

# Determinants of inward foreign direct investment in Colombia: an empirical analysis<sup>1</sup>

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Received: 27/03/2023

Accepted: 03/11/2023

## Abstract

This research delves into the determinants of inward foreign direct investment (FDI) in Colombia in the context of the economic integration promoted by recent governments. Colombia's trade liberalization has sought not only to boost trade flows but also to make the country more attractive to FDI in a framework of fiscal discipline and a stable economic environment conducive to economic growth, albeit characterized by challenging institutional conditions. Government reforms have revitalized FDI inflows into Colombia, with the oil and mining sectors receiving the largest influx of new capital investments. This paper contributes to the literature by using an augmented gravity model approach to analyse the determinants of FDI inflows into Colombia between 2007 and 2020. We find that stable government policies and the rule of law have been key factors in increasing FDI in Colombia, and that bilateral investment treaties are of particular importance as drivers of FDI into the country.

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## Keywords

Foreign direct investment, economic integration, economic policy, investment promotion, competitiveness, econometric models, Colombia

## JEL classification

F21, F36, O16, O54, C10

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<sup>1</sup> The authors are grateful to Linus Zechlin for excellent research assistance and to participants in the 2022 European Trade Study Group (ETSG) Groningen annual conference and the 2022 research seminar of the Institute for International Political Economy Berlin (IPE) of the Berlin School of Economics and Law for their helpful comments. Carlos Abreo was supported by the Government of Colombia and its Ministry of Science, Technology and Innovation under the Pasaporte a la Ciencia programme.

## I. Introduction

Colombia is one of the leading economies in Latin America and is considered an economically open country with one of the best business environments in the region for foreign investors, especially in energy-related sectors (The Economist Intelligence Unit, 2013; World Bank, 2022; Abreo, Bustillo and Rodríguez, 2022). Colombia is characterized by its fiscal discipline and sound monetary policy aimed at controlling inflation, which has made it possible to attain a stable macroeconomic environment with high economic growth rates even at 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 has expanded by more than other economic sectors (e.g., 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 on international markets (Botta, Godin and Missaglia, 2016).

The Colombian economy began to open up in 1990 with the implementation of the so-called trade opening process. In the field of international trade, Colombia went from an import substitution system to a process of reducing both tariff and non-tariff trade barriers. Regarding openness to international investment, Colombia has made major efforts to create a legal framework that promotes these flows. Ramirez and Quintero (2019) point out that in the late 1980s, legislation was passed on vital matters such as the removal of double taxation and the reduction of taxes on remittances. They also draw attention to the International Investment Statute, issued in 1991, which provided a national legal framework liberalizing foreign investment in the country and establishing rules for the creation of special economic zones. According to Velosa (2019), there were substantial legal modifications to this investment framework in the following years, focused on making Colombia more attractive to FDI. In 1999, the constitution was reformed and financial compensation was introduced for expropriation measures irrespective of circumstances. In 2005 and 2006, legislation was passed to enhance the legal stability of FDI in Colombia and abolish a 7% tax on revenues sent abroad by investors. Lastly, in 2017, as part of the effort to promote foreign investment in the energy sector, new modifications were introduced in the general FDI regime to make foreign investment in Colombia even more attractive.

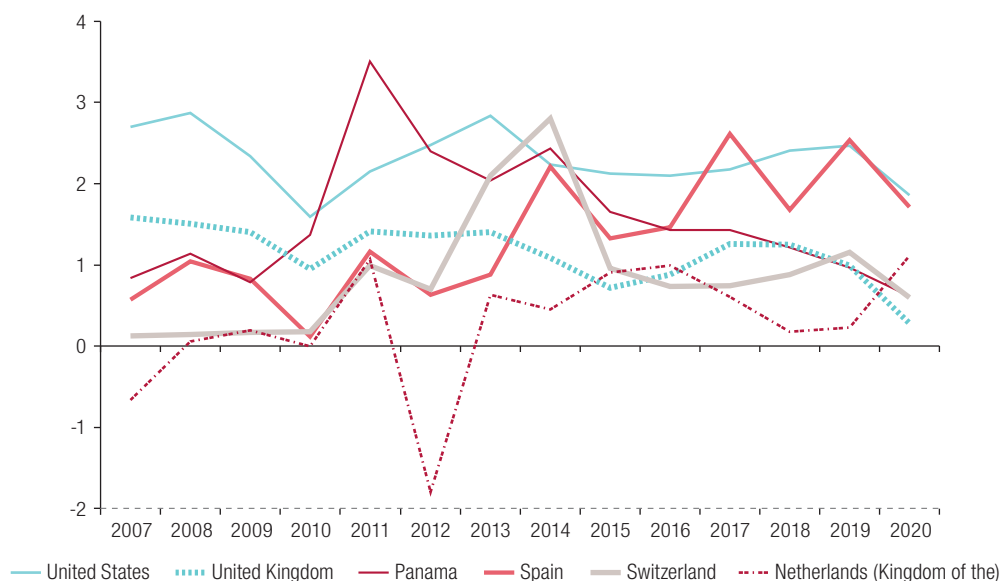
These reforms aided in the revitalization of inward FDI in Colombia, especially in the oil and mining sectors, which received the largest inflows (Velosa, 2019). Botta, Godin and Missaglia (2016) point out that FDI inflows represented less than 3% of GDP between 1990 and 2004, but that since 2005 they have been significantly higher. Concerning some particular characteristics of FDI inflows into Colombia, Buitrago and Leon (2015) indicate that these have helped to finance the country's balance-of-payments deficit. They also state that foreign companies repatriate 70% of their profits (99% in the oil sector). Furthermore, they point out that the ratio between the value of FDI inflows and the dividends generated by these investments represents an outflow of economic resources greater than the inflow of FDI; nevertheless, they confirm that FDI inflows into Colombia have had a positive impact on GDP growth.

This paper investigates the determinants of inward FDI in Colombia in the context of recent governments and their promotion of economic integration. It uses an augmented gravity model to examine the characteristics of FDI inflows into Colombia between 2007 and 2020. Some authors have conducted studies to identify the determinants of FDI inflows into 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 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. Garavito, Iregui and Ramirez (2014), in their empirical study on the determinants of FDI inflows into Colombia at the firm level, identify some salient characteristics of this type of investment in local companies. They affirm that the probability of receiving FDI flows is small 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 receiving FDI flows is greater when companies carry out international trading activities.

Figure 1 exhibits the performance of net FDI inflows into Colombia by main countries of origin from 2007 to 2020. It is essential to mention that despite the challenges related to the internal armed conflict that has existed in Colombia since the second half of the twentieth century, Colombia was South America's third-largest recipient of FDI between 2000 and 2016 with 11% of the total, behind only Brazil (53%) and Chile (15%) (Velosa, 2019). Figure 1 shows that most of the main origin countries for FDI inflows into Colombia are European. It also shows that the United States and Spain have been the largest investors in Colombia over recent years. Investment from Panama declined steadily from 2011, while that from countries such as the United Kingdom and, in particular, Switzerland and the Netherlands showed considerable volatility over the period analysed. Lastly, other countries that invest substantially in Colombia are not shown in the chart. They include Caribbean countries such as Bermuda, the British Virgin Islands and the Cayman Islands that have been or are considered tax havens by some international institutions. Similarly, countries in the region such as Chile and Mexico also make significant investments in Colombia.

**Figure 1**  
Colombia: net inward foreign direct investment by main countries of origin, 2007–2020  
(Billions of dollars)

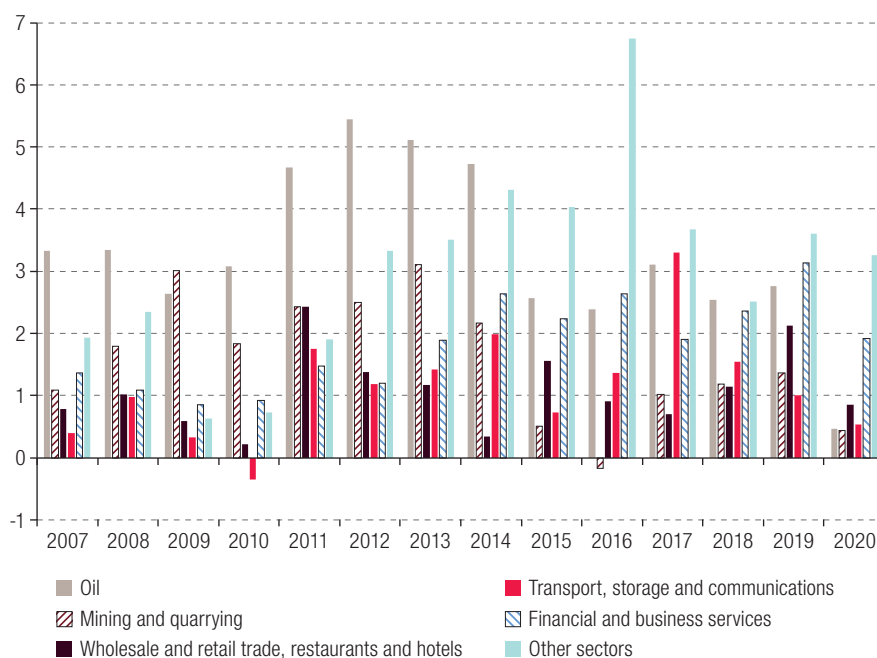


**Source:** Prepared by the authors on the basis of Banco de la República, *Inversión extranjera directa en Colombia - Actividad económica, 2021* [online] <https://www.banrep.gov.co/es/estadisticas/inversion-directa>.

Figure 2 shows net FDI inflows into Colombia from 2007 to 2020 by economic sector. The oil sector was the main recipient of net inward FDI in most of the periods studied, being surpassed only in 2016, 2019 and 2020 by the financial and business services sector. The mining and quarrying sector was the country's second-largest recipient of net inward FDI between 2007 and 2013. It is important to highlight that the large FDI flows into these two sectors in the reference period coincided with a period in which the prices of these commodities, especially that of a barrel of oil (Nyangarika, Mikhaylov and Tang, 2018), reached record highs. By 2013, these sectors' share in the composition of FDI inflows into the country had declined, in line with international trends. The great importance of the oil sector and the mining and quarrying sector in FDI inflows into Colombia is also reflected in the composition

of the country's export basket, as they contributed 63.3% of exports in 2018 at constant dollar prices (Abreo, Bustillo and Rodríguez, 2022). Nevertheless, the composition of inward FDI in Colombia has altered considerably since 2014, owing to the fact that the financial and business services sector has positioned itself as one of the two largest recipients. Moreover, FDI inflows into the “other sectors” category grew strongly in 2016, owing to a very substantial increase in investment in the electricity, gas and water sectors. Lastly, according to Banco de la República (2020), FDI inflows into Colombia decreased by 35.1% in 2020 from the previous year, with the sectors worst affected being oil and mining with a drop of 42.8%, because of the effects of the coronavirus disease (COVID-19) pandemic on the global economy. Declines were also large, but less so, in other economic sectors.

**Figure 2**  
Colombia: net inward foreign direct investment by sector, 2007–2020  
(Billions of dollars)



**Source:** Prepared by the authors on the basis of Banco de la República, *Inversión extranjera directa en Colombia - Actividad económica, 2021* [online] <https://www.banrep.gov.co/es/estadisticas/inversion-directa>.

## II. Literature review

A number of economists have argued that inward FDI is an important component of economic development, particularly in emerging countries (Denisia, 2010), of which Colombia is one, where it produces critical growth benefits. In addition, technical spillovers, employment and competitiveness have been shown to be related to inward FDI (Asiedu, 2002). Caves (1992) concludes that the efforts made by different countries to attract FDI are motivated by the potential positive effects on the domestic market in relation to factors such as technology, know-how, employment and production. Some more recent literature takes issue with these findings, examples being Navaretti and Venables (2004) and Crespo and Fortuna (2007), who argue that the spillovers are not always positive. However, Borensztein, De Gregorio and Lee (1998) and Daude and Stein (2007) argue that FDI contributes more to economic growth than domestic investment.

Blomström, Kokko and Zejan (1994) argue that FDI plays 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). In addition, a number of studies have tried to explain why companies invest their capital abroad. Vernon (1966), in his product life cycle theory, postulates that when an innovative product reaches maturity in the source country, organizations undertake FDI abroad. 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 has been challenged by the new trade theory (NTT), which argues that horizontal integration involving FDI is carried out between developed economies with similar factor endowments to take advantage of economies of scale (Dorakh, 2020).

Unlike trade, FDI flows do not have a single theoretical model associated with them. Dorakh (2020) suggests that these flows are best understood using a variety of theories, most derived from neoclassical trade theory together with NTT and industrial organization theory. The determinants of FDI differ over time and between country pairs and regions, and the explanations for them are variously associated with conceptual frameworks encompassing factor endowments, production and international capital movements. In the more recent literature, FDI has been examined in relation to specific institutional and industrial policies in both the host and the sending countries (Dorakh, 2020).

Gravity models are viewed as a robust empirical method for examining trade between countries while taking into account distance and economic size. The general gravity model deals with bilateral trade flows and was first applied by Tinbergen (1962). Anderson and Van Wincoop (2003) argued that relative trade costs must be accounted for if an accurate model was to be created because “trade between two regions depends on the bilateral barrier between them relative to average trade barriers” (Anderson and Van Wincoop, 2003, p. 176). Accordingly, multilateral trade resistance (MRT) terms are introduced to reflect the relative trade costs of two countries, with inward MRT measures capturing the ease with which importers can access the market and outward MRT measures capturing exporters’ ease of market access (Yotov and others, 2016).

Less common is the use of gravity models to examine FDI between countries in a way that takes trade, size and distance into account. Dorakh (2020) examines the increase in FDI in countries acceding to the European Union (EU), while attempting to estimate how much EU membership promotes FDI in 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 attracting it. The author therefore confirms that the gravity model is the best-fitting model for estimating the determinants of bilateral FDI flows. According to Baldwin and Taglioni (2011), GDP may be a reasonable proxy for both consumer- and producer-driven demand shifts in the role of trade in vertical specialization, 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 would thus expect the origin country’s GDP and the destination country’s GDP to have diminished explanatory power when value chain trade is important, as it is likely to be where FDI is concerned.

Frenkel, Funke and Stadtmann (2004) argue that economic size, risk and economic growth drive the level of FDI flows, while the distance factor negatively influences them. Other studies on the determinants of FDI flows have also considered variables other than those traditionally used in gravity models. This is the case with the study by Alfaro and others (2004), who argue that high-quality financial institutions attract higher FDI flows. Similarly, Asiedu (2006) identifies factors such as infrastructure, inflation, the legal system and the investment framework as determinants of FDI flows. Aleksynska and Havrylchuk (2013) even suggest that countries with institutional weaknesses can attract FDI when they have an abundance of natural resources, as Colombia does. Almfraji and Almsafir (2014) survey

the literature and find general evidence that FDI exerts positive effects on the host country's economic growth. All this indicates that relevant studies take account of gravity variables additional to those considered in the basic gravity model.

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

### III. Data

Following the FDI literature (Brainard, 1997; Dellis, Sondermann and Vansteenkiste, 2017; Wong and Tang, 2011), we use the values for net FDI inflows as a dependent variable. To deal with negative flows without losing the information conveyed by such values, we replace negative values with zero values as explained below. These values are provided by Banco de la República (2021) in current dollars. Additionally, we account for cultural and geographical aspects such as distance, contiguity, a common language and a shared landlocked situation. These variables come from the Gravity and GeoDist databases provided by the Centre for International Prospective Studies and Information (CEPII) and are also included in the Bilateral Longitudinal Observations and Country Statistics (BLOCS) database (Wu and others, 2022).

We also consider variables linked to economic and trade integration, such as whether the countries involved are OECD members, whether there is a preferential trade agreement (PTA) (this variable covers any type of trade agreement) and whether the parties share a bilateral investment treaty (BIT). These last two variables are constructed with data from the Ministry of Commerce, Industry and Tourism of Colombia (2022). It should be noted that although some PTAs include a chapter on investment, we construct the BIT variable by considering whether there is an individual bilateral investment treaty between the pair of countries, regardless of whether there is a specific investment chapter in their PTA.

Additionally, we include variables connected to economic and trade performance. First, the GDP variable for the origin and destination countries is taken as a measure of their economic size. Second, Colombian exports and imports (included in the model individually) are used to determine whether there is a relationship between the FDI flows captured by Colombia and the trade flows generated from the country to its partners and vice versa. We also include variables related to labour productivity in the origin and destination countries, using World Bank data to construct a ratio between GDP and the country's labour force on the basis of new trade theory (NTT). Lastly, the model considers variables related to the institutional quality or governance of Colombia as a host country for FDI, in view of the argument made by Acemoglu, Gallego and Robinson (2014) that the institutional quality of nations is a determinant of their development. The variables taken, in view of the country's difficult political conditions, are the rule of law indicator and the political stability and absence of violence/terrorism indicator provided by the World Bank's Worldwide Governance Index (WGI). Other institutional variables provided by the World Bank were included in the econometric study but turned out to be statistically insignificant. Table 1 gives more details of the variables included in the gravity equation.

Lastly, it is relevant to point out that the choice of the period analysed (2007–2020) was conditioned by the limited statistical information available from the Colombian central bank on FDI inflows into the country. Additionally, the 204 partners included in the study are the countries with which Colombia traded goods in the period analysed.

**Table 1**  
Model variables

Variable	Variable code	Description	Updated	Source	Expected sign
Foreign direct investment <sub>jCol</sub>	FDI <sub>jCol</sub>	FDI inflows from Colombia's partners to Colombia in current dollars	February 2022	Central Bank of Colombia	
Log distance <sub>eCol</sub>	LogDIST <sub>jCol</sub>	Logarithm of distance in kilometres between Colombia and its partners	January 2022	Centre for International Prospective Studies and Information (CEPII)	-
Common language <sub>eCol</sub>	COMLANG <sub>jCol</sub>	Colombia and its partners share a common official or primary language	January 2022	CEPII	+
Contiguity <sub>jCol</sub>	CONTIG <sub>jCol</sub>	Shared physical border between Colombia and its partners	January 2022	CEPII	+
Landlocked <sub>jCol</sub>	LANDLOCKED <sub>jCol</sub>	Colombia and its partners alike are landlocked	January 2022	CEPII	-
Organisation for Economic Co-operation and Development <sub>Col</sub>	OECD <sub>Col</sub>	Colombia is a member of OECD	March 2022	OECD	+
Organisation for Economic Co-operation and Development <sub>j</sub>	OECD <sub>j</sub>	Colombia's partner is a member of OECD	March 2022	OECD	+
Preferential trade agreement <sub>jCol</sub>	PTA <sub>jCol</sub>	Colombia and its partners share a preferential trade agreement	January 2022	CEPII	+
Bilateral investment treaty <sub>jCol</sub>	BIT <sub>jCol</sub>	Colombia and its partners share a bilateral investment treaty	January 2022	Ministry of Commerce, Industry and Tourism	+
Log gross domestic product <sub>Col</sub>	LogGDP <sub>Col</sub>	Logarithm of Colombian gross domestic product in constant dollars	January 2022	CEPII	+
Log gross domestic product <sub>j</sub>	LogGDP <sub>j</sub>	Logarithm of partner countries' gross domestic product in constant dollars	January 2022	CEPII	+
Log Colombian exports <sub>Colj</sub>	LogCOLEXP <sub>Colj</sub>	Logarithm of Colombian exports to its partners in current dollars	March 2022	International Monetary Fund (IMF)	+
Log Colombian imports <sub>jCol</sub>	LogCOLIMP <sub>jCol</sub>	Logarithm of Colombian imports from its partners in current dollars	March 2022	IMF	+
Log labour competitiveness <sub>Col</sub>	LogLABCOMP <sub>Col</sub>	Logarithm of labour competitiveness in Colombia	February 2022	Calculated by the authors from World Bank data (GDP/labour force)	+
Log labour competitiveness <sub>j</sub>	LogLABCOMP <sub>j</sub>	Logarithm of labour competitiveness in Colombia's partners	February 2022	Calculated by the authors from World Bank data (GDP/labour force)	+
Log rule of law <sub>Col</sub>	LogRULELAW <sub>Col</sub>	Rule of law in Colombia	March 2022	World Bank	+
Log political stability <sub>Col</sub>	LogPOLSTABIL <sub>Col</sub>	Political stability and absence of violence/terrorism	March 2022	World Bank	+

**Source:** Prepared by the authors.

**Note:** "Col" denotes Colombia and "j" the partner country.

## IV. Methodological approach

The empirical research implements a relevant, robust and effective econometric approach to capture the characteristics that support or hinder FDI inflows into Colombia: the gravity model. The theoretical and empirical basis of the model was developed by Anderson and Van Wincoop (2003), who then went on to contribute to some of its most important advances. According to Frankel, Stein and Wei (1997), the model establishes that the volume of bilateral trade is proportional to the size of the economies involved, and also that physical distance between them is detrimental to their trade. The gravity model has been widely applied to establish the factors that stimulate or hinder the evolution of various economic variables. It has been used in areas as diverse as transport, local trade, tourism and investment policies, among others (Giuliano, Chakrabarti and Rhoads, 2015). It has also been employed by a wide variety

of authors to understand the behaviour of FDI flows between pairs of countries (e.g., Anderson, Larch and Yotov, 2016; Baltagi, Egger and Pfaffermayr, 2008; Bénassy-Quéré, Coupety and Mayer, 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 only a limited way. 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 was not sufficient owing to the endogeneity issue.<sup>2</sup> FDI models present the same challenges and biases to be avoided as are identified in the trade literature. For this paper, we extended the earlier literature and applied FDI gravity model recommendations derived from more recent work (Anderson, Larch and Yotov, 2016; Baier, Yotov and Zylkin, 2019). Specifically, we used an estimation of the structural FDI gravity model for Colombia as shown in equation (1).

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

where  $j$  denotes the FDI sending country and the variables are as shown in table 1.

We also measured the effect of labour competitiveness in attracting FDI flows to Colombia. Following Álvarez and others (2018), the LABCOMP variable is related to labour productivity, proxied by GDP per worker (labour force). The authors point out that a positive sign for this coefficient denotes lower margin requirements and also greater labour competitiveness. The inclusion of a productivity proxy variable in our model is relevant because of the type of investment that FDI involves and the impact that countries' level of labour competitiveness can have in attracting or generating these monetary flows. The specification that includes the labour competitiveness variable is embodied in equation (2).

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

Considering the implications and perceptions of the economic context in a country receiving flows of FDI from foreign companies, we also propose the use of two additional variables provided by the World Bank, included separately in the model to avoid correlation problems. The first variable is the rule of law, which relates 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 investment and economic performance. Its inclusion in the model allows us to present equation (3).

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

Equation (4), the last, captures the effect of the political stability and absence of violence/terrorism variable. This variable represents perceptions of the likelihood of political instability and violence, including terrorism. We believe it to be fundamental in the attraction of FDI flows to a country like Colombia, which has been experiencing an internal armed conflict for more than 50 years. Colombia has been in a

<sup>2</sup> The type of matrix proposed (one FDI recipient and many FDI sending countries) means that it is not possible to include a time dummy variable. See Gashi, Hisarcikilar and Pugh (2017).

post-conflict situation since 2016 and the signing of a peace agreement with the country's main armed group, the Revolutionary Armed Forces of Colombia – People's Army (FARC-EP); similar agreements are currently being negotiated with several armed groups in the country.

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

Observations in which the dependent variable takes a value of zero pose a problem for log-linear estimation; as the log of zero is undefined, zero FDI flows will drop out of the estimation (Bacchetta and others, 2012). We therefore resort to the Poisson pseudo-maximum likelihood (PPML) estimator proposed by Santos Silva and Tenreyro (2006). They argue that the PPML approach is able to include zero values in the dependent variable, and also takes account of possible endogeneity and other econometric drawbacks such as heteroskedasticity. Moreover, the PPML estimator has been widely used in recent studies for the consistency of its results (Egger and Nigai, 2015), since it yields smaller and more appropriate coefficients than the ordinary least square (OLS) estimator (Santos Silva and Tenreyro, 2006). The authors' explanation for this is that if the parameters of log-linearized models are estimated by OLS, they will be biased under heteroskedasticity, and if the errors are heteroskedastic, the transformed errors will be correlated with the covariates.

We also estimate the gravity model with FDI inflows, which means that some observations may be negative values (divestments). Since the PPML estimator cannot work with negative values, we have the option of discarding them or setting them to zero. Discarding them would leave the estimate with a greater bias than if they were set to zero (Welfens and Baier, 2018): considering that negative FDI values imply disinvestment operations and hence non-contribution to capital formation in the receiving country, the negative investment flows can be assimilated to zero values (Guerin and Manzocchi, 2009). We also estimate our model with another approach which posits that negative values for FDI flows should be replaced by US\$ 1 (see annex A1). In this connection, Dorakh (2020) states that negative FDI flows have an economic meaning and therefore cannot be discarded or replaced by zero values, since this would mean that there was no investment relationship between the countries. The author argues that setting negative FDI flows to US\$ 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 and find them to be similar.

Lastly, Yotov and others (2016) emphasize endogeneity issues when it comes to obtaining reliable estimates for the effect of PTAs on trade: PTA dummies may be correlated with unobservable cross-sectional investment costs. The authors argue that a reverse causality may operate, because a country may be more likely to enter into a trade agreement with another country when they already trade a substantial amount. Thus, to fully take into consideration the effects of investment agreements, we also include BITs between investing countries and Colombia.

## V. Results

Table 2 gives the results of the proposed models when the variables shown in table 1 are implemented. Model 1 includes common gravity model variables known as control variables, such as distance, common language, contiguity and a landlocked situation. As expected, the distance variable shows a negative sign, meaning that, as with international trade in goods, the distance variable is a factor that is detrimental to FDI inflows into Colombia. If Colombia shares a physical border with a partner, its FDI inflows are 232% higher. This result is explained by a 37% increase in FDI inflows from Panama to Colombia in

the period analysed. Conversely, if Colombia's partner is a landlocked country, its investment flows to Colombia will decrease by 72.33%, while the common language variable is insignificant in this model. Variables related to trade and investment integration schemes also yield significant results.

**Table 2**  
Estimation results

Variable	Model (1)	Model (2)	Model (3)	Model (4)
Log distance <sub>eCol</sub>	-1.446*** (-0.441)	-1.142*** (-0.358)	-1.150*** (-0.357)	-1.142*** (-0.358)
Common language <sub>eCol</sub>	0.077 (-0.554)	1.042** (-0.505)	1.072** (-0.508)	1.038** (-0.505)
Contiguity <sub>jCol</sub>	1.200** (-0.582)	1.057 (-0.733)	1.04 (-0.734)	1.056 (-0.734)
Landlocked <sub>jCol</sub>	-1.285** (-0.569)	-0.947*** (-0.322)	-0.921*** (-0.322)	-0.943*** (-0.321)
Organisation for Economic Co-operation and Development <sub>Col</sub>	-0.389* (-0.204)	-0.165 (-0.139)	0.357** (-0.147)	-0.033 (-0.14)
Organisation for Economic Co-operation and Development <sub>j</sub>	2.322*** (-0.43)	1.328** (-0.541)	1.267** (-0.538)	1.327** (-0.543)
Preferential trade agreement <sub>jCol</sub>	-1.505*** (-0.409)	-0.954** (-0.443)	-0.920** (-0.446)	-0.954** (-0.445)
Bilateral investment treaty <sub>jCol</sub>	1.456*** (-0.388)	1.272*** (-0.431)	1.269*** (-0.43)	1.281*** (-0.433)
Log gross domestic product <sub>Col</sub>	-0.072 (-0.418)	-1.793*** (-0.646)	-1.587** (-0.632)	-0.66 (-0.85)
Log gross domestic product <sub>j</sub>	0.308** (-0.136)	0.716*** (-0.151)	0.744*** (-0.153)	0.714*** (-0.151)
Log Colombian exports <sub>Colj</sub>	0.269 (-0.172)	0.338*** (-0.101)	0.338*** (-0.1)	0.340*** (-0.1)
Log Colombian imports <sub>jCol</sub>	-0.055 (-0.092)	-0.037 (-0.101)	-0.047 (-0.103)	-0.038 (-0.1)
Log labour competitiveness <sub>Col</sub>		1.755** (-0.764)	1.016 (-0.778)	0.527 (-0.998)
Log labour competitiveness <sub>j</sub>		0.521*** (-0.13)	0.539*** (-0.132)	0.522*** (-0.13)
Log rule of law <sub>Col</sub>			2.800*** (-1.014)	
Log political stability <sub>Col</sub>				-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

**Source:** Prepared by the authors.

**Note:** Robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

OECD membership reduces Colombia's FDI inflows by 32.22%, calling into question the country's accession to the organization in 2020 as a measure to make it more attractive to FDI. However, if Colombia's partner is an OECD member, FDI inflows increase greatly: by 972.56%. The COVID-19 pandemic in 2020 may have had an additional confounding effect, but it is unlikely to have been that large. Investment decisions are generally made early in the year and executed over the following months, so that investment decisions implemented in 2020 are unlikely to have been 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 into the country, contradicting some studies which affirm that these agreements promote FDI flows between the countries involved. However, it is in line with findings by Wu and others (2022) that more recent trade agreements have had very different institutional characteristics and thus diverse effects on trade patterns.

The BIT variable exhibits a powerfully positive effect (328.88%) on FDI inflows into Colombia, positioning it as a fundamental factor in explaining why this type of investment is attracted to the country. Moreover, and as expected, the partner's GDP has a positive impact on FDI inflows into Colombia, supporting the theoretical foundations of the gravity model. The Colombian GDP, Colombian exports and Colombian imports variables 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 would be improved by adding omitted variables.<sup>3</sup>

Model 2 includes two new variables related to labour productivity in Colombia and its partners as potential promoters of inward FDI in Colombia. In this model, control variables such as distance and a landlocked situation exhibit an influence on Colombian FDI inflows much as in model 1, although with smaller magnitudes. The common language variable has a strongly positive effect (183.48%) on FDI inflows, however, while the contiguity variable becomes insignificant in this model. This is explained by the fact that FDI flows to Colombia from the countries sharing a border with it declined drastically in the period under study, with the exception of Panama. The Colombian OECD membership variable also becomes insignificant. Variables such as whether Colombia's partner is an OECD member and whether the country pair shares a PTA or BIT show effects similar to those in model 1, but with smaller magnitudes.

Additionally, the Colombian GDP variable becomes significant in this model, with a large negative effect (500.74%) on FDI inflows. This suggests that an increase in the country's GDP is detrimental to those flows, contradicting the theoretical foundations of the gravity model and the literature indicating that FDI is an important driver of economic growth. This contradictory result is explained by the structure of the panel data (one host country and many investor countries) and is related to the size of Colombia's GDP. The impact of the partner's GDP variable is positive and greater (71.6%) than in the previous model for FDI inflows into the nation. This confirms earlier findings by Rothgeb (1988), who identified a positive correlation in Latin America between FDI inflows and economic growth, especially in the construction, transport and telecommunication sectors. We further confirm findings by Li and Liu (2005) of a positive correlation between FDI and economic growth due to their positive influence on human capital, captured here via labour productivity.

Concerning the Colombian exports and Colombian imports variables, the effect of the former on FDI inflows turns positive in this model (33.8%), while that of the latter remains insignificant. Furthermore, the inclusion of a proxy for the labour competitiveness of Colombia and its partners shows the increase in Colombia's labour productivity benefiting its FDI inflows by 175.5% and the increase in the partner's labour productivity benefiting Colombian FDI inflows by 52.1%. However, the most relevant aspect of the inclusion of the labour competitiveness variable is that the reset test is highly significant (0.947), which suggests that model 2 is very well specified.

Model 3 yields very similar results to model 2. In this model, however, the Colombian labour competitiveness variable became insignificant, while the labour competitiveness of Colombia's partners shows a greater effect on FDI inflows into Colombia. The influence of the rule of law variable on Colombian FDI inflows is great (280%), which suggests that the strength of the business environment is a critical factor in attracting investment to Colombia. The reset test in this model displays the best specification (0.9924) of all the models proposed in this study.

<sup>3</sup> One of these omitted variables is the possibility that Colombia is a tax haven. We have not found any expository evidence that Colombia is acting as a tax haven for neighbouring countries and therefore exclude this possibility from explicit consideration in our analysis.

Lastly, model 4 also has very similar coefficients to model 3. This model addresses an aspect that has particularly influenced the evolution of Colombia since the second half of the twentieth century, namely violence and terrorism, and yields an unexpected result: a negative effect (-41.5%) for 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 decrease. The model yields a very high result for the reset test, which further supports our findings.

## VI. Discussion

The findings obtained by estimating the proposed models allow us to delve into the characteristics of inward FDI in Colombia.

Regarding the control variables, most of the proposed models show a common language benefiting Colombian FDI inflows, unlike the contiguity variable, which has an adverse effect on them. These results explain why some of the largest investors in Colombia are Spain, Mexico and Chile. Additionally, the statistical significance of the landlocked (negative sign) and Colombian exports (positive sign) variables bears out the claim by Garavito, Iregui and Ramírez (2014) that FDI inflows to Colombia favour companies which carry out foreign trade activities, since these activities are generally impaired when countries are landlocked.

Concerning the variables related to trade integration, investment and economic size, the first thing to note is the remarkable effect on FDI in Colombia when the partner is an OECD member. This finding is confirmed by the fact that the main investors in the country are members of the organization. The PTA variable exhibits an adverse impact on FDI inflows into Colombia, which contradicts the argument of Büthe and Milner (2008) that trade agreements are associated with a liberal foreign economic policy and therefore should indirectly promote FDI flows. However, the finding is consistent, in particular, with those obtained by Abreo, Bustillo and Rodríguez (2022) regarding the negative effect of FTAs on Colombian goods exports, showing that this type of agreement is detrimental not only to exports of goods but also to FDI inflows into the country. Colombian policymakers should, though, treat the BIT variable as a particularly crucial determinant in the attraction of FDI to the country, since in each of the proposed models this variable emerges as one that can be managed and controlled to some extent by governments, unlike the other determinants measured. The prominent positive impact of the BIT variable on Colombian FDI inflows is in line with the empirical findings of Egger and Pfaffermayr (2004), who affirm that investment agreements facilitate FDI flows, something that is confirmed by the entry into force of 2,227 BITs since 1959 (United Nations, 2022).

Furthermore, the partner's labour competitiveness variable proved statistically significant and highly positive in all the models it was included in. This suggests that an increase in labour productivity in Colombia's partners should increase investment flows to the country. However, only in model 2 are Colombian labour competitiveness and the labour competitiveness of the partner country significant at the same time, and the effect on FDI attraction is found to be substantial when variables such as the rule of law and political stability and absence of violence/terrorism are not included. This result should be noted by public policymakers focused on improving labour productivity in the country, because it suggests that labour productivity is a key variable in the attraction of inward FDI, and labour productivity in Colombia, according to OECD (2019), is declining.

The results relating to perceptions 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 is a critical underpinning of these flows. This finding is supported by the introduction of a series of legal reforms in recent decades (Ramírez and Quintero, 2019; Velosa, 2019) to provide a more attractive legal environment in respect of contract enforcement, property rights and law enforcement, which allows the effectiveness of these

measures in attracting FDI flows to Colombia to be verified. The finding is also partially supported by those obtained by Abreo, Bustillo and Rodríguez (2021), who identify the rule of law variable as a leading positive factor in Colombian exports.

However, the findings for the effect of the political stability and absence of violence/terrorism variable, contradicting the usual assumptions, denote an almost natural relationship between terrorism and violence and the attraction of FDI inflows, calling into question 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, the Revolutionary Armed Forces of Colombia – People’s Army (FARC-EP), during the last government of former President Juan Manuel Santos) in attracting FDI to the country. Maher (2015) argues that violence 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 a country, with Colombia being an example. This claim both extends and calls into question those of Caves (1992) about the positive effects of FDI on an economy, with the argument that in countries with violent contexts such as Colombia, there is actually a positive relationship between FDI inflows and increased violence. While seemingly contradicting the literature, these results are to be expected given the conflict situation(s) in Colombia and the various alliances that have emerged between paramilitary groups, foreign companies and political actors. These alliances have been described in detail in the study by Grajales (2017), which corroborates our empirical finding of a link between violence and increased economic activity. To go into the methodology used to calculate these alliance indicators would produce a different type of study, and we leave it to further research. Lastly, the results obtained in relation to the combined influence of the rule of law variable and the political stability and absence of violence/terrorism variable might also be considered contradictory, since it could be supposed that these indicators were complementary to a certain extent and that their evolution should have a high correlation, but from the results obtained we can affirm that this is not the case.

Lastly, two domestic issues are worth analysing as relevant for future FDI inflows into Colombia. First, the recent enactment of the so-called Total Peace legislation 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 (Office of the President of Colombia, 2022). Second, the growing recent uncertainty surrounding the energy transition policies proposed by the current President could affect the fuels industry, the country’s largest. The proposal provides for the possibility of ceasing to grant new licences for oil exploration and eventual exploitation, Colombia’s main source of foreign exchange (Government of Colombia, 2022). These two issues, along with others, could be crucial determinants of FDI inflows into the country in the coming years.

## VII. Conclusions

This study provides some facts concerning the characteristics of FDI inflows into Colombia, using a gravity model of the relationships between Colombia and 204 countries. It includes variables that, to differing degrees, determine the attraction of FDI inflows by Colombia. These are incorporated into four models that, by employing an augmented specification of the traditional gravity model, identify the extent to which the variables included promote the entry of investment flows into Colombia.

Although most of the variables included show the expected effects on FDI inflows into Colombia, we would like to highlight some important items of evidence. First, FDI inflows into Colombia are notably higher when the partner is an OECD member. Conversely, they are lower when a PTA is in force between Colombia and the country concerned. The BIT variable has a substantial impact on the attraction of FDI to Colombia. This could be the most promising factor for boosting FDI inflows to the nation by

means of government agreements. Its key characteristic is that, unlike other variables that exhibit a capacity to promote FDI inflows into Colombia, such as labour productivity, the level of exports and Colombia's and the partner's GDP, improvements in which depend on multiple factors, the BIT factor can be achieved through the determination of the Colombian government via a focus on foreign policy actions to sign investment agreements.

The rule of law variable, as expected, is shown to have an extremely large effect on the attraction of FDI in Colombia, suggesting that any improvement focused on strengthening the law and protecting foreign investments will facilitate and promote inward investment into the country. Conversely, the finding for the political stability and absence of violence/terrorism variable is that the amount of inward FDI in Colombia increases when violence and terrorism intensify. This finding may help us to understand the complexity of the armed conflict in Colombia and its endemic relationship, in this case, with FDI inflows. This means that the so-called Total Peace legislation of the government of the current Colombian President, Gustavo Petro, which aims to build peace processes with various illegal armed actors on the right and left of the political spectrum, while its implications for the evolution of the country's internal armed conflict are currently unknown, is likely to condition FDI inflows, considering the significant effect of institutional variables on the attraction of FDI to Colombia. Lastly, further research could examine the characteristics of FDI inflows into Colombia by economic sector to identify the factors that facilitate or hinder this type of investment in the different areas of the country's economy.

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# Annex A1

**Table A1.1**  
Model estimation results

Variable	Model (1)	Model (2)	Model (3)	Model (4)
Log distance <sub>jCol</sub>	-1.446*** (-0.441)	-1.142*** (-0.358)	-1.150*** (-0.357)	-1.142*** (-0.358)
Common language <sub>jCol</sub>	0.077 (-0.554)	1.042** (-0.505)	1.072** (-0.508)	1.038** (-0.505)
Contiguity <sub>jCol</sub>	1.200** (-0.582)	1.057 (-0.733)	1.04 (-0.734)	1.056 (-0.734)
Landlocked <sub>jCol</sub>	-1.285** (-0.569)	-0.954** (-0.443)	-0.920** (-0.446)	-0.954** (-0.445)
Organisation for Economic Co-operation and Development <sub>Col</sub>	-0.389* (-0.204)	1.272*** (-0.431)	1.269*** (-0.43)	1.281*** (-0.433)
Organisation for Economic Co-operation and Development <sub>t</sub>	2.322*** (-0.43)	-1.793*** (-0.646)	-1.587** (-0.632)	-0.66 (-0.85)
Preferential trade agreement <sub>jCol</sub>	-1.505*** (-0.409)	0.716*** (-0.151)	0.744*** (-0.153)	0.714*** (-0.151)
Bilateral investment treaty <sub>jCol</sub>	1.456*** (-0.388)	0.338*** (-0.101)	0.338*** (-0.1)	0.340*** (-0.1)
Log gross domestic product <sub>Col</sub>	-0.072 (-0.418)	-0.037 (-0.101)	-0.047 (-0.103)	-0.038 (-0.1)
Log gross domestic product <sub>t</sub>	0.308** (-0.136)	-0.947*** (-0.322)	-0.921*** (-0.322)	-0.943*** (-0.321)
Log Colombian exports <sub>Colij</sub>	0.269 (-0.172)	-0.165 (-0.139)	0.357** (-0.147)	-0.033 (-0.14)
Log Colombian imports <sub>jCol</sub>	-0.055 (-0.092)	1.328** (-0.541)	1.267** (-0.538)	1.327** (-0.543)
Log labour competitiveness <sub>Col</sub>		1.755** (-0.764)	1.016 (-0.778)	0.527 (-0.998)
Log labour competitiveness <sub>j</sub>		0.521*** (-0.13)	0.539*** (-0.132)	0.522*** (-0.13)
Log rule of law <sub>Col</sub>			2.800*** (-1.014)	
Log political stability <sub>Col</sub>				-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

**Source:** Prepared by the authors.

**Note:** See table 1 for details of the model variables. Robust standard errors in parentheses. Negative FDI values are replaced by the value 1. \*, \*\* and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

## Annex A2

**Table A2.1**  
List of countries and territories included in the study

Afghanistan	Brazil	Democratic People's Republic of Korea	Guatemala	Libya	Netherlands (Kingdom of the)	Saint Lucia	Timor-Leste
Albania	British Virgin Islands	Democratic Republic of the Congo	Guinea	Lithuania	New Zealand	Saint Vincent and the Grenadines	Togo
Algeria	Brunei	Denmark	Guyana	Luxembourg	Nicaragua	Samoa	Tonga
American Samoa	Bulgaria	Dominica	Haiti	Macao	Niger	San Marino	Trinidad and Tobago
Andorra	Burkina Faso	Dominican Republic	Honduras	Madagascar	Nigeria	Sao Tome and Principe	Tunisia
Angola	Burundi	Ecuador	Hong Kong, China	Malawi	Norfolk Island	Saudi Arabia	Türkiye
Anguilla	Cambodia	Egypt	Hungary	Malaysia	North Macedonia	Senegal	Turkmenistan
Antigua and Barbuda	Cameroon	El Salvador	Iceland	Maldives	Norway	Serbia	Turks and Caicos Islands
Argentina	Canada	Equatorial Guinea	India	Mali	Oman	Seychelles	United Arab Emirates
Armenia	Cape Verde	Eritrea	Indonesia	Malta	Pakistan	Sierra Leone	United Kingdom
Aruba	Cayman Islands	Estonia	Iran (Islamic Republic of)	Marshall Islands	Palau	Singapore	United States
Australia	Central African Republic	Ethiopia	Iraq	Mauritania	Panama	Slovakia	Uganda
Austria	Chad	Faeroe Islands	Ireland	Mauritius	Papua New Guinea	Slovenia	Ukraine
Azerbaijan	Chagos Archipelago	Fiji	Israel	Mexico	Paraguay	Solomon Islands	Uruguay
Bahamas	Chile	Finland	Italy	Micronesia (Federated States of)	Peru	Somalia	Uzbekistan
Bahrain	China	France	Jamaica	Moldova	Pitcairn	South Africa	Vanuatu
Bangladesh	Comoros	French Polynesia	Japan	Mongolia	Philippines	Spain	Venezuela (Bolivarian Republic of)
Barbados	Congo	Gabon	Jordan	Montenegro	Poland	Sri Lanka	Viet Nam
Belarus	Cook Islands	Gambia	Kazakhstan	Montserrat	Portugal	Sudan	Yemen
Belgium	Costa Rica	Georgia	Kenya	Morocco	Qatar	Suriname	Zambia
Belize	Cote d'Ivoire	Germany	Kuwait	Mozambique	Republic of Korea	Sweden	Zimbabwe
Benin	Croatia	Ghana	Kyrgyzstan	Myanmar	Romania	Switzerland	
Bermuda	Cuba	Gibraltar	Lao People's Democratic Republic	Namibia	Russian Federation	Syrian Arab Republic	
Bolivia (Plurinational State of)	Curaçao	Greece	Latvia	Nauru	Rwanda	Tajikistan	
Bonaire, Sint Eustatius and Saba	Cyprus	Grenada	Lebanon	New Caledonia	Saint Helena	Tanzania	
Botswana	Czechia	Guam	Liberia	Nepal	Saint Kitts and Nevis	Thailand	

**Source:** Prepared by the authors on the basis of World Bank, *Countries and Economies* [online] <https://data.worldbank.org/country>.