

Abreo, Carlos; Carrillo, Eduardo; Pédussel Wu, Jennifer

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Characteristics of Colombian inward foreign direct investment

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Hochschule für
Wirtschaft und Recht Berlin
Berlin School of Economics and Law

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Characteristics of Colombian Inward Foreign Direct Investment

Authors: Carlos Abreo, Eduardo Carrillo, Jennifer Pédussel Wu

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Sigrid Betzelt, Eckhard Hein (lead editor), Martina Metzger, Martina Sproll, Christina Teipen, Markus Wissen, Jennifer Pédussel Wu, Reingard Zimmer

Characteristics of Colombian Inward Foreign Direct Investment

Carlos Abreo
Universidad del Atlántico Medio, Spain

Eduardo Carrillo
Universidad Autónoma de Bucaramanga, Colombia

Jennifer Péduessel Wu
Institute of International Political Economy, Berlin School of Economics of Law, Germany

Abstract:

The research delves into the determinants of inward FDI to Colombia in the context of economic integration promoted by recent governments. Colombia's trade liberalisation, in addition to seeking to boost its trade flow, has focused on making the country more attractive to foreign direct investment (FDI), in a framework of fiscal discipline and a stable economic environment for economic growth, albeit characterised by complex institutional conditions. Government reforms have revitalized FDI inflows to Colombia, with the oil and mining sectors receiving the largest influx of new capital investments. Accordingly, this paper contributes to the literature with an analysis of the characteristics of FDI inflows to Colombia between 2007 and 2020 using an augmented gravity model approach. We find that stable government policies and the rule of law are key components in increasing FDI in Colombia and, more importantly, a bilateral investment treaty (BIT) significantly drives FDI into the country.

Keywords: FDI, Gravity Model, BITs, Colombia, Institutional quality, Labour competitiveness.

JEL codes: F21, F36, O16, O54, C10

Corresponding author: Jennifer Péduessel Wu, Jennifer.pedussel-wu@hwr-berlin.de

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1. Introduction

Colombia, as one of the leading economies in the Latin American region, is considered an economically open country and one of the best business environments in the region for foreign investors, especially in energy-related sectors (The Economist, 2013; World Bank, 2022; Abreo et al., 2022). Colombia is characterized by its fiscal discipline and the implementation of an adequate monetary policy aimed at controlling inflation rates, which has made it possible to promote a stable macroeconomic environment with high economic growth rates, even in times of global economic crisis (Park Madison Partners, 2013). Although Colombia has experienced relatively rapid economic growth in recent years, this is mainly because the energy sector grew more than the other economic sectors (i.e., the manufacturing sector has had a negative performance), thereby reinforcing the observation that the positive performance of Colombia's macroeconomic indicators depends mainly on the exploitation of natural resources and the high prices of raw materials in international markets (Botta et al., 2016).

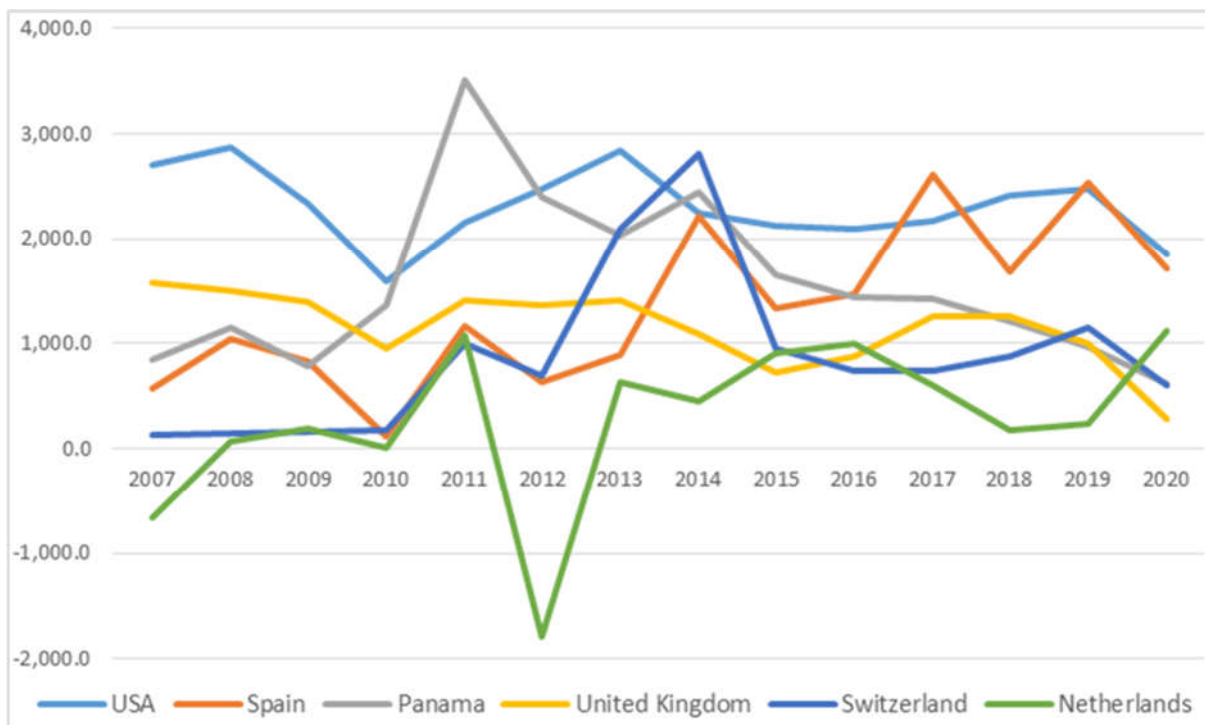
The Colombian economy began its process of economic openness in 1990 through the *Proceso de Apertura Comercial*. In the field of international trade, Colombia went from an import substitution system to a process of reducing trade barriers (tariff and non-tariff). Regarding the openness in international investment, Colombia has made important efforts to create a legal framework that promotes these investment flows. Ramirez and Quintero (2019) point out that at the end of the 1980s, legislation was approved in central aspects such as eliminating double taxation and reducing taxes on remittances. They also state that in 1991, the International Investment Statute was issued, which, by providing a national legal framework, liberalised foreign investment in the country and established rules for the creation of special economic zones in the national territory. According to Valosa (2019), relevant legal modifications in this investment framework were made in the following years, which focused on making FDI more attractive in Colombia. In 1999, the constitution was reformed and economic compensation was introduced with respect to expropriation actions under any circumstance. In 2005 and 2006, legislation is passed to reinforce the legal stability of FDI in Colombia and eliminate a 7% tax on revenues sent abroad by investors. Finally, in 2017, within the framework of promoting foreign investments directed to the energy sectors, new modifications were introduced in the general FDI regime to make foreign investment in Colombia even more attractive.

These reforms have aided in the revitalisation of FDI inflows to Colombia, especially in the oil and mining sectors, which received the highest inflows (Valosa, 2019). Botta et al. (2016) point out that between 1990 and 2004, FDI inflows represented less than 3% of GDP, but as of 2005, these flows have denoted more than 3% of GDP, which represents a significant increase in the level of FDI inflows in Colombia. Concerning some particular characteristics of FDI inflows in Colombia, Buitrago and Leon (2015) indicate that FDI inflows to Colombia contributed to financing its balance of payments deficit. In addition, they state that foreign companies repatriate 70% of their profits (in the oil sector, 99% of profits are repatriated). Furthermore, they point out that the relationship between the value of FDI inflows and the dividends generated by these investments indicates a greater outflow of economic resources

than FDI inflows, nevertheless, they confirm that the FDI inflows to Colombia had a positive impact on GDP growth.

This paper investigates the determinantes of inward FDI flows to Colombia in the context of recent governments and their promotion of economic integration. This paper examines the characteristics of FDI inflows to Colombia between 2007 and 2020 using an augmented gravity model. Some authors have conducted studies to identify the determinants of FDI inflows to Colombia. Ramirez and Quintero (2019) establish that although the unemployment rate and the interest rate are important factors in attracting FDI flows to Colombia, these investment flows are certainly determined by international economic dynamics related to the expansion and diversification processes of transnational companies, for which developing countries are attractive markets. The authors conclude that Colombia does not actually determine the attraction of FDI inflows. Additionally, Garavito et al. (2014) in their empirical study on the determinants of FDI inflows in Colombia at the firm level, show some outstanding characteristics of this type of investment in national companies. They affirm that the probability of receiving FDI flows is reduced for companies that are not part of the oil industry and for small and medium-sized companies regardless of their economic sector. They also state that the probability of obtaining FDI flows increases when companies carry out international trade activities.

Figure 1. Colombian FDI net inflows by main countries of origin

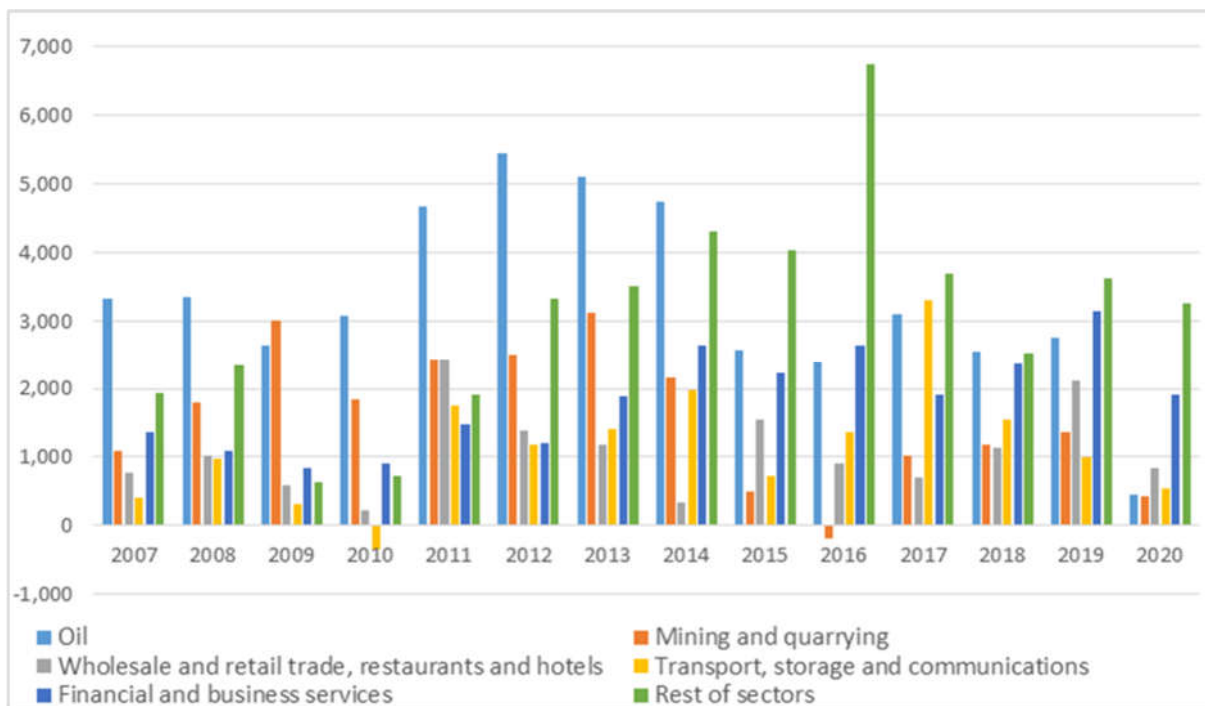


Source: Own elaboration based on Banco de la República data (2021).

Figure 1 exhibits the performance of the FDI net inflows in Colombia by main countries of origin from 2007 to 2020. It is essential to mention that despite the complex problems related to the internal armed conflict that has existed in Colombia since the second half of the 20th century, compared to other countries in the region, Colombia is the third destination of FDI inflows with 11% of the total flows directed towards South America, preceded by Brazil (53%) and Chile (15%) between 2000 and 2016 (Velosa, 2019). Figure 1 shows that most of the

main origin countries of FDI inflows to Colombia are European. It can also be seen that, in terms of amounts, the United States of America (USA) and Spain have been the main investing countries in Colombia in recent years. Additionally, it is appreciated a constant decline in investments from Panama since 2011. Moreover, countries such as the United Kingdom and, in particular, Switzerland and the Netherlands, reflect significant volatility in the amounts of FDI in Colombia in the analysed period. Finally, other countries stand out as large investors in Colombia but are not reflected in the graph. These include Caribbean countries such as Bermuda, the Cayman Islands and the British Virgin Islands, which have been, or are, considered tax havens by some international institutions. For similar reasons, countries in the region, such as Mexico and Chile, also make significant investments in Colombia.

Figure 2. Colombian FDI net inflows by sectors



Source: Own elaboration based on Banco de la República data (2021).

Figure 2 shows FDI net inflows to Colombia from 2007 to 2020 by economic sector. In most of the periods studied, the oil sector is the main recipient of FDI net inflows in Colombia. This sector was only surpassed as the main recipient of FDI by the financial and business services sector in the years 2016, 2019 and 2020. We also observe that the mining and quarrying sector is the second recipient of FDI net inflows in the country, between 2007 and 2013. It is important to highlight that the high FDI flows in these two sectors in the reference period coincide with a period in which the prices of these commodities, especially the price of a barrel of oil (Nyangarika, 2018), reached historical records. As of 2013, the relative importance of this sector in the composition of FDI inflows in the country is decreasing following international trends. The great importance of the oil and mining and quarrying sectors in FDI inflows in Colombia is also reflected in the composition of the country's export basket, where they contributed 63.3% of exports in 2018 at constant USD prices (Abreo et al, 2022). Nevertheless, the composition of FDI inflows in Colombia has varied considerably since 2014 due to the fact that the financial and business services sector is positioned as one of the two main recipients of FDI inflows. Moreover, large growth in FDI inflows to the rest of the sectors

can be seen in 2016, which is due to a prominent increase in investment flows to the electricity, gas and water sector. Finally, based on Banco de la República (2020), FDI inflows in Colombia in 2020 decreased by 35.1% compared to the previous period, with the oil and mining sectors being the most affected sectors with a drop of 42.8%, due to the effect of the COVID-19 in the global economy. Other economic sectors also had significant reductions, although to a lesser extent.

2. Literature review

Several economists argue that FDI is a relevant component of economic development, particularly in developing countries (Denisia, 2010), as is the Colombian case. FDI inflow has been shown to be critical because of growth benefits. In addition, technical spillovers, employment considerations and competitiveness have been shown to be related to FDI inflow (Asiedu, 2002). Caves (1966) concludes that the efforts made by various countries to attract FDI are motivated by the potential positive effects on the domestic market on factors such as technology, know-how, employment, and production, among others. Some more recent literature takes issue with these findings e.g., Navaretti and Venables (2004) and Crespo and Fortuna (2007), who argue that spillovers are not always in a positive direction. However, Borensztein (1998) and Daude and Stein (2007) point out that FDI contributes more to economic growth than domestic investment.

Blomstrom (1994) argues that FDI has a key role in increasing the competitiveness of local businesses. However, it is important to note that the positive effect of FDI may vary from sector to sector (Hirschman, 1958). Furthermore, several studies try to explain why companies invest their capital abroad. Regarding this, Vernon (1966) in his theory of product life cycle, indicates that when an innovative product reaches maturity in the source country, organisations undertake FDI abroad. Additionally, Dunning (1977) argues that firms use FDI to overcome geographical and cultural differences between markets and also that FDI takes place between countries with differences in factor endowments. However, the latter assertion was challenged by the New Trade Theory (NTT), which argues that FDI-related horizontal integration occurs between developed economies with similar factor endowments to take advantage of economies of scale (Dorakh, 2020).

Contrary to trade models, FDI does not have a single theoretical model associated with its flows. Dorakh (2020) indicates that these flows are better understood using a variety of theories, the majority of which are derived from Neoclassical Trade Theory with the NTT and Theory of Industrial Organization. Determinants of FDI are different over time, country pairs, and regions, and are varied in their explanation in association with conceptual frameworks having to do with factor endowments, production and international capital movements. In more recent literature, FDI has been examined in relation to specific institutional and industrial policies of both host and sending countries (Dorakh, 2020).

Gravity models are thought of as a robust empirical method to examine trade between countries while taking into account distance and economic size. The general gravity model examines bilateral trade flows and was first applied by Tinbergen (1962). Anderson and Van Wincoop (2003) argued that relative trade costs must be accounted for in order to create an

accurate model, this is because *'trade between two regions depends on the bilateral barrier between them relative to average trade barriers'* (Anderson & Van Wincoop, 2003, p.176). Thus, multilateral trade resistance (MRT) terms are introduced to reflect the relative trade costs of two countries. Consequently, inward MRT signifies the ease at which importers can access the market, and outward MRT measures exporters' ease of market access (Yotov et al., 2012).

Less usual is the use of gravity models to examine FDI between countries while taking into account trade, size, and distance. Dorakh (2020) examines the increase in FDI in the accession countries due to EU membership while attempting to estimate how much EU membership promotes FDI to these countries. He finds that FDI in the EU, when combined with international trade, fosters deeper links between member and non-member countries and that infrastructure, production, and labour quality play important roles in its attraction. Therefore, the author confirms that the gravity model is the best-fitting model for estimating the determinants of bilateral FDI flows. According to Baldwin and Taglioni (ECB 2011), GDP may be a reasonable proxy for both consumer and producer demand shifts in the role of trade in vertical specialization trade and this reasoning can be adapted to the analysis of FDI flows. GDP should be less good at proxying for the underlying demand shifters. We should thus expect that the origin country's GDP and destination country's GDP will have a diminished explanatory power when value-chain trade is important, as it likely is when considering FDI.

Frankel et al. (2004) argue that economic size, risk and growth drive the level of FDI flows while the distance factor negatively influences them. In addition, other studies on the determinants of FDI flows have considered variables other than those traditionally used in gravity models. This is the case of the study by Alfaro et al. (2004), who argue that quality financial institutions attract higher FDI flows. Similarly, Asiedu (2006) places factors such as infrastructure, inflation, legal system and investment framework as determinants of FDI flows. Aleksynska and Havrylchyk (2013) even suggest that countries with institutional weaknesses can attract FDI because of their abundance of natural resources, as is the Colombian case. All this indicates that relevant studies take into account gravity variables beyond those considered in the basic gravity model.

Overall, FDI is one of the most important variables that explain economic growth and, therefore, economic development. Finally, this review suggests that factors that promote FDI vary from country to country (Mishra and Jena, 2019) and depend on the characteristics of both the home and host country.

3. Data

Following the FDI literature (Brainard, 1997; Dellis, Sondermann, & Vansteenkiste, 2017; Wong & Tang, 2011), we use the values of FDI net inflows as a dependent variable. To deal with negative flows without losing the information conveyed by such values, we replaced negative values with zero values as explained above. These values are provided by the Banco de la República (2021) in current USD. Additionally, we account for cultural and geographical aspects such as distance, contiguity, a common language and if there is a common landlocked condition. These variables come from the Gravity and GeoDist databases provided by the

Table 1. Information of variables implemented in the model

Variable	Variable code	Description	Update date	Source	Expected sign
Foreign Direct Investment _{jCol}	FDI _{jCol}	FDI inflows from Colombian partners to Colombia in current USD	February 2022	Banco de la República de Colombia	
Log Distance _{jCol}	LogDIST _{jCol}	Log Distance in kilometres between Colombia and its partners	January 2022	CEPII	-
Common Language _{jCol}	COMLANG _{jCol}	Colombia and its partners share common official or primary language	January 2022	CEPII	+
Contiguity _{jCol}	CONTIG _{jCol}	Common physical border between Colombia and its partners	January 2022	CEPII	+
Landlocked _{jCol}	LANDLOCKED _{jCol}	Common condition of landlocked country between Colombia and its partners	January 2022	CEPII	-
Organisation for Economic Co-operation and Development _{Col}	OECD _{Col}	Colombia is a member of the OECD	March 2022	OECD	+
Organisation for Economic Co-operation and Development _j	OECD _j	Colombian partner is a member of the OECD	March 2022	OECD	+
Preferential Trade Agreement _{jCol}	PTA _{jCol}	Colombian and its partners share a preferential trade agreement	January 2022	CEPII	+
Bilateral Investment Treaty _{jCol}	BIT _{jCol}	Colombian and its partners share a bilateral investment treaty	January 2022	Ministerio de Comercio Industria y Turismo de Colombia	+
Log Gross Domestic Product _{Col}	LogGDP _{Col}	Log Gross domestic product of Colombian constant USD	January 2022	CEPII	+
Log Gross Domestic Product _j	LogGDP _j	Log Gross domestic product of destination country in constant USD	January 2022	CEPII	+
Log Colombian Exports _{Colj}	LogCOLEXP _{Colj}	Log Colombian exports to its partners in current USD	March 2022	IMF	+
Log Colombian Imports _{jCol}	LogCOLIMP _{jCol}	Log Colombian imports from its partners in current USD	March 2022	IMF	+
Log Labour Competitiveness _{Col}	LogLABCOMP _{Col}	Log labour competitiveness of Colombia	February 2022	Calculated by authors with data from the World Bank (GDP / Labour force)	+
Log Labour Competitiveness _j	LogLABCOMP _j	Log labour competitiveness of Colombian partners	February 2022	Calculated by authors with data from the World Bank (GDP / Labour force)	+
Log Rule of Law _{Col}	LogRULELAW _{Col}	Colombian rule of law	March 2022	World Bank Data	+
Log Political Stability _{Col}	LogPOLSTABIL _{Col}	Political Stability and Absence of Violence/Terrorism	March 2022	World Bank Data	+

Source: Own elaboration. Note that “Col” is Colombia while “j” denotes the partner country.

Centre d'Études Prospectives et d'Informations Internationales (CEPII) and are also included in the BLOCS database (Wu et al, 2022).

Moreover, we consider variables linked to economic and trade integration affairs such as if the countries involved are members of the OECD, if there is a preferential trade agreement (PTA) (this variable contemplates any type of trade agreement) and if the parties share a bilateral investment treaty (BIT). These two last variables are constructed with data from the Ministerio de Comercio, Industria y Turismo de Colombia (2022). It should be noted that although some PTAs include a chapter related to investments, we construct the Bilateral investment treaty (BIT) variable considering the existence of an individual bilateral investment treaty between the pair of countries, regardless of whether there is a specific chapter for investments in its PTA.

We also include variables connected to economic and trade performance. First, the GDP variable in origin and destination is a measure of the economic size of the nations involved. Second, Colombian exports and imports (included in the model individually) to determine if there is a relation between the FDI flows captured by Colombia and the trade flows generated from the country to its partners and from them to the country. We also include variables related to labour productivity in the country of origin and destination, constructed as a ratio between the value of GDP and the labour force of a country (data taken from the World Bank) based on new trade theory (NTT). Finally, the model considers variables related to the institutional quality or governance of Colombia as a host country for FDI, based on the assertion of Acemoglu et al., (2014), who places the institutional quality of nations as a determinant of their development. These variables are the Rule of law and the Political Stability and Absence of Violence/Terrorism provided by the World Governance Index (WGI) from the World Bank (WB), variables that are considered due to the country's complex political conditions. It is worth mentioning that other institutional variables provided by the WB were included in the econometric study; however, they turned out to be statistically insignificant. Table 1 shows more details of the variables implemented in the gravity equation.

Finally, it is relevant to point out that the choice of the analyzed period (2007 - 2020) is conditioned by the limited statistical information offered by the Colombian central bank on FDI inflows to the country. Additionally, the 204 Colombian partners included in the study correspond to those countries with which Colombia has traded goods in the analyzed period.

4. Methodological approach

The empirical research implements a relevant, robust and effective econometric approach in order to capture the characteristics that promote or hinder FDI inflows to Colombia: the gravity model. It is essential to note that the theoretical and empirical basis of the model was developed by Anderson and van Wincoop (2003), who in turn contributed to some of its most important advances. Frankel et al. (1997) argue that the model establishes that the volume of bilateral trade is proportional to the size of the economies involved, and also that the physical distance between them is detrimental to their trade. Nonetheless, the gravity model has been commonly applied to establish the factors that stimulate or hinder the evolution of various economic issues. It has been used in areas as diverse as transport, local trade, tourism or

investment policies, among others (Giuliano et al., 2015). The model has also been widely used to understand the behaviour of FDI flows between pairs of countries by various authors (e-g-. Anderson et al., 2016; Baltagi et al., 2008; Bénassy-Quéré et al., 2007; Bergstrand and Egger, 2007; Egger and Pfaffermayr, 2004; Helpman, 2006).

Although FDI patterns also display gravity characteristics, applied empirical methods have traditionally focused on trade gravity model estimations and have examined FDI in a limited capacity. The most influential paper in this area comes from Baier and Bergstrand (2007), who first designed a panel data FDI analysis and showed that an instrumental variable approach is not sufficient due to the endogeneity issue.¹ As in the trade literature, FDI models, present the same challenges and biases to be avoided. In this paper, we extended earlier literature and applied FDI gravity model recommendations derived from more recent work (Anderson et al., 2016; Baier et al., 2019). Specifically, we used an estimation of the structural FDI gravity model for Colombia shown in equation 1.

$$\begin{aligned}
 FDI_{jCol} = \exp & (\beta_0 \text{LogDIST}_{jCol} + \beta_1 \text{COMLANG}_{jCol} + \beta_2 \text{CONTIG}_{jCol} + \beta_3 \text{LANDLOCKED}_{jCol} \\
 & + \beta_4 \text{OECD}_{Col} + \beta_5 \text{OECD}_j + \beta_6 \text{PTA}_{jCol} + \beta_7 \text{BIT}_{jCol} + \beta_8 \text{LogGDP}_{Col} \\
 & + \beta_9 \text{LogGDP}_j + \beta_{10} \text{LogCOLEXP}_{Colj} + \beta_{11} \text{LogCOLIMP}_{jCol}) n_{jcol}
 \end{aligned}
 \tag{1}$$

where j denotes the FDI sending country and variables are as outlined in Table 1.

Furthermore, we want to measure the effect of labour competitiveness in attracting FDI flows to Colombia. Based on Alvarez et. al (2018), the LABCOMP variable is related to labour productivity, which is proxied by GDP per worker (labour force). The authors point out that a positive sign of this coefficient denotes lower margin requirements and also greater labour competitiveness. It is important to emphasise that the inclusion of a productivity proxy variable in our model is relevant due to the type of investment that is developed through FDI and the impact that the level of labour competitiveness of countries can have on the attraction or generation of these monetary flows. The specification that includes the labour competitiveness variable is reflected in equation 2.

$$\begin{aligned}
 FDI_{jCol} = \exp & (\beta_0 \text{LogDIST}_{jCol} + \beta_1 \text{COMLANG}_{jCol} + \beta_2 \text{CONTIG}_{jCol} \\
 & + \beta_3 \text{LANDLOCKED}_{jCol} + \beta_4 \text{OECD}_{Col} + \beta_5 \text{OECD}_j + \beta_6 \text{PTA}_{jCol} \\
 & + \beta_7 \text{BIT}_{jCol} + \beta_8 \text{LogGDP}_{Col} + \beta_9 \text{LogGDP}_j + \beta_{10} \text{LogCOLEXP}_{Colj} \\
 & + \beta_{11} \text{LogCOLIMP}_{jCol} + \beta_{12} \text{LogLABCOMP}_{Col} + \beta_{13} \text{LogLABCOMP}_j) n_{jcol}
 \end{aligned}
 \tag{2}$$

¹ Due to the type of matrix proposed (1 FDI recipient; many FDI sending countries) it is not possible to include a time dummy variable. Please see Gashi et al. (2017).

Considering the connotation and perception of the economic context of the receiving country of FDI flows by foreign companies, we also propose the inclusion of two additional variables to be included separately in the model to avoid correlation problems, which are provided by the WB. The first variable is the Rule of Law and is related to the business environment in the receiving country. According to Gani and Scrimgeour (2016), this variable represents the strength of the law and is critical to increasing investment and economic performance. Its inclusion in the model allows us to present equation 3.

$$\begin{aligned}
 FDI_{jCol} = \exp & (\beta_0 \text{LogDIST}_{jCol} + \beta_1 \text{COMLANG}_{jCol} + \beta_2 \text{CONTIG}_{jCol} + \beta_3 \text{LANDLOCKED}_{jCol} \\
 & + \beta_4 \text{OECD}_{Col} + \beta_5 \text{OECD}_j + \beta_6 \text{PTA}_{jCol} + \beta_7 \text{BIT}_{jCol} + \beta_8 \text{LogGDP}_{Col} + \beta_9 \text{LogGDP}_j \\
 & + \beta_{10} \text{LogCOLEXP}_{Colj} + \beta_{11} \text{LogCOLIMP}_{jCol} + \beta_{12} \text{LogLABCOMP}_{Col} \\
 & + \beta_{13} \text{LogLABCOMP}_j + \beta_{14} \text{LogRULELAW}_{Col}) n_{jcol}
 \end{aligned}
 \tag{3}$$

The last equation (4) considers the effect of the Political Stability and Absence of Violence/Terrorism variable. This variable represents perceptions about the likelihood of political instability and violence, including terrorism. We believe that this variable is fundamental in the case of attracting FDI flows in a country like Colombia, which has been experiencing an internal armed conflict for more than 50 years. Colombia has been in a post-conflict situation since 2016 due to the signing of a peace agreement with the country's main armed group, the FARC, and is currently negotiating similar agreements with several armed groups in the country.

$$\begin{aligned}
 FDI_{jCol} = \exp & (\beta_0 \text{LogDIST}_{jCol} + \beta_1 \text{COMLANG}_{jCol} + \beta_2 \text{CONTIG}_{jCol} + \beta_3 \text{LANDLOCKED}_{jCol} \\
 & + \beta_4 \text{OECD}_{Col} + \beta_5 \text{OECD}_j + \beta_6 \text{PTA}_{jCol} + \beta_7 \text{BIT}_{jCol} + \beta_8 \text{LogGDP}_{Col} \\
 & + \beta_9 \text{LogGDP}_j + \beta_{10} \text{LogCOLEXP}_{Colj} + \beta_{11} \text{LogCOLIMP}_{jCol} + \beta_{12} \text{LogLABCOMP}_{Col} \\
 & + \beta_{13} \text{LogLABCOMP}_j + \beta_{14} \text{LogPOLSTABIL}_{Col}) n_{jcol}
 \end{aligned}
 \tag{4}$$

Additionally, observations where the dependent variable is zero pose a problem for log-linear estimation; as the log of zero is undefined, zero FDI flows will be dropped out of the estimation (Bacchetta et al., 2012). We, therefore, resort to the Poisson pseudo-maximum likelihood (PPML) estimator proposed by Santos Silva and Tenreyro (2006). They argued that the PPML approach is able to include zero values in the dependent variable, and also, takes into account possible endogeneity and other econometric drawbacks, such as heteroscedasticity. Moreover, the PPML estimator has been widely used in recent studies due to the consistency of its results (Egger and Nigai, 2015), since it offers smaller and more adequate coefficients in relation to those offered by the ordinary least square (OLS) estimator (Santos Silva and Tenreyro, 2006). The authors explain this by the fact that if estimated by OLS, the parameters of log-linearized models will be biased under heteroskedasticity and if the errors are heteroskedastic, the transformed errors will be correlated with the covariates.

Furthermore, we estimate the gravity model with FDI inflows, which means that some observations can be negative values (divestments). Since the PPML estimator cannot work

with negative values, we have the following options: drop these negative flows or set them to zero. In this sense, dropping these flows will leave the estimate with a greater bias than if we set the negative values to zero (Welfens and Baier, 2018). Therefore, when considering that the negative values of the FDI flow imply disinvestment operations and, hence, the non-contribution to capital formation in the receiving country, the negative investment flows could be assimilated to zero values (Guerin and Manzocchi, 2009). Moreover, it is relevant to note that we also estimate our model with another approach that argues that negative values of FDI flows should be replaced by \$1 (see appendix 1). Regarding this, Dorakh (2020) states that negative FDI flows have an economic meaning, therefore, they can not be dropped or replaced by zero values, since it would mean that there is no investment relationship between the countries. The author claims that setting negative FDI flows to \$1 instead of zero would result in a more robust estimate. Nevertheless, we follow the recommendation of Welfens and Baier (2018), although we provide the results with both techniques; both yield similar outcomes.

Lastly, Yotov et al. (2012) emphasize endogeneity issues in attaining reliable estimates for the effect of RTAs on trade, thus the PTA dummies may be correlated with unobservable cross-sectional costs of investment as well. The author state that the agreement may suffer from reverse causality because a country may be more likely to form a trade agreement with a country with which it already trades a substantial amount. Therefore, to fully take into consideration the effects of investment agreements, we also include the BIT between investing countries and Colombia.

5. Results

Table 2 offers the results of the models proposed where variables displayed in Table 1 are implemented. Model 1 includes variables common to gravity models known as control variables, such as distance, common language, contiguity, and landlocked variables. As expected, the distance variable shows a negative sign, which means that, as in international trade in goods, the distance variable is a factor that is detrimental to FDI inflows to Colombia. If Colombia shares a physical border with its partners its FDI inflows will grow by 232%. Conversely, if the Colombian partner is a landlocked country, investment flows to Colombia will decrease by 72.33%, while the common language variable is insignificant in this model. Additionally, variables related to trade and investment integration schemes offer relevant results.

If Colombia is a member of the OECD, its FDI inflows tend to decrease by 32.22%, questioning the accession of Colombia to this organization in 2020 as a measure to increase the attraction of FDI. However, if the Colombian partner is a member of the OECD, FDI inflows to Colombia will increase considerably: 972.56%. It is possible that there is the additional confounder of the Covid-19 pandemic in 2020, but unlikely that this had such a large effect. Investment decisions are generally made early in the year and executed throughout the upcoming months, thus, investment decisions carried out in 2020 were unlikely to be overly biased downward by the pandemic. The variable that reflects whether Colombia and its partners have a trade agreement exhibits a negative effect on FDI inflows to the country, which contradicts some studies that affirm that these agreements promote FDI flows between the

countries involved. This is in line with findings by Wu et al (2022) contending that more recent trade agreements have very different institutional characteristics and thus diverse effects on trade patterns.

Table 2. Estimation results

Variables	Model (1)	Model (2)	Model (3)	Model (4)
Log Distance _{jCol}	-1.446*** (-0.441)	-1.142*** (-0.358)	-1.150*** (-0.357)	-1.142*** (-0.358)
Common Language _{jCol}	0.077 (-0.554)	1.042** (-0.505)	1.072** (-0.508)	1.038** (-0.505)
Contiguity _{jCol}	1.200** (-0.582)	1.057 (-0.733)	1.04 (-0.734)	1.056 (-0.734)
Landlocked _{jCol}	-1.285** (-0.569)	-0.947*** (-0.322)	-0.921*** (-0.322)	-0.943*** (-0.321)
Organisation for Economic Co-operation and Development _{Col}	-0.389* (-0.204)	-0.165 (-0.139)	0.357** (-0.147)	-0.033 (-0.14)
Organisation for Economic Co-operation and Development _j	2.322*** (-0.43)	1.328** (-0.541)	1.267** (-0.538)	1.327** (-0.543)
Preferential Trade Agreement _{jCol}	-1.505*** (-0.409)	-0.954** (-0.443)	-0.920** (-0.446)	-0.954** (-0.445)
Bilateral Investment Treaty _{jCol}	1.456*** (-0.388)	1.272*** (-0.431)	1.269*** (-0.43)	1.281*** (-0.433)
Log Gross Domestic Product _{Col}	-0.072 (-0.418)	-1.793*** (-0.646)	-1.587** (-0.632)	-0.66 (-0.85)
Log Gross Domestic Product _j	0.308** (-0.136)	0.716*** (-0.151)	0.744*** (-0.153)	0.714*** (-0.151)
Log Colombian Exports _{Colj}	0.269 (-0.172)	0.338*** (-0.101)	0.338*** (-0.1)	0.340*** (-0.1)
Log Colombian Imports _{jCol}	-0.055 (-0.092)	-0.037 (-0.101)	-0.047 (-0.103)	-0.038 (-0.1)
Log Labour Competitiveness _{SCol}		1.755** (-0.764)	1.016 (-0.778)	0.527 (-0.998)
Log Labour Competitiveness _j		0.521*** (-0.13)	0.539*** (-0.132)	0.522*** (-0.13)
Log Rule of Law _{Col}			2.800*** (-1.014)	
Log Political Stability _{Col}				-0.415** (-0.176)
Constant	21.697** (-9.16)	55.997** (-23.36)	33.496 (-22.082)	17.001 (-30.227)
Observations	2,053	1,965	1,965	1,965
R-squared	0.635	0.692	0.696	0.693
Reset test	0.0391	0.9472	0.9924	0.9832
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

The BIT variable offers a crucial and positive effect (328.88%) on FDI inflows to Colombia, which positions this variable as a fundamental factor in explaining the attraction of this type of investment to the country. Moreover, and as expected, the GDP of the Colombian partner offers a positive impact on FDI inflows to Colombia, supporting the theoretical foundations of the gravitational model. The variables Colombian GDP, Colombian exports and

Colombian imports are insignificant in Model 1. Last but not least, the result of the Reset test (the specification error test of the regression equation) suggests that the model should be improved by adding omitted variables.

Model 2 includes two new variables related to labour productivity in Colombia and its partners, as variables capable of promoting the entry of FDI in Colombia. In this model, control variables such as distance and landlocked indicate a similar influence on Colombian FDI inflows exhibited in model 1, although in smaller magnitudes. Conversely, the common language variable reflects a positive effect (183.48%) on FDI inflows and the contiguity variable became insignificant in this model. Moreover, the variable that represents whether Colombia is part of the OECD becomes insignificant in this model. Moreover, variables such as whether the Colombian partner is a member of the OECD and whether the country pair shares a PTA and a BIT show a similar effect to that shown in Model 1 but with smaller magnitudes.

Additionally, Colombia's GDP variable became significant in this model, reflecting a high negative effect (500.74%) on its FDI inflows, suggesting that an increase in the country's GDP harms those flows. The GDP variable of the Colombian partner reflects a positive and greater impact (71.6%) than in the previous model on FDI inflows to the nation. Concerning variables corresponding to Colombian exports and Colombian imports, the former became positive in this model showing a positive effect on FDI inflows (33.8%) while the latter remains insignificant. Furthermore, the inclusion of a proxy for the labour competitiveness of Colombia and its partners shows that the increase in Colombia's labour productivity will benefit its FDI inflows by 175.5% and that the increase in the Colombian partner's labour productivity will benefit Colombian FDI inflows by 52.1%. However, the most relevant aspect of the inclusion of the labour competitiveness variable is that the Reset test was highly significant (0.947), which suggests that Model 2 is very well specified.

Model 3 offers very similar results to those reflected in Model 2. However, in this model, Colombia's labour competitiveness variable became insignificant, while the labour competitiveness of Colombian partners reflects a greater effect on FDI inflows to Colombia. The influence of the Rule of Law variable in the Colombian FDI inflows is prominent (280%), which suggests that the strength of the business environment is a critical factor to attract investment to Colombia. Additionally, the Reset test in this model (0.9924) displays the best specification among the models proposed in this study.

Finally, model 4 also has very similar coefficients to those shown in Model 3. This model addresses an aspect that has particularly influenced the evolution of Colombia since the second half of the 20th century, such as violence and terrorism, which yields an unexpected result. The model indicates a negative effect (-41.5%) of the Political Stability and Absence of Violence/Terrorism variable on Colombian FDI inflows. This result suggests that when the perception of this variable improves, FDI inflows to Colombia would decrease. Moreover, this model also offers a very high result for the Reset test, which further supports our findings.

6. Discussion

The findings obtained through the estimation of the proposed models allow us to delve into the characteristics of inward FDI to Colombia.

Regarding control variables, most of the proposed models show that sharing a common language will benefit Colombian FDI inflows, unlike the contiguity variable that reflects an adverse effect on these flows. These results allow us to explain why some of the most important investors in Colombia are Spain, Mexico and Chile. Additionally, the statistical significance of the Landlocked (negative sign) and Colombian exports (positive sign) variables confirms what was stated by Garavito et al. (2014), regarding the fact that FDI inflows to Colombia increase towards companies that carry out foreign trade activities, activities that are generally harmed when countries involved in international trade are landlocked.

Concerning the variables related to trade integration, investment and economic size, first, it is important to note that if a Colombian partner is part of the OECD, its effect on attracting FDI to the country is remarkable. This finding is confirmed since the main investors in the country are members of this organisation. Moreover, the PTA variable exhibits an adverse impact on FDI inflows to Colombia, which contradicts what was indicated by Buthe and Milner (2008), for whom trade agreements are related to a liberal foreign economic policy and therefore should indirectly promote FDI flows. This finding is particularly in line with those obtained by Abreo et al. (2022) on the negative effect of FTAs on Colombian exports of goods, which makes it possible to elucidate that this type of agreement is detrimental not only to exports of goods but also for FDI inflows into the country. In particular, the BIT variable should be considered as a key determinant of FDI attraction to the country by Colombian policymakers, since in each proposed model this variable emerges as a factor that can be, to some extent, managed and controlled by governments, unlike the other measured determinants. The prominent positive impact of the BIT variable on Colombian FDI inflows is in line with what was founded empirically by Egger and Pfaffermayr (2004), who affirm that investment agreements facilitate FDI flows, which is confirmed by the entry into force of 2,227 BITs since 1959 (United Nations, 2022).

Furthermore, the labour competitiveness variable in the Colombian partners shows a statistically significant and highly positive factor in all the models where it was included. This suggests that an increase in labour productivity in Colombia's partners will increase investment flows to the country. On the other hand, only in model 2 are Colombian labour competitiveness and the labour competitiveness of its counterpart country significant at the same time, revealing a significant effect of this factor on FDI attraction when variables such as Rule of Law and Political Stability and Absence of Violence/Terrorism are not included. This result should be considered by policymakers because it suggests that labour productivity is a key variable to attracting FDI to the country and, according to the OECD (2019), labour productivity in Colombia is declining, which should draw the attention of public policymakers focused on improving labour productivity in the country.

The results related to the perception of the business environment provided by the Rule of Law variable and its effects on Colombian FDI inflows show that the strength of the law in

the nation is a critical factor to boost these flows to the country. In this regard, this finding is supported by the introduction of a series of legal reforms carried out in recent decades (Ramirez and Quintero, 2019; Velosa, 2019) to offer a more attractive legal environment related to contract enforcement, property rights and law enforcement, which allows verifying the effectiveness of these measures in attracting FDI flows to Colombia. This finding is partially supported by those obtained by Abreo et al. (2021) who found that the Rule of Law variable is an outstanding factor to promote Colombian exports.

Nonetheless, the contradictory finding of the effect of the variable Political Stability and Absence of Violence/Terrorism denotes an almost natural relationship between terrorism and violence with the attraction of FDI inflows, which questions the effectiveness of improvements in the perception of political stability in recent years (especially the peace agreement reached with the largest guerrilla group in the country and the region at the time, *Fuerzas Armadas Revolucionarias de Colombia* (FARC), during the last government of former President Juan Manuel Santos) in attracting FDI to the country. This finding is supported by Maher (2015), who affirms that the violence exercised by right-wing paramilitary groups and by the national army (as supporters of foreign investment) against guerrillas and civilians, can facilitate the entry of foreign investment into the country, as in the case of Colombia. While seemingly contrary to the literature, these results are to be expected given the situation of Colombian conflict(s) and the various alliances that have emerged between paramilitary groups, foreign companies, and political actors. There are important cases of such alliances presented in the literature cited above that corroborate our empirical findings. To go into the methodology of calculating these alliance indicators would lead to another type of study and we leave this to further research. Lastly, the results obtained in relation to the joint influence of the Rule of Law and Political Stability and Absence of Violence/Terrorism variables can also be considered contradictory since it could be considered that these indicators are complementary to a certain extent and that their evolution should have a high correlation, however, given the results obtained, we could affirm that this is not the case.

Finally, two domestic issues are worth analysing as relevant for future FDI inflows to Colombia. On the one hand, the recent enactment of the so-called *Paz Total*, provides a broad legal framework for the government to carry out individual or collective peace processes with various illegal armed actors. Its objective is to achieve a comprehensive peace that allows for the construction of an inclusive and general peace environment (Presidencia de la República, 2022). On the other hand, the recent and growing uncertainty surrounding the energy transition policies proposed by the current president could affect the main national industry, the fuels industry. The proposal contemplates the possibility of not granting new licences for the exploration and eventual exploitation of oil, which is Colombia's main source of foreign exchange (Programa de Gobierno 2022-2026, 2022). These two aspects, along with others, could be crucial determinants of FDI inflows to the country in the coming years.

7. Conclusions

In this study, we provide some facts related to the characteristics of FDI inflows to Colombia. For this, we use a gravitational model between Colombia and 204 countries. We included variables that, to a different extent, determine the attraction of FDI inflows by Colombia. To do

this, we build four models that, based on an augmented specification of the traditional gravity model, identify to what extent the included variables promote the entry of investment flows to Colombia.

Although most of the included variables offer the expected effect on FDI inflows in Colombia, we would like to highlight some important shreds of evidence. First, FDI inflows to Colombia grow notably when Colombia's partner is a member of the OECD. Conversely, these flows will reduce if a PTA is in force between the countries involved. Moreover, the BIT variable has a relevant impact on the attraction of FDI to Colombia. This factor could be the one capable to boost FDI inflows to the nation through government agreements. The key to this factor is that, unlike other variables that exhibit a capacity to promote FDI inflows to Colombia, such as labour productivity, the level of exports and the GDP of the countries involved, whose improvements depend on multiple factors, the BIT factor can be achieved through the determination of the Colombian government focused on foreign policy actions to sign investment agreements.

Additionally, the Rule of Law variable in Colombia, as expected, indicates an outstanding effect on the attraction of FDI inflows, suggesting that all the improvements focused on strengthening the law and protecting foreign investments will facilitate and promote this investment flows to Colombia. Conversely, the Political Stability and Absence of Violence/Terrorism variable suggests that the amount of FDI inflows increase when violence and terrorism intensify in Colombia. This finding may help us to understand the complexity of the armed conflict in Colombia and its endemic relationship, in this case, with its FDI inflows. In this sense, the so-called Paz Total law of the government of the current Colombian president, Gustavo Petro, which aims to build peace processes with various illegal armed actors from the right and left political spectrum, will have unknown implications for the evolution of the country's internal armed conflict, conditioning FDI inflows considering the significant effect of institutional variables on the attraction of FDI to Colombia. Finally, further research could examine the characteristics of FDI inflows to Colombia by economic sectors to identify the factors that facilitate or hinder this type of investment in the country by economic sectors.

8. References

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Appendix

Appendix 1. Estimation results with negative FDI values replaced by the value of 1

Variables	Model (1)	Model (2)	Model (3)	Model (4)
Log Distance _{jCol}	-1.446*** (-0.441)	-1.142*** (-0.358)	-1.150*** (-0.357)	-1.142*** (-0.358)
Common Language _{jCol}	0.077 (-0.554)	1.042** (-0.505)	1.072** (-0.508)	1.038** (-0.505)
Contiguity _{jCol}	1.200** (-0.582)	1.057 (-0.733)	1.04 (-0.734)	1.056 (-0.734)
Landlocked _{jCol}	-1.285** (-0.569)	-0.954** (-0.443)	-0.920** (-0.446)	-0.954** (-0.445)
Organisation for Economic Co-operation and Development _{Col}	-0.389* (-0.204)	1.272*** (-0.431)	1.269*** (-0.43)	1.281*** (-0.433)
Organisation for Economic Co-operation and Development _j	2.322*** (-0.43)	-1.793*** (-0.646)	-1.587** (-0.632)	-0.66 (-0.85)
Preferential Trade Agreement _{jCol}	-1.505*** (-0.409)	0.716*** (-0.151)	0.744*** (-0.153)	0.714*** (-0.151)
Bilateral Investment Treaty _{jCol}	1.456*** (-0.388)	0.338*** (-0.101)	0.338*** (-0.1)	0.340*** (-0.1)
Log Gross Domestic Product _{Col}	-0.072 (-0.418)	-0.037 (-0.101)	-0.047 (-0.103)	-0.038 (-0.1)
Log Gross Domestic Product _j	0.308** (-0.136)	-0.947*** (-0.322)	-0.921*** (-0.322)	-0.943*** (-0.321)
Log Colombian Exports _{Colj}	0.269 (-0.172)	-0.165 (-0.139)	0.357** (-0.147)	-0.033 (-0.14)
Log Colombian Imports _{jCol}	-0.055 (-0.092)	1.328** (-0.541)	1.267** (-0.538)	1.327** (-0.543)
Log Labour Competitiveness _{Col}		1.755** (-0.764)	1.016 (-0.778)	0.527 (-0.998)
Log Labour Competitiveness _j		0.521*** (-0.13)	0.539*** (-0.132)	0.522*** (-0.13)
Log Rule of Law _{Col}			2.800*** (-1.014)	
Log Political Stability _{Col}				-0.415** (-0.176)
Constant	21.697** (-9.16)	69.813*** (-23.36)	47.311** (-22.082)	30.816 (-30.227)
Observations	2,053	1,965	1,965	1,965
R-squared	0.635	0.692	0.696	0.693
Reset test	0.0391	0.9472	0.9924	0.9832
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Appendix 2. Country list

ABW	BMU	DOM	HKG	LBR	NAM	RUS	TMP
AFG	BOL	DZA	HND	LBY	NCL	RWA	TON
AGO	BRA	ECU	HRV	LCA	NER	SAU	TTO
AIA	BRB	EGY	HTI	LKA	NFK	SEN	TUN
ALB	BRN	ERI	HUN	LTU	NGA	SER	TUR
AND	BWA	ESP	IDN	LUX	NIC	SGP	TZA
ANT	CAF	EST	IND	LVA	NLD	SHN	UGA
ARE	CAN	ETH	IOT	MAC	NOR	SLB	UKR
ARG	CHE	FIN	IRL	MAR	NPL	SLE	URY
ARM	CHL	FJI	IRN	MDA	NRU	SLV	USA
ASM	CHN	FRA	IRQ	MDG	NZL	SMR	UZB
ATG	CIV	FRO	ISL	MDV	OMN	SOM	VCT
AUS	CMR	FSM	ISR	MEX	PAK	STP	VEN
AUT	COG	GAB	ITA	MHL	PAN	SUD	VGB
AZE	COK	GBR	JAM	MKD	PCN	SUR	VNM
BDI	COM	GEO	JOR	MLI	PER	SVK	VUT
BEL	CPV	GHA	JPN	MLT	PHL	SVN	WSM
BEN	CRI	GIB	KAZ	MMR	PLW	SWE	YEM
BES	CUB	GIN	KEN	MNE	PNG	SYC	ZAF
BFA	CUW	GMB	KGZ	MNG	POL	SYR	ZAR
BGD	CYM	GNQ	KHM	MOZ	PRK	TCA	ZMB
BGR	CYP	GRC	KNA	MRT	PRT	TCD	ZWE
BHR	CZE	GRD	KOR	MSR	PRY	TGO	
BHS	DEU	GTM	KWT	MUS	PYF	THA	
BLR	DMA	GUM	LAO	MWI	QAT	TJK	
BLZ	DNK	GUY	LBN	MYS	ROM	TKM	
Note: Abbreviations from World Bank data							

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