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The Evil Act of Posing as an Angel: Can Financial Development Mitigate the Negative Effects of Corruption on Inward Foreign Direct Investment?

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Abstract

Employing three distinct datasets of bilateral FDI positions and flows (UNCTAD, CDIS, and OECD) in a structural gravity approach, this paper examines the impact of financial development and corruption on inward FDI. Applying both OLS and PPML estimation techniques, this paper (with UNCTAD data) finds that the financial development of both host and home countries is a significant determinant of FDI. However, the estimates with CDIS and OECD data show that FDI in the host country is positively associated with home country financial development and, to some extent, negatively associated with that of the host country, which is mainly driven by the developed country groups. Corruption is a persistent problem for FDI; however, the interaction with a good financial sector works as an incentive for inward FDI. Control of corruption has a greater impact on FDI stocks in the developed country than in the developing country.

Keywords: Financial Development, Corruption, Foreign Direct Investment, Gravity Model.
JEL Classification: D25, F10, F21, G20, O50.

1. Introduction

Both developed and developing countries are actively seeking Foreign Direct Investment (FDI) as they believe that FDI will contribute to economic growth in various ways: creating new jobs, increasing capital accumulation, transferring better technologies and raising the total factor productivity. Existing literatures (e.g. Eicher, Helfman & Lenkoski.,2012; Blonigen & Piger, 2014) have established market size, cultural and physical factors, corporate taxes, and labor market endowments as several push and full factors for FDI. Recent studies also recognized financial development as also a determinant of FDI (di Giovani, 2005; Ang, 2008; Hyun & Kim, 2010; Desbordes & Wei, 2017; Donaubauer, NeuMayer &Nunnenkamp, 2019).

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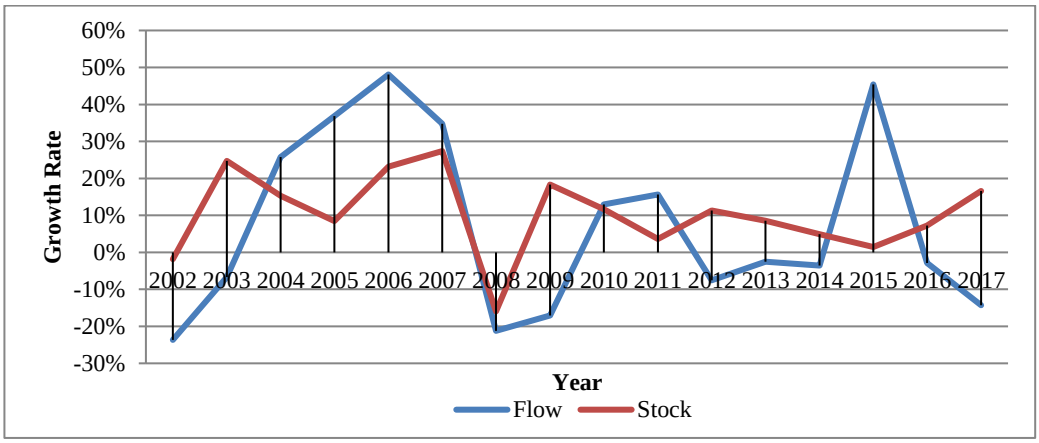
World's FDI inflow strongly grew during 2004-2007 but experienced an abrupt decline in 2008 and 2009. Revived in 2010 and 2011, however, afterwards the flow declined continuously except in 2015. As a result the growth of the world FDI stock was slumped after 2008-2009 crises (see Figure-1). Tight external financing conditions after the global financial crisis have been partly the cause of this downward trend (UNCTAD, 2010). Therefore, external finance, financial development in particular, is also an important determinant of FDI. Moreover, the factors that determines the location choice of FDI activity systematically varies across developed and developing countries (Blonigen & Wang, 2004).

Figure 1: Growth of Word's Inward FDI Flows and Stocks (2002-2017)



Source: Authors Calculation based on World Investment Report 2020, UNCTAD.

Meanwhile, the relationship between corruption and FDI is complex. In general, corruption is harmful for FDI. However, the empirical evidence is mixed. While several studies confirmed the negative role of corruption on FDI (Al-Sadig,2009 ; Alemu, 2012), other studies, however, find that corruption works as an incentive (Egger & Winner, 2005;Hasan, Rahman & Iqbal, 2017; Marquez & Castillo, 2021; Jetin et al.,2024). Although the world's FDI flows slumped in recent years, however, the flow and stock remains stable in the developing countries (UNCTAD, 2018) that are perceived to be more corrupt than developed countries. This duality of corruption gives importance for extended study how

financial development turns out the role of corruption to be a "helping hand' for inward FDI.

The lack of availability of reliable data limits the scope of empirical studies, mainly in the fields of FDI and financial development. Although several studies examine the impact of financial development on FDI (e.g. Giovani, 2005; Ang, 2008; Hyun & Kim, 2010; Desbordes & Wei, 2017; Donaubauer, NeuMayer &Nunnenkamp, 2019), they mostly rely on the private credit to GDP as a proxy for the measurement of financial sector development. Financial development should reflect the size, activity, and efficiency of both financial institutions and markets (Beck, Demirguc-Kunt & Levine, 2000). Due to the lack of a reliable measure of financial development in a longitudinal context, the literature on financial development and FDI in a worldwide context is relatively limited. In addition, there is also a lack of availability of bilateral FDI data. There exist three sources-CDIS of IMF, UNCTAD, and OECD- which provide bilateral FDI data. However, the CDIS data covers only stocks starting from 2009, and UNCTAD gives both flows and stock data for the years 2001-2012 only. The OECD data, reported by OECD countries, covers both flows and stock. These databases have led us to examine the impact of financial development on FDI in a worldwide context. No previous paper has been found that studied the impact of financial development on FDI using the IMF's financial development and CDIS datasets.

While investigating the determinants of bilateral FDI, the "gravity equation" method usually presents an excellent fit of the data. The gravity model is very useful to incorporate the financial development of both host and home by its formulation. The application of structural or theory consistent gravity model (Anderson & Wincoop, 2003) in recent times allows and motivates us to study financial development's and corruption's impact on bilateral FDI.

Although several empirical studies (e.g. Giovani, 2005; Ang, 2008; Hyun & Kim, 2010) exist that examine the effects of financial development on FDI, however, those research suffers from inadequate measurement of FDI and limited scope (Desbordes & Wei, 2017). These studies addressed financial market development from one side of host or host. It makes unclear whether both host and home countries financial development have impact on FDI. To overcome this

issue, Desbordes and Wei (2017) and Donaubauer, NeuMayer &Nunnenkamp (2019) incorporates both host and home countries financial development in their model. They find that both host and home countries financial development are positively related to inward FDI in host countries.

However, Desbordes and Wei (2017) study is restricted to four years (2003-2006) which is failed to account the recent trends after the global financial crisis of 2008-2009. Even though Donaubauer, NeuMayer and Nunnenkamp (2019) covers a longer time period (2001-2012), however, also does not take into account the recent trends. Although Donaubauer, NeuMayer and Nunnenkamp (2019) use a composite index of financial market development measures, none of the existing literatures have used the IMF's financial development index in a worldwide context. Donaubauer, NeuMayer and Nunnenkamp (2019) examine the impact of financial development index by pooling samples to developing countries only, leave unexplored for the developed counterparts. The existing literature on corruption and FDI also leaves unexplored how corruption becomes an incentive for FDI interacting with financial development. The only exception is Krifa-Schindler et al. (2022), which studies the mediating role of financial development in the corruption-FDI nexus, utilizing GMM models.

This study, henceforth, tries to resolve these issues by utilizing different datasets which covers different time periods and recent trends in a gravity framework. This study also pooled the host country samples for developed and developing country groups to observe the heterogeneous effect of financial development (and corruption) on FDI.

2. Literature Review

Due to the lack of a universal model for FDI, the empirical studies on determinants of FDI include numerous variables focusing on a wide spectrum of economic theory. Recent research papers on FDI have placed a prominent role to the financial development among the institutional determinants of FDI flows. Using a dataset on structural reforms for 19 Latin American and 25 eastern European countries over 1989-2004, Campos & Kinoshita (2008) investigates the role of structural reforms -financial reforms, trade liberalization, and

privatization- as determinants of FDI inflows. Controlling for potential endogeneity of the reform variables and using System GMM estimator they find that financial liberalization attracts foreign capital flows.

Dutta & Roy (2011) examines the roles of financial development (proxies by private credit to GDP) on FDI in association with different measures of political risks. Using a panel of 97 countries, their results show that the relationship is non-linear. The impact of financial development on FDI becomes negative after a threshold level of financial development. However, political risk factors affect this relationship by affecting the threshold level. They conclude by saying that, an efficient financial infrastructure will achieve little in attracting FDI if the country is politically unstable.

Using FDI data for advanced and emerging economies, Dellis (2018) explores the role of 25 financial variables in attracting FDI flows. Applying system GMM estimation method they show that fostering an efficient financial sector contributes to increased flow FDI in host economy by the multinational corporations.

The bi-directional causality between financial reform and FDI flows is placed under scrutiny in several studies. Soumare & Tchana-Tchana (2015) use data on 29 emerging economies from 1994 - 2006 and exploit two indicators of stock market development (stock market capitalization to GDP and stock value traded as percent of GDP) and three indicators of banking sector development (private sector credit to GDP, liquid liabilities of financial system to GDP, and commercial bank assets to total banking assets) to empirically study the relationship between foreign direct investment and financial market development. Applying Panel Vector Auto Regression (VAR-2) techniques and Granger Causality tests they document strong bidirectional causality between FDI and stock market development indicators, but ambiguous and inconclusive relationship with banking sector development indicators. Otchere, Soumare &Yourougou (2016) also draw similar conclusion of strong evidence of bi-directional causality between a range of indicators capturing stock market development and FDI flows.

Kelly (2016) examines whether financial sector development enhance the relationship between FDI and economic growth in the context East African countries. He finds little evidence of long run relationship between FDI and economic growth. But, a positive relationship is observed when financial development is interacted with FDI. Alabi et. al (2018), however, finds a long run relationship between financial deepening indicators, FDI and output performance in Nigeria. That is, the development of financial system of the host country is an important precondition for FDI to have a positive impact on economic growth (Hermes & Lensink, 2003)

Islam et al. (2018) also finds positive relationship between financial deepening and FDI in the context of China using ARDL bound cointegration and VECM Granger causality test. This is the only study that uses the new "Broad-based Index of Financial Development" established by IMF (2016).

Application of gravity model in analyzing the determinants of FDI is popular in literature, but few studies consider financial determinants of bilateral FDI flows. In line with the Dunning's OLI framework, macroeconomic and financial variables play key roles in the FDI decisions of firms. To examine this notion, di Giovanni (2005) uses a panel dataset on cross border merger & acquisition (M&A) deals, as FDI, for the period of 1990-1999. Applying a gravity model framework and controlling for a large number of variables, di Giovanni (2005) finds that the size of financial markets, as measured by stock market capitalization to GDP, has a positive association with outward FDI of domestic firms.

Blundell-Wignall & Roulet (2017) estimate a gravity model for 54 country pairs for 1997-2012 to determine the financial determinants of bilateral FDI flows. They use proxy for the liberalization of the financial sectors by the Chinn-Ito index[1]. Controlling for size, distance, corruption, trade openness and country-pair fixed effects, they find evidence for the role of financial openness in the host country in stimulating bilateral capital flows.

[1] see Chin & Ito (2008, 2015)

By an important paper matched with our interest, Desbordes & Wei (2017) examines the effects of source country and destination country financial development (measured by private sector credit to GDP) on FDI. Their findings reveal that both source country and destination country financial development have a large positive influence on green-field, expansion, and mergers & acquisitions FDI. Theories on FDI confirm the importance of both source country and financial development. Firms' access to external finance depends on financial development and thereby, higher source country financial development should have a positive direct external finance effect on the volume of outward FDI (Klein, Peek & Rosengren, 2002). Similarly, higher destination country financial development may have a positive direct external finance effect on the volume of inward FDI. Firms may choose to use local sources for external finance if local financing conditions are favorable (Desai, Foley & Hines, 2004).

A more recent study by Donaubauera, Neumayerb & Nunnenkamp (2019) extends the work of Desbordes & Wei (2017) by employing broader set financial development measures, exploring whether the effects of source and host country financial development are conditional on each other and covering longer time period panel data (2001-2012). Employing a gravity-type model in a global sample of 43 source and 137 host countries on FDI stock data they also find positive, statistically significant effects of both source and host country financial market development on FDI.

In addition, recent studies also try to find the effect institutional and country specific factors on FDI. For example, corruption substantially and negatively affects FDI (Habib & Zurawicki, 2001, 2002; Chamisa, 2020) and therefore is a hurdle of economic growth (Hakimi & Hamdi, 2017). However, Blundell-Wignall & Roulet (2017) findings contradict with the usual notion about corruption on FDI. They find that corruption has an insignificant or even positive effect on FDI which also confirms the finding of Egger & Winner (2005) who said that corruption is a stimulus for FDI. Jetin et al. (2024), finds that corruption stimulates FDI at the world level, but deters FDI in East Asia, Southeast Asia, Australia and New Zealand. Very recently, Krifa-Schneider et al. (2022) studied the mediating role of financial development in FDI-corruption nexus for 80

countries over the 2003-2019 periods and finds a non-linear relationship between corruption and FDI.

Choi, Furceri & Yoon (2019) finds policy uncertainty in the host country substantially reduces FDI inflows, however, good institutional quality and better financial system mitigates this adverse impact. Another study by Chenaf-Nicet & Rougier (2016) reveals that macroeconomic instability (GDP instability, institutional quality) of both host and source country certainly affects FDI inflows. Studies also find that global competitiveness is important for developed and developing host economy for attracting FDI, but, human development appears to be an additional determinant in developing countries (Curtis, Rhodes & Griffin, 2013). Kox & Rojas-Romasgosa (2019) concludes, by applying a structural gravity approach, that preferential trade agreement is expected to increase inward FDI stocks approximately by 54% between the signatory countries.

3. Empirical Methodology and Data

3.1 Econometric Specifications

The general model takes the form as-

$$InFDI_{ijt} = \alpha_0+\beta_1 lnFINDEV_{it}+\beta_2 lnFINDEV_{jt}+\delta_1 InGV'_{it} + \delta_2 InGV'_{jt}+ \gamma GC'_{ij} +\varphi GP'_{ij}+\varepsilon_{ijt} \quad \ldots\ldots (1)$$

where, FDI_{ijt} is FDI from country *j* (home) to *i* (host), α_{it} and α_{jt} are directional fixed effects, $FINDEV_{it}$ and $FINDEV_{jt}$ are financial development of home (source) and host country respectively. GV'_{it} and GV'_{it} is vector of time variant home country and host country characteristics (gravity variable) respectively, GC'_{ij} is a vector time invariant bilateral characteristics (gravity constant), $GP'_{ij}$is a vector of other time variant gravity variables that affect FDI, and ε_{ijt} is the error term.

Intuitively the structural gravity model takes the following form that captures size of the economy, openness and a number of the variable following Kox & Rojas-Romasgosa (2019)-

$$InFDI_{ijt} = \alpha_0+\beta_1lnFINDEVit+\beta_2lnFINDEV_{jt}+\beta_3POLSTAB_{it}+\beta_4CCORRUPT_{it}+ \delta_1InGDPPP_{it} +\delta_2InGDPPP_{jt}+\delta_3lnTRADOPEN_{it}+\delta_4lnTAX_{it}+\delta_5INFRASTR_{it}+ \gamma_1InDIST_{ij} +\gamma_2CONT_{ij} + \gamma_3LANGUAGE_{ij} + \gamma_4COLONIAL_{ij}+ \gamma_5LANDLOCK_{ij} +\varphi_1RTA_{ijt}+ \varphi_2WAGEGAP_{ijt}+\varepsilon_{ijt} \ldots\ldots (2)$$

where, FDI_{ijt} refers stock of FDI from country *j* to *i* at time *t*. POLSTAB, CORRUPT, TRADOPEN, TAX, and INFRASTR represent political stability, corruption level, trade openness, corporate tax rate, infrastructure quality of the host country respectively. RTA is the regional trade agreements (also includes free trade agreements) between home and host country and WAGEGAP measures the wage differentials or skill difference of labor of home and host country.

Following Olivero & Yotov (2012) and Feenstra (2016), the FDI gravity equation is-

$$InFDI_{ijt} = \alpha_{it} + \alpha_{jt} +\beta_1lnFINDEV_{it}+ \beta_2lnFINDEV_{jt}+ \beta_3POLSTAB_{it}+ \beta_4CCORRUPT_{it}+\delta_1lnTRADOPEN_{it}+\delta_2lnTAX_{it}+\delta_3INFRASTR_{it} +\gamma_1InDIST_{ij} +\gamma_2CONT_{ij}+ \gamma_3LANGUAGE_{ij} + \gamma_4COLONIAL_{ij} + \gamma_5LANDLOCK_{ij} +\varphi_1RTA_{ijt}+\varphi_2WAGEGAP_{ijt}+\varepsilon_{ijt} \ldots\ldots (3)$$

Specification (3) includes a host country-time fixed effects and home country-time fixed effects that absorb the size variables. Finally, to deal with potential endogeneity and reverse causality country-pair fixed effects is included in the model (Head & Mayer, 2014; Yotov et al.,2016). An important feature of country-pair fixed effects is that it will absorb all time-invariant gravity covariates. Therefore, the structural gravity equation of FDI becomes-

$$InFDI_{ijt}=\alpha_{it}+\alpha_{jt} +\alpha_{ij}+ \beta_1lnFINDEV_{it}+ \beta_2lnFINDEV_{jt}+ \beta_3POLSTAB_{it}+ \beta_4CCORRUPT_{it}+\delta_1lnTRADOPEN_{it}+\delta_2TAX_{it}+\delta_3INFRASTR_{it} + \varphi_1RTA_{ijt} + \varphi_2WAGE_{ijt}+\varepsilon_{ijt} \ldots\ldots (4)$$

By reviewing literature, it is observed that the impact of corruption has mixed impacts on FDI; even the anticipated outcome is negative. Choi, Furseri & Yoon (2019), and Karaman & Yıldırım-Karaman (2019) find less developed financial markets generally amplify the adverse impact of uncertainty on investment. Similarly, the paper seeks to investigate whether financial development

substantially helps to mitigate the adverse of corruption and the estimated structural gravity equation with the interaction term takes the form as-

$$InFDI_{ijt} = \alpha_{it} + \alpha_{jt} + \alpha_{ij} + \beta_1 InFINDEV_{it} + \beta_2 lnFINDEV_{jt} + \beta_3 POLSTAB_{it} + \beta_4 CCORRUPT_{it} + \beta_5 (CCORRUPT_{it} \text{ X } lnFINDEV_{it}) + \delta_1 lnTRADOPEN_{it} + \delta_2 lnTAX_{it} + \delta_3 INFRASTR_{it} + \varphi_1 RTA_{ijt} + \varphi_2 WAGEGAP_{ijt} + \varepsilon_{ijt} \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Like trade data, bilateral FDI data also have zero figures. Therefore, to accounts for the heteroscedasticity and existence of the zero figures, the model is estimated by [equations (2)-(5)] applying the pseudo-poisson maximum likelihood (PPML) as suggested by Santos Silva & Tenreyro (2006). As an example, a PPML representation of equation (5) is-

$$FDI_{ijt} = \exp \alpha_{it} + \alpha_{jt} + \alpha_{ij} + \beta_1 lnFINDEV_{it} + \beta_2 lnFINDEV_{jt} + \beta_3 POLSTAB_{it} + \beta_4 CCORRUPT_{it} + \beta_7 (CCORRUPT_{it} \text{ X } lnFINDEV_{it}) + \delta_1 lnTRADOPEN_{it} + \varepsilon_{ijt} + \delta_2 lnTAX_{it} + \delta_3 INFRASTR_{it} + \varphi_1 RTA_{ijt} + \varphi_2 WAGEGAP_{ijt} \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

3.2. Data

Empirical studies on FDI have always been a challenge due to data availability (Blonizen & Davies, 2004; Kox & Rojas-Romasgosa, 2019). Presence of the large number of missing, incomplete and suppression of FDI data due to confidentiality leads researchers to study FDI in cross sectional data with little time series dimension (Blonizen& Davis, 2004). On the other hand, data limitations hinder the application of gravity analysis to FDI data since gravity analysis has to be based on bilateral flows (Kox & Rojas-Romasgosa, 2019). Most data sources (e.g. UNCTAD, WDI of WB) provide FDI data on aggregate basis with the rest of the world which are unfit for gravity study. Only a few sources provide FDI bilateral data.

a. Coordinated Direct Investment Survey (CDIS) of IMF

CDIS is a statistical data collection effort of IMF that provides direct investment data by counterpart countries. CDIS presents detailed bilateral data on inward direct investment positions (stocks) and outward direct investment positions (stocks) in million US$ since 2009. The presentation of the CDIS data follows the directional principle in which data are organized according to the

direction of the direct investment relationships. One advantage of CDIS data is that it provides derived inward and outward direct investment positions by data mirroring which helps to reduce the data gaps and errors at counterpart economy level. CDIS also reports confidential data as "c". My CDIS full balanced panel dataset consists of 166 host and home countries over the period of 2009 to 2017.

b. UNCTAD FDI Bilateral Data

UNCTAD (2014) compiles a bilateral FDI statistics which provides FDI data for 206 countries over 2001-2012 covering inflows, outflows, inward stock and outward stock. The data is reported in million US$ including zero flows ("_") and missing data (".."). Following data procedure of Anderson, Larch and Yotov (2020), the paper complements inward stock and flow data by counterpart 'mirror' outward data. This mirroring procedure helps us to lessen data gaps and missing observations. My UNCTD full balanced panel dataset is consisted of 169 host and home countries with the period of 2001-2012.

c. OECD Bilateral FDI Data

One drawback of CDIS and UNCTAD data is that they do not cover long time periods. In this context a bilateral FDI dataset based on bilateral FDI information of OECD is constructed which covers the period from 2001 to 2017. The paper considers reported outward data of the reporting country (home) as inward data of the counterpart country (host). The OECD data provides FDI flows and stock flowing from the OECD countries to both OECD and non-OECD countries. According to OECD (2020), the OECD area accounted for 77% of the global FDI outflows in 2019[2]. Inclusion of China and Russia give a sharp rise in the global FDI outflows to 86%. In case of outward stock/positions the OECD countries including China and Russia accounted for 83% of the global outward stock. Therefore, the compiled OECD database is also a representative of the global FDI patterns. The OECD bilateral FDI data are reported in million US$. The OECD full database of bilateral FDI is consisted of 166 host countries and 38 home countries (including China and Russia). The outward FDI data for China is taken from the Statistical Bulletin of China's Outward Foreign Direct Investment (2017, 2010, and

[2]FDI in Figures, April 2020 issue, OECD.

2006) and the FDI data for Russia has been taken from the Bank of Russia (the Central Bank of Russian Federation).

3.2.1. Dealing with Missing Values

A major disadvantage of dyadic FDI data is the presence of the significant amount of missing data. The reasons of missing data could be because of non-reported or suppressed (Kox & Rojas-Romasgosa, 2019). The most preferable practice with missing data in FDI studies (e.g. Bevan, Estrin & Meyer, 2004;Kox & Rojas-Romasgosa, 2019, Donaubauer, Neumayer & Nunnenkamp, 2019; Dorakh, 2020; Zongo, 2020) is to replace by zero. The main estimations follow this procedure as it helps us to have a balanced panel.

However, missing observations in the dependent variable (FDI) tend to cluster in host countries that are poorer and dyads that are farther away from each other (Kerner, 2009). In the robustness measure, I follow the list wise deletion of observations in which dyads have no reported values of FDI in any year of the sample period (as followed by Welfans & Baier, 2018;Kox & Rojas-Romasgosa, 2019). A possible selection bias could arise; however, the bias could be smaller than the bias due to treat missing data as zero. This procedure reduces country pairs from 27,390 to 18,223 in CDIS dataset leaving the number of observations from 264,510 to 164,007. For the UNCTAD dataset, country pairs reduced from 28,392 to 7,688 leaving the number of observations from 340,704 to 92,256. Finally, for the OECD dataset, I now have 5,887 country pairs with 100,079 observations instead of 6,270 country pairs with 106,590 observations in the full sample.

3.2.2. Dealing with Negative FDI Values

Another problematic issue in analyzing FDI is the presence of zero and negative values. The following Table-1 shows the presence of negative values in the FDI databases:

Table 1: Negative FDI Data

	FDI Positions (Stock)			FDI Flows	
	CDIS	**UNCTAD**	**OECD**	**UNCTAD**	**OECD**
Full Sample	2.39%	0.41%	1.38%	2.25%	9.84%
Revised Sample	3.60%	1.50%	1.47%	8.30%	10.86%

In the OLS estimator of gravity model the dependent variable takes the logarithmic form. In this case, the OLS estimator is not acceptable as neither of the zero value nor the negative values have a log. Although, the PPML estimator can successfully handle zero values, but it does not work with negative observations if the conditional mean is negative. There are several solutions to handle the negative values:

1. dropping negative values
2. Setting Negative values equal to zero
3. Transforming Negative values to 1
4. Logarithmic Transformation of FDI (Busse & Hefeker, 2007; Azzimonti, 2019) which includes negative values by-

   $FDI^*_{ijt} = Ln[FDI_{ijt} + \sqrt{.}(1+FDI^2_{ijt})]$

5. Logarithmic Transformation of FDI (Blonigen & Davies, 2004) to accommodate negative values by-

   $FDI^*_{ijt} = (+/-)\ Ln|\ FDI_{ijt} * 1000000 + 1|$

However, dropping negative values could lead to larger bias and loosing consistency than setting to zero (Welfans & Baier, 2018). On the contrary, Dorakh (2020) showed that the estimation of FDI by treating negative values as 1 is stronger than treating as zero. Setting negative to zero would mean that there are no investment relationships between the home and host countries. The logarithmic transformation followed by Busse & Hefeker (2007) and Azzimonti (2019) would not be feasible as it generates further missing observations as well as difficulty associated with interpretation of FDI elasticity. Blonigen & Davies (2004), however, suggests logging the absolute value of FDI, and then reintroducing the original sign after transformation. This paper follows Dorakh (2020) suggestions.

The dependent variable is bilateral FDI stock as it is less volatile than bilateral FDI flows (de Sousa & Lochard, 2011; Donaubauer, Neumayer &Nunnenkamp, 2019) and provides a greater number of positive observations (Table-1).

The main explanatory variable is financial development. This paper utilizes different measures of financial development from IMF's financial development index database developed by Svirydzenka (2016). Table-2 provides the definition and sources of variables utilized in this study:

Table 2: Description of Variables and Sources

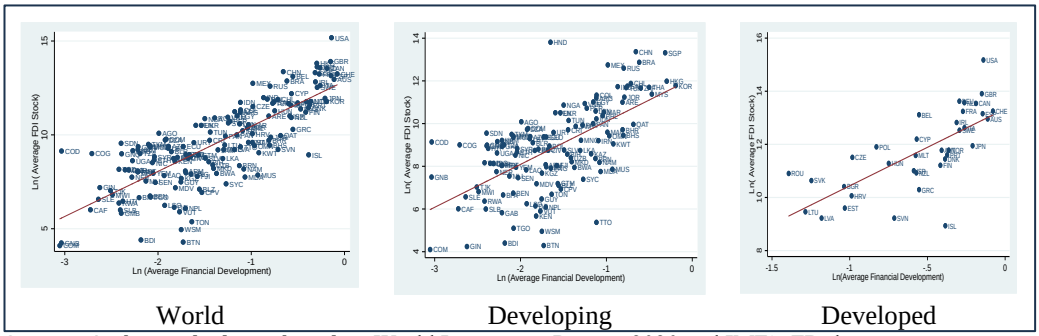
Variables	Description/ Construction	Sources
Foreign Direct Investment (FDI)	Bilateral FDI from country *j*(home) to country *i*(host). FDI is measured in both inward stocks and inflows.	CDIS, IMF
		UNCTAD Bilateral FDI Database
		OECD, Statistical Bulletin of China' OFDI, and Bank of Russia
Financial Development (FD/FI/FM) for host and home	Svirydzenka (2016) developed a financial development index for the IMF. FD is defined as a relative ranking of countries on the depth access and efficiency of their financial institutions and financial market. FD index is a composite measure of Financial Institution Index (FI) and Financial Market Index (FM).	Financial Development Index database, IMF
GDPPPP for host and home	GDP measured in current international dollars on PPP basis.	International Comparison Program (ICP), 2017, WB.
Political Stability (POLSTAB) in host	Political stability is measured by the political stability and absence of violence indicator of World Bank's Worldwide Governance Indicator (WGI) developed by Kaufman et al., 2010.	WGI 2019 update, WB
Control of Corruption (CCORRUPT) in host	The Control of corruption of WGI and The Freedom from Corruption (FFC) indicator developed by Heritage Foundation is treated as a measure of corruption.	WGI 2019 Update, WB; 2020 Index of Economic Freedom, Heritage Foundation.
Trade Openness (TRADEOPEN) in host	Trade Openness is measured by the sum of exports and imports as a ratio of GDP.	UNData
Corporate Tax (TAX) in host	TAX is defined by (1+ Corporate Tax Rate). The corporate tax data has been collected from different sources.	Centre for Business Taxation Database 2017, Habu (2017)
		Tax Foundation (2019)

Variables	Description/ Construction	Sources
Regional Trade Agreements (RTA) between host and home	RTA is comprised of Free Trade Agreements (FTA), Custom Union (CU), Economic Integration Union (EIA) and Partial Scope (PS).	Mario Larch's RTA database (Egger & Larch, 2008)
Infrastructure (INFRASTR) in host	Infrastructure is measured by the proxy of the average of fixed telephone subscription (per 100 people) and mobile cellular subscription (per 100 people)	WDI, WB
Wage Difference (WAGEGAP)	Constructed as a dummy by considering the negative of difference of real GDP per capita of host and home as 1, and 0 otherwise.	UNData
Distance (DIST)	Population weighted bilateral distance between exporter and importer in kilometer.	CEPII's Geodist database (Mayer & Zignago, 2011).
Contiguity (CONT)	A dummy for contiguity between exporter and importer.	
Common Language (LANGUAGE)	A dummy for common language between exporter and importer.	
Colony (COLONIAL)	A dummy for exporter and importer ever in colonial relationship.	
Landlocked (LANDLOCK)	A dummy for exporter and importer if they are landlocked.	
Other Variables used in robustness measures		
Gross Value Added Export (GVA-Exp) of host	Total value added export is the sum of Domestic Value Added (DVA) and Foreign Value Added (FVA).	UNCTAD-EORA GVC database (Casella et al., 2019)
Domestic Investment (GFCF_GDP) in host	Measured as the ratio of Gross Fixed Capital Formation (GFCF) to GDP.	WDI, WB and IFS, IMF.
Capital Account Openness (KAOPEN) in host and home	The degree of capital account openness is represented by the Chinn-Ito Index (KAOPEN).	The Chinn-Ito Financial Openness Index 2018 Update[Chinn& Ito(2006)]

3.3. Stylized Facts

It is observed that the mean value of FDI stocks and flows in all three datasets are positive. The presence of large number of missing or zero values as well as negative values fairly biased the mean values. In the following I present the stylized facts of the data.

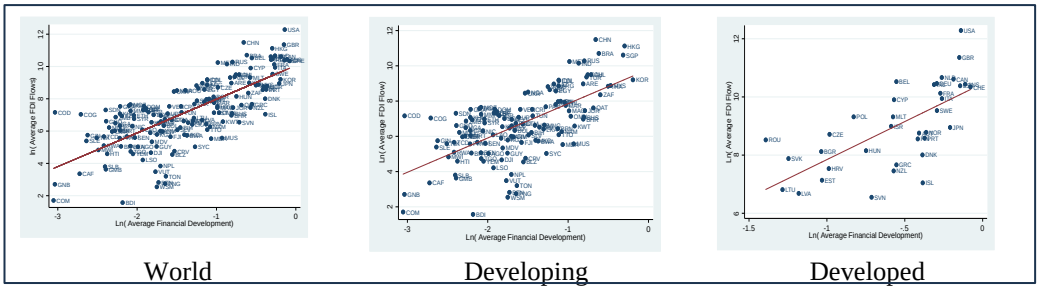
Figure 2: Inward FDI Stocks and Host Country Financial Development: 2001-2017



World Developing Developed

Source: Authors calculation based on World Investment Report, 2020 and IMF's FD data

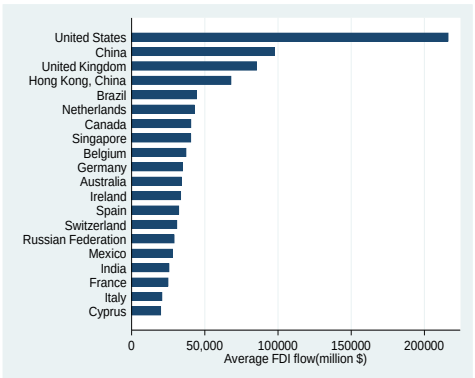
Figure 3: Inward FDI Flows and Host Country Financial Development: 2001-2017

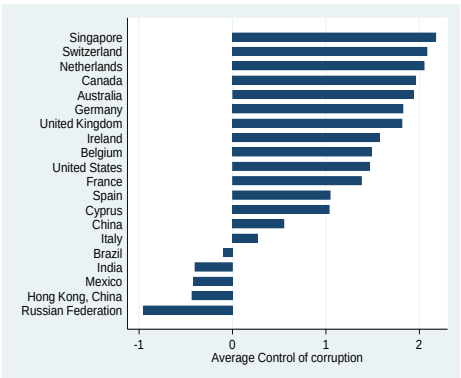


World Developing Developed

Source: Authors calculation from World Investment Report, 2020 and IMF's FD data

Figure 4: Inward FDI and control of corruption of to 20 host countries: 2001-2017





Top 20 FDI(Flow) host Countries | Control of Corruption of top 20 FDI host countries

Source: Authors calculation from World Investment Report, 2020 and WGI data

Figure-2 and Figure-3 represent stylized facts of our data. Figure-2 presents the inward FDI stocks and host country financial development averaged over 2001-2017. Figure-3 shows the same relationship but with FDI flow data. It is observed that there is an unconditional positive relationship between host country financial development and FDI stocks and flows. These positive relationships are relatively stronger for developing countries than the developed counterparts. In the same way, Desbordes and Wei (2017) presents that the relationship between outward FDI and home or source country financial development are stronger than that of the inward FDI and host country financial development.

Figure-4 compares average FDI flows to top 20 host countries over 2001-2017 (left panel) with their control of corruption level (right panel). The World Bank's WGI control of corruption values ranges from -2.50 (highly corrupted) to 2.50 (no corruption). Although the control of corruption level in China, Hong Kong SAR, China and Brazil are relative low, however, they ranked second, fourth and fifth in receiving FDI during the period of 2001-2017.

These stylized facts suggest that bilateral FDI is dependent on host (and home too) country financial development and other factors. Corruption seems weakly associated with the inward FDI, and, therefore, demands deep investigation.

4. Empirical Results

In order to get reliable estimate of FDI and financial development nexus, the paper first estimated the model with home and host fixed effect including time fixed effects. Next, country specific fixed effects with time to control for dynamic forces and both inward and outward multilateral resistances relating to FDI flows is introduced. Finally, pair fixed effects are employed to avoid endogeneity bias due to omitted variables and reverse causality.

An important issue still remains with the consistent estimation of the structural gravity model. The OLS fixed effects estimates do not account for heteroscedasticity and the existence of zeros. Zero FDI stocks or flows are very common in FDI data. The OLS estimate may mislead the results especially when large number missing observations are also treated as zeros. To get a consistent

estimate of the model, the pseudo-poisson maximum likelihood (PPML) is applied as suggested by Santos Silva & Tenreyro (2006) and it is preferable for several reasons. PPML accounts for the heteroscedasticity and existence of the zeros in FDI data.

The estimation of the theoretically constructed gravity model with MRTs is a challenge as they are not directly observable (Yotov et al.,2016). According to Feenstra (2016), introduction of directional fixed effects (home and host) fixed effects in cross sectional framework could be an easiest solution to capture MRT. However, Head and Mayer (2014) criticized that time-invariant directional fixed effects do not capture MRTs effectively and advocating using of host-time and home-time fixed effects. The inclusion of the host-time and home-time fixed effects absorb the size variables (e.g. GDP) from the structural gravity model as well as all other observable and unobservable country-specific characteristics which vary across these dimensions like national policies, institutions, and exchange rates (Yotov et al., 2016). The main explanatory variable, financial development and corruption are also time-variant, and there is a risk of elimination from the estimation. To overcome this risk of elimination from the estimation, time varying host-year and home-year fixed effects that vary every four years is employed (following Gylfason, Martinez-Zarzoso & Wukman,2015; Florensa et al., 2015; Martinez-Zarzoso and Marquez-Ramos, 2019; and Rodriguez-Crespo & Martinez-Zarzoso,2019). It can capture MRTs.

A persistent problem in empirical FDI gravity studies is endogeneity and reverse causality which results in biased estimates. Use of standard instruments is a method of dealing with endogeneity. However, due to lack of plausible instruments, researchers are now suggesting to include country-pair fixed effects (Head & Mayer, 2014; Yotov et al., 2016; Welfans & Baier, 2018; Donaubauer, Neumayer &Nunnenkamp, 2019). The dyad or pair fixed effects control for time invariant characteristics of all country pairs and time fixed effects. Finally, this paper estimates the model with host-year, home-year and pair fixed effects to capture both MRTs relating to FDI flows as well as endogeneity and heteroscedasticity.

According to Santos Silva & Tenreyro (2006), in PPML estimation the dependent variable will be in levels, not in logs. Explanatory variables, financial development, corporate tax, regional trade agreements, political risk, corruption, trade openness, wage and GDP, are lagged by one year. One period lag is hardly sufficient to tackle endogeneity bias, however, the problem would not be persistent when pair fixed effects is taken (Donaubauer, Neumayer &Nunnenkamp, 2019). Therefore, the PPML representations of the estimated specifications become-

(1) with host, home and year fixed effects-

$$FDI_{ijt}= \exp \alpha_i+\alpha_j+\alpha_t+\beta_1 lnFINDEVi_{,t-1}+\beta_2 lnFINDEV_{j,t-1}+\beta_3 POLSTAB_{i,t-1}+\beta_4 CCORRUPT_{i,t-1}+\delta_1 InGDPPP_{i,t-1}+\delta_2 InGDPPP_{j,t-1}+\delta_3 lnTRADOPEN_{i,t-1}+\delta_4 lnTAX_{i,t-1}+\varepsilon_{ijt}+\delta_5 lnINFRASTR_{i,t}+\gamma_1 InDIST_{ij}+\gamma_2 CONT_{ij}+\gamma_3 LANGUAGE_{ij}+\gamma_4 COLONIAL_{ij}+\gamma_5 LANDLOCK_{ij}+\varphi_1 RTA_{ij,t-1}+\varphi_2 WAGEGAP_{ij,t-1} \quad (7)$$

(2) with host-year and home-year fixed effects-

$$FDI_{ijt}= \exp \alpha_{it}+\alpha_{jt}+\beta_1 lnFINDEVi_{,t-1}+\beta_2 lnFINDEV_{j,t-1}+\beta_3 POLSTAB_{i,t-1}+\beta_4 CCORRUPT_{i,t-1}+\delta_1 InGDPPP_{i,t-1}+\delta_2 InGDPPP_{j,t-1}+\delta_3 lnTRADOPEN_{i,t-1}+\delta_4 lnTAX_{i,t-1}+\varepsilon_{ijt}+\delta_5 lnINFRASTR_{i,t}+\gamma_1 InDIST_{ij}+\gamma_2 CONT_{ij}+\gamma_3 LANGUAGE_{ij}+\gamma_4 COLONIAL_{ij}+\gamma_5 LANDLOCK_{ij}+\varphi_1 RTA_{ij,t-1}+\varphi_2 WAGEGAP_{ij,,t-1} \quad (8)$$

(3) with pair and year fixed effects-

$$FDI_{ijt}= \exp \alpha_{ij}+\alpha_t+\beta_1 lnFINDEVi_{,t-1}+\beta_2 lnFINDEV_{j,t-1}+\beta_3 POLSTAB_{i,t-1}+\beta_4 CCORRUPT_{i,t-1}+\delta_1 InGDPPP_{i,t-1}+\delta_2 InGDPPP_{j,t-1}+\delta_3 lnTRADOPEN_{i,t-1}+\delta_4 lnTAX_{i,t-1}+\varepsilon_{ijt}+\delta_5 lnINFRASTR_{i,t}+\varphi_1 RTA_{ij,t-1}+\varphi_2 WAGEGAP_{ij,\,t-1} \quad (9)$$

(4) with host-year, home-year and pair fixed effects-

$$FDI_{ijt} = \exp\ \alpha i_t + \alpha j_t + \alpha_{ij} + \beta_1 lnFINDEVi_{,t-1} + \beta_2 lnFINDEV_{j,t-1} + \beta_3 POLSTAB_{i,t-1} + \beta_4 CCORRUPT_{i,t-1} + \delta_1 InGDPPP_{i,t-1} + \delta_2 InGDPPP_{j,t-1} + \delta_3 lnTRADOPEN_{i,t-1} + \delta_4 lnTAX_{i,t-1} + \varepsilon_{ijt} + \delta_5 lnINFRASTR_{i,t} + \varphi_1 RTA_{ij,t-1} + \varphi_2 WAGEGAP_{ij,\ t-1} \ldots\ldots \quad (10)$$

The PPML estimation results are presented in Table-3 to Table-6. In Table-3, the paper employs host, home and year fixed effects and in Table-4, the host-year and home-year fixed effects. In these cases, it can assess the effect of time-invariant gravity parameters (distance, contiguity, language, landlocked) on FDI. In general, time-invariant parameters have expected sign and in most case the significance level. Consistent with the literature, both the host country and home country GDP have significant positive impact on FDI flows. Regional trade agreements also positively impact FDI. It, therefore, constructs the wage gap as a dummy variable that equals 1 if the host country's real GDP per capita is lower than the home country's, based on the assumption that relatively lower host-country wages may attract foreign investors. The results with OECD data reveal that the prediction is right as the sign of coefficient is positive and significant.

One of the main explanatory variables of interest is financial development. It is observed that the UNCTAD data gives the consistent and reliable estimations. For that reason researchers (Kox & Rojas-Romasgosa, 2019; Donaubauer, Neumayer &Nunnenkamp, 2019) prefer to use UNCTAD bilateral FDI data while studying FDI in a worldwide context. Considering the UNCTAD data as the benchmark for interpretation, it is observed that financial development has positive and significant effect on FDI. The results are consistent with the existing literature (Desbordes & Wei, 2017; Donaubauer, Neumayer &Nunnenkamp, 2019). The results are mixed with CDIS and OECD data. In case of CDIS data, the coefficient of financial development (FD and FI) for host country is significantly negative, but that of the home country is insignificant. However, in case of the OECD data, which covers long time span, the results indicate that the home or source country financial development is more important than that of the host country for FDI stocks in the host country. The mix results could be apparent that the three datasets cover different time periods. Nevertheless, in case of OECD database, the sample is comprised of only 38

home countries which could be a cause of divergence in the findings. According to World Investment Report, 2018 (UNCTAD, 2018), global FDI inflows fell by 2% in 2016 and further dropped by 23% in 2017. The reports also stated the net value of cross border mergers and acquisitions as well as announced Greenfield investment-an indicator of future trend-declined sharply in 2016 and 2017.

Another explanation could be that financial development helps Multinational Enterprises (MNEs) to source money from the host country for their external finance. As a result of financial development, MNEs see sourcing money from the host financial system as more profitable than borrowing from the home country. Sourcing finance from the host economy, however, contribute to the domestic investment in the host economy. Therefore, there could be a substitutability relationship between financial development and FDI in domestic investment[i].

Table 3: Gravity Estimation of Financial Development and FDI (PPML with Host, Home and Year FE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
Dependent Variable: fdi_stock									
$lnfd\_host_{(t-1)}$	-0.372**			0.980***			-0.397		
	(0.181)			(0.176)			(0.296)		
$lnfd\_home_{(t-1)}$	0.156			0.655***			1.095***		
	(0.332)			(0.231)			(0.372)		
$polstab_{(t-1)}$	0.0874*	0.113**	0.0776	-0.0543	-0.0659	-0.0365	0.0717	0.117	0.0463
	(0.0477)	(0.0452)	(0.0497)	(0.0479)	(0.0519)	(0.0487)	(0.0785)	(0.0787)	(0.0817)
$ccorruption_{(t-1)}$	0.174**	0.192**	0.167**	0.284***	0.281***	0.314***	0.279**	0.274**	0.271**
	(0.0793)	(0.0787)	(0.0792)	(0.0788)	(0.0834)	(0.0793)	(0.115)	(0.118)	(0.114)
$lngdp\_host_{(t-1)}$	1.113***	1.164***	1.092***	0.788***	0.882***	0.968***	1.192***	1.291***	1.111***
	(0.265)	(0.253)	(0.270)	(0.271)	(0.279)	(0.279)	(0.281)	(0.273)	(0.290)
$lngdp\_home_{(t-1)}$	1.051***	1.070***	1.090***	1.276**	1.345***	1.358***	3.873***	4.004***	3.887***
	(0.322)	(0.315)	(0.318)	(0.518)	(0.491)	(0.523)	(0.600)	(0.573)	(0.600)
$lntradeopen_{(t-1)}$	0.154	0.0185	0.189	0.0417	0.0565	-0.0295	0.348*	0.203	0.412**
	(0.155)	(0.152)	(0.160)	(0.175)	(0.166)	(0.177)	(0.187)	(0.181)	(0.197)
$lntax_{(t-1)}$	-0.200	-0.215	-0.0281	0.313	0.257	0.456	0.474	0.575	0.465
	(1.144)	(1.121)	(1.145)	(0.625)	(0.643)	(0.649)	(1.289)	(1.306)	(1.303)
Infastructure	0.0460	0.0841	-0.0123	-0.102	-0.0937	-0.0637	0.0123	0.0501	-0.00888
	(0.112)	(0.110)	(0.119)	(0.0722)	(0.0725)	(0.0736)	(0.0742)	(0.0713)	(0.0817)
lndistw	-0.524***	-0.524***	-0.523***	-0.604***	-0.604***	-0.604***	-0.392***	-0.389***	-0.390***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
	(0.0737)	(0.0737)	(0.0739)	(0.0669)	(0.0670)	(0.0669)	(0.0977)	(0.0978)	(0.0977)
contig	0.308	0.308	0.308	0.255*	0.254*	0.253*	0.398*	0.398*	0.389*
	(0.197)	(0.197)	(0.198)	(0.149)	(0.150)	(0.150)	(0.210)	(0.210)	(0.209)
language	0.235	0.236	0.240	0.403***	0.403***	0.408***	0.280*	0.281*	0.291**
	(0.155)	(0.155)	(0.155)	(0.134)	(0.134)	(0.134)	(0.146)	(0.146)	(0.146)
colony	0.140	0.140	0.138	0.510***	0.511***	0.508***	0.310**	0.309**	0.322**
	(0.167)	(0.167)	(0.167)	(0.148)	(0.148)	(0.148)	(0.151)	(0.152)	(0.151)
landlocked	-0.0391	-0.0386	-0.0415	-0.00142	-0.000826	-0.00368	0.156	0.159	0.172
	(0.283)	(0.283)	(0.283)	(0.317)	(0.317)	(0.317)	(0.233)	(0.233)	(0.233)
$rta_{(t-1)}$	0.479***	0.480***	0.479***	0.542***	0.543***	0.541***	0.215	0.219	0.223
	(0.166)	(0.166)	(0.167)	(0.139)	(0.141)	(0.140)	(0.151)	(0.151)	(0.151)
$wagegap_{(t-1)}$	0.207	0.207	0.213	0.183	0.183	0.186	0.395**	0.395**	0.384**
	(0.178)	(0.178)	(0.178)	(0.138)	(0.138)	(0.138)	(0.166)	(0.166)	(0.166)
$lnfi\_host_{(t-1)}$		-0.719***			0.897***			-0.891***	
		(0.201)			(0.253)			(0.309)	
$lnfi\_home_{(t-1)}$		-0.123			0.531**			-0.349	
		(0.342)			(0.259)			(0.347)	
$lnfm\_host_{(t-1)}$			0.00320			0.213**			0.0699
			(0.0248)			(0.0869)			(0.0758)
$lnfm\_home_{(t-1)}$			0.0493			0.221**			1.027***
			(0.0845)			(0.105)			(0.188)
Constant	-16.25**	-17.60***	-16.17**	-14.04	-16.46*	-18.37**	-59.20***	-63.19***	-57.94***
	(6.516)	(6.299)	(6.463)	(9.061)	(9.018)	(9.176)	(9.485)	(9.136)	(9.434)
Host FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Home FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Years	2009-2017			2001-2012			2001-2017		
Observations	219,120	219,120	183,014	302,774	302,774	261,030	100,282	100,282	92,340
Pseudo R^2	0.900	0.900	0.897	0.897	0.897	0.893	0.847	0.847	0.846

Note: Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table 4: Gravity Estimation of Financial Development and FDI (PPML with Host-Year and Home-Year FE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
Dependent Variable: fdi_stock									
lnfd_host$_{(t-1)}$	-0.169			0.623***			-0.412		
	(0.198)			(0.171)			(0.271)		
lnfd_home$_{(t-1)}$	0.357			0.264			0.937***		
	(0.327)			(0.233)			(0.331)		
polstab$_{(t-1)}$	0.0550	0.0881*	0.0520	-0.0667*	-0.0737*	-0.0618	0.0491	0.0642	0.0299
	(0.0508)	(0.0481)	(0.0528)	(0.0384)	(0.0394)	(0.0388)	(0.0864)	(0.0839)	(0.0898)
ccorruption$_{(t-1)}$	0.241***	0.255***	0.237***	0.289***	0.280***	0.310***	0.458***	0.443***	0.460***
	(0.0896)	(0.0873)	(0.0888)	(0.0853)	(0.0870)	(0.0847)	(0.122)	(0.125)	(0.123)
lngdp_host$_{(t-1)}$	0.668***	0.710***	0.645***	0.850***	0.839***	0.955***	0.189	0.200	0.124
	(0.219)	(0.224)	(0.219)	(0.198)	(0.201)	(0.207)	(0.252)	(0.251)	(0.256)
lngdp_home$_{(t-1)}$	0.585**	0.577**	0.622***	1.496***	1.437***	1.518***	2.569***	2.656***	2.669***
	(0.240)	(0.238)	(0.231)	(0.304)	(0.297)	(0.314)	(0.371)	(0.371)	(0.369)
lntradeopen$_{(t-1)}$	0.103	-0.0619	0.112	-0.118	-0.0410	-0.149	0.0479	-0.0663	0.109
	(0.133)	(0.120)	(0.131)	(0.147)	(0.152)	(0.150)	(0.169)	(0.169)	(0.181)
lntax$_{(t-1)}$	0.298	0.259	0.410	-0.0819	-0.0748	0.0451	1.677	1.777	1.684
	(1.250)	(1.228)	(1.232)	(0.702)	(0.702)	(0.715)	(1.336)	(1.341)	(1.335)
Infastructure	0.0173	0.0803	-0.00457	-0.0634	-0.0706	-0.0342	0.0772	0.114	0.0538
	(0.120)	(0.114)	(0.126)	(0.0865)	(0.0855)	(0.0873)	(0.0784)	(0.0757)	(0.0837)
lndistw	-0.524***	-0.524***	-0.523***	-0.604***	-0.603***	-0.604***	-0.390***	-0.388***	-0.387***
	(0.0738)	(0.0738)	(0.0740)	(0.0669)	(0.0670)	(0.0669)	(0.0975)	(0.0975)	(0.0977)
contig	0.309	0.308	0.308	0.255*	0.255*	0.254*	0.402*	0.403*	0.393*
	(0.197)	(0.197)	(0.198)	(0.149)	(0.149)	(0.150)	(0.210)	(0.210)	(0.209)
language	0.236	0.236	0.240	0.403***	0.403***	0.408***	0.278*	0.278*	0.289**
	(0.155)	(0.155)	(0.155)	(0.134)	(0.134)	(0.134)	(0.146)	(0.146)	(0.146)
colony	0.140	0.140	0.138	0.510***	0.511***	0.507***	0.311**	0.311**	0.323**
	(0.167)	(0.167)	(0.167)	(0.148)	(0.148)	(0.148)	(0.151)	(0.151)	(0.151)
landlocked	-0.0393	-0.0389	-0.0416	-0.00231	-0.00169	-0.00424	0.173	0.175	0.190
	(0.283)	(0.283)	(0.283)	(0.316)	(0.316)	(0.317)	(0.233)	(0.233)	(0.233)
rta$_{(t-1)}$	0.478***	0.479***	0.479***	0.543***	0.545***	0.543***	0.217	0.220	0.227
	(0.167)	(0.167)	(0.168)	(0.139)	(0.141)	(0.140)	(0.152)	(0.152)	(0.151)
wagegap$_{(t-1)}$	0.206	0.207	0.213	0.184	0.184	0.187	0.401**	0.400**	0.390**
	(0.179)	(0.179)	(0.179)	(0.138)	(0.138)	(0.138)	(0.166)	(0.166)	(0.166)
lnfi_host$_{(t-1)}$		-0.701***			0.890***			-0.711**	
		(0.254)			(0.249)			(0.322)	
lnfi_home$_{(t-1)}$		-0.0166			0.557**			-0.269	
		(0.383)			(0.258)			(0.385)	
lnfm_host$_{(t-1)}$			0.0249			0.100			0.00516
			(0.0287)			(0.0805)			(0.0574)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
lnfm_home$_{(t-1)}$			0.0992			0.0540			0.786***
			(0.129)			(0.103)			(0.145)
Constant	-3.506	-4.557**	-3.617	-18.35***	-17.16***	-20.57***	-27.60***	-29.55***	-27.84***
	(2.289)	(2.324)	(2.292)	(3.059)	(3.407)	(3.061)	(3.412)	(3.647)	(3.289)
Host-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Home-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Years	2009-2017			2001-2012			2001-2017		
Observations	219,120	219,120	183,014	300,788	300,788	260,257	100,282	100,282	92,340
Pseudo R^2	0.900	0.900	0.897	0.896	0.896	0.893	0.846	0.846	0.845

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Gravity Estimation of Financial Development and FDI (PPML with Pair FE and Year FE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
Dependent Variable: fdi_stock									
lnfd_host$_{(t-1)}$	-0.262			0.973***			-0.250		
	(0.163)			(0.167)			(0.289)		
lnfd_home$_{(t-1)}$	0.139			0.655***			1.060***		
	(0.327)			(0.190)			(0.358)		
polstab$_{(t-1)}$	0.0737	0.101**	0.0674	-0.0297	-0.0424	-0.0139	0.0441	0.0857	0.0285
	(0.0461)	(0.0436)	(0.0474)	(0.0447)	(0.0461)	(0.0461)	(0.0718)	(0.0736)	(0.0751)
ccorruption$_{(t-1)}$	0.137*	0.156**	0.133*	0.279***	0.276***	0.313***	0.126	0.144	0.126
	(0.0788)	(0.0760)	(0.0785)	(0.0763)	(0.0790)	(0.0786)	(0.0968)	(0.0958)	(0.0952)
lngdp_host$_{(t-1)}$	1.019***	1.068***	1.000***	0.755***	0.833***	0.934***	0.973***	1.052***	0.893***
	(0.221)	(0.210)	(0.224)	(0.215)	(0.217)	(0.224)	(0.239)	(0.234)	(0.247)
lngdp_home$_{(t-1)}$	1.062***	1.074***	1.103***	1.279***	1.388***	1.349***	3.867***	3.977***	3.881***
	(0.288)	(0.279)	(0.287)	(0.423)	(0.381)	(0.433)	(0.601)	(0.579)	(0.600)
lntradeopen$_{(t-1)}$	0.0579	-0.0687	0.0790	-0.0113	0.00344	-0.0723	0.163	0.0490	0.189
	(0.133)	(0.128)	(0.135)	(0.168)	(0.166)	(0.170)	(0.153)	(0.152)	(0.163)
lntax$_{(t-1)}$	0.0927	0.0359	0.229	0.451	0.366	0.587	-0.0328	0.0719	-0.0371
	(1.078)	(1.051)	(1.074)	(0.632)	(0.645)	(0.657)	(1.236)	(1.240)	(1.249)
Infrastructure	0.0468	0.0982	0.00607	-0.103*	-0.0985	-0.0643	0.0537	0.0804	0.0348
	(0.108)	(0.105)	(0.110)	(0.0626)	(0.0607)	(0.0638)	(0.0803)	(0.0744)	(0.0894)
rta$_{(t-1)}$	0.0233	0.0394	0.0187	-0.266**	-0.227**	-0.275**	-0.185	-0.163	-0.186*
	(0.0539)	(0.0532)	(0.0539)	(0.122)	(0.109)	(0.126)	(0.114)	(0.124)	(0.111)
wagegap$_{(t-1)}$	-0.0808	-0.0732	-0.0878	-0.0210	-0.0221	-0.0130	-0.0112	-0.00885	-0.00376
	(0.195)	(0.190)	(0.195)	(0.0650)	(0.0668)	(0.0661)	(0.0762)	(0.0796)	(0.0758)
lnfi_host$_{(t-1)}$		-0.629***			0.961***			-0.688**	
		(0.178)			(0.226)			(0.288)	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
lnfi_home$_{(t-1)}$		-0.215			0.561**			-0.317	
		(0.324)			(0.238)			(0.346)	
lnfm_host$_{(t-1)}$			0.0112			0.202***			0.0692
			(0.0235)			(0. 0769)			(0.0613)
lnfm_home$_{(t-1)}$			0.0576			0.223**			0.967***
			(0.0872)			(0.0875)			(0.184)
Constant	-18.14***	-19.45***	-18.19***	-17.14***	-19.85***	-21.27***	-57.95***	-61.31***	-56.79***
	(5.365)	(5.135)	(5.305)	(6.656)	(6.429)	(6.777)	(8.698)	(8.492)	(8.685)
Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Year	2009-2017			2001-2012			2001-2017		
Observations	78,192	78,192	74,350	69,789	69,789	68,180	60,184	60,184	58,208
Pseudo R^2	0.987	0.987	0.987	0.973	0.973	0.973	0.951	0.951	0.951

Note: Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table 6: Gravity Estimation of Financial Development and FDI (PPML with Host-Year, Home-Year and Pair FE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
Dependent Variable: fdi_stock									
lnfd_host$_{(t-1)}$	-0.112			0.631***			-0.337		
	(0.182)			(0.163)			(0.263)		
lnfd_home$_{(t-1)}$	0.315			0.271			0.830***		
	(0.331)			(0.195)			(0.321)		
polstab$_{(t-1)}$	0.0486	0.0816*	0.0478	-0.0537	-0.0602	-0.0498	0.0484	0.0593	0.0341
	(0.0491)	(0.0465)	(0.0508)	(0.0391)	(0.0383)	(0.0392)	(0.0815)	(0.0802)	(0.0847)
ccorruption$_{(t-1)}$	0.210**	0.223***	0.208**	0.277***	0.265***	0.300***	0.321***	0.326***	0.324***
	(0.0880)	(0.0842)	(0.0874)	(0.0862)	(0.0826)	(0.0866)	(0.103)	(0.103)	(0.103)
lngdp_host$_{(t-1)}$	0.628***	0.663***	0.603***	0.858***	0.818***	0.972***	0.0875	0.0878	0.0294
	(0.185)	(0.192)	(0.187)	(0.190)	(0.180)	(0.203)	(0.257)	(0.258)	(0.262)
lngdp_home$_{(t-1)}$	0.677***	0.663***	0.712***	1.585***	1.541***	1.600***	2.659***	2.751***	2.754***
	(0.231)	(0.227)	(0.225)	(0.299)	(0.273)	(0.312)	(0.373)	(0.379)	(0.370)
lntradeopen$_{(t-1)}$	0.0536	-0.104	0.0543	-0.140	-0.0714	-0.164	-0.0745	-0.161	-0.0313
	(0.125)	(0.114)	(0.122)	(0.135)	(0.141)	(0.141)	(0.143)	(0.143)	(0.156)
lntax$_{(t-1)}$	0.553	0.486	0.630	-0.0199	-0.00858	0.111	1.255	1.348	1.226
	(1.199)	(1.175)	(1.185)	(0.669)	(0.665)	(0.684)	(1.269)	(1.254)	(1.269)
lnfrastructure	0.0401	0.110	0.0304	-0.0690	-0.0787	-0.0391	0.108	0.138*	0.0852
	(0.112)	(0.109)	(0.115)	(0.0711)	(0.0665)	(0.0717)	(0.0801)	(0.0748)	(0.0864)
rta$_{(t-1)}$	-0.00076	0.0178	0.000148	-0.248**	-0.207**	-0.249**	-0.196*	-0.185	-0.195*
	(0.0530)	(0.0524)	(0.0534)	(0.118)	(0.101)	(0.117)	(0.113)	(0.124)	(0.109)
wagegap$_{(t-1)}$	-0.103	-0.0944	-0.105	-0.0240	-0.0250	-0.0184	-0.00551	-0.00728	0.00123
	(0.211)	(0.207)	(0.211)	(0.0636)	(0.0669)	(0.0661)	(0.0815)	(0.0828)	(0.0812)
lnfi_host$_{(t-1)}$		-0.617***			0.979***			-0.574*	
		(0.230)			(0.237)			(0.303)	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VAR.	**CDIS Data**			**UNCTAD Data**			**OECD Data**		
lnfi_home$_{(t-1)}$		-0.112			0.603**			-0.351	
		(0.371)			(0.247)			(0.383)	
lnfm_host$_{(t-1)}$			0.0268			0.0925			-0.00178
			(0.0275)			(0.0709)			(0.0527)
lnfm_home$_{(t-1)}$			0.0978			0.0538			0.735***
			(0.127)			(0.0854)			(0.142)
Constant	-7.356***	-8.281***	-7.466***	-23.14***	-21.76***	-25.40***	-29.38***	-31.22***	-29.65***
	(2.175)	(2.198)	(2.182)	(2.930)	(3.124)	(2.914)	(3.145)	(3.402)	(3.021)
Host-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Home-Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Pair FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Years	2009-2017			2001-2012			2001-2017		
Observations	78,192	78,192	74,350	69,747	69,747	68,170	60,184	60,184	58,208
Pseudo R^2	0.987	0.987	0.987	0.973	0.973	0.973	0.950	0.950	0.950

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Corruption is another explanatory variable of interest. The paper uses the World Banks' control of corruption indicator which has been taken from the 2018 update of the Worldwide Governance Indicator (WGI). The value of the control of corruption estimate ranges from -2.5(weak control) to 2.5(strong control). Therefore, a positive and significant relationship between control of corruption and FDI indicates a negative and significant relationship between corruption and FDI (Egger & Winner, 2005). In Table-3 and Table-4, It finds that control of corruption (ccorruption) has a positive and significant effect on FDI stocks, meaning that corruption significantly and negatively affect FDI.

In Table-5, regression results with pair fixed effects and year fixed effects, and in Table-6, host-year, home-year, and pair fixed effects in PPML estimator are reported. The results remain qualitatively same. In general, the results show that financial development has a significant effect on FDI. It seems that the home (source) country financial development is more important than the financial development in the host (destination) country. All gravity time invariant variables (distance, contiguity, language, and colony) have the expected sign and significance level. GDP of market size is significant for both the host and home countries. Generally, political stability and control of corruption positively affect FDI.

4.1. Does Financial Development mitigate adverse effect of corruption?

The paper finds that corruption has a significant negative effect on FDI. It is now imperative to check whether financial development substantially mitigates the risk of corruption in augmenting FDI by interacting financial development of the host country with the control of corruption variable in specifications 7 to 10. A negative sign of the interaction term is expected which signifies that with the presence of a good financial sector, corruption even works as an incentive for FDI (Egger & Winner, 2005). The analysis is based on the UNCTAD dataset as the dataset provides more significant estimates. The results with PPML estimates are reported in Table-7.

The coefficient of interactions of financial development, measured by FD, with control of corruption is negative and significant when we impose host-year and home-year fixed effects (Column-4 and Column-10). The coefficient of interactions (FI and control of corruption) is negative and significant at 1% level of significance in all specifications. However, the sign is positive with 5% level of significance when the financial development is measured by the financial market index. It, therefore, infers that host country financial development mitigates the negative role of corruption for inward FDI.

Table 7: Financial Development, Corruption and FDI (PPML Gravity Estimates with UNCTAD data)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VAR.	**Host Home and Year FE**			**Host-Year Home-Year FE#**			**Pair and Year FE**			**Host-Year Home-Year# & Pair FE**		
$lnfd\_host_{(t-1)}$	0.997***			0.730***			0.996***			0.753***		
	(0.185)			(0.186)			(0.175)			(0.173)		
$lnfd\_home_{(t-1)}$	0.651***			0.260			0.650***			0.268		
	(0.229)			(0.233)			(0.188)			(0.194)		
$polstab_{(t-1)}$	-0.0587	-0.0962*	-0.0203	-0.0834**	-0.101***	-0.0593	-0.0356	-0.0756	0.00231	-0.0722*	-0.0909**	-0.0477
	(0.0472)	(0.0531)	(0.0481)	(0.0368)	(0.0388)	(0.0381)	(0.0447)	(0.0468)	(0.0458)	(0.0374)	(0.0375)	(0.0387)
$ccorruption_{(t-1)}$	0.268**	0.138	0.369***	0.203*	0.116	0.323***	0.257**	0.118	0.369***	0.181*	0.0818	0.311***
	(0.106)	(0.110)	(0.0907)	(0.107)	(0.111)	(0.0930)	(0.101)	(0.105)	(0.0889)	(0.102)	(0.106)	(0.0923)
$ccorruption_{(t-1)}$* $lnfd\_host_{(t-1)}$	-0.0395			-0.212**			-0.0529			-0.240***		
	(0.0914)			(0.0970)			(0.0886)			(0.0926)		
$lngdp\_host_{(t-1)}$	0.782***	0.841***	0.980***	0.828***	0.819***	0.956***	0.746***	0.787***	0.945***	0.829***	0.787***	0.972***
	(0.268)	(0.268)	(0.282)	(0.198)	(0.199)	(0.207)	(0.212)	(0.206)	(0.227)	(0.190)	(0.177)	(0.203)
$lngdp\_home_{(t-1)}$	1.276**	1.348***	1.357***	1.505***	1.457***	1.518***	1.281***	1.404***	1.343***	1.601***	1.576***	1.599***
	(0.518)	(0.487)	(0.523)	(0.304)	(0.297)	(0.314)	(0.423)	(0.377)	(0.431)	(0.298)	(0.270)	(0.312)
$lntradeopen_{(t-1)}$	0.0368	0.0266	-0.00599	-0.126	-0.0675	-0.147	-0.0179	-0.0282	-0.0483	-0.151	-0.102	-0.162
	(0.175)	(0.165)	(0.181)	(0.147)	(0.151)	(0.150)	(0.167)	(0.163)	(0.173)	(0.133)	(0.136)	(0.141)
$lntax_{(t-1)}$	0.315	0.494	0.514	-0.0913	0.159	0.0603	0.455	0.630	0.641	-0.0242	0.265	0.123
	(0.624)	(0.636)	(0.648)	(0.703)	(0.713)	(0.716)	(0.632)	(0.638)	(0.654)	(0.670)	(0.664)	(0.684)
Infrastructure	-0.101	-0.0732	-0.0638	-0.0607	-0.0497	-0.0338	-0.102	-0.0760	-0.0643	-0.0662	-0.0549	-0.0388
	(0.0720)	(0.0710)	(0.0747)	(0.0842)	(0.0840)	(0.0877)	(0.0622)	(0.0578)	(0.0646)	(0.0683)	(0.0627)	(0.0721)
lndistw	-0.604***	-0.603***	-0.604***	-0.604***	-0.603***	-0.604***						

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VAR.	**Host Home and Year FE**			**Host-Year Home-Year FE#**			**Pair and Year FE**			**Host-Year Home-Year# & Pair FE**		
	(0.0669)	(0.0670)	(0.0669)	(0.0668)	(0.0669)	(0.0669)						
contig	0.255*	0.254*	0.253*	0.255*	0.255*	0.254*						
	(0.149)	(0.149)	(0.150)	(0.149)	(0.149)	(0.150)						
language	0.403***	0.403***	0.408***	0.403***	0.403***	0.408***						
	(0.134)	(0.134)	(0.134)	(0.134)	(0.134)	(0.134)						
colony	0.510***	0.511***	0.508***	0.510***	0.510***	0.507***						
	(0.148)	(0.148)	(0.148)	(0.148)	(0.148)	(0.148)						
landlocked	-0.00128	-0.000506	-0.00444	-0.00172	-0.00135	-0.00438						
	(0.317)	(0.317)	(0.317)	(0.316)	(0.316)	(0.317)						
$rta_{(t-1)}$	0.542***	0.543***	0.541***	0.543***	0.545***	0.543***	-0.266**	-0.234**	-0.280**	-0.249**	-0.221**	-0.249**
	(0.139)	(0.140)	(0.140)	(0.139)	(0.140)	(0.140)	(0.122)	(0.113)	(0.125)	(0.121)	(0.106)	(0.116)
$wagegap_{(t-1)}$	0.183	0.180	0.186	0.183	0.181	0.187	-0.0227	-0.0381	-0.0109	-0.0311	-0.0436	-0.0181
	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.138)	(0.0648)	(0.0658)	(0.0654)	(0.0636)	(0.0656)	(0.0659)
$lnfi\_host_{(t-1)}$		0.984***			0.991***			1.060***			1.101***	
		(0.250)			(0.240)			(0.228)			(0.236)	
$lnfi\_home_{(t-1)}$		0.499*			0.513**			0.513**			0.546**	
		(0.255)			(0.253)			(0.233)			(0.239)	
$ccorruption_{(t-1)}$* $lnfi\_host_{(t-1)}$		-0.349***			-0.406***			-0.385***			-0.458***	
		(0.110)			(0.114)			(0.104)			(0.103)	
$lnfm\_host_{(t-1)}$			0.183**			0.0926			0.173***			0.0863
			(0.0761)			(0.0734)			(0.0658)			(0.0636)
$lnfm\_home_{(t-1)}$			0.231**			0.0528			0.234***			0.0531
			(0.103)			(0.104)			(0.0859)			(0.0861)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VAR.	**Host Home and Year FE**			**Host-Year Home-Year FE#**			**Pair and Year FE**			**Host-Year Home-Year# & Pair FE**		
ccorruption(t-1)*lnfm_host$_{(t-1)}$			0.119**			0.0281			0.120**			0.0240
			(0.0485)			(0.0492)			(0.0470)			(0.0484)
Constant	-13.95	-15.94*	-18.58**	-18.07***	-17.17***	-20.59***	-17.04**	-19.44***	-21.41***	-22.86***	-21.81***	-25.41***
	(9.057)	(8.890)	(9.231)	(3.062)	(3.392)	(3.066)	(6.649)	(6.288)	(6.804)	(2.929)	(3.091)	(2.917)
Host FE	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
Home FE	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
Year FE	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO
Host-Year FE	NO	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	YES
Home-Year FE	NO	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	YES
Pair FE	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
Observations	302,774	302,774	261,030	300,788	300,788	260,257	69,789	69,789	68,180	69,747	69,747	68,170
(Pseudo) R^2	0.897	0.897	0.893	0.897	0.897	0.893	0.973	0.973	0.973	0.973	0.973	0.973

Note: Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1. # Host-year and Home-Year FE varies by every four years.

4.2. Financial Development and FDI Nexus by Country Classification

It is argued that the conditions of financial system are lacking in developing countries compared to the developed counterparts. This lacking leads the developing countries greater scope of reforms and thereby greater potential to attract higher FDI (Donaubauer, Neumayer & Nunnenkamp, 2019). Although the global FDI flow dropped in 2016 and 2017, the flow to the developing countries however remained stable (UNCTAD, 2018). Moreover, Blonigen and Wang (2004) find that the factors that determine the location choice of FDI activity systematically varies across developed and developing countries. In this context, the sample is pooled for developing and developed host country groups and concentrates the estimation only with the financial development index (FD) for simplicity. The PPML estimation for specifications of 7, 8 and 10 are reported in Table-8, Table-9 and Table-10.

Table-8 reports the PPML estimation with host, home and year fixed effects to control for country specific characteristics as well as the factors that varies by year. While in Table-9, the model is estimated with host-year and home-year fixed effects to control for MRTs, the Table-10 also includes the pair fixed effects to further control for heteroscedasticity and endogeneity. A systematic difference in the magnitude of coefficients and in sign and significance level for the two country groups (developing and developed) is observed.

By Table-8 and Table-9, it can assess the impact of gravity time-invariant variables on FDI stock. Distance has significant (1% level) negative impact for both the groups. Contiguity also has the significant positive impact on FDI for both developed and developing country groups. Language and Colony, however, are more important factor for inward FDI in developing countries than the developed counterparts as the coefficients of those variables are highly and positively significant for the developing country group. The results are valid for the three datasets (CDIS, UNCTAD and OECD).

The estimate of the time variant gravity variable (GDP) varies significantly between the two country groups. The effect of host country GDP on inward FDI is significantly positive, but the magnitude of the coefficient is higher in case of developed countries. On the other hand, the home country GDP has also positive impact on FDI in line with theory; however, the magnitude of the coefficient

differs between the two countries groups in terms of the datasets used for the study. The magnitude of the coefficient is higher for the developed county groups for CDIS and OECD data; however, it is higher for the developing country groups in case of UNCTAD data.

The host country financial development significantly contributes to the rise of FDI for both developed and developing countries in the early years of the sample period (UNCTAD data). However, the financial development of the host country turns to impact FDI negatively for the developed country groups in the recent years (in case of CDIS and OECD data) and becomes neutral for the developing country groups as the coefficient is not significant. One of the reasons for this negative sign could be that in recent years the lending interest rates in developed countries became substantially low[ii]. As a result, MNEs see much profitable to procure external finance from the host country rather than to bring more funds from the home country. Political tensions could be a reason for which the impact of financial development on FDI becomes neutral in case of developing host country groups. On the other hand, the home country financial development is more important for the developing country groups than the developed counterparts. In general, it can be asserted that financial development of both the host and home country are important factors for inward FDI.

Political stability and the control of corruption have greater impact on inward FDI stocks in the developed country groups than the developing country groups. Corporate tax rate negatively affect FDI for developing countries in case of UNCTAD data, however, in the later years the impact turns out to be positive with the CDIS data. The results shows corporate tax has no impact on FDI for the developed country groups. In general wage gap and infrastructure positively attract FDI in the developing countries. RTA has mixed results in terms of different specifications. In case of home-year and host-year fixed effects estimations, a positive and significant impact in FDI for both the developed and developing groups is found. But, while pair fixed effects is imposed, RTA negatively affects FDI in developing countries only (for UNCTAD and OECD data)[ii]

[ii] According to World Bank data, the lending interest was in Canada (2.7% in 2017), Japan (1.0% in 2017), UK (0.5% in 2014), USA (3.3% in 2015) . However in Brazil, China, Russia and India it was 47%, 4.4%, 10.6% and 9.5% respectively in 2017.

Table 8: Gravity Estimation of Financial Development and FDI (PPML with Host, Home and Year FE)-Developing and Developed Country Groups

	(1)	(2)	(3)	(4)	(5)	(6)
	CDIS Data		**UNCTAD Data**		**OECD Data**	
VAR.	Dependent Variable: fdi_stock					
	Developing	Developed	Developing	Developed	Developing	Developed
$lnfd\_host_{(t-1)}$	-0.0284	-0.584*	0.355**	1.130***	0.348	-0.647
	(0.190)	(0.315)	(0.152)	(0.283)	(0.308)	(0.541)
$lnfd\_home_{(t-1)}$	0.622**	-0.0546	1.121***	0.426*	1.402***	0.993**
	(0.262)	(0.474)	(0.312)	(0.246)	(0.498)	(0.452)
$polstab_{(t-1)}$	0.0163	0.208**	0.00861	-0.0573	0.0235	0.0848
	(0.0533)	(0.0831)	(0.0829)	(0.0489)	(0.0683)	(0.125)
$ccorruption_{(t-1)}$	0.118*	0.147	0.133	0.240*	0.112	0.244**
	(0.0694)	(0.121)	(0.119)	(0.128)	(0.162)	(0.123)
$lngdp\_host_{(t-1)}$	0.416***	1.684***	-0.366	1.234***	0.527*	1.685***
	(0.142)	(0.339)	(0.375)	(0.335)	(0.279)	(0.389)
$lngdp\_home_{(t-1)}$	0.453**	1.262***	0.891*	1.394**	2.194***	4.182***
	(0.207)	(0.395)	(0.455)	(0.615)	(0.496)	(0.691)
$lntradeopen_{(t-1)}$	0.102	-0.235	0.00101	0.264	-0.129	0.380
	(0.0957)	(0.220)	(0.252)	(0.194)	(0.217)	(0.235)
$lntax_{(t-1)}$	1.431*	0.787	-0.589	0.326	1.406	0.0433
	(0.734)	(1.467)	(0.738)	(0.873)	(1.100)	(1.663)
Infrastructure	0.354***	0.0407	-0.182*	-0.0796	0.0958	-0.0281
	(0.0699)	(0.238)	(0.106)	(0.0833)	(0.0827)	(0.146)
lndistw	-0.996***	-0.402***	-1.024***	-0.383***	-1.156***	-0.287**
	(0.0680)	(0.0847)	(0.0735)	(0.0942)	(0.100)	(0.142)
contig	0.433***	0.367*	0.408**	0.451***	0.182	0.491**
	(0.149)	(0.213)	(0.170)	(0.171)	(0.214)	(0.243)
language	1.120***	-0.0782	1.202***	0.171	0.0243	0.232
	(0.129)	(0.166)	(0.146)	(0.145)	(0.231)	(0.158)
colony	0.521***	0.0433	0.440**	0.372**	0.555**	0.299*
	(0.179)	(0.145)	(0.214)	(0.163)	(0.249)	(0.167)
landlocked	-0.150	0.174	-0.166	0.182	-0.293	0.267
	(0.447)	(0.311)	(0.233)	(0.378)	(0.362)	(0.264)
$rta_{(t-1)}$	0.535***	0.385**	0.391***	0.583***	0.161	0.361*
	(0.129)	(0.187)	(0.147)	(0.199)	(0.131)	(0.219)
$wagegap_{(t-1)}$	-0.00102	0.0120	0.336*	0.0546	0.0397	0.142
	(0.217)	(0.170)	(0.175)	(0.138)	(0.266)	(0.180)
Constant	3.590	-27.74***	10.55	-23.54**	-20.78**	-70.61***
	(3.278)	(8.435)	(10.27)	(11.50)	(9.312)	(11.25)
Host FE	YES	YES	YES	YES	YES	YES
Home FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	174,570	44,550	235,609	54,798	81,018	19,264
(Pseudo) R^2	0.891	0.911	0.866	0.903	0.747	0.820

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Gravity Estimation of Financial Development and FDI (PPML with Host-Year and Home-Year FE)-Developing and Developed Country Groups

	(1)	(2)	(3)	(4)	(5)	(6)
	CDIS Data		**UNCTAD Data**		**OECD Data**	
VAR.	Dependent Variable: fdi_stock					
	Developing	Developed	Developing	Developed	Developing	Developed
lnfd_host$_{(t-1)}$	0.0329	-0.136	0.424**	0.545**	0.425	-1.030**
	(0.180)	(0.379)	(0.173)	(0.257)	(0.278)	(0.473)
lnfd_home$_{(t-1)}$	0.728**	0.119	0.833*	0.115	1.505***	0.837**
	(0.306)	(0.452)	(0.493)	(0.242)	(0.463)	(0.390)
polstab$_{(t-1)}$	0.0111	0.201**	0.0596	-0.133***	-0.00222	0.0570
	(0.0573)	(0.0803)	(0.0854)	(0.0385)	(0.0745)	(0.120)
ccorruption$_{(t-1)}$	0.126*	0.267**	0.245**	0.231*	0.170	0.575***
	(0.0721)	(0.135)	(0.115)	(0.135)	(0.192)	(0.138)
lngdp_host$_{(t-1)}$	0.241*	0.974***	0.695***	0.874***	0.382**	-0.00455
	(0.129)	(0.291)	(0.224)	(0.261)	(0.194)	(0.350)
lngdp_home$_{(t-1)}$	0.309**	0.633**	2.265***	1.390***	1.482***	2.880***
	(0.150)	(0.320)	(0.296)	(0.405)	(0.265)	(0.468)
lntradeopen$_{(t-1)}$	0.0796	-0.217	-0.160	0.0124	-0.0352	0.0356
	(0.0834)	(0.188)	(0.227)	(0.139)	(0.182)	(0.226)
lntax$_{(t-1)}$	1.641**	1.800	-1.765**	0.927	1.091	2.485
	(0.741)	(1.671)	(0.704)	(0.985)	(1.133)	(1.728)
Infrastructure	0.374***	-0.0226	-0.194	-0.0248	0.178**	-0.0441
	(0.0700)	(0.250)	(0.142)	(0.0776)	(0.0770)	(0.175)
lndistw	-0.997***	-0.402***	-1.024***	-0.381***	-1.159***	-0.281**
	(0.0680)	(0.0849)	(0.0739)	(0.0948)	(0.101)	(0.143)
contig	0.434***	0.368*	0.405**	0.452***	0.181	0.497**
	(0.149)	(0.213)	(0.172)	(0.172)	(0.215)	(0.243)
language	1.121***	-0.0779	1.195***	0.172	0.0231	0.229
	(0.129)	(0.166)	(0.147)	(0.145)	(0.232)	(0.158)
colony	0.521***	0.0423	0.442**	0.374**	0.555**	0.301*
	(0.179)	(0.145)	(0.213)	(0.163)	(0.248)	(0.167)
landlocked	-0.150	0.174	-0.156	0.183	-0.299	0.300
	(0.448)	(0.312)	(0.234)	(0.377)	(0.362)	(0.263)
rta$_{(t-1)}$	0.533***	0.383**	0.393**	0.590***	0.144	0.372*
	(0.130)	(0.187)	(0.164)	(0.200)	(0.133)	(0.220)
wagegap$_{(t-1)}$	-0.00217	0.0102	0.347**	0.0532	0.0458	0.142
	(0.222)	(0.171)	(0.176)	(0.138)	(0.266)	(0.180)
Constant	8.036***	-9.146***	-22.81***	-19.07***	-8.540***	-29.79***
	(1.542)	(3.269)	(3.720)	(3.932)	(3.193)	(4.071)
Host-Year FE#	YES	YES	YES	YES	YES	YES
Home-Year FE#	YES	YES	YES	YES	YES	YES
Observations	174,308	44,550	232,452	54,105	81,018	19,264
(Pseudo) R^2	0.891	0.911	0.864	0.902	0.746	0.817

Note: Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1. # Host-year, Home-year FE vary by every four years.

Table 10: Gravity Estimation of Financial Development and FDI

(PPML with Host-Year, Home-Year and Pair FE)-Developing and Developed Country Groups

	(1)	(2)	(3)	(4)	(5)	(6)
	CDIS Data		UNCTAD Data		OECD Data	
VAR.	Dependent Variable: fdi_stock					
	Developing	Developed	Developing	Developed	Developing	Developed
$lnfd\_host_{(t-1)}$	0.0752	-0.138	0.378**	0.572**	0.377	-0.934**
	(0.168)	(0.356)	(0.158)	(0.256)	(0.268)	(0.462)
$lnfd\_home_{(t-1)}$	0.443*	0.0877	0.803**	0.0819	1.318***	0.761**
	(0.262)	(0.427)	(0.392)	(0.220)	(0.416)	(0.381)
$polstab_{(t-1)}$	-0.00965	0.195**	0.0344	-0.112***	0.0130	0.0551
	(0.0449)	(0.0805)	(0.0944)	(0.0361)	(0.0635)	(0.112)
$ccorruption_{(t-1)}$	0.114	0.236*	0.324***	0.200	0.0607	0.444***
	(0.0710)	(0.129)	(0.0933)	(0.125)	(0.136)	(0.130)
$lngdp\_host_{(t-1)}$	0.330***	0.938***	0.724***	0.866***	0.302	-0.0952
	(0.116)	(0.257)	(0.218)	(0.286)	(0.193)	(0.379)
$lngdp\_home_{(t-1)}$	0.310**	0.671**	2.433***	1.471***	1.625***	2.987***
	(0.136)	(0.302)	(0.312)	(0.417)	(0.255)	(0.491)
$lntradeopen_{(t-1)}$	0.0377	-0.246	-0.123	-0.0526	-0.111	-0.0447
	(0.0822)	(0.183)	(0.222)	(0.138)	(0.154)	(0.202)
$lntax_{(t-1)}$	1.601**	1.818	-1.383**	0.761	0.503	2.109
	(0.700)	(1.653)	(0.704)	(0.962)	(0.955)	(1.657)
Infrastructure	0.355***	-0.000459	-0.160	-0.0539	0.223***	-0.0843
	(0.0661)	(0.247)	(0.104)	(0.0753)	(0.0829)	(0.168)
$rta_{(t-1)}$	-0.00959	0.0482	-0.404**	-0.107	-0.325***	-0.0633
	(0.0778)	(0.0657)	(0.176)	(0.118)	(0.117)	(0.170)
$wagegap_{(t-1)}$	0.174**	-0.154	0.0136	-0.0319	0.0103	-0.0357
	(0.0718)	(0.231)	(0.116)	(0.0666)	(0.197)	(0.0900)
Constant	-0.355	-11.66***	-32.51***	-21.86***	-18.67***	-30.89***
	(1.500)	(3.153)	(3.602)	(3.659)	(2.784)	(3.728)
Host-Year FE[#]	YES	YES	YES	YES	YES	YES
Home-Year FE[#]	YES	YES	YES	YES	YES	YES
Pair FE	YES	YES	YES	YES	YES	YES
Observations	53,143	24,808	46,955	22,401	42,545	17,433
(Pseudo) R^2	0.983	0.986	0.951	0.976	0.921	0.940

Note: Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1.Host-year, Home-year FE vary by every four years.

5. Conclusions and Recommendations

This study examined the effect of financial development on inward FDI, mainly stocks, using the gravity framework in a worldwide context covering 169 countries. The choice of other control or explanatory variables is based on the theoretical background on FDI determinants. To capture the patterns of the relationship between financial development (FD, FI and FM) and FDI as well as reasons of FDI activity, the study employs structural gravity model using three unique datasets for bilateral FDI (CDIS, UNCTAD and OECD). The reason for utilizing three distinct datasets is that they cover different time periods. The CDIS data covers period from 2009-2017, the UNCTAD data covers 2001-2012 and finally, the OECD data integrates both the periods (2001-2017). China and Russia are added in the list of source or home country in the OECD database.

To get reliable estimates, the paper addresses the challenges of FDI study-treatment of zero and negative values- following Dorakh (2020). As usual, It also addresses multilateral resistances, endogeneity and heteroscedasticity by utilizing various dimensional fixed effects and one period lags of the explanatory variables. Both OLS and PPML with high dimensional fixed effects are employed. The PPML estimates give the most consistent and efficient estimates as it handle zeros efficiently. Consistent with existing literature, the study with UNCTAD data, in general, finds that financial development (irrespective of its measurement) of both host (destination country) and home (source country) are significant (mostly positive) determinants of FDI stocks(flows as well). Several robustness tests also confirm that the main specifications and finding are robust. However, the estimates with CDIS and OECD-that covers recent years- show that inward FDI in host countries positively associated with home country financial development and, to some extent, negatively associated with that of the host country. This result indicates that MNEs are now sourcing their external finance demand from the host countries as financial development leads them funding from the host countries as less costly. Other reason could be the increasing political tensions and trade wars among the nations cause disinvestment or less appetite for Greenfield investment, however, this justification needs further research.

While the political stability has a mixed effect on FDI stocks, corruption still remains a persistent problem in FDI. By interacting financial development of the host country with the control of corruption variable the study finds, however, that the presence of a good financial sector, corruption even works as an incentive for FDI.

By pooling the full sample to developing and developed host countries the study also reassesses the financial development and FDI nexus. The conditions of financial system are, in general, lacking in developing countries compared to the developed counterparts that leads the developing countries greater scope of reforms and thereby greater potential to attract higher FDI. The results suggest that the host country financial development significantly contributes to the rise of FDI for both developed and developing countries in the early years of the sample period (UNCTAD data). However, the financial development of the host country turns to impact FDI negatively for the developed country groups in the recent years (in case of CDIS and OECD data) and becomes neutral for the developing country groups as the coefficient is not significant. One of the reasons for this negative sign could be that in recent years the lending interest rates in developed countries became substantially low.

Pooling data into developing and developed country groups, the study also reveal that political stability and the control of corruption have greater impact on inward FDI stocks in the developed country groups than the developing country groups. Corporate tax rate negatively affect FDI for developing countries in case of UNCTAD data, however, in the later years the impact turns out to be positive with the CDIS data. The results shows corporate tax has no impact on FDI for the developed country groups. In general wage gap and infrastructure positively attract FDI in the developing countries.

The study has import contribution in FDI gravity literature. First, the study examines the impact of financial development on bilateral FDI by utilizing a comprehensive set of financial development measurement of IMF for the first time. Second, the study extends the gravity literature incorporating the interaction between control of corruption and financial development to assess how financial development substitutes the adverse effect of corruption on FDI. Third, the study

for the first time employs three distinct datasets of bilateral FDI which covers different time periods.

Although the study finds the overall relationship between both host and home country financial development and FDI is positive, however, estimation with recent data uncover that the host country financial development is becoming negative. It means that financial development. to some extent, substitute FDI. Countries, therefore, should be careful in designing policies to boost economic growth by industrial development. The industrial policy and other macroeconomic policy should be aligned in such a way that it accommodates choice whether the industrialization should be driven by augmenting domestic investment or by attracting more FDIs. Excessive liberalization may hamper FDI inflows, and, therefore, countries should be careful in further liberalizing the financial system. Even though, financial development helps to mitigate adverse effect of corruption for FDI, developing countries, especially should be more concern on controlling corruption. This will lead the MNEs presence in the host country as well as domestic firms more competitive in the world markets.

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