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# Does Corruption Matter for Sources of Foreign Direct Investment?

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# Does corruption matter for sources of foreign direct investment?

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**Abstract**[1]

The paper provides a cross-country empirical analysis of the impact of corruption on foreign direct investment flows. The gravity model augmented with joint effects of corruption in the origin and destination countries determines differentiated patterns of investment flows between countries with various level of control of corruption. The estimates point towards greater investment flows between countries with good control of corruption. Moreover, 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. The resulting changes in composition of investment volumes towards more investment from cleaner countries may further reinforce the strengthening of economic and political institutions that keep corruption in check.

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

JEL Classification Number: F21, O43

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# 1. Introduction

This paper re-examines the relationship between bilateral foreign direct investment (FDI) flows and the quality of economic institutions - proxied by 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 project 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 determine differentiated patterns of investment flows between countries with different level of control of corruption. In particular, the paper looks at joint effects of corruption in the origin and destination countries and documents the extent to which the impact of corruption in the recipient country of investment inflows depends on the corruption in the country of origin of investment. We argue that the novel approach presented in the paper provides additional insights compared with the existing methodology adopted in a number of empirical and theoretical studies, which uses the distance between the levels of institutional quality as a determinant of the joint effects of institutions in the source and destination countries on FDI.

The paper employs a gravity model of foreign direct investment to explain bilateral FDI flows in a large sample of developed and developing countries, which covers a wide range of country-level investment partnerships during the years following the global financial crisis (2008 to 2012). The gravity model estimates suggest that, all else equal, a pair of countries with strong control of corruption enjoys higher FDI flows than any other country pairings. Moreover, this paper argues that the effect of a country's improving institutions on FDI is not homogenous: the effect of improving control of corruption in the destination country on the size of investment flows increases with the control of corruption in the origin country. As a result, the destination country attracts additional investment that comes to a greater extent from countries with low corruption and to a lesser extent from countries with widespread corruption. This change in the quality composition of volumes of FDI may lead to improvements in the 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 augmented gravity models to illustrate the joint effects of corruption in the origin and destination countries for FDI flows and provides robustness checks of the baseline results. Section 4 offers for consideration a simple theoretical model capturing the main patterns in the data. 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 offer 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.

### 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, Mauro (1995) shows that corruption has a pronounced negative effects on long-term growth by deterring investment. Wei (2000) further found a negative effect of corruption on FDI in a sample of 12 source countries and 45 host countries (mostly OECD members). Wei (1997) 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 (2012a) 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 Subastat (2012b) present a similar finding while Bellos and Subasat (2013) find this 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 (2012a) 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.

The approach based on measuring institutional distance is fairly restrictive. Within this approach the sign of the marginal effect of improving a recipient country’s economic institutions does depend on the quality of institutions of its investment partners, yet the magnitude of the effect does not. In other words, as a country’s institutions improve, it is assumed to receive equally more investment from all countries with institutions better than its own (and less investment from countries with poor institutions).

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.

# 3. Empirical analysis

This section develops an econometric model to determine effects of control of corruption on foreign direct investment with a particular focus on joint effect of institutions in the country of origin and destination. The empirical model is built to test the following propositions:

1. The sign of the effect of improving control of corruption on bilateral FDI flows may depend on the relative levels of the quality of institutions in the recipient and origin countries (the institutional distance hypothesis).

2. The magnitude of the marginal effect of improved institutions in the recipient country depends on the control of corruption in the country of origin of FDI. In other words, the better the institutions of partner countries, the higher additional FDI flows in response to improving institutions in a country of origin, once other characteristics are controlled for.

## 3.1. 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 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 the purpose of determining effects of control of corruption on FDI flows, we require a dataset that captures a wide cross-country variation in terms of degrees of control of corruption. Therefore, for this analysis we use bilateral FDI outflows data from UNCTAD and focus on the available data for the period since the beginning of the global financial crisis (2008 to 2012). In contrast to Eurostat dataset that covers bilateral inward and outward investment for EU countries, Turkey and FYR Macedonia in relation to the rest of the world and OECD dataset with a similar set of countries pairs, UNCTAD offers a broader coverage of countries, including south-south FDI flows (those between emerging market countries).

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). The quality of institutions 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). To make interpretation easier, the index is rebased to the range from 0 to 5. Descriptive statistics for variables of the model are reported in Table 1.

**Table 1: Descriptive statistics**

| Variable | Median | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| FDI flows | 39.20 | 891.08 | 4050.18 | 0.002 | 101826.60 |
| Distance | 4509.07 | 5504.45 | 4332.35 | 59.62 | 19335.40 |
| Common border | 0 | 0.09 | 0.28 | 0 | 1 |
| Common language | 0 | 0.19 | 0.39 | 0 | 1 |
| Common colonial history | 0 | 0.05 | 0.23 | 0 | 1 |
| GDP per capita, destination | 9671.94 | 19341.74 | 19844.47 | 184.05 | 85015.80 |
| GDP per capita, origin | 19269.37 | 24350.23 | 21031.04 | 150.74 | 85015.80 |
| Population, destination, million | 16.75 | 82.99 | 225.55 | 0.05 | 1350.70 |
| Population, origin, million | 20.10 | 124.70 | 310.76 | 0.05 | 1350.70 |
| Capital account openness, destination | 2.39 | 1.13 | 1.50 | -1.89 | 2.39 |
| Capital account openness, origin | 2.39 | 1.26 | 1.47 | -1.89 | 2.39 |
| Control for corruption, destination | 2.19 | 2.44 | 1.07 | 0.32 | 4.52 |
| Control for corruption, origin | 2.63 | 2.65 | 1.07 | 0.17 | 4.52 |

Note: Descriptive statistics average over the years 2008 to 2012.

### 3.2. Results

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

$$fdi_{ijt} = \alpha + \beta_1 X_{it} + \beta_2 X_{jt} + \gamma Z_{ijt} + \alpha_t + \varepsilon_{ijt} \qquad \text{(Specification 1)}$$

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. $\alpha_t$ denotes fixed time effects and $\varepsilon_{ijt}$ denotes the error term. The results of the baseline Specification 1 is reported in the Table 1 column 1.

In general, the standard determinants of the gravity model ($Z_{ijt}$) show expected signs and magnitudes. Bilateral investment flows strongly depend on the size of the source and destination economies and their and levels of income. A 10 per cent increase in income per capita in the source economy is associated with an approximately 6 per cent increase in bilateral investment flows; as is a 10 per cent increase in population. The elasticities with respect to population and income of the destination economy are somewhat smaller.

Doubling the distance between the countries is estimated to halve bilateral investment. Bilateral investment flows between countries that share a border are on average 60 to 70 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 90 per cent higher; having a common colonial history is associated with 40 to 60 per cent higher investment flows.

Even though investments may tend to originate in more financially open countries, the results do not provide any strong evidence –there is negative impact on FDI of capital account openness of a country of origin, but this result statistically very weak.

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 30 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"). That is, the marginal effect of improving a recipient country's institution on FDI is constant and does not depend on a source of investment. This corresponds to the top-left panel of Chart 1.

Yet businesses in different countries may have different levels of tolerance towards corruption, often based on domestic experience. Corruption may introduce bottlenecks in implementation of investment project or raise uncertainty and reduce returns beyond levels acceptable to the investor, i.e. "sand the wheels". On the other hand, it may also "grease the wheels" enabling investors to circumvent particularly burdensome regulation.

Thus 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").

The existing literature has primarily focused on the institutional distance hypothesis (see for example, Bello and Subasat (2012a), Cezar and Escobar (2015)) – an assumption that the marginal impact of changes in control of corruption on investment flows depend on whether incidence of corruption in the country of origin of investment is higher or lower than in the destination country. In this case, the investment levels can be explained, among other things, by the "institutional distance" between the two countries.

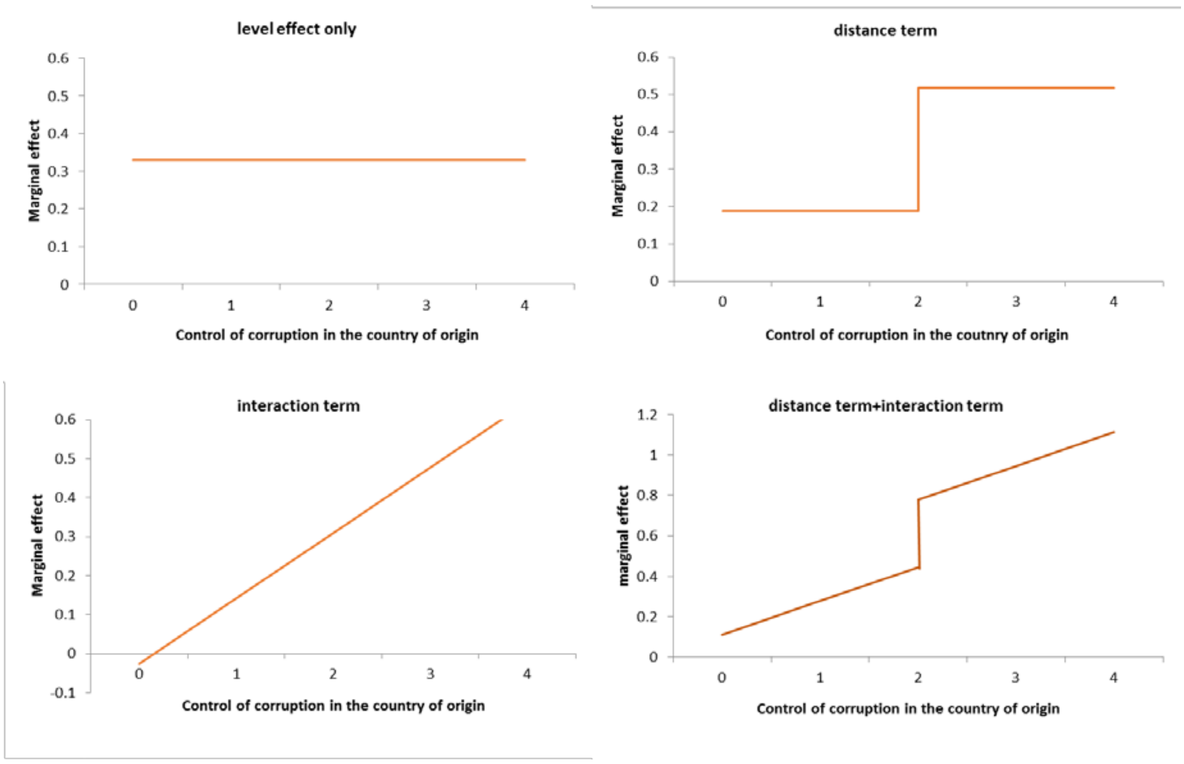
The institutional distance can be introduced in Specification 1 by augmenting the standard gravity equation with an absolute difference of control of corruption in the destination country and the source country:

$$fdi_{ijt} = \alpha + \beta_1 X_{it} + \beta_2 X_{jt} + \beta_3 |X_{jt} - X_{it}| + \gamma Z_{ijt} + \alpha_t + \varepsilon_{ijt} \quad \text{(Specification 2)}$$

If the coefficient on the distance term, $\beta_3$, happens to be negative, this specification predicts that countries with similar levels of control of corruption will have the highest levels of bilateral FDI, controlling for other factors. The marginal effect of improving control of corruption in a destination country in this specification can be $\beta_2 + \beta_3$, $\beta_2 - \beta_3$ depending on the relative levels of the quality of institutions in the two countries.

Chart 1 shows how the assumption of constant marginal effect in the standard gravity model (top left) is replaced with an assumption of two-tier marginal effect in the institutional distance model (top right).

**Chart 1. Marginal effect of improving institutions in the destination country**




The results of the Specification 2 are reported in the Table 1 column 2. The coefficient of the absolute difference is negative and statically significant supporting the hypothesis of the institutional distance in the data.

The Specification 2 can be written in a more general form, allowing for different marginal effects of changes in the quality of economic institutions. Denoting a dummy variable $D_1$ for the case of better institutions in the destination country ($X_{ji}>X_{ij}$) and $D_2$ for the opposite case, the generalised version of Specification 2 becomes:

$$fdi_{ijt} = \alpha + \varphi_1 X_{it} D_1 + \varphi_2 X_{it} D_2 + \varphi_3 X_{jt} D_1 + \varphi_4 X_{jt} D_2 + \gamma Z_{ijt} + \alpha_t + \varepsilon_{ijt} \quad \text{(Specification 3)}$$

In this case, the marginal effects of improving a country's institutions on inward FDI flows and on outward FDI are no longer linked by a linear restriction (four parameters are estimated for four different marginal effects instead of three as in Specification 2).

The results of the Specification 3 are reported in the Table 1 column 3. The Wald test does not reject the null hypothesis that the distance effect is the same for inward and outward FDI, namely that the following linear restriction holds: $\varphi_1 - \varphi_2 = \varphi_4 - \varphi_3$ (the p-value is 20%). Therefore, a more parsimonious Specification 2 is preferred.

Next, we want to check if institutional distance affects not only the levels of bilateral investment flows but also the marginal effect of changes in economic institutions. To do so, we augment Specification 2 with an interaction term between the control of corruption in the country of origin of investment and the recipient country.

$fdi_{ijt} = \alpha + \beta_1 X_{it} + \beta_2 X_{jt} + \beta_3 |X_{jt} - X_{it}| + \beta_4 X_{jt} X_{it} + \gamma Z_{ijt} + \alpha_t + \varepsilon_{ijt}$ (Specification 4)

Specification 4 implies the following marginal effects of improving the quality of economic institutions in the recipient country:

$$\frac{dfdi}{dX_{it}} = \beta_2 + \beta_4 * \boldsymbol{X_{jt}} + \boldsymbol{\beta_3} * \boldsymbol{sign}(\boldsymbol{X_{jt}} - \boldsymbol{X_{it}})$$

This corresponds to the bottom-right panel of Chart 1, a sloping line with a jump (as opposed to a horizontal line with a jump).

The results of the estimation are presented in the Table 1 column 5. The interaction term is positive and statistically significant, while the coefficient on the absolute difference loses its statistical significance. The coefficients on various gravity control variables remain broadly unchanged, compared with the earlier specifications.

Specification 4 can be further generalised to allow for different coefficients on the interaction term for the cases when control of corruption in the country of origin of investment is stronger than that in the destination country compared with cases when it is weaker. Using earlier notation, this specification can be written as:

$fdi_{ijt} = \alpha + \beta_1 X_{it} + \beta_2 X_{jt} + \beta_3 |X_{jt} - X_{it}| + \beta_4 X_{jt} X_{it} D_1 + \beta_5 X_{jt} X_{it} D_2 + \gamma Z_{ijt} + \alpha_t + \varepsilon_{ijt}$ (Specification 5)

In terms of marginal effects, this corresponds to a case where the slopes of the two sections of the sloping line are allowed to be different.

The results, reported in Table 1, column 5, remain broadly unchanged. The coefficient on the distance term remains statistically insignificant. The two interaction effects remain positive and statistically significant. At the same time, they are not different from each other in statistical sense or in terms of their magnitude. Therefore, a parsimonious Specification 4 is preferred.

If the distance term is omitted (column 6), the interaction term remains positive and statistically significant. In terms of marginal effect of improved control of corruption, this specification corresponds to a sloping line without a jump (Chart 1, bottom-left panel). The marginal effect is expressed as follows:

$$\frac{dfdi}{dX_{it}} = \alpha_2 + \alpha_3 * \boldsymbol{sign}(\boldsymbol{X_{jt}} - \boldsymbol{X_{it}})$$

### 3.3. Discussion

When interaction terms are included in the estimated specifications (columns 4-6), the coefficients on the control of corruption in the origin and destination countries lose their statistical significance and in fact often turn negative. However, this can be expected, as these coefficients represent the marginal effect of improving control of corruption on bilateral investment coming from a hypothetical, non-existent, partner with control of corruption score of zero (original World Governance Indicator score of -2.5). The marginal effects estimated for a wide range of partner countries remain positive.

In order to understand the magnitude of the marginal effect, we can look at one country of origin of investment which is in the first quartile in terms of control of corruption (for instance, Vietnam which has an average score of 1.38) and a country around the 75th percentile of the distribution (such as Spain, which has an average score of 3.04). A one standard deviation improvement in the quality of economic institutions (say, from the level of Albania to that of Poland) will boost the bilateral investment from a country with lower incidence of corruption, Spain, by around 35 percentage points more compared with the increase in investment from the less "clean" country of origin (in this example, Vietnam). This is a sizeable difference, corresponding to an extra US$ 250 million in annual investment for an average pair of countries.

The estimates thus suggest that improvements in a country's institutions may help to catalyse more investments from countries with lower incidence of corruption. Over time, increased weight of investment partnerships with cleaner countries 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.

One can think of a model with an interaction term as an extension and generalisation of the institutional distance approach. Suppose the true marginal effect of improving control of corruption in a destination country on bilateral investment flows is a function of the control of corruption in the country of origin (the next section provides a simple theoretical model to illustrate such a dependence). In this case, the two-tier line implied by the institutional distance approach is a much better approximation of the relationship than the linear specification implying a constant marginal effect. Yet a specification with an interaction term may provide a further improvement in terms of approximation of the true dependence – the hypothesis consistent with the data.

### 3.4. Robustness

The basic gravity specifications may omit a number of country characteristics that affect countries' propensity to invest abroad and attract investment. 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 that subsumed various unobserved country characteristics (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 terms capturing relative magnitudes of the levels of corruption in the origin and destination countries (such as the institutional distance or the interaction term) 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 country and industry characteristics while at the same time controlling for country fixed effects and industry fixed effects.

The results for the specifications that include time-country fixed effects for both the countries of origin of investment and the destination countries are presented in Table 2 columns 1 to 3. These fixed effects account for trends in country GDP per capita, population level, and capital account openness as well as a number of unobserved country characteristics. In columns 1 and 2 present country-year fixed effects are included, in turn, only for origin countries and only for destination countries. Column 3 corresponds to a specification with both sets of fixed effects included at the same time.

The coefficient on the interaction term between the origin country control of corruption and that of the destination country remains positive and statistically significant.

### Table 1. The joint effects of corruption on FDI flows

| Specifications | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Dependent variables | | Bilateral FDI, log | | | | |
| | | | | | | |
| Distance, log | -0.4159*** | -0.4100*** | -0.3995*** | -0.4036*** | -0.4063*** | -0.4044*** |
| | [0.039] | [0.038] | [0.039] | [0.038] | [0.038] | [0.038] |
| Common border | 0.6645*** | 0.6074*** | 0.6149*** | 0.5883*** | 0.6002*** | 0.5847*** |
| | [0.125] | [0.126] | [0.127] | [0.126] | [0.126] | [0.126] |
| GDP per capita, destination, log | 0.2785*** | 0.2807*** | 0.3132*** | 0.2975*** | 0.2869*** | 0.2935*** |
| | [0.043] | [0.043] | [0.042] | [0.043] | [0.043] | [0.043] |
| GDP per capita, origin, log | 0.6839*** | 0.6826*** | 0.7191*** | 0.6877*** | 0.6856*** | 0.6862*** |
| | [0.052] | [0.052] | [0.051] | [0.052] | [0.052] | [0.052] |
| Population, destination, log | 0.3699*** | 0.3769*** | 0.3745*** | 0.3752*** | 0.3756*** | 0.3767*** |
| | [0.023] | [0.023] | [0.023] | [0.023] | [0.023] | [0.023] |
| Population, origin, log | 0.5371*** | 0.5399*** | 0.5356*** | 0.5346*** | 0.5371*** | 0.5364*** |
| | [0.021] | [0.021] | [0.021] | [0.021] | [0.021] | [0.021] |
| Comman language | 0.9955*** | 0.9830*** | 0.9860*** | 0.9784*** | 0.9792*** | 0.9777*** |
| | [0.083] | [0.083] | [0.084] | [0.083] | [0.083] | [0.083] |
| Common colonial history | 0.4503*** | 0.4634*** | 0.4628*** | 0.4452*** | 0.4601*** | 0.4519*** |
| | [0.134] | [0.133] | [0.133] | [0.132] | [0.132] | [0.131] |
| Capital account openness, destination | -0.0021 | -0.0064 | -0.0055 | 0.0026 | -0.0051 | -0.0004 |
| | [0.029] | [0.029] | [0.029] | [0.029] | [0.029] | [0.029] |
| Capital account openness, origin | -0.0518* | -0.0563* | -0.0531* | -0.0415 | -0.0472 | -0.0460 |
| | [0.030] | [0.030] | [0.030] | [0.031] | [0.030] | [0.030] |
| Control of corruption, destination | 0.3321*** | 0.3308*** | | -0.2495 | 0.0728 | -0.0984 |
| | [0.056] | [0.056] | | [0.156] | [0.110] | [0.107] |
| Control of corruption, origin | 0.4491*** | 0.4748*** | | -0.0949 | 0.1752 | 0.0575 |
| | [0.056] | [0.058] | | [0.154] | [0.107] | [0.090] |
| Control of corruption, origin*Dummy1 | | | 0.5336*** | | | |
| | | | [0.092] | | | |
| Control of corruption, origin*Dummy2 | | | 0.2429*** | | | |
| | | | [0.063] | | | |
| Control of corruption, destination*Dummy1 | | | 0.1464* | | | |
| | | | [0.079] | | | |
| Control of corruption, destination*Dummy2 | | | 0.4857*** | | | |
| | | | [0.074] | | | |
| Control of corruption, absolute difference between destination and origin | | -0.1546*** | | 0.0861 | -0.0392 | |
| | | [0.042] | | [0.074] | [0.056] | |
| Control of corruption, interaction origin*destination | | | | 0.2118*** | | 0.1566*** |
| | | | | [0.053] | | [0.031] |
| Control of corruption, interaction origin*destination*Dummy1 | | | | | 0.0980*** | |
| | | | | | [0.034] | |
| Control of corruption, interaction origin*destination*Dummy2 | | | | | 0.1100*** | |
| | | | | | [0.033] | |
| Constant | -19.4829*** | -19.5620*** | -19.9186*** | -18.4699*** | -19.0155*** | -18.7666*** |
| | [0.753] | [0.747] | [0.741] | [0.787] | [0.760] | [0.770] |
| | | | | | | |
| Observations | 9,138 | 9,138 | 9,138 | 9,138 | 9,138 | 9,138 |
| R-squared | 0.407 | 0.409 | 0.407 | 0.412 | 0.411 | 0.411 |
| Year fixed effect | YES | YES | YES | YES | YES | YES |
| Robust standard errors in brackets | | | | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | | | | |

**Table 2. Robustness checks**

| Specifications | 1 | 2 | 3 |
|---|---|---|---|
| Dependent variables | Bilateral FDI, log | | |
| | | | |
| Distance, log | -0.6156*** | -0.5306*** | -0.8307*** |
| | [0.040] | [0.042] | [0.039] |
| Common border | 0.4908*** | 0.4992*** | 0.3649*** |
| | [0.124] | [0.125] | [0.120] |
| Comman language | 0.9080*** | 0.9452*** | 0.7280*** |
| | [0.098] | [0.091] | [0.099] |
| Common colonial history | 0.3814*** | 0.5492*** | 0.5382*** |
| | [0.122] | [0.133] | [0.113] |
| GDP per capita, destination, log | 0.3698*** | | |
| | [0.041] | | |
| Population, destination, log | 0.4014*** | | |
| | [0.024] | | |
| Capital account openness, destination | -0.0203 | | |
| | [0.026] | | |
| Control of corruption, destination | -0.2168** | | |
| | [0.101] | | |
| GDP per capita, origin, log | | 0.7434*** | |
| | | [0.051] | |
| Population, origin, log | | 0.5736*** | |
| | | [0.020] | |
| Capital account openness, origin | | -0.0529* | |
| | | [0.029] | |
| Control of corruption, origin | | 0.0042 | |
| | | [0.087] | |
| Control of corruption, interaction, origin*destination | 0.2007*** | 0.1592*** | 0.2014*** |
| | [0.029] | [0.029] | [0.026] |
| Control of corruption, absolute difference between origin and destination | | | |
| | | | |
| Constant | -0.4906 | -9.5700*** | 6.1856*** |
| | [0.547] | [0.632] | [1.375] |
| | | | |
| Observations | 10,009 | 9,721 | 10,637 |
| R-squared | 0.535 | 0.510 | 0.631 |
| Country of origin*Year fixed effect | YES | NO | YES |
| Country of destination*Year fixed effect | NO | YES | YES |
| Robust standard errors in brackets | | | |
| *** p<0.01, ** p<0.05, * p<0.1 | | | |

## 4. The theoretical model

Here we present a simple theoretical model that illustrates circumstances under which the impact of a change in control of corruption on bilateral investment may depend on the quality of economic institutions in partner country.

Consider a very simple model of investment decision involving a government and an investor. The government can seek to extract rents while the investor, which could be foreign or domestic, has 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 (bribes), 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 $\gamma bI$.

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:

$$\pi(I) = \alpha \ln I - \mu I - \gamma bI \quad (3.1)$$

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

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

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.

The second mixed derivative in the model corresponds to the coefficient on the interaction term in the empirical model estimated in the previous section.

# 5. Conclusion

The paper looked at the effects of the quality of institutions limiting corruption on bilateral flows of FDI focusing on the joint effect of 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. The results are robust to including origin and destination country fixed effects.

Improvements in control of corruption thus affect not only the volume of inward FDI but also the mix of cross-border investments in terms of prevailing countries of origin. Increasing proportion of FDI from countries with strong institutions may in turn help to improve the quality of management, standards of business conduct and corporate governance in the domestic economy, giving rise to a virtuous cycle of stronger control of corruption and higher FDI.

The findings regarding the importance of interaction between the levels of control of corruption in destination countries and the countries of origin are also important when it comes to endeavours to build a theoretical model to capture the patterns of FDI observed in the data.

# Annex 1: Proof and derivations

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

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:[2]

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

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 $\frac{d^2I^*}{dc d\gamma} > 0$

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

[2] 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 $\mu > 0$.

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.

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.

## Annex 2: List of countries in the sample

Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria*, Azerbaijan, Bahrain, Bangladesh, Barbados, Belarus, Belgium*, Belize, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria*, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Costa Rica, Croatia*, Cyprus*, Czech Republic*, Denmark*, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia*, Ethiopia, Fiji, Finland*, France*, Eritrea, Gabon, Georgia, Germany, Ghana, Greece*, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong SAR, Hungary*, Iceland*, India, Indonesia, Ireland*, Islamic Republic of Iran, Israel, Italy*, Japan*, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Kyrgyz Republic, Lao P.D.R., Latvia*, Lebanon, Liberia, Libya, Lithuania*, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta*, Marshall Islands, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherland*s, New Zealand, Nicaragua, Niger, Nigeria, Norway*, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland*, Portugal*, Qatar, Republic of Congo, Romania*, Russian Federation, Rwanda, Saint Kitts and Nevis, Samoa, Saudi Arabia, Saint Lucia, Senegal, Seychelles, Sierra Leone, Singapore, Slovak Republic*, Slovenia*, Solomon Islands, South Africa, Spain*, Sri Lanka, Sudan, Suriname, Swaziland, Sweden*, Switzerland*, Tajikistan, Tanzania, Thailand, The Bahamas, The Gambia, Togo, Trinidad and Tobago, Tunisia, Turkey*, Uganda, Ukraine, United Arab Emirates, United Kingdom*, United States*, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe

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

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