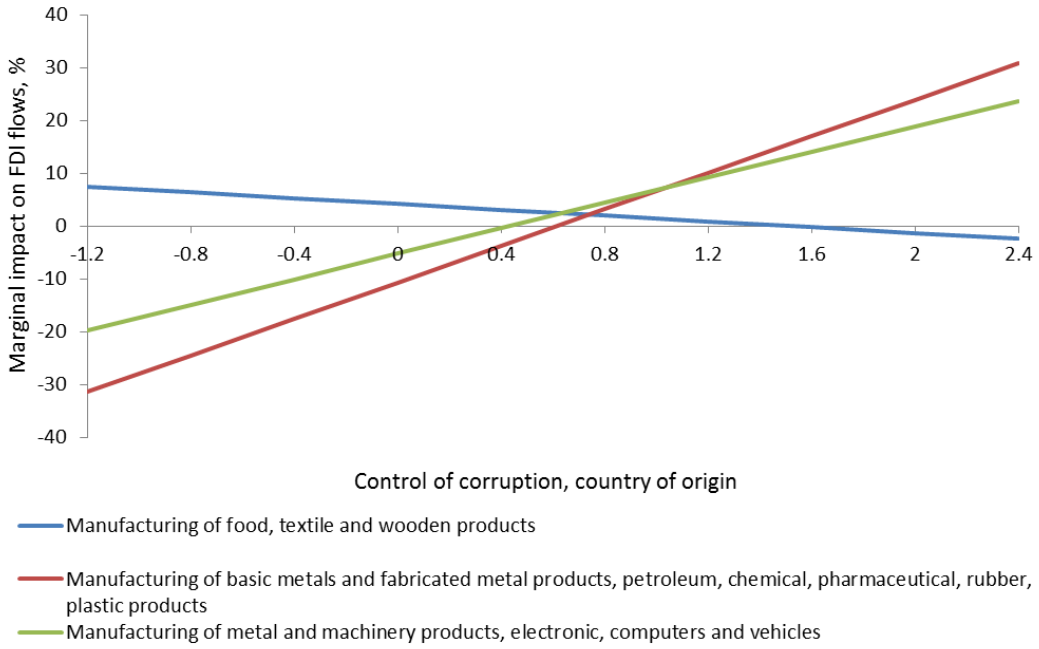
Chart 2: The impact of better corruption control in a destination country



Source: Authors' calculations.

Note: The chart shows the impact of one standard deviation improvement in control of corruption in the destination country as a function of control of corruption in the country of origin.

Chart 3: The impact of better corruption control in a destination country



Source: Authors' calculations.

Note: The chart shows the impact of one standard deviation improvement in control of corruption in the destination country as a function of control of corruption in the country of origin.

4.3 Robustness checks

Analysis based on UNCTAD data

As a robustness check, a similar analysis is performed on UNCTAD data on bilateral FDI flows covering the period 2008-11. The UNCTAD dataset has the broadest coverage in terms of reporting countries and thus potentially available country pairs, although generally a smaller proportion of overall FDI may be attributed to individual partner countries (compared with the Eurostat dataset).

The results are summarised in Table 6. They are generally consistent with the previously obtained estimates, and the coefficient on the interaction term between control of corruption in the source country and the control of corruption in the destination country is economically and statistically significant.

Table 6: Determinants of bilateral investment flows (UNCTAD data)

	POLS	POLS	POLS	BE	RE
	(1)	(2)	(3)	(4)	(5)
Dependent variable			*Bilateral FDI flow, log*		
Distance, log	-0.5025***	-0.5199***	-0.5014***	-0.5344***	-0.5328***
	[0.045]	[0.045]	[0.045]	[0.042]	[0.042]
Common border	0.8965***	0.9183***	0.8059***	0.8511***	0.8465***
	[0.146]	[0.146]	[0.148]	[0.168]	[0.149]
GDP per capita, origin, log	1.1404***	0.8875***	0.8709***	0.8094***	0.9666***
	[0.059]	[0.091]	[0.090]	[0.087]	[0.081]
GDP per capita, destination, log	0.6081***	0.4267***	0.4328***	0.3931***	0.4392***
	[0.035]	[0.050]	[0.050]	[0.047]	[0.047]
Population, origin, log	0.5413***	0.5775***	0.5725***	0.5819***	0.5693***
	[0.025]	[0.027]	[0.027]	[0.024]	[0.025]
Population, destination, log	0.4790***	0.4862***	0.4942***	0.4636***	0.4709***
	[0.026]	[0.027]	[0.026]	[0.021]	[0.025]
Common language	0.8574***	0.8530***	0.8433***	0.8383***	0.8477***
	[0.125]	[0.124]	[0.125]	[0.123]	[0.126]
Common colonial past	0.4131***	0.3845**	0.3935***	0.4263***	0.4317***
	[0.150]	[0.150]	[0.149]	[0.165]	[0.147]
Capital account openness, origin	-0.0093	0.0111	0.0303	0.0763*	0.0260
	[0.045]	[0.045]	[0.045]	[0.041]	[0.039]
Capital account openness, dest	0.0291	-0.0080	-0.0014	0.0127	-0.0113
	[0.030]	[0.030]	[0.031]	[0.031]	[0.027]
Control of corruption, origin		0.2879***	0.2120***	0.2951***	0.1722**
		[0.076]	[0.076]	[0.082]	[0.073]
Control of corruption, dest		0.3196***	0.1195	0.0670	0.0778
		[0.065]	[0.081]	[0.069]	[0.071]
Control of corruption, origin*dest			0.1972***	0.2529***	0.2137***
			[0.039]	[0.034]	[0.035]
Constant	-25.9256***	-22.9953***	-23.0327***	-21.7809***	-23.3525***
	[0.930]	[1.048]	[1.031]	[0.948]	[0.958]
Observations	5,916	5,916	5,916	5,916	5,916
R-squared	0.431	0.439	0.445	0.491	0.491

Source: Authors' estimations.

Note: Year dummy variable is included but not reported. Standard errors are in parenthesis, clustered at country pair level. Values significant at the 10 per cent are marked with *, at the 5 per cent level with **, at the 1 per cent level with ***.

Fixed-effects analysis

Cross-country models of bilateral investment may omit a number of country characteristics that affect countries' propensity to invest abroad and attract investment or otherwise explain certain trends in cross-border investment flows. One way to mitigate this issue and account for unobserved heterogeneity in cross-country gravity models is to include origin and destination country fixed effects (see, for instance, Anderson and van Wincoop, 2003).

This approach has its limitations in the case of analysing the impact of corruption as common measures of corruption have relatively little meaningful time variation (and in fact may be viewed as part of a country "fixed effect").

However, the interaction term between the levels of corruption in the origin and destination country can be included even when individual levels of corruption are accounted for by country (or country-time) fixed effects. This approach is similar, for instance, to the estimation employed by Rajan and Zingales (1998) who focus on the interaction term between countries and industries while at the same time controlling for country fixed effects and industry fixed effects.

The results are presented in Table 7, where pooled regressions include origin*time and destination*time fixed effects that account for trends in country GDP per capita, population level, capital account openness as well as unobserved trend in investments. The coefficient on the interaction term between the origin country control of corruption and that of the destination country remains positive and statistically significant (and its magnitude, if anything, increases somewhat). Columns 3 and 4 further present results with fixed effects included only for origin countries and only for destination countries, respectively.

Table 7: Fixed effects analysis

	POLS	POLS	POLS	POLS
	(1)	(2)	(3)	(4)
VARIABLES		bilateral FDI flow, log		
Distance, log		-0.8071***	-0.5888***	-0.5064***
		[0.053]	[0.038]	[0.038]
Common border		0.5036***	0.6894***	0.6759***
		[0.137]	[0.143]	[0.130]
GDP per capita, origin, log				0.7942***
				[0.046]
GDP per capita, destination, log			0.4845***	
			[0.042]	
Population, origin, log				0.5089***
				[0.019]
Population, destination, log			0.4785***	
			[0.020]	
Common language		0.6568***	0.7768***	0.8859***
		[0.101]	[0.104]	[0.092]
Common colonial past		0.5259***	0.2912**	0.6335***
		[0.115]	[0.118]	[0.111]
Capital account openness, origin				0.0550*
				[0.029]
Capital account openness, destination			0.0004	
			[0.025]	
Control of corruption, origin				0.3073***
				[0.049]
Control of corruption, destination			0.0307	
			[0.057]	
Control of corruption, origin*dest	0.3766***	0.2517***	0.2587***	0.1844***
	[0.030]	[0.028]	[0.029]	[0.028]
Constant	-1.5970**	8.2654***	-8.1411***	-13.1024
	[0.695]	[0.842]	[0.535]	[.]
Observations	15,487	15,487	14,459	14,299
R-squared	0.621	0.673	0.572	0.573
Destination*Year FE	Yes	Yes	No	Yes
Origin*Year FE	Yes	Yes	Yes	No

Source: Authors' estimations.

Note: Standard errors in parenthesis, clustered at country pair level. Values significant at the 10 per cent are marked with *, at the 5 per cent level with **, at the 1 per cent level with ***.

To understand the magnitude of this effect, consider two countries of origin of investment – at the 25th and 75th percentile of the distribution of the control of corruption score (Israel and Indonesia). If a destination country reduces corruption by one standard deviation, it will attract around 40 percentage points more investment from a low-corruption country (Israel) than from a higher-corruption one (Indonesia).

5. Conclusion

The paper looked at the effects of the quality of institutions limiting corruption on bilateral flows of FDI focusing on the interaction between control of corruption in the source and destination countries. This approach treated control of corruption as both country characteristics and a characteristic of an investment relationship between a pair of countries.

Overall, the analysis suggests that corruption deters foreign investment and improvements in control of corruption are associated with sizable increases in cross-border investment. Moreover, these increases depend on the level of corruption in the partner country. The effects are highest in terms of attracting investment from countries with low corruption. In some cases, the impact of reducing corruption on attracting investment from countries with high incidence of corruption may actually be negative (as shown on Charts 2 and 3). The results are robust to including origin and destination country fixed effects and focusing on the interaction term for the levels of corruption, which highlights the differential impact of reducing corruption on investment flows from less corrupt and more corrupt partner countries.

Overall, these findings shed some light on how divergent results of earlier empirical studies of the effects of corruption on FDI could be reconciled: while in most cases investors are deterred by corruption, in certain cases (particularly in cases of parent firms from corrupt countries) investors might view corruption as a valuable opportunity to get around rules and regulations. Hence the marginal impact of corruption on FDI may in some instances become neutral or positive. The results also expand earlier findings on the substitution effects between FDI and domestic investment in countries with stronger governance (Morrissey and Udomkerdmongkol, 2012) showing that the substitution effect may also arise within FDI (in this case, investment from more corrupt countries of origin gets “crowded out” as host countries’ institutions improve).

By implication, improvements in control of corruption may affect not only the volume of FDI but also the mix of cross-border investments in terms of prevailing countries of origin. FDI from countries with strong institutions may in turn help to improve quality of management, standards of business conduct and corporate governance in the economy, further supporting improvements in the domestic institutions that reduce corruption.

Annex 1: Proof and derivations

Proposition 1. $\frac{dI^*}{dc} \geq 0$; $\frac{dI^*}{d\gamma} \geq 0$; $\frac{d^2I^*}{dcd\gamma} \geq 0$

If rent-seeking takes place ($b > 0$), the investor's solution is given by:

$I^*(b) = \alpha/(\mu + \gamma b)$

Taking this into account, the government's objective function can be written as:

$U(b) = c\alpha\ln\alpha - c\alpha\ln(\mu + \gamma b) + (1 - c)\alpha b/(\mu + \gamma b)$

The first order condition with respect to b gives:[3]

$c\alpha\gamma/(\mu + \gamma b) = (1 - c)\alpha\mu/(\mu + \gamma b)^2$

This can be written as:

$\mu + \gamma b = \frac{1-c}{c}\frac{\mu}{\gamma} = \mu/(c^{/}\gamma)$

where $c^{/} = c/(1 - c)$ is a monotonic increasing transformation of c, the measure of control of corruption.

Hence:

$I^*(b) = \alpha/(\mu + \gamma b) = c^{/}\alpha\gamma/\mu$

The optimal ratio of private rent to investment is given by:

$b^* = \frac{\mu}{\gamma^2}\left[\frac{1}{c'} - \gamma\right]$

For low values of control of corruption ($c^{/} < 1/\gamma$), there exists an interior solution involving a positive bribe.

For higher values of control of corruption ($c^{/} \geq 1/\gamma$), the solution will be rent-seeking-free ($b^* = 0$), with the corresponding optimal investment of $I^* = \alpha/\mu$. In case of an interior solution:

$\frac{dI^*}{dc^{/}} = \alpha\gamma/\mu > 0$, hence $\frac{dI^*}{dc} > 0$

$\frac{dI^*}{d\gamma} = c^{/}\alpha/\mu > 0$

$\frac{d^2I^*}{dc^{/}d\gamma} = \alpha/\mu > 0$ hence $\frac{d^2I^*}{dcd\gamma} > 0$

[3] It can be shown that the second-order condition for a maximum is satisfied. The second order condition can be written as $\mu + \gamma b < 2\mu/(c^{/}\gamma)$. Given (A1), this holds for $\mu > 0$.

In cases when investor's bribe aversion is strong enough to discourage bribery all partial derivatives are equal to zero.

The analysis above abstracts from the investor's participation constraint ($\pi(I^*) \geq 0$), assuming, for simplicity, the investor is committed and can sustain negative pay-off. If participation constraint matters, the condition $\pi(I^*) \geq 0$ yields:

$c^{/} > e\mu/(\alpha\gamma)$

where e is exponent (approximately 2.71).

For interior solution with participation constrained satisfied to exist it is thus sufficient to assume that $\alpha > e\mu$. In other words, the firm is productive enough to "sustain" rent-seeking activity.

Proposition 2. There exists $c^{/}*$ ($0 < c^{/}* < 1/\gamma$) and there exists $k*$ ($k* < \gamma$) such that for all higher values of $c^{/}$ ($c^{/}* < c^{/} < 1/\gamma$) a rent is extracted ($b > 0$) and the tender is awarded to a more corruption-averse investor as long as its productivity satisfies $k \geq k*$. For a given $k = k*$ the tender is awarded to the less corruption-averse investor whenever $0 < c^{/} < c^{/*}$.*

Assume first that rent-seeking behaviour takes place ($b > 0$). The government's utility from signing a contract with an investor is given by:

$U(b, \gamma, k) = ck\alpha\ln\alpha + ck\alpha\ln k - ck\alpha\ln(\mu + \gamma b) + (1 - c)k\alpha b/(\mu + \gamma b) =$

$ck\alpha\ln\alpha + ck\alpha\ln k - ck\alpha\ln\mu + ck\alpha\ln\gamma + ck\alpha\ln c^{/} + (1 - c)k\alpha(1 - c^{/}\gamma)/\gamma =$

$ck\alpha[\ln\alpha + \ln k - \ln\mu + \ln\gamma + \ln c^{/} + 1/(c^{/}\gamma) - 1]$

The utility differential from dealing with the second (corruption-averse but productive) investor relative to dealing with the first one is given by:

$\Delta U = U(b, \gamma, k) - U(b, 1, 1) =$

$ck\alpha[\alpha\ln\alpha + \ln k - \ln\mu + \ln\gamma + \ln c^{/} + 1/(c^{/}\gamma) - 1] - c\alpha[\alpha\ln\alpha - \ln\mu + \ln c^{/} + 1/c^{/} - 1]$

The condition for choosing the second investor, $\Delta U > 0$, can be written as:

$\Delta U = (k - 1)\ln\alpha + k\ln k - (k - 1)\ln\mu + k\ln\gamma + (k - 1)\ln c^{/} + \frac{1}{c^{/}}[\frac{k}{\gamma} - 1] - (k - 1) > 0$

ΔU is a continuous function of k and a continuous, increasing function of $c^{/}$. For low values of $c^{/}$ ($c^{/} \rightarrow 0$) the value of ΔU is unambiguously negative ($\Delta U \rightarrow -\infty$). As $c^{/}$ approaches the maximum value for which rent-seeking still takes place ($c^{/} \rightarrow 1/\gamma$) the value of ΔU approaches the following value:

$$\Delta U^{up} = (k - 1)(\ln\alpha - \ln\mu) + k\ln k + \ln\gamma + (k - \gamma) \quad \text{(A1)}$$

All terms of this expression are positive except for $k - \gamma$, which can be negative for $k < \gamma$. For $k = \gamma$ the expression (A1) is unambiguously positive, and hence it is positive at least in some vicinity of γ, for all $k \geq k*$ (where $k* < \gamma$). This in turn means that there exists $c^{/*}$ such that for all $c^{/}$ satisfying $1/\gamma > c^{/} > c^{/*}$ a solution with rent-seeking exists, in which the government will choose the second investor provided they have sufficient productivity advantage ($k \geq k^*$). As ΔU is a continuous increasing function of $c^{/}$, the government will choose the first (more rent-tolerant) investor for all $c^{/} < c^{/*}$. At $c^{/} = c^{/*}$ the government is indifferent between the two investors.

Annex 2: List of countries in the sample

Afghanistan, Albania, Algeria, Andorra, Angola, Anguilla, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria*, Azerbaijan, Bahamas, The, Bahrain, Bangladesh, Barbados, Belarus, Belgium*, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria*, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, China*, Christmas Islands, Cocos Islands, Colombia, Comoros, Congo, Rep., Cook Islands, Costa Rica, Côte d'Ivoire, Croatia*, Cuba, Cyprus*, Czech Republic*, Denmark*, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Equatorial Guinea, Eritrea, Estonia*, Ethiopia, Faroe Islands, Fiji, Finland*, France*, French Polynesia, Gabon, Gambia, The, Georgia, Germany*, Ghana, Gibraltar, Greece*, Greenland, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong SAR, China, Hungary*, Iceland*, India, Indonesia, Iran, Islamic Rep., Iraq, Ireland*, Israel, Italy*, Jamaica, Japan*, Jordan, Kazakhstan, Kenya, Kiribati, Korea, Dem. Rep., Korea, Rep., Kuwait, Kyrgyz Republic, Lao PDR, Latvia*, Lebanon, Lesotho, Liberia, Libya, Lithuania*, Luxembourg*, Macao SAR, China, Macedonia, FYR*, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta*, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Fed. Sts., Moldova, Mongolia, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherlands*, Netherlands Antilles, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Niue, Norfolk Island, Norway*, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Pitcairn, Poland*, Portugal*, Qatar, Romania*, Russian Federation, Rwanda, Samoa, San Marino, São Tomé & Príncipe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovak Republic*, Slovenia*, Solomon Islands, Somalia, South Africa, Spain*, Sri Lanka, St. Helena, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Swaziland, Sweden*, Switzerland*, Syrian Arab Republic, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Turkey*, Turkmenistan, Turks and Caicos Islands, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom*, United States*, Uruguay, Uzbekistan, Vanuatu, Venezuela, RB, Vietnam, Virgin Islands, British, West Bank and Gaza, Yemen, Rep., Zambia, Zimbabwe

Note: Countries marked with * are reporter countries in the Eurostat database

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