mathematics

MDPI

Article

Do Trade and Investment Agreements Promote Foreign Direct Investment within Latin America? Evidence from a Structural Gravity Model

Marta Bengoa [1,2,*], Blanca Sanchez-Robles [3] and Yochanan Shachmurove [4,5]

1 Colin Powell School, City University of New York (CUNY-CCNY), New York, NY 10031, USA
2 SARChI College of Business and Economics, University of Johannesburg South Africa, Senior Fellow at CIRANO, Montreal, QC H2Y1C6, Canada
3 Department of Economic Analysis at UNED University, 28040 Madrid, Spain; bsanchez-robles@cee.uned.es
4 The City College and Graduate Center of the City University of New York (CUNY-CCNY), New York, NY 10031, USA; yshachmurove@ccny.cuny.edu
5 Faculty of Management at The University of Warsaw, 00-927 Warsaw, Poland
* Correspondence: mbengoa@ccny.cuny.edu

Received: 28 September 2020; Accepted: 21 October 2020; Published: 30 October 2020

Abstract: Latin America has experienced a surge in foreign direct investment (FDI) in the last two decades, in parallel with the ratification of major regional trade agreements (RTAs) and bilateral investment treaties (BITs). This paper uses the latest developments in the structural gravity model theory to study if the co-existence of BITs and two major regional agreements, Mercosur and the Latin American Integration Association (ALADI), exerts enhancing or overlapping effects on FDI for eleven countries in Latin America over the period 1995–2018. The study is novel as it accounts for variations in the degree of investment protection across BITs within Latin America by computing a quality index of BITs. It also explores the nature of interactions (enhancing/overlapping effects) between RTAs and BITs. The findings reveal that belonging to a well-established regional trade agreement, such as Mercosur, is significantly more effective than BITs in fostering intra-regional FDI. Phasing-in effects are large and significant and there is evidence of enhancing effects. Results within the bloc are heterogeneous: BITs exert a positive, but small effect, for middle income countries. However, BITs are not effective in attracting FDI in the case of middle to low income countries, unless these countries ratify BITs with a high degree of investment protection.

Keywords: foreign direct investment; bilateral investment treaties; regional trade agreements; structural gravity model

1. Introduction

Foreign Direct Investment (FDI) into and across Latin America has experienced a dynamic performance in the last few decades. In parallel, many countries in the area have taken part in regional trade agreements (RTAs) and bilateral investment treaties (BITs). RTAs foster trade by facilitating access to foreign markets. Sometimes they contain provisions about FDI which enhance these flows. BITs specify conditions under which foreign investment operates in the host country. This paper addresses the following questions: What is the relative importance of RTAs versus BITs as a way of attracting FDI? Do effects differ depending on the nature of the BITs and the presence of other agreements? Do they complement or substitute for economic and political institutions? There is substantial controversy in the empirical literature about these matters.

Some contributions have argued that host countries should exhibit a certain minimum level of income or other forms of social capacity in order to profit from FDI [1,2]. Nevertheless, it is frequent for

developing countries to lack, at least partially, the necessary environment (human capital, rule of law, institutions, etc.) for efficient activity of multinational enterprises (MNEs). This raises the question of whether the impact of RTAs and BITs on FDI might be contingent on the institutional framework of the host country.

Specifically, this paper addresses three questions:

(i) What is the impact of regional agreements and BITs on intraregional FDI in Latin America? In particular, the paper focuses on the FDI creation and diversion effects of the two main RTAs in the region, Mercosur (Southern Common Market) and ALADI (The Latin American Integration Association). The study explores the relative effectiveness—interaction and complementarity—of trade and investment treaties regarding their impact on FDI.
(ii) Do the qualitative aspects of BITs, as measured by a new index, matter for their efficacy?
(iii) Do the specific institutional characteristics of recipient countries determine or condition the effectiveness of major RTAs and BITs?

The framework of a structural gravity model for FDI is used for this purpose (see [3], for a thorough exposition). The structural gravity model in economics, inspired by its physic counterpart, has recently acquired popularity as an appropriate tool for analyzing international trade and investment. According to this model, bilateral flows/stocks among countries are directly related to their sizes (usually captured by their Gross Domestic Product or GDPs) and inversely related to the distance between them. This framework combines an intuitive appeal, which can be rigorously founded on theoretical propositions, with strong predicting capabilities.

The study constructs a panel data detailing intra-regional bilateral FDI stocks among eleven Latin American countries over the period 1995–2018. It takes into account BITs' quality in terms of the degree of investment protection they warrant, cross-country differences in endowments, and level of developed institutions. The paper employs the Poisson pseudo-maximum likelihood estimator (PPML), as recommended by [4]. It addresses the potential endogeneity derived from the establishment of RTAs and BITs as well as the robustness of the results to alternative estimations. The main findings suggest that Mercosur exerts a larger impact than either ALADI or the presence of BITs on intra-bloc foreign direct investment. This is also true when controlling for investment protection strength. However, BITs are effective in fostering intra-regional FDI in Latin America when there is a sizeable degree of institutional development in the host country or a high degree of investment protection entailed by the treaty. Furthermore, the interaction of Mercosur, ALADI and BITs positively impacts FDI. The effects of BITs are larger for middle income than in low-middle income economies. The results are consistent with those obtained for other areas of the world [5–7].

This paper focuses on Latin America since the subcontinent is composed of developing and middle-income countries, whose population have the potential to substantially improve their living conditions. Therefore, it is of the utmost importance from a development viewpoint. Furthermore, the area is in the midst of undergoing an active and complex integration process, in which countries have engaged historically in different, often conflicting, approaches to trade liberalization and FDI. In addition, the empirical literature exploring FDI in the area is scarce as well as reaching ambiguous results. More generally, South-South empirical studies of the impact of RTAs and BITs on FDI for developing countries are still sparse. Finally, the area comprises countries which exhibit a substantial degree of heterogeneity, while sharing common aspects. It is, therefore, an appropriate sample for an empirical investigation.

This paper lies at the intersection of several strands of the literature. On one hand, it is closely related to contributions exploring FDI from a theoretical and empirical viewpoint [8–11]. On the other hand, it builds upon analyses conducted within the structural gravity model see [3,12–15]. Additionally, it is similar in spirit to papers which examine the impact of BITs on FDI [7,16–18]. Finally, Dixon and Haslam's work [17] analyze the impact of BITs on FDI in several samples, one of them of intraregional Latin American flows. Their results for this subsample are somewhat puzzling, since they suggest that

the interaction of weak BITs and RTAs has a negative impact on FDI for this area. This study extends and complements these previous studies.

This paper contributes to the literature in four dimensions. First, and in terms of methodology, we work with a fully specified structural gravity model expressly accounting for multilateral resistance terms among countries. Second, and as a consequence of methodological differences, the results are more in accordance with the underlying theoretical framework than other contributions, and very robust to alternative specifications. Third, the study accounts for variations in the quality of BITs through computing a quality index. Refs [7,18] analyze the effects of BITs by means of an index capturing dispute settlement mechanisms. This study extends and complements these analyses by designing a more thorough index of BITs, encompassing a wider set of BIT clauses potentially important for investors. The samples are also different, since they work with a large number of developed and developing countries, while the focus of this study is Latin America. Additionally, this paper explores the possibility of enhancing or overlapping effects when there are major RTAs in place coexisting with BITs. Finally, the analysis here covers the largest temporal horizon possible by working with bilateral data over 1995–2018.

In particular, the paper suggests that the interaction of Mercosur and BITs has a positive and significant impact on FDI whereas the combination of ALADI and BITs also displays a positive effect, although smaller in size and less significant. The study also explores the heterogeneity within the country sample according to their income levels.

The structure of the paper is as follows: Section 2 provides insights about the main RTAs and BITs in Latin America and discusses the links between RTAs, BITs, and foreign direct investment, summarizing the relevant literature. Section 3 describes the theoretical model that underlies our empirical work. Section 4 presents the data and develops the empirical methodology. Section 5, presents the results. Section 6 concludes.

2. An Overview of Integration Agreements in Latin America and the Links between RTAs, BITs and FDI

Mercosur was signed in 1991 by Argentina, Brazil, Paraguay and Uruguay. Mercosur was designed to be a customs union, with a free intra-zone trade and a common trade policy. Bolivia entered in 2006 but has not been recognized as a full member by the other members. Venezuela joined in 2015 and has since been suspended from the Treaty. Chile, Colombia, Ecuador, Peru, Guyana and Suriname are associated members. Mexico signed a deep FTA in 2006 and it has the status of observer. Members started to lower their tariffs in 1991 and the tariff schedule varies in the range 0%–20%. Approximately 90% of trade was liberalized by 1997. Mercosur included protocols for BIT protection and investor-state dispute settlement (ISDS) mechanisms; however, they have never been enforced. Mercosur engaged in negotiations with other Latin American countries to establish free trade agreements (FTAs). The FTAs provide substantial levels of integration between Mercosur and third countries, named associated members. The associated members are Chile, Colombia, Ecuador, Peru, Guyana, and Suriname. FTAs aimed to reduce tariffs to the same levels as Mercosur and diminish non-tariff barriers, facilitating trade and investment. The online Appendix A exhibits the sequence of the signatories of the FTAs.

The Latin America Free Trade Association was created in 1962 as the first component of an intended large integration project. It was superseded by ALADI in 1980. ALADI provides a general framework which intends to foster integration in the region and guarantee its economic and social development. It is not a deep integration mechanism per se. From that starting point, individual countries have strengthened their integration process by gradually engaging in bilateral or multilateral treaties with other ALADI members. De facto, ALADI now encompasses various free trade agreements within its framework. Not all countries within ALADI have yet established substantial/deep trade agreements among themselves. The countries under the ALADI umbrella are: Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Paraguay, Panama, Peru, Uruguay, and Venezuela.

Hence the gradual integration that ALADI envisaged is still in process. Table A1 of the online Appendix A summarizes the pairs of countries, under the general ALADI scheme, involved over time in FTA agreements.

Latin American countries have signed an increasing number of BITs between 1995 and 2007, although the attitude of countries towards these agreements is not uniform. Chile has been very active and takes part in seven BITs, which include clauses with a high degree of protection to foreign investors. Colombia and Mexico, instead, have only signed one and two BITs respectively, with a lower degree of investment protection. During our period of analysis Brazil has not ratified any BIT, but since 2015 the country has negotiated, but not concluded, BITs with Mexico, Chile, Colombia and Peru (for a more detailed account see the United Nations Commission for Trade and Development (UNCTAD), 2017). Table A2 of the online Appendix A offers the list of BITs and their dates of entry into force.

2.1. The Relationship between Regional Trade Agreements and Foreign Direct Investment

The literature has traditionally focused on the distinction between horizontal and vertical types of foreign investment. Horizontal (or proximity concentration) FDI undertakes all production in the country whose market it intends to serve, thus substituting trade between the parent firm and affiliates Refs [8,19]. High trade barriers incentivize the setup of proximity-concentration FDI and therefore RTAs do not necessarily impact horizontal FDI positively [10].

Vertical FDI, instead, carries out each step of the production process in a different location, in order to minimize costs through scale economies and/or benefit from the low cost of inputs [20]. This implies an active exchange of intermediate and final goods between parents and affiliates. Vertical MNEs benefit from the trade liberalization which an agreement entails; hence RTAs exert a positive impact on vertical FDI.

On the other hand, US multinationals abroad seem to be organized in a horizontal pattern, although frequently MNE parent firms own vertically linked affiliates [11]. The combination between horizontal and vertical features follows what has been named a hybrid-knowledge capital model [9]. A particular case is the export-platform strategy [21]: companies set up a plant in a country belonging to a trade bloc in order to improve their access to other markets in the bloc. In these instances, net effects of trade integration are more nuanced and non-predictable a priori, since they depend on the relative importance and complex relationships between horizontal and vertical integration patterns within the firms.

Additionally, RTAs may also alter the macroeconomic environment where firms operate by strengthening fiscal discipline, macroeconomic stability and the rule of law in the host country [22–24]. Therefore, they might provide a more favourable setting to attract FDI.

Since the net impact of RTAs on aggregate FDI is a priori ambiguous, due to the intertwining of different forces described previously, the connection between RTAs and FDI is an empirical issue. Related evidence is not unanimous, though. A number of contributions report a positive impact of RTAs on FDI. With respect to the case of Mexico and NAFTA, ref [24] find a non-significant effect. For the European Union [25] documents a similar result (although the effect gradually decays). Ref [13] asserts that trade liberalization favoured the relocation of FDI from West to East Europe in the 90s, partly based upon export platform motives. Finally, these studies document a positive impact of trade agreements on FDI for a sample of OECD and non-OECD countries (see [10,26]).

In the case of the Canada–US Free Trade Agreement (CUSFTA) on FDI flows [24], no significant effect was found. For Latin America, Ref [22] identify pro-market and stable macroeconomic policies as the main factors attracting FDI, but an important role for Mercosur was not found. Finally, there are contributions suggesting that the impact of RTAs on FDI is contingent on other factors, such as skill differences in the home and host country [27], the institutional, financial, and macroeconomic framework of the host country [28], and the features of the agreement itself [16].

The lack of consensus in the literature might be due to the use of different identification strategies and econometric methods, such as the set of control variables included in the equations, the specification of fixed effects, and the estimation procedures. This paper contributes to shedding light on these issues.

2.2. Bilateral Investment Treaties and Foreign Direct Investment

The literature has identified three main theoretical reasons why BITs may impact FDI: they *signal* that signatory governments are willing to create an adequate institutional and economic environment for FDI [29,30]; they provide an *insurance* for foreign investors by establishing compensation schemes and conflict resolution procedures; they *deter* non-compliance because of the potential reputation costs for countries breaching the treaties [7]. When BITs are considered as signals, they may attract FDI from both partner and non-partner countries. If BITs are considered as insurers or deterrents, though, the attraction of FDI from partners will be higher than from non-partners, albeit both will be positive.

The first wave of empirical contributions about the impact of BITs on FDI addressed the link between the presence of a BIT and FDI, while more recent research focuses on the association between the nature of the BIT (as summarized by a set of characteristics) and the attraction of flows. In general, results from both cases are mixed. These studies [6,29,31–33] report a positive impact of investment treaties on FDI. In addition, Ref [12] found that the (positive) long-run effect of BITs on FDI is larger than the short-run impact because of phasing in effects. Following refs [30,33], BITs act as substitutes for weak legal and regulatory institutions in the host country.

Other studies, refs [34–37], instead, do not find a link between BITs and FDI. Tobin and Rose-Ackerman [38] suggest that BITs do not impact FDI when considered in isolation, but that they exert a positive effect when interacting with institutional or fundamental variables, thus concluding that BITs complement institutions in the host country.

The strand of the literature which deals with the nature of BITs is more recent in time and sparser. These contributions consider not only the number of BITs in place but also their key qualitative aspects. They usually work with bilateral data (as opposed to aggregate), which allows an investigation the link between a particular BIT signed by a pair of countries and the inflows between that same pair of countries.

A key feature of BITs is the treatment of dispute settlement procedures but results here are not uniform either. The impact of BITs on North-South and South-South FDI flows over the period 1990–2008 is the focus of the study by Dixon and Haslam [17]. They construct an index to capture more thoroughly the degree of FDI protection entailed by each BIT, including, but not restrained to, dispute settlement procedures (see their online Appendix A for classification). Their empirical results suggest that only treaties providing a strong degree of protection to investment impact FDI.

Frenkel and Walter's work [18] focuses on dispute settlement procedures. In the spirit of [17], they construct an indicator for each BIT by adding the assigned scores to various features. They show that the strength of the dispute settlement mechanisms is positively correlated with FDI. A recent study [7] concentrates on the effects of dispute settlement mechanisms on both partner and non-partner countries. They suggest that BITs have a positive impact on FDI from partner countries if a dispute with an investor has not affected the host country.

This paper builds partially on these contributions. Alternatively to the Dixon and Haslam study [17], it uses a gravity model with bilateral data which enables us to identify the impact of particular BITs on their own signatories. The analysis is not restricted uniquely to the quality of BITs dispute settlement mechanisms, as in previous studies [7,18].

It follows from the above that results regarding the connection between the existence and/or characteristics of BITs and FDI are mixed so far. As in the case of RTAs, some of the discrepancies may relate to econometric aspects such as the definition of the variable capturing the BITs, the strategy of controlling for endogeneity and phasing-in effects, the estimation techniques, and the use of aggregate versus bilateral data. Moreover, there is no consensus about the key characteristics of a BIT and how to measure them. Finally, it is not clear either if BITs have a differential impact in countries with weak

versus strong institutions. On the one hand, they may substitute for institutions by giving credibility to governments, (as claimed by [30–33]). On the other, they act as complements since strong institutions lend support to treaties [38]. Ultimately, this is a multifaceted issue related to geography, the quality of institutions, the nature of the agreements, the rule of law, and other idiosyncratic aspects of the country itself.

3. Theoretical Framework: The Gravity Model for FDI

The gravity model has been extensively used to study international trade flows. Further theoretical and empirical advances allow its use as a framework to study FDI [39]. The gravity model is compatible with a theoretical model of heterogeneous multinational firms. Moreover, it conveniently allows us to capitalize on the rich information embedded in databases organized around dyads of countries (home/parent country origin of FDI flows and host/receptor of FDI flows); this feature is especially relevant for this paper because we study how RTAs and bilateral BITs signed across Latin American countries impact intra-bloc bilateral FDI.

In addition, the disaggregation by country pairs over time increases the number of observations available to explore the panel dimension. Finally, recent contributions have been actived in designing adequate techniques to circumvent econometric issues associated with the gravity equation, such as the inclusion of fixed effects [40], or the presence of many zeros in the data [4].

While the gravity equation for trade now has a solid theoretical background, the development of theoretical gravity FDI models is more recent. The Head and Ries' model [41] serves as baseline for this paper, but we consider technology as non-rival as in [9]. This analysis follows, as well, Anderson and Yotov's model [42] in developing an intuitive FDI gravity equation, similar to the structural gravity system for trade, which is possible to estimate directly.

The FDI structural system is also similar in spirit to the trade structural gravity model [43,44]. It departs from a definition of bilateral FDI:

$$FDI_{ij,t}^{stock} \equiv \omega_{ij,t}^{\varepsilon} M_{i,t} \tag{1}$$

where $FDI_{ij,t}$ represents FDI stocks between countries i and j at a time t, $M_{i,t}$ is the non-rival aggregate technology capital stock in a particular time, ω_{ijt} represents openness (or barriers to FDI) for foreign technology coming from country i to country j, and ε is the elasticity of FDI with respect to openness. To transform FDI stocks into values we multiply Equation (1) by its marginal product:

$$FDI_{ij,t}^{stock,value} \equiv \omega_{ij,t}^{\varepsilon} M_{i,t} \frac{\partial Y_{j,t}}{\partial M_{i,t}} \tag{2}$$

in which $M_i = \phi_i \frac{E_i}{P_i}$, where E_i represents total expenditures of country i which equal the country's output plus net rents from foreign investment, P_i stands for consumer prices (which can be considered as a multilateral resistance since higher prices for goods and inputs can affect FDI), and Y is nominal output. The production function is Cobb Douglas. Therefore $\frac{\partial Y_j}{\partial M_i} = \phi_j \frac{Y_j}{M_i}$; Y_j equals $Y_t = \sum_j Y_{j,t}$. Solving the representative agent's problem delivers a structural system for the steady-state. The gravity system of equations is given by:

$$FDI_{ij} = \phi_i \phi_j \omega_{ij}^{\varepsilon} \frac{E_i}{P_i} \frac{Y_j}{M_i} \tag{3}$$

$$P_i = \left[\sum_{j=1}^{N} \left(\frac{\tau_{ji}}{\Pi_j} \right)^{1-\sigma} \frac{Y_j}{Y} \right]^{\frac{1}{1-\sigma}}, \tag{4}$$

$$\prod_j = \left[\sum_{i=1}^{N} \left(\frac{\tau_{ji}}{P_i} \right)^{1-\sigma} \frac{E_i}{Y} \right]^{\frac{1}{1-\sigma}}. \tag{5}$$

where P_i denotes the aggregate price index or the multilateral resistance, as defined in [43], and τ_{ji} represents standard iceberg trade costs. Equation (3) establishes that FDI between two countries depends positively on the home country size E_i and the size of the host economy Y_j. According to Equation (3), FDI depends negatively on FDI barriers $\phi_i\phi_j$. Higher multilateral resistances (MR) in the country of origin or higher opportunity cost of investing in technology should lead to lower FDI. ω_{ij} takes the form:

$$\omega_{ij,t} = d_{ij}^{\beta_1} \cdot \exp\left(\beta_2 X_{ij,t}\right) \tag{6}$$

where d_{ij} stands for the bilateral distance between the countries and $X_{ij,t}$ is a set of variables that capture both deterrents and incentives for FDI. This includes the variables Mercosur, ALADI, and BITs, as well as the BIT investment protection index (details are included below). The analysis adds control for other common institutional characteristics, differences in factor endowments, and labor costs. It also includes time-invariant covariates such as distance and adjacency. It is possible to transform Equation (3) into a baseline specification that includes time-varying bilateral determinants, factors that are specific to the country of origin or destination, and time-invariant variables affecting FDI:

$$X_{ij,t} = \sum_{h=1}^{H} \alpha_h Z_{i,t}^h + \sum_{r=1}^{R} \alpha_r Z_{j,t}^r + \sum_{m=1}^{M} \alpha_m Z_{ij}^m + \sum_{k=1}^{K} \alpha_k Z_{ij,t}^k + \varepsilon_{ij,t} \tag{7}$$

where $X_{ij,t}$ represents FDI stocks from country i to country j in year t, $Z_{i,t}$ is a set of H variables which are specific for the country I, $Z_{j,t}$ is a set of R variables specific for the country j, Z_{ij} stands for the M time invariant variables, $Z_{ij,t}$ is a set of K time-varying variables for both countries, and $\varepsilon_{ij,t}$ is the error component. The structure of fixed effects (FE) determines which variables could be included in the regression to avoid collinearity. There are N cross sections units observed for T periods (1995–2018). An estimation caveat in Equation (7) is that the MRs are not directly observable. The following section discusses this further.

4. Data and Empirical Strategy

4.1. Descriptive Analysis

This analysis focuses on a panel dataset of 11 Latin American countries over the period 1995–2018. The countries in our sample are: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, Peru, and Uruguay. Data on FDI stocks come from the United Nations Commission for Trade and Development (UNCTAD). Our panel is organized in dyads of countries. If country i does not invest in country j in time t, the correspondent observation is zero. This structure entails that a number of observations are zero. The World Trade Organization (WTO) provides extensive data on RTAs, and BIT data comes from UNCTAD. The rest of the gravity variables come from CEPII (Centre d'Etudes Prospectives et d´Informations Internationals), Penn World Tables 8.0, World Bank, and UNCTAD (see Table A3 in the online Appendix A for definition of variables and sources). The countries in the sample account for more than 90% of GDP and FDI within the region.

Figure 1 compares the countries in our sample in terms of their FDI within Latin America. The main investor in the area is Chile, followed by Mexico, Brazil and Argentina, while the main recipients of FDI are Brazil, Argentina, and Chile. Economies with high GDP have greater capacity of attracting FDI, in accord with the gravity model.

Figure 2 displays a slight negative correlation between the total numbers of BITs in force in a country and the total FDI (R-square = 0.0987). This suggests that the link between FDI and number of BITs is more complex than expected. Therefore, the use of number of BITs per country to capture the relationship between BITs and FDI presents shortcomings and, as established in the literature review, might reflect only a signaling effect. In the empirical approach the focus turns to an analysis of the impact of a BIT signed by a pair of countries (instead of the total number of BITs a country has signed over the period) and the evolution of FDI among that pair over time. In this way it is possible to capture more thoroughly the effectiveness of establishing a particular BIT between two countries.

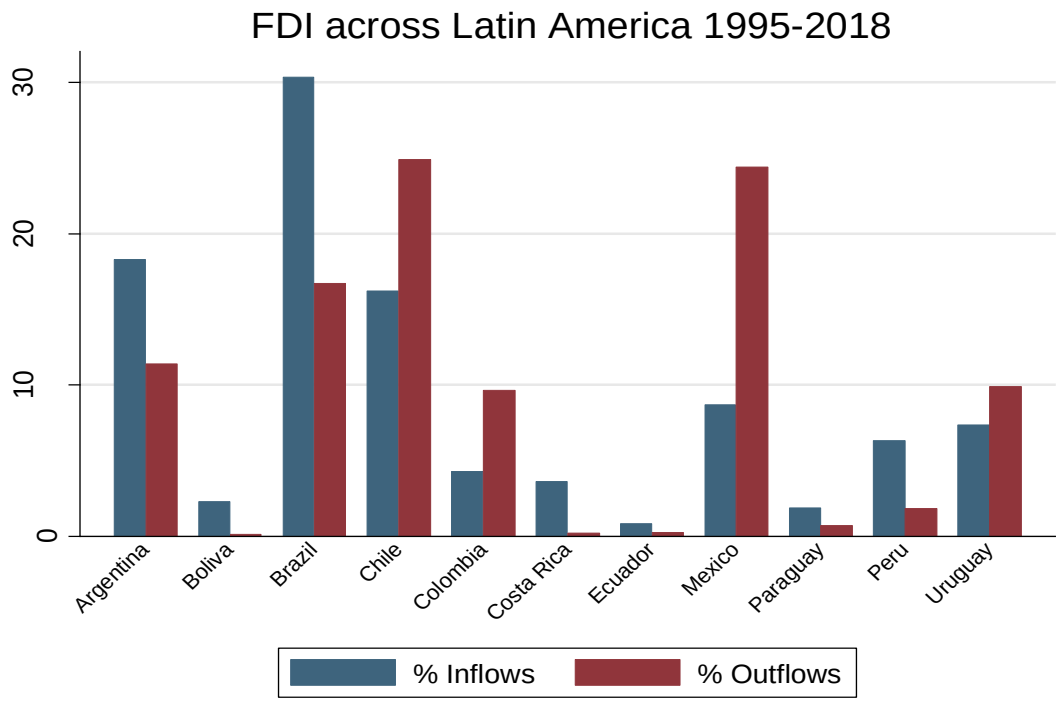

Figure 1. Intra-regional foreign direct investment (FDI) inflows/outflows in Latin America. Source: own elaboration. Vertical axis represents inflows/outflows by country over total FDI inflows/outflows in the area.

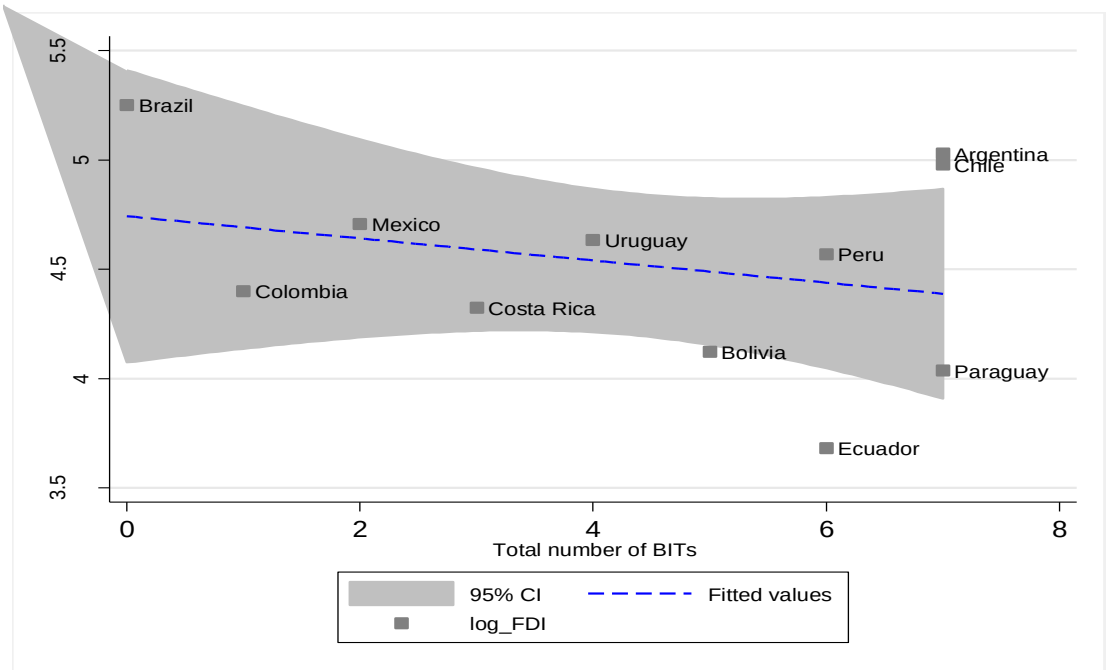

Figure 2. Intra-regional FDI vs number of bilateral investment treaties (BITs) in force (1995–2018). Source: Authors' calculations based on the United Nations Commission for Trade and Development (UNCTAD). Horizontal axis: total number of BITs in force in country j over the period 1995–2018. Vertical axis: sum of the stocks (constant dollars of 2012) received by each country j from the rest of countries in the sample.

The descriptive analysis offers some useful insights: it conveys the idea of differential patterns of intraregional FDI, a non-perfect matching between origin and destination countries across Latin America, and the need to control for size and other country characteristics.

4.2. Empirical Strategy: Estimation of the Gravity Equation for FDI

The general specification in Equation (7) raises the question about the appropriate estimation technique. One possible approach is to estimate the log-linearized gravity model by ordinary least squares (OLS). However, estimating using OLS presents several issues. First, the OLS estimation introduces bias associated with the presence of zero-FDI bilateral observations, due to the nonexistence of the natural log of zero. Therefore, estimating the model without taking into account zero observations generates biased estimated coefficients. Our FDI stock presents zeros since there are years and pair of countries that do not have FDI. Second, the log-linearization of the gravity equation changes the properties of the error term, leading to inefficient estimations in the presence of heteroscedasticity. FDI data are subject to heteroscedasticity, thus, estimating by OLS will give a log-linear residual that depends on the vector of covariates, generating inconsistent estimators.

Given the limitations that FDI presents regarding the existence of observations with zero values and the presence of heteroscedasticity, the seminal paper of Santos-Silva and Tenreyro [4] proposes to use the Poisson pseudo-maximum likelihood estimator (PPML). The PPML estimator circumvents the shortcomings of a linear model and estimates the gravity equation in its multiplicative form. Their study conveys that even when controlling for fixed effects, the presence of heteroscedasticity can generate strikingly different estimates when the gravity equation is log-linearized, rather than estimated in levels. The PPML is a special case of the Generalized Nonlinear Linear Model (GNLM) in which the variance is proportional to the mean. The authors show that this method is robust to different patterns of heteroscedasticity and resolves the inefficiency problem since it changes the distribution of the error term.

Despite the proven robustness of the PPML estimator, there are still some limitations, as heteroscedasticity might persist. The PPML estimator relies on the assumption that the variance is proportional to the mean ($\exp(x\beta)$), which may pose questions about its optimality. Additionally, PPML may present limited-dependent variable bias when a significant part of the observations is censored (which is not the case in this study).

Figure 3 sums up the main aspects of our empirical investigation.

Alternatively, and for robustness, in this study the structural gravity model is estimated using two alternative methods: Hausman-Taylor and the inverse hyperbolic sine transformation. The Hausman-Taylor method allows for the estimation of parameters of variables such as GDP, which vary only in a single dimension, and for the selection of variables considered endogenous in the model without uniquely controlling for heterogeneity by the structure of fixed effects. The inverse hyperbolic sine transformation is also adequate for estimating bilateral FDI across countries because its distribution is defined at zero.

To estimate the structural gravity model, the empirical analysis follows the methodology exposed in [3,40,45]. Therefore, this analysis includes fixed effects (FE), as opposed to random effects, since FE provide a better fit with samples encompassed by countries selected on a priori grounds [46]. It is also an appropriate technique to handle the unobservable heterogeneity potentially remaining among country pairs [47]. The variable BITs refers to those agreements that are in force, in line with the works of [13,23]. For the gravity variables, the study follows [39], who conclude that the variables more robustly correlated with FDI are the home and host country GDPs, RTAs, BITs, distance, and differences in endowments.

One of the problems when estimating Equation (7) is how to control for multilateral resistances. One natural way is to include fixed effects. Including time fixed effects and home and host fixed effects [45] is sufficiently adequate. Time fixed effects capture the business cycle, whereas country fixed effects control for all time invariant country characteristics. However, the omission of specific

effects capturing the bilateral interaction between countries could bias the estimation [40]. It is proposed to complement the main effects (time, home country and host country) with interaction effects, defined for country pairs and characterized for being time invariant, together with other country specific characteristics such as distance, contiguity, or common language.

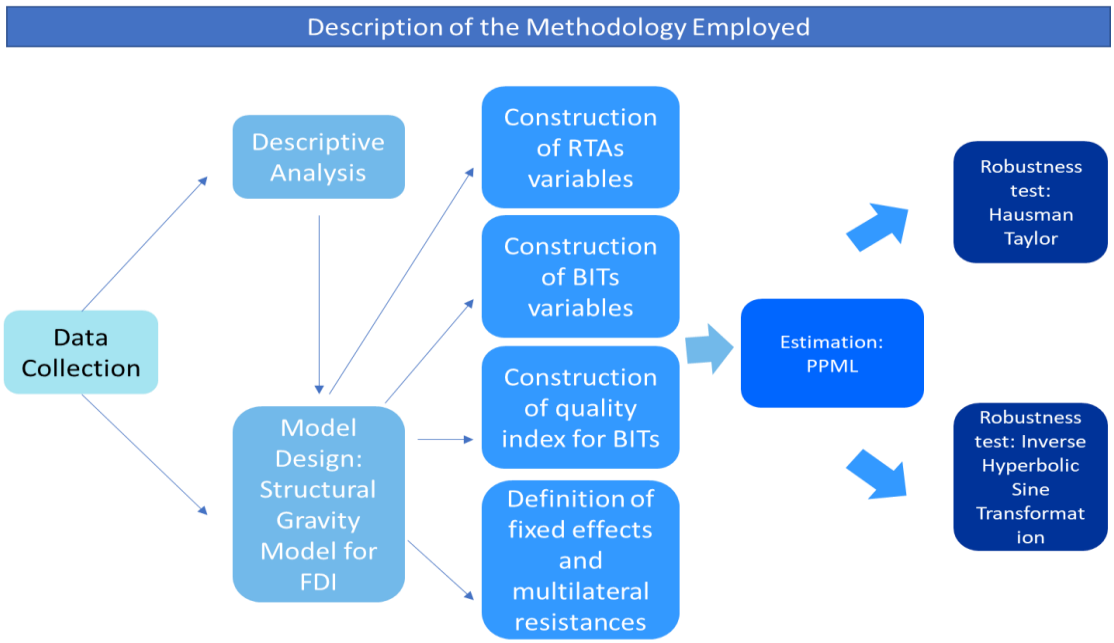

Figure 3. Empirical Model Description. Source: own elaboration. Notes: this figure displays some relevant features of our empirical investigation. Its starting point has been the collection of data from the sources detailed in Table A3. At first, descriptive analysis of the data has been carried out and discussed to inform the empirical model. The structural gravity model has been chosen as the most appropriate theoretical framework for the data. The next step has been the design and construction of different variables intended to capture the effects of regional trade agreements (RTAs) and BITs and the fixed effects. To design, code and compute these variables it was necessary to map all the agreements within Mercosur, The Latin American Integration Association (ALADI) and all the BITs, together with the design and computation of a quality index for BITs. The Poisson Pseudo-Likelihood Estimator (PPML) has been identified as the most convenient method of estimation for the model and it has been complemented with two additional robustness tests.

With respect to multilateral resistances, refs [3,48,49] suggest the inclusion of exporter time and importer time FE, taking into account that these will already capture the national output or expenditure of both countries.

In this setting, estimations may present endogeneity due to unobserved heterogeneity and reverse causality. The problem is tractable by alternative methods; this is how this study addresses this issue:

1. The analysis uses time invariant country pair fixed effects to correct for endogeneity due to unobserved heterogeneity in country pairs. In cross sections of country-pairs observed repeatedly over time, previous empirical studies suggest the inclusion of country-pair fixed effects in order to absorb the potential correlation between one or several regressors and the error term [13,47]. This way of controlling for country-pair and multilateral resistances with country-time fixed effects leads to estimates that can be interpreted as a difference-in-difference direct effect of the Mercosur, ALADI and BIT agreements on bilateral FDI.
2. If a group of countries interchange vast amounts of FDI, it is possible that they may be prompted to set up a RTA or a BIT. In this case, refs [3,47] recommend testing for endogeneity associated with reverse causation by including future leads of the RTA and BIT variables in the estimation. The empirical analysis also incorporates this approach in the estimations.

3. Additionally, the Hausman-Taylor method is used to control for endogeneity. Thus, it explicitly considers the Mercosur, ALADI and BITs variables as endogenous. Previous studies [46,50–52] apply this methodology to gravity models.

Therefore, Equation (7) can be estimated by PPML as:

$$X_{ij,t} = exp\left[\sum_{h=1}^{H} \alpha_h Z_{i,t}^h + \sum_{r=1}^{R} \alpha_r Z_{j,t}^r + \sum_{m=1}^{M} \alpha_m Z_{ij}^m + \sum_{k=1}^{K} \alpha_k Z_{ij,t}^k + \nu_i + \nu_j + \nu_t\right] + \varepsilon_{ij,t} \quad (8)$$

$$X_{ij,t} = exp\left[\sum_{h=1}^{H} \alpha_h Z_{i,t}^h + \sum_{r=1}^{R} \alpha_r Z_{j,t}^r + \sum_{m=1}^{M} \alpha_m Z_{ij}^m + \sum_{k=1}^{K} \alpha_k Z_{ij,t}^k + \nu_{i,t} + \nu_{j,t} + \nu_{ij}\right] + \varepsilon_{ij,t} \quad (9)$$

The difference between Equations (8) and (9) lies in the structure of the fixed effects. The analysis accounts for MR in Equation (9) with origin country-time (annual) and destination country-time (annual) FE. When we use country-year FE, the variables which proxy for the size of the countries drop out from the equation to avoid collinearity. The same effect applies for time invariant variables that are collinear with the country-pair FE structure.

$X_{ij,t}$ is the bilateral FDI stock in year t from country i to country j. The set of H observable variables $Z_{i,t}^h$ includes gross domestic product (GDP) in origin, and political risk in origin (we use this as control variable). The set of R observable variables $Z_{j,t}^r$ includes GDP in the recipient country, the sum of the GDP of the countries linked to the recipient by a trade agreement, and the political risk index of the recipient. The set of M observable variables Z_{ij}^m includes distance between the two countries, and adjacency (if both countries share a common border). Finally, the set of K observable variables $Z_{ij,t}^k$ includes our variables of main interest, capturing RTAs, Mercosur and ALADI, bilateral investment agreements, diversion effects, factor endowment differentials and labor cost differentials for each dyad of countries. Factor endowment differentials are computed as $\left|ln\left(\frac{K_{i,t}}{L_{i,t}}\right) - ln\left(\frac{K_{j,t}}{L_{j,t}}\right)\right|$, K being capital stock and L labor. The labor cost differential between pairs of countries is computed as: $\left|ln\left(\frac{Y_{i,t}}{L_{i,t}}\right) - ln\left(\frac{Y_{j,t}}{L_{j,t}}\right)\right|$, Y being gross domestic product.

The economic intuitions for the observable variables are as follows:

1. The GDP of the home and host country are expected to have a positive impact on FDI. In the case of the destination country, a larger level of income is tantamount to a more dynamic market.
2. The variable, $\left(\sum_j GDP_{j,t}^{RIA}\right)$, which is the sum of the GDP of the countries linked to the recipient by a trade agreement, is intended to capture the extended market effect [10]. Note that the gravity equation is an expenditure function and we must use variables in nominal terms, to avoid what is called the bronze medal mistake (see [3]).
3. The analysis uses two dyad variables, one to capture the FDI creation and the other the FDI diversion effect of Mercosur, in the spirit of [10,53]. The variables are Mercosur and One Mercosur, respectively. The Mercosur variable reflects the original treaty and the subsequent creation of free trade agreements with the associate members. Mercosur is a dummy which takes the value one when both countries, i and j, are part of Mercosur (either as original signatories, as an associated member or as signing a FTA with full scope, as described in the Appendix A) in a particular year t, and 0 otherwise. Since associated members incorporated in Mercosur in different years, it follows that the variable Mercosur exhibits time and country-pair variation.

The variable One Mercosur takes the value one when the recipient country j—the host country—belongs to Mercosur in the way defined above, while the country of origin of the flows, i, does not; it takes the value zero otherwise. Note that in this case the dummy equals one when the recipient country in the dyad belongs in the RTA as an original signatory, as an associated member (Chile, Colombia, Ecuador and Peru) or as a signatory of a non-partial scope FTA agreement within the Mercosur framework (Mexico from 2006 onwards) at a particular time. This captures the FDI diversion

effect (see [54]). FDI diversion occurs when investment flows from a Mercosur non-member country to a Mercosur member decline after that host country joined the RTA.

The variable ALADI follows the same construction as Mercosur. The variable ALADI reflects the FTAs (free trade zones) established over time across the countries within the ALADI framework. It takes value one for a pair of countries i, j —that were original signatories of ALADI—when the two countries entered into a free trade zone in time t (t being the year when the agreement entered into force) and zero otherwise. Therefore, the variable ALADI exhibits time and country-pair variation. The variable One ALADI is similar to One Mercosur.

4. The empirical analysis captures the effect *of* BITs in two ways. The variable BIT takes the value 1 if a ratified agreement is in place between the pair of countries at time t, and 0 otherwise. This variable captures the signaling effect. Second, the variable BIT-index is a continuous variable in the interval (0,1) which captures the degree of investment protection conferred by the said BIT. It is constructed in the spirit of [17,18].

To create the BIT investor protection index, it is necessary first to map all the BITs signed among the countries in our sample. BITs are classified according to 14 different clauses (see online Appendix A). We agree with the assessment of Berger et al. [55] in the sense that investors worry not only about dispute settlement arrangements but also about other aspects, such as policies on transfers of funds, treatment before and after the establishment, and performance requirements.

Ultimately, a sound dispute settlement mechanism is non-effective if the foreign firm in the host country is not profitable enough in the first place, because the treatment it receives prevents the consolidation of earnings and/or the contention of operational costs. In the sample, all BITs include ISDS provisions as well as State-State Dispute Settlement (SSDS) and similar clauses; focusing only on variations within these two clauses, therefore, would have given us less variability across BITs (for a complete definition of all clauses mapped see Appendix A).

Next, each indicator has a score associated with it. The score reflects how each particular aspect is covered in each BIT: 1 meaning maximum protection for investors and 0 non-protection. All individual scores add up (assuming equal weights, following [17,18,56]), to be normalized. Figure 4 displays the relationship between the BITs' pro-investment index and FDI.

The bulk of the treaties have a score of around 0.64–0.72, although there are a few values in the neighbourhood of 0.8. The median BIT protection index score is 0.68 and we use this value as a cut-off point (the average is 0.69). The assumption of equal weights could be problematic, but any other method of weighing individual indicators could also be contested.

5. To capture the enhancing or overlapping effects between trade agreements and BITs, the empirical analysis includes interactions in the model, i.e., Mercosur and ALADI are multiplied by the BIT investor protection index.
6. The relative availability and costs of inputs, which may have an important role in location decisions are FactorEndow and laborCost [9]. Following [57], FactorEndow measures the difference in the capital/labor ratio between the two countries. LaborCost captures the gap between countries in the price of labor. Because of the absence of good data on this issue, the analysis uses official data from the International Labor Organization (ILO). ILO assumes that real wages are equal to productivity, defined as the ratio GDP/number of workers.
7. The Political Risk variable accounts for the degree of consolidation of the rule of law, social, economic and political institutions and political stability. It has been constructed from the World Bank Aggregate Governance Indicator 1995–2018, complemented with the International Country Risk Indexes from Princeton University.

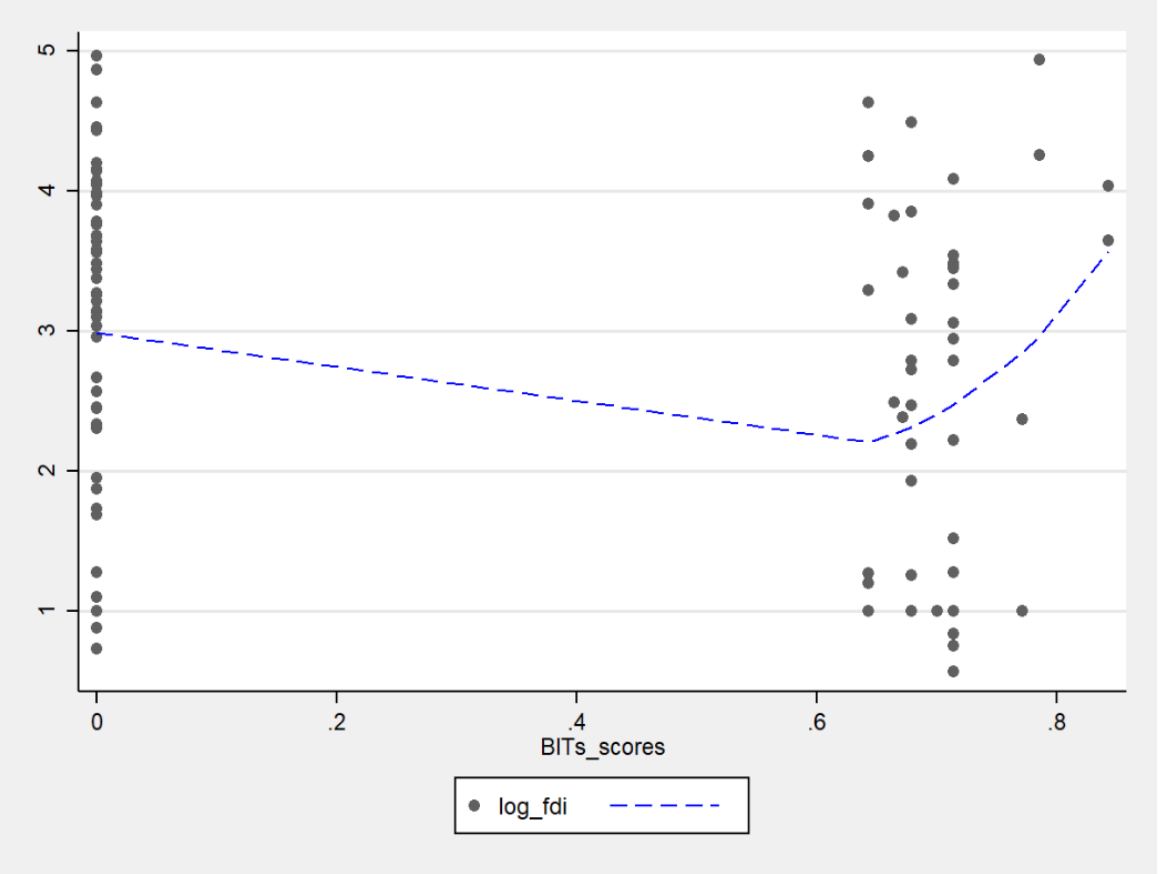

Figure 4. FDI intra-regional inflows per country (as percentage of total intra-regional inflows in Latin America) vs BITs pro-investor index (1995–2018). Source: Author's calculations using data from UNCTAD and WTO.

5. Empirical Results

Table 1 displays the results of the PPML estimation of the baseline gravity model described in Equation (8). In these regressions, the main focus lies on the impact of Mercosur, ALADI, and BIT related agreements. Regressions include fixed effects and time fixed effects to control for national heterogeneity and business cycles, respectively. The fixed effects absorb all observable and unobservable characteristics that are country-specific.

The variables which capture the purchasing power or market power of the host and home country are positive and significant, as expected. Their signs and magnitudes are similar to those reported by [39,58] in their meta-analyses of robust FDI determinants. The empirical studies analogous to ours use a large variety of samples, methodologies, and specifications. This implies some degree of heterogeneity in the size of the point estimates of the main variables, albeit results are typically the same in spirit. Therefore, both the market size of the investor and, more importantly, according to the point estimate, the market of the host country exerts a large influence on the decision to invest in the countries in our sample. This result makes economic sense: a big market represents a dynamic expected demand by potential consumers which, in turn, entails a higher level of revenues for firms offering that particular good or service. In addition, in this kind of setting, fixed costs related to the establishment of a firm in a foreign market can be supported by a larger number of products, hence reducing total costs per unit.

The market potential is captured by the sum of the GDPs of the countries belonging to the same RTA as the host country. This variable exhibits a positive and significant point estimate, in the neighborhood of 0.9, which is similar or even slightly higher than the coefficient of the host country

GDP. The analysis of Yeyati et al. [10] also finds a positive and significant impact of the extended market on FDI. The results regarding this variable suggests that foreign firms choose their location in Latin America not only to satisfy the local market of the destination country but also to access their neighbors more easily via an export platform strategy, as in [13,21]. Furthermore, these findings provide preliminary evidence about the effectiveness of the trade agreements in attracting FDI from third countries.

Distance is negative and significant while adjacency is positive and significant, as expected, with magnitudes similar to those reported by [23,58,59]. The latter find a lower point estimate for distance, between −0.38 and −0.46, but the impact of contiguity is quite akin to ours. A recent paper [60] reports distance estimates between −0.68 and −1.5. Although their level of analysis is slightly different, since they work with disaggregated data by industries and with a sample of 243 countries, it is reassuring that our distance coefficients are closer to theirs than those reported by [23]. Our results of magnitude and signs of traditional variables included in gravity models are thus comparable to those displayed in the literature.

The variable Mercosur is positive, significant and quite stable, with point estimates that vary around 0.136–0.147. We can recover the impact of this dummy from the expression $\left[e^{\hat{\beta}} - 1\right]$. A point estimate of 0.147 (column 4), means that, since Mercosur entered into force, FDI flows to its members have increased on average by 15.83% per year. Thus, the effect of Mercosur ranges between 14.56% and 15.83% per year. This is similar to the result reported by [23] for Economic Integration Agreements and Custom Unions (0.11), and also to [7] when they perform their estimation using PPML. It is also in line with the results reported by [3] but is smaller than the 0.41–0.5 point estimate documented by [13] for European agreements. The difference in the estimates found by [13] and by this paper can be attributed to two reasons: firstly, European countries have been traditionally very connected; secondly, European agreements bring about very strong ties among their members, implying ultimately free movement of goods, services and resources, to an extent not reached yet by Latin American treaties.

The variable One Mercosur displays a negative and significant coefficient. The joint consideration of the Mercosur and One-Mercosur variables indicates that, when the host country enters Mercosur, FDI within the members of the blocs increase, but FDI between a member and a third country declines. This sort of FDI diversion is not negligible since it amounts to 8.43–6.60%. Empirical evidence for this phenomenon can be found in [10]. The dummy capturing the ALADI agreements is positive, although less significant than Mercosur. The point estimate of ALADI is also considerably smaller, around 0.049–0.062. Thus, the effect of ALADI on FDI is between 5.02 to 6.39%. The diversion effect of ALADI is only significant at the 10% level (column 4) and amounts approximately to 3%. In the rest of the estimations the coefficient of ONE_ALADI is non-significant.

The different degrees of integration provided by the agreements can explain the dissimilar creation and diversion effects of Mercosur and ALADI. Mercosur is a consolidated, common market RTA that has promoted a certain degree of stability within the region. The FTAs within ALADI, (in contrast to the Mercosur type agreement) do not necessarily exert a significant impact on the macroeconomic environment of the host country, nor contribute to the harmonization of legislation and standards between them. Their impact on FDI, therefore, while relevant, is more subdued than that of Mercosur. As mentioned above, ref [13] estimate this effect to be around 0.4–0.5 for European agreements, thus lending countenance to our claim that the impact of a trade agreement is positively correlated with the degree of integration it provides.

Table 1. Estimates of RTAs and BITs on FDI stocks. Gravity-PPML with country and time fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Y_{i,t}$ (log)	0.726		0.764	0.701		0.693	0.752		0.628
	(0.000) ***		(0.003) ***	(0.006) ***		(0.007) ***	(0.003) ***		(0.005) ***
$Y_{j,t}$ (log)	0.815		0.804	0.831		0.809	0.802		0.813
	(0.002) ***		(0.003) ***	(0.003) ***		(0.004) ***	(0.002) ***		(0.003) ***
$\left(SumGDP_{j,t}^{RIA}\right)(log)$		0.935	0.947		0.895	0.906		0.926	0.985
		(0.490) **	(0.486) **		(0.488) **	(0.475) **		(0.468) **	(0.506) **
Distance$_{ij}$ (log)	−0.702	−0.713	−0.724	−0.743	−0.782	−0.736	−0.801	−0.751	−0.762
	(0.104) ***	(0.096) ***	(0.109) ***	(0.113) ***	(0.095) ***	(0.079) **	(0.108) ***	(0.123) ***	(0.114) ***
Adjacency$_{ij}$	0.216	0.261	0.272	0.260	0.206	0.214	0.236	0.221	0.274
	(0.065) ***	(0.053) ***	(0.048) ***	(0.047) ***	(0.052) ***	(0.050) ***	(0.044) ***	(0.039) ***	(0.049) ***
Mercosur$_{ij,t}$	0.143	0.146	0.138	0.147	0.136	0.142	0.136	0.138	0.140
	(0.033 ***	(0.031) ***	(0.029) ***	(0.026) ***	(0.027) ***	(0.022) ***	(0.019) ***	(0.017) ***	(0.021) ***
ALADI$_{ij,t}$	0.061	0.049	0.055	0.062	0.056	0.053	0.054	0.060	0.049
	(0.024) **	(0.026) *	(0.029) *	(0.030) *	(0.031) *	(0.026) **	(0.024) **	(0.026) **	(0.027) **
BITs$_{ij,t}$	0.086		0.082	0.074	0.069	0.065	0.063		0.052
	(0.046) *		(0.044) *	(0.039) **	(0.036) *	(0.035) *	(0.033) *		(0.028) *
BIT index$_{ij,t}$		0.045	0.043			0.042		0.039	
		(0.024) *	(0.023) *			(0.022) *		(0.021) *	
ONE_Mercosur$_{ij,t}$				−0.081	−0.076	−0.074	−0.070	−0.065	−0.064
				(0.022) ***	(0.032) ***	(0.026) ***	(0.024) ***	(0.028) ***	(0.031) ***
ONE_ALADI$_{ij,t}$				−0.026	−0.023	−0.028	−0.025	−0.018	−0.021
				(0.025)	(0.023)	(0.032)	(0.037)	(0.042)	(0.041)
Factor Endow$_{ij,t}$							0.104	0.113	0.107
							(0.031) ***	(0.039) ***	(0.042) ***
Political Risk$_{j,t}$							−0.043	−0.052	−0.053
							(0.010) ***	(0.009) ***	(0.014) ***
Labor Cost dif$_{ij,t}$							0.037	0.042	0.045
							(0.020) *	(0.0321) *	(0.022) *
No. Observations	2230	2230	2230	2230	2230	2230	2230	2230	2230
Adj. R^2	0.537	0.521	0.546	0.557	0.560	0.529	0.587	0.579	0.601
Individual Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports panel gravity estimates for FDI stocks from country *i* to country *j* for 1995–2018. It reports Poisson pseudo-maximum likelihood estimation with individual country effects and time FE. Robust standard errors are in parenthesis and clustered by country pair. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The variable capturing BITs is positive and significant at least at the 10% level in all specifications. The point estimate ranges between 0.052 and 0.086, indicating a yearly effect between 5.3% and 8.5%, consistent with results of previous studies employing a similar methodology [6]. Qualitative results are similar in spirit to those of [7]. The main message here is that BITs also enhance FDI inflows to host countries; The differences in the point estimates of the BIT indicator in their contribution and ours can be attributed to alternative econometric specifications, since we use PPML as our baseline technique and they do not. Interestingly, the point estimate is smaller than the coefficients obtained for Mercosur, but larger than that of ALADI. The variable that captures the impact of the quality of BITs (the BIT index) on FDI is significant and ranges between 0.039 and 0.045. The economic interpretation of this result is straightforward. Those treaties granting a higher level of protection to foreign investments, in the form of less stringent establishment prerequisites, assurance of fair and equitable treatment, allowance for transfer of funds, and design of sound dispute settlements mechanisms, among others, facilitate the smooth operation of foreign firms and hence help attract new investment.

The effect of the variable capturing differences in factor endowments is positive and highly significant. Intuitively, if labor is relatively more abundant in the host country than in the home country, it will also be cheaper, thus creating incentives for foreign firms intending to rationalize their employee costs. Labor cost differentials are only marginally significant. The economic interpretation of this variable is the same as for differences in factor endowments but its effect is captured with less precision. This variable is constructed as the difference in GDP over total employment in the home and the host countries. In other words, it captures differences in productivities, which should be closely linked to dissimilarities in labor costs, under the hypothesis of efficient labor markets. This assumption, however, may not hold in some developing countries, thus negatively affecting the accuracy of the indicator.

The political risk variable exerts a significant and negative impact on FDI stocks. Since it proxies for the institutional environment, our results suggest that more stable countries attract higher amounts of FDI, while political unrest acts as a deterrent. Countries with larger degrees of macroeconomic and political stability and well-established political institutions provide more predictable environments and reduce the uncertainty associated with new investments, thus fostering the attraction of FDI. The size of effect is akin to that reported by [28,58], in this last case for Middle East and North African countries, respectively.

These results support the hypothesis of an intra-regional FDI in Latin America driven both by considerations about market size and relative endowments. These findings suggest, therefore, that the pattern of FDI within Latin America can be represented by a hybrid, knowledge capital model in the particular case of the export-platform strategy [13,21]. Intuitively, according to this analytical framework, firms make decisions taking into account the opportunities provided by a potentially dynamic demand for the goods they offer (as proxied by market size), and by differentials in input costs (captured by relative endowments), which translate into more efficient production processes.

Table 2 summarizes the results obtained from the estimation of Equation (9). Now the structure of the fixed effects has changed and includes country-time fixed effects to account for multilateral resistances. This specification [47,48,61] addresses the potential endogeneity in the model by using country-pair fixed effects (or first-differencing) in panel data structures. This structure of fixed effects (country-year and country-pair) absorbs the host-home GDPs, the market purchasing power, and the distance and adjacency variables.

The estimated coefficient for the BIT index is positive and significant at the 90% level. The point estimate is around 0.042. Both the coefficients of the dummy for the BIT and the degree of protection index are quite similar to the results obtained by [18] when they work with bilateral FDI flows. We have estimated the model specified in Table 2 including diversion effect variables and the results are similar to those in Table 1. The magnitude of the coefficients slightly changes but the interpretation remains. Since we are working now with a continuous function over an interval, instead of usinga dummy, the index allows the testing of several interesting hypotheses. It is possible, as ref [17] show, that the relationship between BIT–FDI varies for different values of the index (notice that the

score attributed to each BIT does not change once the BIT enters into force unless withdrawal occurs; in this framework, BIT index is equivalent to BIT index t-5). In order to test this hypothesis, we have considered two scenarios and introduced them separately in the equations: a value of the index smaller than 0.68 (meaning that the corresponding BIT is less pro-investor) and an index larger than 0.68 (which represents a treaty with a more pro-investor orientation).

Results suggest that the impact of the index does change with its value: those BITs whose indexes show a less favorable stance for the investor are non-significant whereas those which are more pro-investor are positive and significant at 90% (see column 3 and 5). Notice, however, that the impact of BITs (as captured either by the variable BITs or BIT index) is still lower than that of Mercosur but larger than ALADI's, as in the previous specifications.

In order to further explore the heterogeneity suggested by the index, the model includes interactions of the BIT index with the proxies for the RTAs. When interacted with Mercosur, the pro-investor index is positive and significant at 99%, with a point estimate of 0.068. The result carries over to the subset of BITs with higher index values (with an impact of 7%). Instead, the interaction of ALADI with the index, although showing the expected signs, is not significant. A higher value of the index combined with participation in Mercosur is, hence, more effective in attracting FDI than just a higher index score (columns 4 and 5). The interaction term, both positive and significant, indicates that the effect of Mercosur is enhanced for higher values of the BIT investment protection variable.

Table 2. Impact of RTA and BIT investor protection index on FDI. Gravity-PPML estimation with country-year and country-pair FE.

	Stock FDI$_{ij,t}$				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Mercosur	0.129 (0.018) ***	0.122 (0.023) ***	0.115 (0.019) ***	0.103 (0.013) ***	0.096 (0.010) ***
ALADI	0.030 (0.016) *	0.032 (0.017) *	0.027 (0.016) *	0.025 (0.014) *	0.031 (0.013) *
BITs	0.042 (0.021) **			0.039 (0.019) **	0.034 (0.019) **
BIT index		0.034 (0.018) *		0.039 (0.019) *	
BIT Index < 0.68 (less pro−investor)			0.026 (0.029)		0.018 (0.036)
BIT Index ≥ 0.68 (pro−investor)			0.037 (0.020) *		0.042 (0.019) *
Mercosur * BIT Index				0.062 (0.013) ***	
Mercosur * BIT Index ≥ 0.68					0.068 (0.020) ***
Aladi*BIT Index				0.023 (0.017)	
ISDS concluded				−0.008 (0.023)	−0.007 (0.029)
Controls	Yes	Yes	Yes	Yes	Yes
No. Observations	2230	2230	2230	2230	2230
Individual country−year fixed effect	Yes	Yes	Yes	Yes	Yes
Country−pair fixed effect	Yes	Yes	Yes	Yes	Yes

Note: This table reports panel gravity estimates for FDI stocks from country i to country j for the period 1995–2018. It reports Poisson pseudo-maximum likelihood estimation with country time FE (η_{it}, η_{jt}) and pair country FE (η_{ij}). We control for the effect of country outliers as part of FE. We control for labor cost differentials, endowment differences, and political risks. Country pair fixed effects are used to address the issue of endogeneity in RTAs and BITs [47]. Robust standard errors are in parenthesis, clustered by country pair. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Panel A of Table 3 presents two additional specifications of the basic estimation in order to test for the impact of the policy variables. The first column includes a country-pair fixed effects structure

and estimates coefficients for the leads of the policy variables to test for endogeneity due to reverse causation [3,47]. In other words, this specification aims to assess whether abundant FDI among some countries prompts the constitution of a trade agreement among them, so investment at time t translates into RTAs or BITs at time t + h. If RTAs/BITs are exogenous to FDI, then the estimated coefficient for the lead variables should not be significantly different from zero. Indeed, the results show a non-significant effect of the lead variables.

The lags of the Mercosur, ALADI and BITs capture the impact of phasing-in effects. Now the question is whether trade and investment agreements take some time to fully display their effects. It is reasonable to think that firms need a period of adaptation to changing circumstances in order to consider alternatives and make location decisions. The lagged coefficients, also positive and significant, display a significant impact on FDI, meaning that their effect comes about gradually. We have worked with five lags for several reasons. First, effects of trade and investment agreements seem to peak in four–five years. Second, we want to capture the heterogeneous effects of implementation processes across countries. These results are consistent with [12]. In general, the impact of (lagged) Mercosur lies at around 13.42%. The effect of (lagged) BITs is, again, smaller than that of Mercosur but larger than that of ALADI. These results are in accord with the reported pattern in [3]: the lagged impact of Mercosur, ALADI and BITs is larger than the contemporaneous impact. In other words, medium- and long-term effects of these treaties exceed short-term effects.

Panel B of Table 3's estimations presents the results using the Hausman-Taylor method to further address the possible endogeneity of the policy variables. This method uses the deviations from the mean of the exogenous time-varying variables for each country pair as instruments [62]. This procedure removes the part of the error term correlated with the endogenous time-varying variables. Since the deviations from the group means are by definition uncorrelated with the error term, they do not alter the estimation of the exogenous time varying variables when estimating the coefficient of the rest of the variables.

The main policy variables are treated as endogenous. The estimated coefficients are slightly higher in magnitude than those obtained by PPML with country-time and country-pair fixed effects. These results are consistent with the larger coefficients obtained by [3,47] when estimating the effects of RTAs on exports for a different set of countries. The Hausman test gives us a chi-square tests with a probability below 0.05. Therefore, we reject the null hypothesis of random effects. The instruments pass a conventional test for overidentifying restrictions. As a robustness check the online Appendix A presents estimations using an inverse hyperbolic sine transformation of the FDI dependent variable.

It is plausible that BITs exert heterogeneous effects not only because of their own characteristics but also due to the nature of the signatories in terms of economic and institutional development. To test this hypothesis, a further analysis first classifies the countries in our sample in two categories, according to their income level, and works with subsamples.

Table 4 reports very suggestive results. The impact of BITs per se is large in the subsample encompassed by medium income countries, and non-significant for middle-low income countries. The BIT index is positive and significant in the first subsample, but only marginally significant in the second.

Similarly, a BIT index above 0.68 is significant for middle income countries; it is only marginally significant, however, for middle-low income countries. When the BIT index is below 0.68, it is only significant at the 90% confidence level for the first subsample and non-significant for the second. The interaction between Mercosur and BITs displays results consistent with previous estimations (Table 2). Notice that the interaction term is also positive and significant for middle-low income countries. This model specification seems to confirm the hypothesis of complementarity between BITs and institutions. BITs are primarily effective in reducing the perceived risk by investors, and thus help attract FDI, when the host country has sounder and more stable institutions. From an economic point of view, a more developed institutional framework in a particular country provides credibility to the

agreements signed by that country, enhancing their efficacy. In [10], the authors find that the effect of RTA is higher in those countries which are more attractive for FDI.

Table 3. Impact of RTAs and BITs on FDI. PPML and Hausman-Taylor Estimations.

	Panel A: PPML		**Panel B: Hausman−Taylor**		
	(1)	**(2)**	**(1)**	**(2)**	**(3)**
$Y_{i,t}$ (log)			0.564		0.537
			(0.062) ***		(0.071 ***
$Y_{j,t}$ (log)			0.792		0.805
			(0.069) ***		(0.042 ***
$\left(SumGDP_{j,t}^{RIA}\right)(log)$				0.901	0.875
				(0.489) **	(0.425) **
Distance (log)			−0.503	−0.498	−0.485
			(0.257) **	(0.250) **	(0.248) **
Adjacency			0.273	0.253	0.261
			(0.081) ***	(0.073) ***	(0.062) ***
Mercosur	0.123	0.118	0.153	0.145	0.169
	(0.032) ***	(0.026) ***	(0.070) ***	(0.062) ***	(0.073) ***
ALADI	0.031	0.026	0.056	0.048	0.052
	(0.016) *	(0.014) *	(0.028) *	(0.025) **	(0.026) **
BITs	0.047	0.039	0.063		0.072
	(0.024) **	(0.020) **	(0.032) **		(0.035) **
BIT index				0.041	0.046
				(0.022) *	(0.021) *
Mercosur_LEAD5	0.072				
	(0.048)				
ALADI_ LEAD5	0.015				
	(0.032)				
BITs_ LEAD5	0.029				
	(0.054)				
Mercosur_LAG5		0.126			
		(0.011) ***			
ALADI_ LAG5		0.038			
		(0.020) *			
BITs_ LAG5		0.046			
		(0.021) **			
Controls	Yes	Yes	Yes	Yes	Yes
No. Observations	1896	1896	1670	1670	1670
Adj. R^2			0.426	0.443	0.521
Sigma_u			0.729	0.931	0.834
Sigma_e			1.317	1.320	1.320
Rho (fraction of variance due to u_i)			0.234	0.332	0.285
F−stat overidentification restriction			1.345	1.421	1.415
			(0.426)	(0.432)	(0.447)

Note: Panel A represents Poisson pseudo-maximum likelihood estimation with country time FE ($\eta_{it,}$ η_{jt}) and pair country FE (η_{ij}). Country pair fixed effects are used to address endogeneity in RTAs and BITs (see [47]). As control variables we include labor cost differentials, endowment differences, and political risk. Panel B reports Hausman-Taylor estimates for bilateral FDI in logs. GDPs and sum GDP are considered as time-varying and exogenous. Distance is considered as endogenous, time-invariant (proxy for trade costs). Adjacency is considered exogenous, time-invariant. Mercosur, ALADI, and BITs are considered as endogenous, time-varying. The F-statistic should not be different from zero, and refers to the test for over-identifying restrictions in the corresponding log-linear instrumental variable (IV) model (p-value of over-identifying restrictions in parenthesis). Robust standard errors in parenthesis, clustered by country pair *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4. Impact of RTA and BIT pro-investor index for country subsets. Gravity-PPML, with country-time and country-pair fixed effects.

	Middle Income Countries				**Middle-Low Income Countries**			
	(1)	**(2)**	**(3)**	**(4)**	**(1)**	**(2)**	**(3)**	**(4)**
Mercosur	0.106	0.097	0.115	0.119	0.092	0.101	0.095	0.087
	(0.016)***	(0.023)***	(0.020)***	(0.016)***	(0.024)***	(0.013)***	(0.021)***	(0.025)***
Aladi	0.036	0.042	0.031	0.028	0.030	0.019	0.022	0.015
	(0.020)*	(0.021)*	(0.025)	(0.015)*	(0.016)*	(0.011)*	(0.012)*	(0.018)
BITs	0.039	0.036		0.041	0.032	0.027		0.037
	(0.022)*	(0.020)*		(0.022)*	(0.045)	(0.038)		(0.042)
BIT Index		0.043				0.029		
		(0.020)**				(0.015)*		
BIT Index < 0.68	0.023		0.028	0.019	0.021		0.025	0.018
	(0.011)*		(0.012)*	(0.011)*	(0.018)		(0.029)	(0.027)
BIT Index ≥ 0.68	0.042		0.045	0.047	0.036		0.039	0.042
	(0.021)**		(0.020)**	(0.021)**	(0.019)*		(0.021)*	(0.019)**
Mercosur * BIT Index		0.055				0.057		
		(0.027)**				(0.025)**		
Mercosur * BIT Index ≥ 0.68	0.057		0.059	0.055	0.042		0.040	0.036
	(0.019)***		(0.012)***	(0.010)***	(0.011)***		(0.013)***	(0.015)***
Aladi*BIT Index		0.017	0.018	0.014		0.021	0.019	0.023
		(0.030)	(0.037)	(0.026)		(0.010)*	(0.009)*	(0.011)*
ISDS concluded		−0.018	−0.012	-0.015		−0.006	−0.009	−0.011
		(0.047)	(0.052)	(0.061)		(0.039)	(0.042)	(0.058)
Mercosur_LAG5			0.084	0.093			0.090	0.092
			(0.012)***	(0.024)***			(0.022)***	(0.031)***
Aladi_LAG5			0.023	0.016			0.014	0.012
			(0.008)*	(0.009)*			(0.007)*	(0.006)*
BITs_LAG5				0.039				0.030
				(0.020)**				(0.014)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj-R^2	0.439	0.520	0.561	0.536	0.410	0.421	0.438	0.446
Wald Test	32.15	31.29	31.42	27.31	28.22	31..05	27.31	32.91
Observations	1160	1160	1042	1042	960	960	852	852

Source: Own elaboration. Notes: Middle income countries division according to GDP per capita in constant dollars using the World Bank's approach. First group of countries includes: Argentina, Brazil, Chile, Costa Rica, Mexico, and Uruguay. Middle-low income countries include: Bolivia, Colombia, Ecuador, Peru, and Paraguay. Dependent variable accounts for bilateral FDI stocks received in country j (subset) from all 11 economies. All models include origin and destination time fixed effects to control for MR and country-pair FE to control for endogeneity. We control for labor cost differentials, endowment differences, and political risk. Country-pair clustered robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Wald test p-value for the difference of coefficients in both samples is 0.00.

6. Concluding Remarks

When it comes to institutional strategies promoting trade agreements and bilateral investment treaties to attract FDI to areas in development, there are still empirical questions that remain unclear. This study is novel in addressing the following questions: (i) Does the effect on FDI depend on key characteristics (clauses) of the BITs? (ii) If there is co-existence of BITs in force with major trade agreements, which ones are more effective in attracting foreign investment? Are there overlapping or enhancing effects? (iii) Finally, it is not clear if BITs have a differential impact in countries with weak versus strong institutions. This paper uses a flexible econometric specification derived from a structural gravity model of FDI to assess the impact of RTAs and BITs on intra-regional FDI stocks in Latin America over the years 1995–2018.

The analysis shows that the participation in deep integration agreements, such as Mercosur, has the strongest impact on intra-regional FDI inflows, of between 14.56% and 15.83%. Taking part in less ambitious trade agreements as ALADI does help attract FDI inflows but the effect is more modest and amounts to 3–5% on average. Finally, BITs enhance the attraction of foreign investment, with an average effect of 3.7% and 4.6%, which lies in between those estimated for Mercosur and ALADI.

To disentangle the mere presence of a BIT between two countries from that associated with the quality of the BIT, we have constructed an index in order to capture the level of protection provided to foreign investors by a BIT. The estimations suggest that higher levels of protection are associated with greater capacities of attraction of FDI in Latin America, when the index is above a certain threshold. Additionally, the analysis shows that when RTAs are combined with investment agreements offering a high degree of protection, they help attract foreign investment within Latin America.

Not only the features of the BIT influence the capacity to attract foreign investment. The institutional characteristics of the host country are crucial as well. According to estimations, BITs are associated with larger FDI inflows in a subsample made up of the countries with the highest income. For middle-low income countries (Bolivia, Colombia, Ecuador, Paraguay, and Peru), however, the mere presence of BITs per se is not associated with an increase in FDI. Furthermore, the impact of higher quality BITs is smaller and statistically less significant for middle-low income countries than for more developed nations. Thus, BITs appear as complements of a sound institutional environment in the host country.

These findings have implications for policy making. First, belonging to solid, consolidated trade agreements which imply high levels of integration is beneficial not only from the point of view of external trade but also because it helps attract FDI inflows. Countries seeking higher levels of foreign investment might want to consider membership in these types of accords, together with a reinforcement of the treaties they have already signed.

Second, empirical analysis has shown that BIT exerts a signal effect but its impact is conditional upon the degree of integration and consolidation of the RTA, the level of development—or institutional advancement—of the host country, and the extent to which a particular BIT protects foreign investment. Policy makers interested in attracting FDI should engage in investment treaties that warrant a reasonable degree of protection to foreign investors. The signing of these agreements may entail a costs, in the form of restrictions to the autonomy of the host country, for example. In line with other contributions our results imply that policymakers should weigh carefully the trade-offs associated with entry into a BIT. Otherwise, the political costs associated with the signing of these agreements may not be worthwhile. Finally, Latin American economies striving to attract foreign investment should keep in mind that the combined effect of belonging to consolidated RTAs together with BITs enhances FDI.

The main limitation of this paper is the use of aggregate data instead of disaggregated FDI by sector. It would be interesting to ascertain whether the impact of Mercosur, ALADI and BITs varies across different industries. Further research is necessary to gauge in more detail the potentially different effect of treaties according to their sectoral distribution, but unfortunately sectoral/industry data are not yet available on a bilateral basis at a cross-country level for Latin America.

Author Contributions: M.B.: conceptualization, data curation, formal analysis, methodology, writing, review and editing. B.S.-R.: conceptualization, investigation, methodology, writing, review and editing. Y.S.: conceptualization, investigation, writing, review and editing. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: We thank the CIRANO data lab, Thierry Warin, Joseph Pelzman, Zadia Feliciano, Mona Pinchis-Paulsen, Federico Ortino, Thilo Huning, and Kevin Foster for helpful comments. David Dam provided excellent research assistance. We are grateful to participants in the VIII La Laguna Workshop on International Economics 2019, the Global Research on Emerging Economies Conference 2018, the Lipsey Panel at the Western Economic Association 2017, the International Panel Data Conference 2016, the Workshop of Economic Integration, the European Trade Study Group 2016, the International Trade and Finance Association meeting 2016 and seminar participants at Department of Economics at University of Cape Town, SARChI and Dept. of Economics at University of Johannesburg, CIRANO, and the Institute of Economics at University of

Republic (Uruguay) for the comments received during presentations of previous versions of this work. All errors are our own.

Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

ALADI	The Latin American Integration Association/Asociación Latinoamericana de Integración
ASEAN	Association of Southeast Asian Nations
BITs	Bilateral investment treaties
CEPII	French Centre d'Etudes Prospectives et d'Informations Internationales
CUSFTA	The Canada-United States Free Trade Agreement
FDI	Foreign direct investment
FE	Fixed effects
FET	Fair and equitable treatment
GDP	Gross Domestic Product
GNLM	Generalized Nonlinear Linear Model
IHS	Inverse hyperbolic sine transformation
ILO	International Labor Organization
IMF	International Monetary Fund
ISDS	Investor-state dispute settlement
Mercosur	Mercado comun del sur
MFN	Most-favored-nation clause
MNEs	Multinational enterprises
MRs	Multilateral resistances
NAFTA	North American Free Trade Agreement
NT	National treatment
OECD	The Organisation for Economic Co-operation and Development
OLS	Ordinary least square
PPML	Poisson pseudo-maximum likelihood
RTAs	Regional trade agreements
SSDS	State-State dispute settlement
UNCTAD	United Nations Commission for Trade and Development
WTO	World Trade Organization

Appendix A

Appendix A.1. Clauses Mapped in the BIT Investment Protection Index

Individual provisions are coded for all the BITs between the 11 Latin American countries in our sample, i.e., 14 provisions that UNCTAD and the American Bar Association consider of substance to protect any investment to which a developing host country is a signatory. Low scores indicate less investment protection. Values of 0.5 are assigned to medium level investor protection [17,18].

1. National treatment (NT) pre-establishment: Ensures that requirements for foreign firms upon entry in the host country, such as establishment and participation in existing enterprises, are no greater than those for domestic firms. If the clause is present, the index in this section sums 1 in this category, 0 otherwise.
2. National treatment post establishment: The same as 1 but associated with "the treatment of the investment after its entry". If present, the index in this category takes value 1, 0 otherwise.
3. Most-favored-nation (MFN) treatment pre-establishment: MFN treatment of the foreign firm regarding entry, establishment and participation in existing enterprises. If present, the index in this category takes value 1, 0 otherwise.
4. Most-favored-nation (MFN) treatment post-establishment: The same as 3, after the entry of the foreign firm. If the clause is present it takes value 1.

5. Fair and equitable treatment (FET): Can be qualified either by reference to International Law (General International Law, Principles of International Law or Customary International Law) or "by listing the elements of the FET obligation". In the last case, the FET obligation may "include an indicative or exhaustive list of more specific elements" to avoid.
6. Full protection and security: This commitment, in turn, may be:

    - Standard "if the treaty contains an unqualified obligation to provide full protection and security" (with formulations such as most constant protection, legal protection and security, and so forth).
    - Referenced to domestic law of the host country

7. No general security exception: Ensures that the host country does not prevent investment in a particular sector for security reasons.
8. Indirect expropriation: Treaties may refer to this issue under two approaches: the scope of measures covered, and/or refining expropriation clauses.

On the scope of measures covered: The options under this classification are the following:
Indirect expropriation not mentioned "if the treaty's expropriation clause does not contain an explicit reference to indirect expropriation".

- Indirect expropriation mentioned, whatever the formulae it employs ("measures having effect equivalent to nationalization or expropriation", measures tantamount to expropriation, de facto expropriation).
- No expropriation clause "if the treaty does not include a provision that protects foreign investors against non-compensated dispossession of their investments".

9. Transfer of funds: A "provision regarding the free transfer of funds relating to investments (covering outward and/or inward transfers". If present, the index in this category takes a value of 1.
10. Performance requirements: If the treaty includes a provision that restricts the use of performance requirements, the measure in these clause takes value 1.
11. Umbrella clause: requiring the signatories "to respect or observe any obligation assumed by it with regard to a specific investment", hence protecting it de facto under its umbrella. The measure in these clause takes value 1.
12. State-State Dispute Settlement (SSDS): If the treaty provides for a dispute settlement procedure (e.g., arbitration) between States, the measure in this clause takes value 1.
13. Investor-State Dispute Settlement (ISDS): If the treaty establishes a mechanism for the settlement of disputes between covered investors and the host State (arbitration and/or domestic courts of the host State) the measure in these clause takes value 1.
14. Alternatives to arbitration: The more options at investors' disposal the better, although we assign a value of 0.5 to a treaty that establishes that the investor needs to go first through a local court before international arbitration.

    - "Voluntary Alternative Dispute Resolution (conciliation/mediation)" "If the treaty mentions the possibility of such procedures (e.g., non-binding, third-party procedures) but does not prescribe them as a necessary step".
    - "Compulsory Alternative Dispute Resolution (conciliation/mediation) If the treaty prescribes the use of compulsory conciliation or mediation.
    - "None" if the treaty does not refer to alternative means of settling investor–State disputes (conciliation/mediation or similar non-binding procedures).

Appendix A.2. Construction of the Mercosur and ALADI Variables

The sequence of the signature of the FTAs within Mercosur, considered deep integration agreements, and the incorporation of associated members is as follows:

1. All Mercosur original countries (Argentina, Brazil, Paraguay and Uruguay) and Chile entered into a FTA (Free Trade Agreement named AAP.CE number 35) in 1996.
2. All Mercosur original countries and Bolivia entered into a FTA (Free Trade Agreement AAP.CE number 36) in 1997.
3. All Mercosur original countries and Colombia and Ecuador entered into a FTA (Free Trade Agreement named AAP.CE number 59) in 2005.
4. All Mercosur original countries and Mexico entered into a FTA (Free Trade Agreement named AAP.CE number 54 and 55) in 2006.
5. All Mercosur original countries and Peru entered into a FTA (Free Trade Agreement, named AAP.CE number 58) in 2006.
6. Paraguay was suspended as a member during 2012.

Every FTA within ALADI are mapped. Table A2 shows the FTAs within the ALADI framework together with the year in which the FTA entered into force.

Table A1. Free Trade Zones across the signatories of original ALADI treaty.

	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Mexico	Paraguay	Peru	Uruguay
Argentina			1995							
Bolivia				2006						
Brazil	1995									
Chile		2006			2007		1999		2007	
Colombia				2007			1995			
Costa Rica										
Ecuador				2010						
Mexico				1999	1995					2004
Paraguay										
Peru				2007						
Uruguay							2004			

Source: own elaboration based on ALADI records. See http://www.aladi.org/nsfaladi/textacdos.nsf/vACEWEB?OpenView&Start=1&Count=800&Expand=7#7.

1. Argentina and Brazil signed the RTA called AAP.CE number 14 in 1999.
2. Bolivia and Chile signed the RTA called AAP.CE number 22 in 2006.
3. Chile and Mexico signed the RTA called AAP.CE number 41 in 1999.
4. Chile and Bolivia signed the RTA called AAP.CE number 22 in 2006.
5. Chile and Colombia signed the RTA called AAP.CE number 22 in 2007 (they had a previous partial agreement since 1995).
6. Chile and Mexico signed the RTA called AAP.CE number 41 in 1999.
7. Chile and Peru signed the RTA called AAP.CE number 38 in 2007 (they had a previous partial scope agreement since 1998).
8. Colombia and Mexico signed the RTA called AAP.CE number 33 in 1995.
9. Ecuador has not engaged in any free trade zone with other Latin American countries. It has a partial scope agreement with Chile since 2010.
10. Mexico and Uruguay signed the RTA called AAP.CE number 60 in 2004.

Table A2. BITs in force across Latin American countries.

	Argentina	Bolivia	Brazil	Chile	Colombia	Costa Rica	Ecuador	Mexico	Paraguay	Peru	Uruguay
Argentina		2005		1995		2001	1996	1998	1995	1996	
Bolivia	2005			1999			1997		2003	1995	
Brazil											
Chile	1995	1999				2000	1996		1998	2001	2010
Colombia										2004	
Costa Rica	2001			2000					2001		
Ecuador	1996	1997		1996					1995–2008	2000	1985–2008
Mexico	1998										2002
Paraguay	1995	2003		1998		2001	1995–2008			1995	1994
Peru	1996	1995		2001	2004		2000		1995		
Uruguay				2010			1985-2008	2002	1994		

Source: own elaboration based on UNCTAD (2017). The years reflects when the agreement entered in force and if terminated before 2018.

Appendix A.3. Gravity Model for FDI

The gravity model for FDI departs from a definition of bilateral FDI:

$$FDI_{ij,t}^{stock} \equiv \omega_{ij,t}^{\varepsilon} M_{i,t} \tag{A1}$$

where $FDI_{ij,t}$ represents FDI stocks between countries i and j at a time t. $M_{i,t}$ is the non-rival aggregate technology capital stock in a particular time. ω_{ijt} represents openness (or barriers to FDI) for foreign technology coming from country i to country j. ε is the elasticity of FDI with respect to openness. To transform FDI stocks into values we multiply Equation (A1) by its marginal product:

$$FDI_{ij,t}^{stock,value} \equiv \omega_{ij,t}^{\varepsilon} M_{i,t} \frac{\partial Y_{j,t}}{\partial M_{i,t}} \tag{A2}$$

in which $M_i = \phi_i \frac{E_i}{P_i}$, where E_i represents total expenditures of country i which equals the country output plus net rents from foreign investment. P_i stands for consumer prices (which can be considered as a multilateral resistance since higher prices for goods and inputs can affect FDI). Y is nominal output. Solving the representative agent's problem delivers a structural system for the steady-state. Then, the gravity structural system is given by:

$$FDI_{ij} = \phi_i \phi_j \omega_{ij}^{\varepsilon} \frac{E_i}{P_i} \frac{Y_j}{M_i} \tag{A3}$$

$$P_i = \left[\sum_{j=1}^{N} \left(\frac{\tau_{ji}}{\Pi_j} \right)^{1-\sigma} \frac{Y_j}{Y} \right]^{\frac{1}{1-\sigma}}, \tag{A4}$$

$$\prod_j = \left[\sum_{i=1}^{N} \left(\frac{\tau_{ji}}{P_i} \right)^{1-\sigma} \frac{E_i}{Y} \right]^{\frac{1}{1-\sigma}}. \tag{A5}$$

where P_i denotes the aggregate price index or the multilateral resistance, as defined by Anderson and van Wincoop [43]. τ_{ji} represents standard iceberg trade costs. Equation (A3) can be transformed to estimate the parameters of interest empirically (see Section 4.2 of the manuscript).

Appendix A.4. Data and Robustness Tests

Table A3. Variables and sources.

Variable	Description	Source
FDI_{ij}	Bilateral Foreign Direct Investment stocks	UNCTAD (proprietary data from 1990–2008 and 2012–2018). Foreign Direct Investment Statistics database.
$Y_{i/j,t}$	GDP home/host country (dollars 2010)	Balance of Payments, IMF
D_{ij}	Bilateral distance between two countries based on distances between their biggest cities	CEPII dataset available http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6
$\left(\Delta GDP_{ij,t}^{RIA}\right)$	Sum of GDP to which the host country has tariff-free access.	Own elaboration from IMF http://www.imf.org/external/ns/cs.aspx?id=28
Adjacency	Dummy, takes value 1 when countries share border, 0 otherwise.	Own elaboration
Mercosur	Dummy, 1 when both countries belong to Mercosur, including associated members and deep FTA within Mercosur framework, 0 otherwise.	Own elaboration
ONE Mercosur	Dummy: 1 if recipient country belongs to Mercosur, and sender country does not, 0 otherwise.	Own elaboration
ALADI	Dummy: 1 when both countries belong to a FTA within the *ALADI framework*, 0 otherwise.	Own elaboration
BITs	Dummy: 1 when there is a BIT in force among the two countries, 0 otherwise	World Trade Organization database (WTO)
BIT index	Continuous variable in the interval (0,1). See text for details and Appendix A below	Own elaboration with data from UNCTAD (2017)
FactEndow	Difference between home and host country ratio of gross fixed capital formation over labor force	World Development Indicators; labor force from ILO, UN
LaborCost Dif	Difference in the Relative Cost of Labor among the home and host country	International Labor Organization http://www.ilo.org/global/statistics-and-databases/lang--en/index.htm
PolitRisk	Role of Institutions, law enforcement and government stability. Complemented with International Country Risk	World Bank and Princeton University

Source: own elaboration.

Estimations with the Inverse Hyperbolic Sine (IHS) Transformation Method

This method is also adequate for zeros and negative values. The inverse hyperbolic sine transformation for FDI is defined as: $log\left(FDI_{ij,t} + \left(FDI_{ij,t}^2 + 1\right)^{\frac{1}{2}}\right)$. Except for very small values of FDI, the IHS is approximately equal to $log\left(2FDI_{ij,t}\right)$ or $log(2) + log\left(FDI_{ij,t}\right)$ and it can be interpreted in exactly the same way as a standard logarithmic dependent variable (see Aisbett et al., 2018 for discussion).

Table A4. Impact of RTAs and BITs investor protection index on FDI. Inverse hyperbolic sine transformation, two-way fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mercosur	0.132	0.127	0.122	0.112	0.117	0.119	0.121
	(0.028) ***	(0.031) ***	(0.028) ***	(0.036) ***	(0.029) ***	(0.027) ***	(0.031) ***
ALADI	0.025	0.021	0.017	0.023	0.018	0.015	0.019
	(0.011) *	(0.009) *	(0.008) *	(0.012) *	(0.008) *	(0.007) *	(0.012)
BITs	0.047	0.045	0.038	0.032	0.036	0.035	0.039
	(0.015) **	(0.022) **	(0.019) **	(0.014) **	(0.018) **	(0.018) *	(0.020) *
ONE_Mercosur	−0.064	−0.061	−0.066	−0.058	−0.052	−0.054	−0.056
	(0.020) ***	(0.015) ***	(0.018) ***	(0.013) ***	(0.023) ***	(0.020) ***	(0.018) ***
ONE_ALADI	−0.012	−0.014	−0.016	−0.015	−0.011	−0.010	−0.009
	(0.005) *	(0.007) *	(0.008) *	(0.006) *	(0.015)	(0.015)	(0.019)
BIT index		0.044		0.039			0.043
		(0.020) *		(0.019) *			(0.021) *
BIT Index < 0.68 (less pro-investor)			0.016		0.018	0.014	
			(0.022)		(0.026)	(0.029)	
BIT Index ≥ 0.68 (pro-investor)			0.032		0.030	0.028	
			(0.017) *		(0.015) *	(0.013) *	
Mercosur *				0.042			0.036
BIT Index				(0.012) ***			(0.009) ***
Mercosur *					0.048	0.052	
BIT Index ≥ 0.68					(0.010) ***	(0.006) ***	
Aladi*BIT Index				0.016		0.014	0.011
				(0.023)		(0.028)	(0.031)
ISDS concluded				−0.015	−0.012	−0.006	−0.009
				(0.048)	(0.052)	(0.043)	(0.039)
Mercosur_LAG5						0.096	0.102
						(0.033) ***	(0.038) ***
ALADI_LAG5						0.008	0.010
						(0.003) *	(0.005) *
BITs_LAG5							0.036
							(0.018) **
Controls		Yes	Yes	Yes	Yes	Yes	Yes
No. Observations		1962	1962	1962	1962	1632	1632
Individual country−year fixed effect		Yes	Yes	Yes	Yes	Yes	Yes
Country−pair fixed effect		Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports estimates for FDI flows from country i to country j at the aggregate level for the period 1995–2018. Estimation with host year FE and pair-country FE (η_{ij}). We control for labor cost differentials, endowment difference, political risk, and GDP in the home economy. Robust standard errors in parenthesis, clustered by country pair. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A5. Correlation Matrix.

	fdi stock	**gdp_d**	**gdp_o**	**Distance**	**Adjacency**	**Mercosur**	**ONE_Mercosur**
fdistock	1						
gdp_d	0.1534 *	1					
gdp_o	0.1921 *	0.0109	1				
distance	−0.0300	0.1615 *	0.1615 *	1			
adjacency	0.0687 *	0.1115 *	0.0541 *	−0.5483 *	1		
Mercosur	0.2109 *	0.1511 *	0.1511 *	−0.0853 *	0.1681 *	1	
ONE_Mercosur	−0.1201 *	0.2538 *	0.0334	−0.0191	0.1101 *	0.4601 *	1
Aladi	0.1389 *	0.1356 *	0.1356 *	0.1188 *	0.0679 *	0.1637	0.0902
ONE_Aladi	−0.1370 *	0.5079 *	0.0292	0.1104 *	0.0775 *	0.2341	0.357
l5_Mercosur	0.2194 *	0.1190 *	0.1190 *	−0.2246 *	0.2270 *	0.3857 *	0.2604
l5_Aladi	0.1133 *	0.1598 *	0.1598 *	0.0942 *	0.0441	0.1682	0.0843
Mercosur_LEAD5	0.1743	0.1386 *	0.1386 *	−0.0069	0.1322 *	0.4438	0.3889
Aladi_LEAD5	0.1006	0.1261	0.1261	0.1569	0.069	0.0838	0.0496
bit_enforced	0.0251 *	0.2224 *	0.2138 *	0.0235	0.0481 *	0.1113	0.0974
bit_index	0.0151 *	0.2066 *	0.2061 *	0.0527 *	0.1042 *	0.0244	−0.0164
BIT_LAG5	0.0307 *	0.2202 *	0.2113 *	0.0164	0.0165	0.1657	0.1119
BIT_LEAD5	0.0119	0.2506	0.2422	0.0558	0.0674	0.0211	0.0677
sum_gdp_partner	0.2215 *	0.0832 *	0.0927 *	0.1982	0.0408	0.1879 *	0.0264
factendow	0.0828 *	0.2192 *	0.1093 *	0.0000	−0.0203	0.0000	0.2208
laborcostdif	0.0495 *	0.1286 *	0.1014 *	0.0000	−0.0122	0.0000	−0.2745 *
politrisk	−0.1233 *	−0.0046 *	−0.0273	0.0890 *	−0.1127	0.0451	−0.0245
	Aladi	ONE_Aladi	Mercosur_LAG5	Aladi_LAG5	Mercosur_LEAD5	Aladi_LEAD5	bit_enforced

Table A5. *Cont.*

	fdi stock	gdp_d	gdp_o	Distance	Adjacency	Mercosur	ONE_Mercosur
Aladi	1						
ONE_Aladi	0.2386 *	1					
Mercosur_LAG5	0.0838 *	0.1541 *	1				
Aladi_LAG5	0.4325 *	0.1784 *	0.1251 *	1			
Mercosur_LEAD5	0.1706 *	0.2052 *	0.3531 *	0.1647 *	1		
Aladi_LEAD5	0.4713 *	0.2274 *	−0.0018	0.6186 *	0.1637 *	1	
bit_enforced	0.004	−0.0921	0.0211	−0.0816 *	0.1657 *	0.0185	1
bit_index	0.0265	−0.0457	−0.1609 *	−0.0879 *	0.0393	0.0561 *	0.4251 *
BIT_LAG5	0.0185	−0.0935	0.1145 *	−0.0530 *	0.1620 *	−0.0581	0.4461 *
BIT_LEAD5	−0.0816 *	−0.1800	0.0242	−0.1479 *	0.0663 *	0.0067	0.3105 *
sum_gdp_partner	0.1561 *	−0.0068	0.1460 *	0.1762 *	0.1507 *	0.1419 *	−0.1323 *
factendow	0.000	−0.0562	0.0000	0.0000	0.0000	0.000	0.0210
laborcostdif	0.000	−0.0095	0.0000	0.0000	0.0000	0.000	0.0311
politrisk	0.1008 *	−0.0283	−0.0202 *	0.0478	−0.0204	0.1297	−0.0032
	bit_index	BIT_LAG5	BIT_LEAD5	sum_gdp_partner	factendow	laborcostdif	politrisk
bit_index	1						
BIT_LAG5	0.3493 *	1					
BIT_LEAD5	0.3778 *	0.3466 *	1				
sum_gdp_partner	0.2232	0.2205	0.2735	1			
factendow	0.0121	0.0193	0.0166	0.1268 *	1		
laborcostdif	−0.0116	0.0332	0.0274	0.1217 *	0.2015 *	1	
politrisk	−0.0612 *	−0.0302	0.0380	0.0270	0.2530 *	0.1381 *	1

Source: own elaboration. Variables gdp_o and gdp_d stand for origin and destination. The rest of variables are self-explanatory. * $p < 0.05$.

References

1. Borensztein, E.; De Gregorio, J.; Lee, J. How does FDI affect economic growth? *J. Int. Econ.* **1998**, *45*, 115–135. [CrossRef]
2. Alvarado, R.; Iñiguez, M.; Ponce, P. FDI and economic growth in Latin America. *Econ. Anal. Policy* **2017**, *56*, 176–187. [CrossRef]
3. Yotov, Y.; Piermartini, R.; Monteiro, J.A.; Larch, M. *An Advanced Guide to Trade Policy Analysis: The Structural Gravity Model*; World Trade Organization: Geneva, Switzerland, 2016.
4. Santos-Silva, J.; Tenreyro, S. The Log of gravity. *Rev. Econ. Stat.* **2006**, *88*, 641–658. [CrossRef]
5. Jang, Y. The Impact of bilateral FTA on bilateral FDI among developed countries. *World Econ.* **2011**, *34*, 1628–1651. [CrossRef]
6. Egger, P.; Merlo, V. BITs bite: An anatomy of the impact of BITs on multinational firms. *Scand. J. Econ.* **2012**, *114*, 1240–1266. [CrossRef]
7. Aisbett, E.; Busse, M.; Nunnenkamp, P. BITs as deterrents of host-country discretion: The impact of investor-state disputes on FDI in developing countries. *Rev. World Econ.* **2018**, *154*, 119–155. [CrossRef]
8. Markusen, J.R.; Venables, A. The theory of endowment, intra-industry and multi-national trade. *J. Int. Econ.* **2000**, *52*, 209–234. [CrossRef]
9. Markusen, J.R.; Maskus, K. Discriminating among alternative theories of the multinational enterprise. *Rev. Int. Econ.* **2002**, *104*, 694–707. [CrossRef]
10. Levy-Yeyati, E.; Stein, E.; Daude, C. *Regional Integration and the Location of FDI. Working Paper 492*; Inter-American Development Bank, Research Department: Washington, DC, USA, 2003.
11. Ramondo, N.; Rappoport, V.; Ruhl, K. Intra-firm trade and vertical fragmentation in U.S. multinational corporations. *J. Int. Econ.* **2016**, *98*, 51–59. [CrossRef]
12. Egger, P.; Merlo, V. The impact of BITs on FDI dynamics. *World Econ.* **2007**, *30*, 1536–1549. [CrossRef]
13. Baltagi, B.H.; Egger, P.; Pfaffermayr, M. Estimating Regional Trade Agreement effects on FDI in an interdependent world. *J. Econom.* **2008**, *145*, 194–208. [CrossRef]
14. Chenaf-Nicet, D.; Rougier, E. The effect of macroeconomic instability on FDI flows: A gravity estimation of the impact of regional integration in the case of Euro-Mediterranean agreements. *Int. Econ.* **2016**, *145*, 66–91. [CrossRef]
15. Felbermayr, G.; Toubal, F. Cultural Proximity and Trade. *Eur. Econ. Rev.* **2010**, *54*, 279–293. [CrossRef]
16. Büthe, T.; Milner, H. FDI and institutional diversity in trade agreements: Credibility, commitment and economic flows in the developing world, 1971–2007. *World Politics* **2014**, *66*, 88–122. [CrossRef]
17. Dixon, J.; Haslam, P.A. Does the quality of investment protection affect FDI flows to Developing Countries? Evidence from Latin America. *World Econ.* **2016**, *39*, 1080–1108. [CrossRef]
18. Frenkel, M.; Walter, B. Do bilateral investment treaties attract FDI? The role of international dispute settlement provisions. *World Econ.* **2019**, *42*, 1316–1342. [CrossRef]
19. Markusen, J.R. Multinationals, multiplant economies and the gains from trade. *J. Int. Econ.* **1984**, *16*, 205–226. [CrossRef]
20. Helpman, E. A simple theory of international trade with multinational corporations. *J. Political Econ.* **1984**, *92*, 451–471. [CrossRef]
21. Neary, J.P. FDI and the single market. *Manch. Sch.* **2002**, *70*, 291–314. [CrossRef]
22. Castilho, M.; Zignago, S. Trade, FDI and regional integration in Mercosur. *Revue Econ.* **2000**, *51*, 761–774.
23. Anderson, J.E.; Larch, M.; Yotov, Y. Trade liberalization, growth and FDI: A structural estimation framework. *ETSG Work. Pap.* 2017. Available online: http://www.etsg.org/ETSG2016/Papers/052.pdf (accessed on 1 November 2018).
24. Blomström, M.; Kokko, A. *Regional Integration and FDI*; NBER Working Paper 1997; NBER: Cambridge, MA, USA, 1997.
25. Egger, P.; Pfaffermayr, M. FDI and European integration in the 1990s. *World Econ.* **2004**, *27*, 99–110. [CrossRef]
26. Büge, M. *Do PTA Increase Their Members' FDI?* German Development Institute Discussion Paper; DIE-GDI: Bonn, Germany, 2014.
27. Carr, D.L.; Markusen, J.R.; Maskus, K.E. Estimating the knowledge-capital model of the multinational enterprise. *Am. Econ. Rev.* **2001**, *91*, 693–708. [CrossRef]

28. Cherif, M.; Dreger, C. Institutional determinants of financial development in MENA countries. *Rev. Dev. Econ.* **2016**, *20*, 670–680. [CrossRef]
29. Kerner, A. Why should I believe you? Costs and consequences of BITs. *Int. Stud. Q.* **2009**, *53*, 73–102. [CrossRef]
30. Busse, M.; Königer, J.; Nunnenkamp, P. FDI promotion through bilateral investment treaties: More than a bit? *Rev. World Econ.* **2010**, *146*, 147–177. [CrossRef]
31. Neumayer, E.; Spess, L. Do BITs increase FDI to developing countries? *World Dev.* **2005**, *33*, 1567–1585. [CrossRef]
32. Salacuse, J.W.; Sullivan, N. Do BITs really work? An evaluation of BITs and their grand bargain. *Harv. Int. Law J.* **2005**, *46*, 67–130.
33. Sirr, G.; Garvey, J.; Gallagher, L. BITs and FDI: Evidence of asymmetric effects on vertical and horizontal investments. *Dev. Policy Rev.* **2017**, *35*, 93–113. [CrossRef]
34. Hallward-Driemeier, M. *Do Bilateral Investment Treaties Attract FDI? Only a Bit ... and They Could Bite*; Policy Research Working Paper WPS3121 2003; World Bank: Washington, DC, USA, 2003.
35. Rose-Ackerman, S.; Tobin, J. FDI and the business environment in developing countries: The impact of BITs. *Yale Law Econ. Res. Paper* **2005**, *293*. Available online: http://ssrn.com/abstract=557121 (accessed on 1 November 2018).
36. Gallagher, K.P.; Birch, M.B. Do investment agreements attract investment? Evidence from Latin America. *J. World Investig. Trade* **2006**, *7*, 961–974. [CrossRef]
37. Yackee, J.W. BITs, credible commitment, and the rule of (International) Law: Do BITs promote foreign direct investment? *Law Soc. Rev.* **2008**, *42*, 805–832. [CrossRef]
38. Tobin, J.L.; Rose-Ackerman, S. When BITs have some bite: The political-economic environment for bilateral investment treaties. *Rev. Int. Organ.* **2011**, *6*, 1–32. [CrossRef]
39. Blonigen, B.A.; Piger, J. Determinants of FDI. *Can. J. Econ.* **2014**, *47*, 775–812. [CrossRef]
40. Egger, P.; Pfaffermayr, M. The proper panel econometric specification of the gravity equation: A three-way model with bilateral interaction effects. *Empir. Econ.* **2003**, *28*, 571–580. [CrossRef]
41. Head, K.; Ries, J. FDI as an outcome of the market for corporate control: Theory and evidence. *J. Int. Econ.* **2008**, *74*, 2–20. [CrossRef]
42. Anderson, J.E.; Yotov, Y. Terms of trade and global efficiency effects of free trade agreements, 1990–2002. *J. Int. Econ.* **2016**, *99*, 279–298. [CrossRef]
43. Anderson, J.E.; van Wincoop, E. Gravity with gravitas: A solution to the border puzzle. *Am. Econ. Review* **2003**, *93*, 170–192. [CrossRef]
44. Head, K.; Mayer, T. Gravity equations: Workhorse, toolkit, and cookbook. In *Handbook of International Economics*; Gopinath, G., Helpman, E., Rogoff, K., Eds.; Elsevier: Amsterdam, The Netherlands, 2014; Volume 4, pp. 131–195.
45. Mátyás, L. Proper econometric specification of the gravity model. *World Econ.* **1997**, *20*, 363–368. [CrossRef]
46. Egger, P. A note on the proper econometric specification of the gravity equation. *Econ. Lett.* **2000**, *66*, 25–31. [CrossRef]
47. Baier, S.L.; Bergstrand, J.H. Do free trade agreements actually increase members' international trade? *J. Int. Econ.* **2007**, *71*, 72–95. [CrossRef]
48. Olivero, M.P.; Yotov, Y. Dynamic gravity: Endogenous country size and asset accumulation. *Can. J. Econ.* **2012**, *45*, 64–92. [CrossRef]
49. Feenstra, R. *Advanced International Trade: Theory and Evidence*; Princeton University Press: Princeton, NJ, USA, 2016.
50. Egger, P.; Pfaffermayr, M. Distance, trade and FDI: A Hausman–Taylor SUR approach. *J. Appl. Econom.* **2004**, *19*, 227–246. [CrossRef]
51. Babetskaia-Kukharchuk, O.; Maurel, M. Russia's accession on to the WTO: The potential for trade increase. *J. Comp. Econ.* **2004**, *32*, 680–699. [CrossRef]
52. McPherson, M.; Trumbull, W. Rescuing observed fixed effects: Using the Hausman-Taylor method for out-of-sample trade projections. *Int. Trade J.* **2008**, *22*, 315–340. [CrossRef]
53. Frankel, M.; Funke, K.; Stadtmann, G. A panel Analysis of bilateral FDI flows to emerging economies. *Econ. Syst.* **2004**, *28*, 281–300. [CrossRef]
54. Yang, S.; Martinez-Zarzoso, I. A panel data analysis of trade creation and trade diversion effects: The case of ASEAN-China Free Trade Area. *China Econ. Rev.* **2014**, *29*, 138–151. [CrossRef]

55. Berger, A.; Busse, M.; Nunnenkamp, P.; Roy, M. Do trade and investment agreements lead to more FDI? Accounting for key provisions inside the black box. *Int. Econ. Econ. Policy* **2013**, *10*, 247–275. [CrossRef]
56. Kohl, T.; Brakman, S.; Garretsen, H. Do trade agreements stimulate international trade differently? Evidence from 296 trade agreements. *World Econ.* **2016**, *39*, 97–131. [CrossRef]
57. Janicki, H.P.; Warin, T.; Wunnava, P. Endogenous OCA theory: Using the gravity model to test Mundell's intuition. *CES Work. Pap.* **2005**, 125.
58. Eicher, T.S.; Papageorgiou, C.; Raftery, A.E. Default priors and predictive performance in Bayesian model averaging, with application to growth determinants. *J. Appl. Econom.* **2011**, *26*, 30–55. [CrossRef]
59. Bergstrand, J.; Egger, P. A knowledge-and-physical-capital model of international trade flows, FDI and multinational enterprises. *J. Int. Econ.* **2007**, *73*, 278–308. [CrossRef]
60. Borchert, I.; Larch, M.; Shikher, S.; Yotov, Y. *Disaggregated Gravity: Benchmark Estimates and Stylized Facts from a New Database*; School of Economics Working Paper Series 2020-8; LeBow College of Business, Drexel University: Philadelphia, PA, USA, 2020.
61. Egger, P.; Nigai, S. Structural gravity with dummies only: Constrained ANOVA-type estimation of gravity models. *J. Int. Econ.* **2015**, *97*, 86–99. [CrossRef]
62. Hausman, J.A.; Taylor, W.E. Panel data and unobservable individual effects. *Econometrica* **1981**, *49*, 1377–1398. [CrossRef]