The Impact of Corruption on the Extensive and Intensive Margins of the Foreign Direct Investment

by

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ABSTRACT

Although the impact of corruption on foreign direct investment (FDI) has been studied quite extensively, little study has been done to analyze the difference between new investors and existing investors. By incorporating corruption into the gravity model of FDI and conducting a macro-level analysis with the data of U.S. FDI and affiliates in a large number of host countries, this paper shows that corruption has a negative impact on the extensive margin of FDI (whether to invest) in the host country but does not have significant influence on the intensive margin (how much to invest). This result is more significant among developing host countries than developed ones.

PREFACE

The motivation of doing this study came from what I read about African economic development. Throughout the several decades after many African countries' independence, corruption has been one of the biggest impediments of their economic development. No matter socialism or capitalism these countries pursue, as long as the wealth and resources are embezzled by political power, the economic achievements cannot be enjoyed fully by their citizens. Going from this topic, I narrowed down the focus to corruption's impact on foreign direct investment, an important part of the whole economy.

During the first semester, I struggled a lot in deciding on what method to use for this study. There was one period when I planned to conduct an experiment and consulted with many professors. Eventually, I came back to the macro-level study based on advice given by professors. I really thank my advisor Professor William Easterly and my second reader Professor Nan Xu for giving so much help and guidance along the way. This project was certainly not a smooth one. I met a lot of difficulties when developing my proposal, collecting data, and analyzing data. But I'm glad that I finished it and learned so much from the process.

I. Introduction

Africa's economic development challenges raise an important issue about corruption worldwide. In the hardship of Africa's economic development over the past decades, corruption is a major problem that has been concerned with prohibiting Africa's growth. Rent-seeking, the culture of fraud, and bribery are common practices in many African countries. For example, there were persistent accusations of corruption in the use of aid to Ghana in the 1990s. In 1999, public officials were found to have "embezzled more than 100 million cedis" from the UNDP's poverty reduction budget, which totaled "roughly 1.4 billion cedis". (*The Ghanaian Chronicle*, 2000). A lot of the political leaders and parties are corrupt and cannot deliver benefits to the people. In fact, the corrupt government officials and elites grasp a major part of the nations' wealth, which prevents the accumulation of capital in productive industries. Also, domestic and foreign businesses are deterred from entering the market, fearing that the corruption will impair their benefits.

Among the wide range of corruption research, the study of the impact of corruption on foreign direct investment (FDI) is a rather important one and most study of how corruption impacts the FDI has suggested a grabbing hand effect of corruption instead of a helping hand effect. Although it has been studied quite extensively, the difference between new investors and existing investors was not considered. Little study has been done to analyze the extensive (whether to invest) and intensive (how much to invest) margin of FDI separately. Going beyond the literature that studies its general effects on FDI, this paper explores more nuances: Does corruption influence the intensive margin in FDI and the extensive margin in FDI differently? The analysis shows that corruption has a negative impact on the extensive margin of FDI in the destination country but does not have significant influence on the intensive margin. This result is more significant among developing host countries than developed ones.

In the second section, I introduce the different measurements of corruption. In the third section, I review the literature on corruption's impact on FDI and the method of studying corruption. In the fourth section, I present my methodology, model, data collection, results, as well as the interpretation. In the last section, I conclude and discuss limitations of this study.

II.   Measurement of Corruption

In the past research on the effects of corruption, the measurement of corruption has always been difficult. Different types of measurement are developed in order to evaluate the magnitude of corruption for researchers, policymakers, and business people. Despite a revolution in measurement, estimated levels of corruption remain varied, making consensus on their magnitude impossible (Olken & Pande 2012). Different types of measurement have their own advantages and disadvantages, too.

The first type of measurement is through direct measures, which rely on either official statistics or surveys on direct experience of corruption to collect evidence-based information. Because of its extensive information on corruption, official data is recognized as a reputable source for policymaking. However, relying on it solely is not suggested because many victims do not report, and it only shows the bare minimum of corruption (Manual on Corruption Surveys 2018).

Experience-based survey data are widely used in literature. The International Crime Victims Survey, which measures the direct experience of crime in different nations, including bribery incidents, is one of the most important data sets (UNODC). It covers data of 49 countries till 2005. For firms, there are also World Bank's Enterprise Surveys and Business Environment and Enterprise Performance Survey. In the former dataset, each country has different years being covered, thus making it hard to compare and run regressions across time. The latter has the latest

data in 2009, which is relatively old. One example is Svensson (2003), who examines how much bribe money Ugandan companies paid in a 1998 survey; bribe payments of "roughly $88 per worker, or around 8% of total costs", were reported by firms in the survey on average. The advantages of experience-based survey data are that they overcome under-reporting problems of official statistics and allow comparability of data and disaggregation of information for different population groups. It is also easily replicable across counties. However, the problem is that bribery sample surveys aren't adequately calibrated to detect major corruption or embezzlement. Even in anonymous polls, most citizens have minimal contact with high-level officials, and those who engage in corruption with them are reluctant to reveal it (Olken & Pande, 2012).

The second type of measurement is indirect measures. Since it is hard to measure the actual level of corruption, these measures are based on expert assessments or other types of surveys on the perceived level of corruption in one country. Perception-based measures are, in reality, the most widely used estimates of corruption and the foundation for most cross-country corruption indices (Olken & Pande, 2012). The two most important datasets are Transparency International's Annual Corruption Perception Index (CPI) and the Control of Corruption Index from World Bank's World Governance Indicators (WGI). The latter measure is a composite of many perception-based corruption indices. The Advantage of perception-based measures is their good coverage of cross-country and cross-time data. This makes it possible to study macro-level determinants and consequences of corruption in a large cross-section of countries (Svesson, 2003). However, one shortcoming is that it suffers from unpredictably biased sampling and reporting (Sequeira, 2012). Also, there is mixed evidence on the validity of perception-based measurement. Though Fisman and Miguel (2007) discover a positive correlation between being perceived as a corrupt country by the CPI and actual corrupt practices, Olken (2007) finds that perceptions of

corruption may differ from real practices, implying that perception-based indices may not effectively reflect actual levels of corruption and cannot be used as a proxy to estimate actual levels of corruption.

The third major type is the measurement by subtraction. In this measure, the researcher obtains two measures of the same quantity: one measure before corruption happens and one measure afterward. The estimate of corruption will be the difference between the two measures (Olken & Pande, 2012). This study chooses to use the perception-based measurement due to its coverage of cross-country and cross-time datasets.

III.   Literature Review

Four features were identified in the literature: 1) there has been a debate on whether corruption has a positive or negative impact on economic activities; 2) most study has suggested a negative impact of corruption on FDI, while little study has considered the difference between new investors and existing investors; 3) there is a trend of moving from macro-level study of corruption to micro-level; 4) new efforts have been spent on experimental methods to study corruption.

1. The Impact of Corruption on Economic Growth and FDI

In general, corruption has two types of effects: first, distortionary effects on resource allocation, which refers to how much current economic activity is redirected and rendered less efficient, and second, disincentive effects, which refers to how much risk and uncertainty are introduced into the economic environment, deterring prospective economic activities, particularly investment. (Goudie & Stasavage, 1998).

Some earlier research suggests positive effects of corruption on economic growth, like Nathaniel Leff (1964) who claims that corruption boosts investment by speeding up the

bureaucratic process and forcing businesses to improve efficiency in order to compete for higher bids., and non-economists like Samuel Huntington (1968) who point out that corruption is the "grease for a rigid, over-centralized administration". These reasons, however, are viewed as problematic because the distortion effects occur within the system, slowing the bureaucratic process and reducing allocational efficiency (Bardhan, 1997). Instead, the general consensus over academia and policymakers is corruption's detrimental effects on economic growth.

In exploring the negative impacts, past literature has concentrated on how corruption impacts different types of economic activities. One group of literature focuses on corruption's impact on investment. One of the earliest empirical studies was done by Paolo Mauro (1995), who shows that corruption can lower investment, thereby lowering economic growth. Later, there are more studies that prove the negative relationship between corruption and private investment (Mo, 2001) and foreign investment (Smarzynska & Wei, 2000; Zhu & Shi, 2019). Interestingly, corruption does not have a direct negative impact on public investment; rather, as Bardhan (1997) argues, It has a distorting effect, diverting public investment to less-detectable activities or politicians' personal spending, lowering the profitability of productive investments in comparison to rent-seeking initiatives. Empirical studies find that corruption increases public investment while reducing its productivity, lowering expenditure on operations and maintenance and expenditure on health and education, and lowering the quality of public infrastructure (Tanzi & Davoodi, 1997; Cavallo & Daude, 2011).

Most study of how corruption impacts the foreign direct investment (FDI) has suggested a grabbing hand effect of corruption instead of a helping hand effect. Hines (1995) observes that the U.S. FDI locates in less corrupt countries. Smarzynska and Wei (2000) uses firm-level FDI in transition economies as evidence that suggests a negative impact of corruption on inward FDI

flows. However, Abed and Davoodi (2000) were not able to prove this result in their study of per capita FDI inflows to transition economies between 1994 and 1998. Habib and Zurawicki (2002) demonstrates the detrimental effects of both the amount of corruption and the absolute difference in the level of corruption between the host and home nations on FDI using a cross section of bilateral FDI flows. By analyzing data from 1983 to 1999, Egger and Winner (2006) found that corruption is an impediment of FDI in developed countries but not in less developed ones and demonstrated that the importance of corruption decreased over the years. Malesky & Samphantharak (2008) utilized a unique dataset of 500 firms in Cambodia and conducted a natural experiment, proving that the predictability of corruption can significantly lead to less investment by investors. Zhu & Shi (2019) found little evidence that corruption "greases the wheels of commerce" and suggested that the perceived benefits of predictable corruption are limited.

Although the impact of corruption on FDI has been studied quite extensively, the difference between new investors and existing investors was not considered. There has been little study that focuses on whether corruption influences extensive (whether to invest) and intensive (how much to invest) margin of FDI differently. Research on factors other than corruption that influence FDI has looked at this distinction. Ly-My and Lee (2019) studied the effect of aid for trade on both margins of greenfield FDI because they wanted to find out whether aid for trade not only increases the value of the FDI flows but also helps to diversify FDI flows by increasing the number of host countries and the number of projects in these countries. The diversification of FDI flows in new countries and in new projects is captured by the extensive margin of FDI. Davis et al. (2021) analyzed the impacts of taxes on the two margins of FDI by using firm-level cross-border investment data. They adopted a two-stage logit estimation, with the first stage being the probability to invest, and the second stage being the size of the investment.

The separation of two margins should also be adopted in studying corruption because for new investors who faces a new country and existing investors who have already set up their business, the influence of corruption on their investment decision may be different. A corrupt economy can be regarded unable to provide open and equal market access to every competitor. Bribery to the host country officials are not market value, thus raising the cost of entering the market. This can deter foreign new investors from starting a new business in this country. However, for existing investors who have already founded their business and been used to the bribery practice, it is possible that they can take advantage of the corruption to benefit its own business. In this case, the impact of corruption becomes blurry and even a possibly positive one to the size of FDI. Therefore, this research aims to fill the gap in literature and explore how may corruption influence the two margins differently. The hypothesis is that corruption has a negative effect on the extensive margin of FDI, whereas, it has a positive effect on the intensive margin.

2. *The Method of Studying Corruption*

From the earlier to the latest literature, there is a clear trend from focusing on macro-level to micro-level analysis. In the beginning, scholars approached the effects of corruption mainly from a macro level, using cross-country data to test the effects of corruption on the overall economic growth or other macro-level economic indicators. However, the major problem of running macro-level regressions is the endogeneity nature of corruption. That is, it can cause certain changes in economic growth but economic growth can also cause a change in the corruption level and practices. And finding credible instrumental variables for corruption at a macro level becomes difficult. Therefore, many studies switched their focus to searching for micro-level evidence by using within-country survey data and firm-level data. However, many of the research are still plagued by the inherent bias of using perception indexes to measure corruption, as well as

the challenge of showing causal effects when using observational data with endogeneity bias (Serra & Wantchekon, 2012).

Therefore, in the past two decades, there have been new efforts in applying experimental methods to the study of corruption. By employing field, lab, and natural experiments, scholars are able to overcome the constraints with measurement and the endogeneity problem. Till now, conventional lab experiments have studied, first, the micro-determinants of corruption with a focus on gender effects and cultural effects, and second, corruption deterrents, such as monitoring and punishment, whistle-blowing, and wage effects (Serra & Wantchekon, 2012). One of the earliest literature done by Abbink, Irlenbusch, and Renner (2002) studies whether the risk of detecting and punishing corrupt transactions influences bribing behavior. They developed the basic bribery game where three subjects are involved: a private firm (the briber), a public official (the bribee), and a third player representing the victim of corruption. In one treatment, it is impossible to detect corruption; whereas there is a 0.3 percent chance of discovery in another. They find that monitoring and punishment do have effects on deterring corruption. A lab experiment by Rivas (2008) find that women are less likely to initiate corruption than men, but they are not necessarily more inclined to accept bribery. However, not many papers deal with the impact of corruption on investment through experiments. Among them, Zhu and Shi (2019) study the effect of corruption on FDI by leveraging a vignette experiment embedded in an original firm survey in China. They find that overseas investors always consider corruption detrimental.

Despite the progress on experimental methods to study corruption, it also has some problems with its external validity. To better improve the external validity, a more direct comparison between lab experiment results and those of other types of experiments is needed. And since currently, more experiments focus on bribery - one special type of corruption, how we can

expand from "petty" corruption to "grand" corruption that influences economic activities as a whole remains an issue for more research to explore (Armantier & Boly 2012).

Considering the advantages and downsides of different methods, I use macro-level study to enable the usage of cross-country data, enhance the representation of a macro-level phenomenon, and prevent the external validity issue. But as said, there could be endogeneity bias as limitations.

IV.   Methodology and Results

1. Model

In this research, I used the gravity model of FDI, which has been widely used in FDI models (Kahouli & Maktouf 2015). The standard FDI gravity model is specified as:

$$FDI\ ij\ =\ G\frac{YiYj}{Dij}\quad (1)$$

Where Yi and Yj are the GDP of the origin country and the destination country; Dij is the geographical distance between the two; G is a constant. To incorporate the impact of corruption, I consider the following model:

$$FDI\ ij\ =\ G\frac{YiYj}{Dij*Cj}\quad (2)$$

Where Cj is the corruption level in the destination country. The intuition behind is that the more corruption there is in the destination country, the less likely that outside investors want to invest in this country. This intuition follows how most study has concluded. Now if we break down FDI ij into two margins, the hypothesized model should be the following:

$$FDI\ Extensive\ Margin\ ij\ =\ G\frac{YiYj}{Dij*Cj}\quad (3)$$

$$FDI\ Intensive\ Margin\ ij\ =\ G\frac{YiYj*Cj}{Dij}\quad (4)$$

Where Cj negatively influences the extensive margin and positively influences the intensive margin.

However, the standard gravity model only considers limited variables. In this research, I incorporate a broader model that contain more covariates that influence FDI based on the variables considered in Brada et al. (2019). Therefore, all the independent variables in the model are: 1) home country GDP, 2) host-country GDP, 3) host-country GDP per capita, 4) distance between most populated cities of the home country and the host country, 5) common official language (whether the home country and host country have common official or primary language), 6) hegemon relationship (whether the home country is current or former hegemon of the host country), 7) coverage of regional trade agreement.

For dependent variables, I adopted the measurement used by Ly-My and Lee (2019) in their paper where the extensive margin and intensive margin are measured by the total counts of greenfield projects and the average dollar value of each project. Similarly, in this research, the extensive margin of FDI is measured by the number of foreign affiliates in the host country; the intensive margin of FDI is constructed by the FDI position (stocks) per affiliate per host country, that is, FDI position divided by the number of affiliates. The number of foreign affiliates captures whether there are more new investment and new business. According to OECD, FDI positions represent the value of the stock of direct investments held at the end of the reference period. Divided by the number of affiliates, it captures the size of the investment. I use FDI position rather than FDI flow because it can better reflect the size of investment made by foreign affiliates. Some of the stock can be financed by borrowing from home-country banks and investors, but flow data would miss counting this part (Brada et al. 2019). Also, stock data is less volatile than flow data and presents fewer zero and negative observations (Cezar and Escobar 2016).

2. Data

I choose to look at the U.S. FDI data toward 160 countries from 2010 to 2019 and have the US as the home country because it has relatively more detailed datasets on FDI position and the number of foreign affiliates in the host countries. Also, since the US is the largest economy in the world, it has investments in most of the countries, making the dataset large enough to get reliable results. Datasets of FDI position abroad and the number of foreign affiliates abroad are obtained from the Bureau of Economic Analysis (BEA).

To measure corruption level, I use both the Control of Corruption data within the World Governance Indicators (WGI) produced by the World Bank and Corruption Perception Index (CPI) by Transparency International to run the same tests. WGI's Control of Corruption represents perceptions of the amount to which public power is used for private gain, including petty and grand corruption, as well as "capture" by elites and business interests.[1] CPI compiles data from a variety of sources to provide corporate leaders and nation experts' assessments of the amount of corruption in a certain country.[2] The results by using both indexes will be reported. WGI and CPI are both standardized, each with a range from -2 to 2 and 0 to 100. The higher WGI or CPI is, the better governance the country has, meaning that the lower corruption it has (I will use the reverse WGI and CPI later in the analysis to indicate the level of corruption). One issue is that the pre-2012 CPI is not comparable over time due to the aggregation of information from multiple years by Transparency Intentional before 2012. Therefore, in the test by CPI, the time range is from 2012 to 2019. The GDP data of the US and all the host countries are from the World Bank's World Development Indicators. Data for all the other covariates come from CEPII. Table 1 presents the

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[1] World Bank. World Governance Indicators.

[2] Transparency International. Corruption Perception Index.

descriptive statistics of number of affiliates, FDI position, and the corruption level (reverse WGI /

CPI). Table 2 summarizes all the other covariates. Figure 1 shows the distribution of the corruption

level of the host countries. Both indices follow the similar pattern where more countries cluster

around the higher corruption level.

Table 1. Descriptive Statistics

VARIABLES	Year	Obs.	Mean	Std. Dev.	Min	Max
Number of Foreign Affiliates						
	2010	160	160.7	390.6	0	3,159
	2011	160	164.0	396.6	0	3,208
	2012	160	168.0	405.8	0	3,272
	2013	160	169.6	407.8	0	3,280
	2014	160	218.9	531.0	0	4,250
	2015	160	221.2	537.5	0	4,315
	2016	160	222.9	539.3	0	4,306
	2017	160	224.2	541.8	0	4,309
	2018	160	223.9	541.6	0	4,315
	2019	160	246.7	589.5	0	4,681
FDI Position in millions of dollars						
	2010	139	24,965	75,470	-199	514,689
	2011	136	27,697	83,594	-198	595,658
	2012	139	29,503	91,139	-59	647,365
	2013	137	31,054	98,226	-584	740,740
	2014	140	33,476	108,300	-64	753,546
	2015	142	34,522	113,217	-145	829,693
	2016	141	36,605	120,714	-164	816,667
	2017	138	41,538	136,647	-249	929,746
	2018	138	39,322	126,603	-202	809,663
	2019	134	41,464	131,939	-498	830,438
Level of Corruption (WGI)						
	2010	160	-0.0278	1.033	-2.359	1.673
	2011	160	-0.0247	1.027	-2.404	1.587
	2012	160	-0.0283	1.023	-2.381	1.524
	2013	160	-0.0353	1.021	-2.405	1.594

	2014	160	-0.0207	1.005	-2.253	1.773
	2015	160	-0.0287	1.004	-2.276	1.766
	2016	160	-0.0301	1.004	-2.284	1.806
	2017	160	-0.0184	0.995	-2.241	1.826
	2018	160	-0.0272	0.991	-2.213	1.638
	2019	160	-0.0305	0.994	-2.170	1.723
Level of Corruption (CPI)	2012	146	-44.84	19.92	-90	-8
	2013	146	-44.53	20.00	-91	-8
	2014	144	-45.26	19.87	-92	-12
	2015	140	-44.67	20.27	-91	-11
	2016	146	-44.85	19.43	-90	-14
	2017	149	-44.91	19.14	-89	-15
	2018	149	-44.97	19.26	-88	-14
	2019	149	-45.13	19.00	-87	-15

Table 2. Descriptive Statistics of Other Covariates

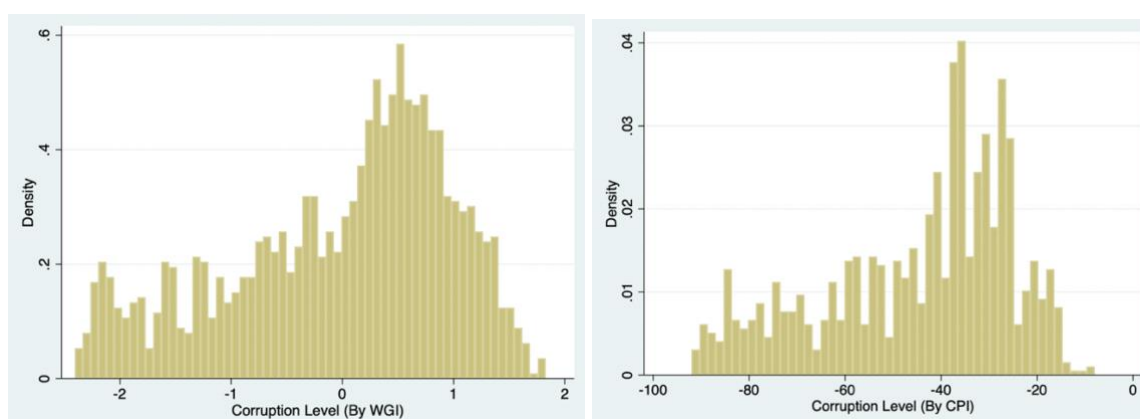|	(1)	(2)	(3)	(4)	(5)
VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
GDP (Host Country)	1,593	363.9	1084	0.16	14280
GDP (USA)	1,600	17960	2041	14990	21430
Distance in km	1,600	8,619	3,654	548.4	16,180
Comlang_off (dummy)	1,600	0.306	0.461	0	1
Hegemon (dummy)	1,600	0.025	0.156	0	1
GDP Per Capita in current thousands dollars (Host Country)	1,574	15.75	20.92	0.226	119.2
RTA_Coverage (dummy)	1,600	0.121	0.327	0	1

Figure 1. Distribution of the Corruption Level of the Host Countries

3. Model Specification and Results

Following the extended gravity model, I used linear specification by taking the log of the non-dummy variables on each side of the equation. Since both corruption indices are standardized, the data should already have the features of the log form of actual corruption level in reality. Therefore, the corruption term does not have the log form in the model specification. Since some of the number of affiliations are zero, I add one to all the data before I take the log so that all the observations can be kept. But for the term Log (FDI/Affiliation Number), I choose not to do any transformation because by adding constant on either the numerator or the denominator will change the scale. The model is specified as the following.

(1) Pooled OLS:

$Log(Affiliation\ Number) = \alpha + \beta1 * Corruption_{it} + \beta2 * Log(GDP)_{it} + \beta3 * Log(GDP_{USA})_{t} + \beta4 * Log(dist)_{i} + \beta5 * Log(GDP\ per\ capita)_{it} + \beta6 * Comlang_{i} + \beta7 * hegemon_{i} + \beta8 * RTA\ Coverage_{i} + \varepsilon_{it}$

$Log(FDI/Affiliation\ Number) = \alpha + \beta1 * Corruption_{it} + \beta2 * Log(GDP)_{it} + \beta3 * Log(GDP_{USA})_{t} + \beta4 * Log(dist)_{i} + \beta5 * Log(GDP\ per\ capita)_{it} + \beta6 * Comlang_{i} + \beta7 * hegemon_{i} + \beta8 * RTA\ Coverage_{i} + \varepsilon_{it}$

(2) Fixed Effect:

$Log(Affiliation\ Number) = \alpha + \theta_{i} + \beta1 * Corruption_{it} + \beta2 * Log(GDP)_{it} + \beta3 * Log(GDP_{USA})_{t} + \beta4 * Log(GDP\ per\ capita)_{it} + \varepsilon_{it}$

$Log(FDI/Affiliation\ Number) = \alpha + \theta_{i} + \beta1 * Corruption_{it} + \beta2 * Log(GDP)_{it} + \beta3 * Log(GDP_{USA})_{t} + \beta4 * Log(GDP\ per\ capita)_{it} + \varepsilon_{it}$

Here, θ_{i} represent cross-country fixed effect. When CPI is used, I also add a term, δ_{t}, in both OLS and fixed effect models to capture the time fixed effect because there may be global trends

contained in the CPI index. The results of using WGI are presented in Table 3 and the results by CPI are presented in Table 4.

To interpret this result, we see that the coefficients of corruption in the model to the number of affiliates, i.e. the extensive margin, are negative, meaning that the higher corruption is, the fewer affiliates will be in the host country. This negative relationship is significant when using both indices to estimate in OLS method. It is significant in the fixed effect model with the CPI index but not with the WGI index. Whereas, the coefficient of corruption in the model to the intensive margin of FDI is positive by using both indices and both OLS and fixed effect estimation even though they are not significant. But note that the standard errors of these results on the intensive margin lead to the confidence interval lying cross the zero point, which means it is possible that the effect is zero or negative. This means that it is likely that the higher corruption is, the more average FDI there will be, but this effect is not significant and may be negative. This comparison is interesting and partly aligns with the hypothesis. Corruption negatively impacts the extensive margin, that is, whether investors want to start a new business in the destination country; whereas, corruption does not matter that much for the existing investors' decision to continue investing in this country and may even positively drives more investment. To interpret it a step further, this result means that corruption mainly blocks investors' incentives to enter the market, but doesn't prevent existing investors to continue their investment or make use of the corrupt environment to invest more.

Even though significant results are observed for the impact of corruption on the extensive margin of FDI, the magnitude of coefficient seems very small. For instance, by using the CPI index, the fixed-effect model result shows that one score decrease in the corruption level will only lead to about 0.776% increase in the number of affiliates. However, if a country can actually reduce its

corruption level to a certain degree, the influence on attracting more new investors to start business should not be neglected. Take Argentina as an example, its CPI index increased from 35 to 45 from 2012 to 2019, i.e. the corruption level in Argentina decreased by 10 scores. Accordingly, the number of U.S. affiliates in Argentina increased from 247 to 300 over the same period. This 21.5% increase in the extensive margin of U.S. FDI in Argentina could partly be attributed by the lowered corruption level.

Table 3. Corruption and Both Margins of FDI (WGI)

	Y = Number of Affiliates		FDI Position / Number of Affiliates	
	(1)	(2)	(3)	(4)
VARIABLES	OLS	Fixed Effect	OLS	Fixed Effect
corruption	-0.311***	-0.000852	0.0549	0.119
	(0.0382)	(0.0500)	(0.0523)	(0.115)
log_gdp_USA	0.00356*	0.00805***	-0.00748***	-0.00557***
	(0.00187)	(0.000652)	(0.00257)	(0.00133)
log_gdp	0.739***	-0.104	0.196***	-0.174
	(0.0131)	(0.0932)	(0.0179)	(0.204)
log_gdpcap_d	0.219***	0.406***	0.374***	0.825***
	(0.0314)	(0.0849)	(0.0452)	(0.189)
log_dist	-0.627***		-0.121**	
	(0.0525)		(0.0577)	
comlang_off	0.641***		0.582***	
	(0.0562)		(0.0747)	
heg_o	1.842***		0.329	
	(0.271)		(0.268)	
rta	0.271***		0.267***	
	(0.0555)		(0.0650)	
log_pop				
Constant	-10.03***	4.903**	-1.108*	6.333
	(0.509)	(2.155)	(0.632)	(4.784)
Observations	1,573	1,573	1,203	1,203
R-squared	0.819	0.173	0.330	0.052
Number of Country		160		151

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4. Corruption and Both Margins of FDI (CPI)

VARIABLES	Y = Number of Affiliates		FDI Position / Number of Affiliates	
	(1)	(2)	(3)	(4)
	OLS	Fixed Effect	OLS	Fixed Effect
corruption	-0.0168***	-0.00776***	0.00284	0.00895
	(0.00229)	(0.00269)	(0.00311)	(0.00557)
log_gdp_USA	1.074***	1.638***	-1.374***	-1.635***
	(0.362)	(0.100)	(0.488)	(0.205)
log_gdp	0.750***	-0.509***	0.189***	0.627***
	(0.0165)	(0.101)	(0.0221)	(0.238)
log_gdpcap_d	0.220***	0.552***	0.378***	0.261
	(0.0391)	(0.0852)	(0.0543)	(0.204)
log_dist	-0.540***		-0.109*	
	(0.0583)		(0.0652)	
comlang_off	0.619***		0.642***	
	(0.0629)		(0.0862)	
heg_o	1.156***		-0.770***	
	(0.247)		(0.280)	
rta	0.314***		0.267***	
	(0.0590)		(0.0727)	
2013.year	-0.0586	-0.0263	-0.0136	0.00583
	(0.0999)	(0.0248)	(0.128)	(0.0508)
2014.year	0.102	0.146***	-0.158	-0.119**
	(0.0903)	(0.0238)	(0.122)	(0.0477)
2015.year	0.107	0.0855***	-0.205*	-0.0656
	(0.0884)	(0.0238)	(0.122)	(0.0475)
2016.year	0.131	0.0899***	-0.111	0.0148
	(0.0857)	(0.0238)	(0.118)	(0.0469)
2017.year	0.0215	-0.00177	-0.0232	0.0505
	(0.0860)	(0.0232)	(0.115)	(0.0460)
2018.year	-0.111	-0.0959***	0.0598	0.0964**
	(0.0920)	(0.0245)	(0.129)	(0.0482)
2019o.year	-	-	-	-
Constant	-44.59***	-35.26***	40.89***	37.48***
	(11.10)	(3.274)	(14.91)	(6.998)
Observations	1,154	1,154	920	920
R-squared	0.835	0.333	0.354	0.134
Number of Country		149		137

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Further, I check the results by dividing the host countries into developed countries and developing countries to see whether the same effect of corruption apply to both groups.[3] The results are presented below in Table 5, 6, 7, and 8. It is found that the results are not as significant for developed host countries but are more significant for developing host countries. With WGI index for developed host countries, corruption has no significant effect on either of the FDI margin, even though the sign of the coefficient follows what is estimated for all host countries. With WGI for developing economies, corruption has significant negative effect on the extensive margin by the OLS model but no significant effect on the intensive margin. With CPI index for developed countries, corruption is tested to have no significant impact on the extensive margin but have significant positive impact on the intensive margin by fixed effect model. With CPI for developing countries, corruption is tested to have significant negative impact on the extensive margin by both the OLS model and the fixed effect model but does not have significant impact on intensive margin, which exactly follows the results from the all-country estimation.

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[3] The developed countries from this dataset includes Switzerland, Norway, Netherlands, Denmark, Japan, Germany, Austria, France, Canada, Belgium, Australia, Sweden, Italy, Iceland, United Kingdom, Ireland, Finland, Spain, New Zealand, Greece, South Korea, Portugal, Czech Republic, Slovenia, Israel, Estonia, Latvia, Lithuania. This is based on the ranking from Human Development Index 2020 report.

Table 5. Results for Developed Countries (WGI)

VARIABLES	Y = Number of Affiliates		FDI Position / Number of Affiliates	
	(1)	(2)	(3)	(4)
	OLS	Fixed Effect	OLS	Fixed Effect
corruption	-0.0433	-0.121	0.0731	0.185
	(0.0616)	(0.0966)	(0.0965)	(0.214)
log_gdp_USA	0.00535**	0.00635***	2.12e-05	-0.00123
	(0.00248)	(0.000803)	(0.00327)	(0.00184)
log_gdp	0.988***	1.314***	0.249***	0.158
	(0.0279)	(0.413)	(0.0261)	(0.931)
log_gdpcap_d	0.427***	-0.871**	1.531***	0.835
	(0.118)	(0.436)	(0.120)	(0.976)
log_dist	-0.353***		-0.110***	
	(0.0457)		(0.0297)	
comlang_off	0.981***		0.898***	
	(0.0844)		(0.101)	
o.heg_o	-		-	
rta	-0.773***		-0.437***	
	(0.0868)		(0.100)	
Constant	-19.68***	-26.74***	-7.348***	-2.940
	(0.837)	(9.510)	(0.847)	(21.65)
Observations	268	268	248	248
R-squared	0.921	0.368	0.736	0.087
Number of Country		27		27

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Results for Developing Countries (WGI)

VARIABLES	Y = Number of Affiliates		FDI Position / Number of Affiliates	
	(1)	(2)	(3)	(4)
	OLS	Fixed Effect	OLS	Fixed Effect
corruption	-0.456***	0.00989	-0.0417	0.115
	(0.0522)	(0.0558)	(0.0717)	(0.133)
log_gdp_USA	0.00291	0.00825***	-0.00850***	-0.00694***
	(0.00209)	(0.000786)	(0.00292)	(0.00167)
log_gdp	0.746***	-0.138	0.218***	-0.143
	(0.0149)	(0.103)	(0.0217)	(0.227)
log_gdpcap_d	0.196***	0.411***	0.373***	0.800***
	(0.0338)	(0.0914)	(0.0491)	(0.204)
log_dist	-0.744***		-0.206**	
	(0.0564)		(0.0803)	
comlang_off	0.573***		0.478***	
	(0.0658)		(0.0955)	
heg_o	1.921***		0.410	
	(0.271)		(0.281)	
rta	0.278***		0.178**	
	(0.0679)		(0.0834)	
Constant	-9.000***	5.375**	-0.721	5.725
	(0.542)	(2.361)	(0.714)	(5.291)
Observations	1,303	1,303	955	955
R-squared	0.759	0.160	0.288	0.054
Number of Country		133		124

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Results for Developed Countries (CPI)

VARIABLES	Y = Number of Affiliates		FDI Position / Number of Affiliates	
	(1)	(2)	(3)	(4)
	OLS	Fixed Effect	OLS	Fixed Effect
corruption	-0.000856	0.00394	0.00825	0.0280***
	(0.00350)	(0.00352)	(0.00565)	(0.00959)
log_gdp_USA	0.893*	1.387***	-1.249*	-1.654***
	(0.495)	(0.109)	(0.676)	(0.302)
log_gdp	0.995***	-1.135***	0.224***	3.869***
	(0.0316)	(0.397)	(0.0280)	(1.149)
log_gdpcap_d	0.478***	1.597***	1.642***	-2.951**
	(0.132)	(0.408)	(0.124)	(1.186)
log_dist	-0.358***		-0.130***	
	(0.0465)		(0.0344)	
comlang_off	0.953***		0.876***	
	(0.0921)		(0.103)	
o.heg_o	-		-	
rta	-0.765***		-0.459***	
	(0.0907)		(0.106)	
2013.year	-0.102	-0.0732***	0.0570	0.0112
	(0.145)	(0.0254)	(0.160)	(0.0711)
2014.year	0.0621	0.0932***	-0.0352	-0.0682
	(0.124)	(0.0242)	(0.142)	(0.0657)
2015.year	0.205*	0.110***	0.207	0.0938
	(0.118)	(0.0263)	(0.151)	(0.0746)
2016.year	0.167	0.0888***	0.258*	0.125*
	(0.120)	(0.0256)	(0.143)	(0.0727)
2017.year	0.0424	0.00249	0.202	0.184***
	(0.117)	(0.0240)	(0.155)	(0.0643)
2018.year	-0.109	-0.0875***	0.0803	0.128*
	(0.120)	(0.0253)	(0.175)	(0.0665)
2019o.year	-	-	-	-
Constant	-47.14***	-12.05	31.68	-36.67
	(15.17)	(8.337)	(20.67)	(23.81)
Observations	216	216	202	202
R-squared	0.926	0.682	0.751	0.267
Number of Country		27		27

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Results for Developing Countries (CPI)

| VARIABLES | Y = Number of Affiliates | | FDI Position / Number of Affiliates | |
| | (1) | (2) | (3) | (4) |
	OLS	Fixed Effect	OLS	Fixed Effect
corruption	-0.0257***	-0.00930***	-0.00263	0.00556
	(0.00318)	(0.00316)	(0.00426)	(0.00665)
log_gdp_USA	1.082***	1.719***	-1.331**	-1.728***
	(0.414)	(0.121)	(0.552)	(0.253)
log_gdp	0.752***	-0.553***	0.204***	0.609**
	(0.0188)	(0.113)	(0.0272)	(0.263)
log_gdpcap_d	0.196***	0.558***	0.379***	0.310
	(0.0428)	(0.0933)	(0.0595)	(0.222)
log_dist	-0.683***		-0.210**	
	(0.0651)		(0.0979)	
comlang_off	0.562***		0.553***	
	(0.0754)		(0.110)	
heg_o	1.243***		-0.739**	
	(0.251)		(0.289)	
rta	0.300***		0.178*	
	(0.0741)		(0.0913)	
2013.year	-0.0476	-0.0160	-0.0480	0.000657
	(0.113)	(0.0299)	(0.150)	(0.0616)
2014.year	0.107	0.157***	-0.183	-0.134**
	(0.102)	(0.0287)	(0.144)	(0.0580)
2015.year	0.112	0.0928***	-0.245*	-0.108*
	(0.101)	(0.0287)	(0.145)	(0.0577)
2016.year	0.135	0.101***	-0.148	-0.0166
	(0.0968)	(0.0287)	(0.138)	(0.0570)
2017.year	0.0259	-9.78e-05	-0.0510	0.0191
	(0.0979)	(0.0278)	(0.132)	(0.0561)
2018.year	-0.108	-0.0997***	0.0534	0.0905
	(0.106)	(0.0295)	(0.146)	(0.0588)
2019o.year	-	-	-	-
Constant	-43.85***	-37.15***	40.01**	40.72***
	(12.68)	(3.836)	(16.85)	(8.188)
Observations	938	938	718	718
R-squared	0.783	0.313	0.305	0.137
Number of Country		122		110

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

V.   Discussion and Conclusion

This paper incorporates corruption into the gravity model of FDI and separately tests the effect of corruption on the extensive margin and the intensive margin of FDI using the U.S. FDI and affiliates data. The results have shown that corruption has a negative impact on the extensive margin of FDI in the destination country but does not have significant influence on the intensive margin. In another word, corruption mainly blocks new investors' incentives to enter the market, but does not matter that much for existing investors or prevent them to make use of the corrupt environment and invest more. This result is not as significant for developed host countries but are more significant for developing host countries. This suggests that the influence of corruption in developed countries are very small but still matter in developing host countries. For policymakers in developing countries, it becomes important to improve their political and economic institution and decrease their corruption level in order to attract more new foreign investors. For investors who are thinking to invest in a new country, this study shows that the corruption level could still be a great concern. In general, this paper contributes to the literature by separating the FDI into two difference margins

Since this study used the U.S. FDI and affiliates data, there could be limitation in representing investors in other countries. Future study can expand the dataset for home countries to increase the variability. Also, since this study is a macro-level cross-country one using perception-based corruption measurements, future research can further explore in a micro-level approach, that is, to collect firm-level data or conduct surveys to firm decision makers.

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