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RESEARCH ARTICLE



The impact of heterogeneity in bilateral investment treaties on foreign direct investment

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ABSTRACT

Prior research remains highly debated regarding whether bilateral investment treaties (BITs) effectively attract foreign direct investment (FDI). In this context, this study introduces a new dataset, the international investment agreement (IIA) mapping project, and panel data on FDI flows among 203 countries worldwide from 2009 to 2021. The findings indicate that higher BITs quality indicators, including breadth, depth, and non-economic standards (NES), significantly enhance FDI stock, with this effect remaining robust across various model specifications. Furthermore, as the domestic institutional quality of host countries improves, this positive effect is further amplified. These insights deepen the understanding of BITs effectiveness and offer policy implications for policymakers aiming to attract FDI through more comprehensive BITs.

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Foreign direct investment; bilateral investment treaties; treaties quality; institutional quality

1. Introduction

FDI inflows have been widely recognized as significantly contributing to the economic growth of host countries in many ways, such as capital formation, productivity improvement, technology transfer, employment creation and trade promotion.¹ In this context, efforts by host governments to attract FDI play an important role, and a specific measure is the BITs, which are a set of particular agreements and clauses entered into by the two governments to incentivize, promote, and protect mutual investment between the two countries. Some studies suggest that BITs significantly promote FDI flows.² However, other scholars question the investment promotion effect of BITs through empirical studies, arguing that BITs do not significantly boost FDI.³ Some scholars suggest that the lack of convincing results on this topic is due to differences in methodology and model specification; however, a significant reason may also be that most prior studies do not consider the great diversity and heterogeneity of international investment agreements (Chaisse & Bellak, 2015). Only a few scholars have explored the heterogeneity of BITs and differences in treaty content (Jacobs, 2013; Swenson,

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¹See de Mello (1999), Hsiao and Hsiao (2006), Keller (2010), and Varblane et al. (2003).

²See Banga (2003), Busse et al. (2010), and Neumayer and Spess (2005).

³See Hallward-Driemeier (2003), Rose-Ackerman and Tobin (2005), and Yackee (2007).

2005). As Hallward-Driemeier (2003) argues, BITs can be an essential instrument of commitment, but the nature of the commitment can vary considerably depending on the terms of the BITs. Thus, some BITs provide more comprehensive investor benefits than others (Swenson, 2005).

Chaisse and Bellak (2015) develop the BITSel Index indicator system based on the content of five main categories, such as breadth and liberalization. Jacobs and Ostergard (2019) construct measurement criteria based on four aspects: exceptions, monetary transfers, treatment, and broad treatment. On the one hand, this study responds to the call from prior research to account for differences in the quality and intensity of BITs. It enhances BITs quality indicators and further analyzes the effects of these indicators on FDI. Existing research on BITs quality has yet to fully reflect all the elements of a typical bilateral investment treaty. To further deepen and refine the impact of BITs quality on FDI, we will use an exhaustive but underutilized database, the IIA Mapping Project provided by UNCTAD's International Investment Agreements Navigator. The structure and design of BITs vary depending on the type of BITs, the time of conclusion, and the nature and development level of the contracting states (Egger et al., 2023). However, most BITs are comparable because they have a similar structure and are composed of identical elements. The IIA Mapping Project mapping contains 101 elements describing the content of international investment agreements. We will assign values to these 101 elements individually as appropriate, calculate the quality of BITs, and analyze their impact on FDI.

Based on the above analysis, the research objectives of this study are summarized as follows. Firstly, most of the above studies focus on FDI from developed countries to developing countries (Busse et al., 2010; Neumayer et al., 2016) or vice versa (Gómez-Mera & Varela, 2024; Li & Zhao, 2021). However, few studies have analyzed the general impact of BITs on FDI using multilateral data covering all countries. This study utilizes FDI data involving 203 home countries and 196 host countries. Secondly, unlike the common approach in previous studies that treats BITs homogeneously, our research focuses on the heterogeneous impact of BITs quality on FDI. Prior studies typically relied on binary variables (indicating whether country pairs have BITs) or the total count of signed or ratified BITs. Contrary to previous research, we employ the IIA Mapping Project, which encompasses 101 elements, to calculate the quality of BITs, capture their heterogeneity, and analyze their impact on FDI. To specify the quality of BITs and create indicators, we categorize the 101 elements according to the characteristics they represent and score them as breadth, depth, and NES. Lastly, we investigate the interaction between BITs quality and the domestic institutional quality of the host country, exploring whether they complement or substitute each other to delve into the role and impact of BITs as supranational institutions.

Some enterprises often invest in shell companies located in offshore financial centers (OFCs) for tax avoidance, etc., and bring FDI from OFCs back to their home countries, causing these OFCs to have massive inward and outward investment flows that are disproportionate to GDP (Haug et al., 2023). This phantom FDI is usually not affected by BITs, so FDI data covering these economies can distort the research results. However, not all of the FDI in these economies is phantom FDI but also includes real investment flows. Damgaard et al. (2019) decompose the FDI stock into real FDI and phantom FDI and estimate that for OFCs such as Luxembourg, real FDI may be as low as 5% of the total FDI stock. Therefore, to mitigate data distortion, this study excludes OFCs in the baseline

regression. In the robustness checks, it includes OFCs and adjusts the FDI values to reflect the share of real investment.

This study yields two key findings. First, an increase in the four quality indicators of BITs – breadth, depth, NES, and overall BITs quality (BQ) – can significantly promote FDI. Specifically, for each one-unit increase in the quality of BITs (i.e., adding one beneficial provision or removing one restrictive provision), FDI increases by 0.306%. BITs with an average quality level can increase FDI by 20.608%. A further finding is that the quality of BITs has a greater effect on attracting FDI in host countries with high institutional quality than in those with weak institutional quality, which is consistent with the findings of previous studies that advocate that BITs complement domestic institutions.⁴ This suggests that policymakers should consider not only the presence of BITs but also their qualitative aspects when designing strategies to attract FDI, thereby leveraging BITs to maximize FDI.

The rest of this study is organized as follows. [Section 2](#) presents the theory and prior research on whether and how BITs affect FDI, along with a preliminary discussion of BITs quality in previous studies. [Section 3](#) details the model, empirical methodology, data, and construction of BITs quality indicators. [Section 4](#) discusses the baseline results, specifically the impact of BITs quality on FDI and its heterogeneous effects across host countries with varying institutional quality. [Section 5](#) conducts robustness checks to enhance the reliability of the baseline results. Finally, [Section 6](#) summarizes the findings and provides policy recommendations and limitations that can guide future research.

2. Theories and literature review

2.1. The heterogeneous nature of BIT provisions

2.1.1. Prior research

Despite the heterogeneity in BITs, most research treats them as homogeneous entities, with only a few studies examining the variations in BITs provisions. Chaisse and Bellak (2015) assess 1498 BITs signed from 1980 to 2012 and construct a BITSel Index indicator system based on the content of 11 clauses in five main categories: (1) breadth of investment agreement; (2) liberalization of foreign investment flows; (3) anti-discrimination principle; (4) regulatory constraint; and (5) access to international dispute settlement. Jacobs and Ostergard (2019) systematically analyze the provisions of 748 BITs and construct an indicator system to measure treaty strength, covering 37 areas of variation across four aspects: (1) exceptions within the treaty, (2) protections for monetary transfers, (3) specific treatment protections, and (4) broad treatment standards. Some studies make preliminary explorations into the impact of BITs quality indicators on FDI. Nguyen et al. (2014) use Chaisse and Bellak (2011) BITSel index criterion to build an index of 57 BITs in Vietnam using panel data from 1995 to 2012 and find that the BITSel index has a statistically significant and positive impact on FDI inflows. It shows that more favorable BITs have a more substantial effect on FDI. Desbordes (2016) finds that BITs significantly positively impact the number of greenfield investments and

⁴See Hallward-Driemeier (2003), Li and Zhao (2021), Rose-Ackerman and Tobin (2005), and Tobin and Rose-Ackerman (2011).

M&A transactions, especially when BITs have a broader liberalization scope measured by Chaisse and Bellak (2015) composite BITSel indicator.

2.1.2. BITs breadth, depth, and non-economic standards

We inherit the definition of breadth from Chaisse and Bellak (2015), i.e., the cases and range that will apply as delineated by the BITs. However, the breadth of BITs in our study includes, but is not limited to, the definition of the investments and the temporal scope of application they mentioned. Therefore, a high breadth means covering a more comprehensive range of investments and investors over a longer timeframe, thus attracting a broader range of investments and investors. In addition to breadth, not all BITs provide the same degree of investment protection (Sauvant & Sachs, 2009; UNCTAD, 2007), so another critical dimension is depth, i.e., the level of protection, treatment, and liberalization that investors get when they enter the host countries. Our study's depth index of BITs extends beyond the liberalization, anti-discrimination, regulatory constraint, and dispute settlement aspects covered in Chaisse and Bellak (2015); Jacobs and Ostergard (2019) by incorporating additional clauses. As the depth of BITs increases, it will positively affect the investment decisions of multinational corporations. Furthermore, assessing BITs quality also encompasses NES (Chaisse and Bellak 2011). As supranational institutions, BITs shape the external environment for multinational corporations. The elements included in the NES reflect global trends with which multinationals must comply, such as sustainable development, corporate social responsibility, poverty reduction, labor, and environmental aspects. The less these standards are included and the lower the investment costs and burdens for investors, the higher the quality of BITs. Accordingly, the higher the quality of BITs regarding NES, the more attractive they are to FDI.

2.2. The relationship between BITs and FDI

The FDI literature lacks a comprehensive theoretical foundation and a model that identifies the primary determinants of location choices (Blonigen, 2005). Within this context, BITs, as formal supranational institutions, align well with institutional theory (Hartmann et al., 2022). Scott (1995) defines institutions as regulatory, normative, and cognitive structures that stabilize social behavior. BITs fill institutional voids in host countries and reduce political risk; they serve as supranational constraints on national institutional players, including host governments (Hartmann et al., 2022). By limiting the sovereignty of signatory countries, BITs discourage discriminatory and arbitrary actions, thereby creating a stable environment that earns the trust of FDI firms and promotes FDI inflows (Neumayer & Spess, 2005).

Hallward-Driemeier (2003) is one of the earliest scholars to argue that BITs have no significant impact on FDI. By analyzing bilateral FDI data from OECD countries to developing countries, she finds that BITs do not significantly affect FDI inflows as a share of GDP or as a share of total FDI. Similarly, Gurshev and Hamza (2021), in their analysis of the outward FDI of British multinational companies, demonstrate that BITs, when functioning as a market access mechanism, have a statistically significant negative impact on horizontal FDI in host countries. Numerous studies also hold a negative view on the

effects of BITs.⁵ In contrast, Egger and Pfaffermayr (2004) through an analysis of extensive OECD outward FDI data, find that ratified BITs have a significant positive effect on bilateral FDI stocks, and even BITs that are only signed but not yet implemented also show a positive anticipation effect. Additional studies also draw similar conclusions about the positive effects of BITs.⁶ Some studies show that the effectiveness of BITs depends on the partner sample and model specifications (Neumayer & Spess, 2005). Gallagher and Birch (2006) argue that while BITs have a positive effect on FDI flows to some extent, their impact is limited. Their findings indicate that the total number of BITs positively influences overall FDI inflows to South America but does not attract FDI from the United States. By contrast, Salacuse and Sullivan (2005), using cross-sectional FDI data for developing countries, find that only BITs signed with the United States promote greater FDI inflows, while those signed with other OECD countries do not significantly impact. Haftel (2008) modifies the study by Salacuse and Sullivan (2005) to include only signed and ratified BITs and obtains results consistent with those of Salacuse and Sullivan (2005).

This study identifies three main reasons for the ambiguous results of previous studies. The first reason is that previous studies use different regression specifications, particularly in terms of whether or not endogeneity is addressed (Busse et al., 2010). The second reason is that previous studies are based on small, non-representative samples of partner countries (Neumayer & Spess, 2005), with limited discussion of offshore economy issues. Last but not least, there was no discussion of the differentials and quality issues of BITs. Previous literature suggests that BITs and FDI are significantly correlated, likely because the endogeneity of BITs is often overlooked (Liu et al., 2021). First, the Poisson Pseudo Maximum Likelihood (PPML) method addresses major limitations of OLS in handling trade and investment issues, such as zero values and heteroscedasticity problems.⁷ And using country-pair fixed effects can alleviate the endogeneity problem of BITs in gravity models (Bergstrand & Egger, 2007). Accordingly, this study adopts the PPML model with a comprehensive set of home-time, host-time, and directional country-pair fixed effects as the primary specification (Kox & Rojas-Romagosa, 2020). Second, this study uses a larger sample, covering 203 home countries and 196 host countries, to produce more representative results. In international operations, some multinational companies may establish companies in tax havens and engage in institutional arbitrage by cycling investments through these locations, leveraging low tax rates and the absence of foreign exchange controls (Sharman, 2012). Clearly, the distribution of FDI cannot be fully understood without considering the role of tax havens and offshore finance (Bradley et al., 2023; Gurshev & Hamza, 2021). Beyond the baseline regression, we incorporate the sample of OFCs in the robustness checks. However, previous studies have not adequately captured the heterogeneous nature of BITs, focusing primarily on their existence and often overlooking the varying levels of investor protection and rights embedded within these treaties (Kerner, 2018; Sauvart & Sachs, 2009). We construct breadth, depth, and non-economic standard indicators of BITs to examine their impact on FDI from a qualitative perspective.

⁵See Hallward-Driemeier (2003), Rose-Ackerman and Tobin (2005), and Yackee (2007).

⁶See Busse et al. (2010), Gómez-Mera and Varela (2024), and Neumayer and Spess (2005).

⁷For a more detailed discussion on PPML, refer to Bradley et al. (2023), Jäkel et al. (2024), and Kox and Rojas-Romagosa (2020).

2.3. BITs and host country institution

Supranational institutions serve as extensions of and coexist with national institutions, and the interaction between supranational institutions and national institutions should be considered (Hartmann et al., 2022). Therefore, when analyzing the impact of BITs on FDI flows, in addition to the effects of BITs themselves, another critical issue is whether it substitutes or complements the domestic institution. The research findings of Hallward-Driemeier (2003) suggest that BITs serve as a complement rather than a substitute for good institutional quality and local property rights. Tobin and Rose-Ackerman (2011) also argue that a favorable political environment for investment supplements bilateral investment agreements, and countries must establish necessary domestic institutions to interact with these agreements to make their international commitments to investors credible and valuable. Similarly, Rose-Ackerman and Tobin (2005) contend that before a country can attract FDI through BITs, it must possess a minimum level of political stability. BITs only positively affect FDI flows in countries that already have political stability. Li and Zhao (2021), using outward FDI data of emerging market companies, conclude that BITs can complement good institutions and enhance investor confidence. However, Neumayer and Spess (2005) state that the above statement means that BITs are most effective in countries that least need them. They believe that BITs can replace the quality of domestic institutions and provide guarantees for foreign investors when the host country lacks good domestic institutions. Gómez-Mera and Varela (2024) contend that BITs diminish political risk, and the higher the political risk, the more effective the BITs become. Busse et al. (2010) also reach a similar conclusion. The interactions between BITs and the quality of host domestic institutions as measured by dummy variables and stocks in previous studies have not been conclusive, so we provide a new perspective on this issue by looking at whether the quality of BITs is a substitute for or a complement to the quality of the domestic institutions from a qualitative point of view.

3. Methodology

3.1. Dependent variable

The dependent variable in this study uses inward FDI stock data from the Coordinated Direct Investment Survey (CDIS) provided by the International Monetary Fund. The globally conducted CDIS compiles comprehensive data on direct investment, covering both inward and outward positions. This study focuses on inward FDI stock. However, missing values in inward FDI stock data are replaced using mirror data, which refers to the corresponding outward FDI stock reported by partner countries (Kox & Rojas-Romagosa, 2020). A small proportion of negative values are replaced with zero (Kox & Rojas-Romagosa, 2020). Following prior studies,⁸ we normalize the FDI stock by the GDP of the host country, measuring the FDI level as the ratio of FDI stock to the host country's GDP. GDP is calculated in current U.S. dollars, with data sourced from the World Bank's World Development Indicators. The percentage of inward FDI relative to host GDP is considered the best indicator of a country's ability to attract FDI (Jensen & McGillivray, 2005). Compared

⁸See Bütthe and Milner (2009), Hallward-Driemeier (2003), and Rosendorff and Shin (2012).

to measuring in current or constant U.S. dollars, this approach significantly reduces the adverse effects of outliers (Choi, 2009). Measuring FDI as a ratio to host GDP eliminates the need to deflate the dependent variable and ensures comparability across different countries and time periods (Büthe & Milner, 2008). Since studies place greater emphasis on examining how much FDI a country can increase relative to its economic scale rather than the absolute level of FDI, it is necessary to standardize economic scale (Choi & Samy, 2008). Based on data availability, our sample observations cover FDI data from 203 home countries to 196 host countries during the period 2009 to 2021. The baseline regression includes 113,587 observations across 10,644 country pairs, with an average of more than 10 observations per country pair. A robustness check includes OFCs that are frequently associated with profit shifting, where the FDI values for these countries are adjusted to reflect the share of real investment. The OFCs considered in this check include Bermuda, Cayman Islands, Cyprus, Hong Kong SAR, Ireland, Isle of Man, Luxembourg, Netherlands, and Singapore. As a result, the sample incorporating these OFCs consists of 132,032 observations across 12,367 country pairs. Refer to Appendix Table A1 for the list of sample countries.

3.2. Independent variables

Using data from the IIA Mapping Project provided by UNCTAD's International Investment Agreements Navigator, we assigned values to 2,592 BITs that were signed and entered into force between 2,503 pairs of countries (unions) from 1959 to 2021. Overall, BITs that cover more provisions favorable to foreign investment and fewer provisions restricting the benefits and powers of foreign investors are considered higher quality (Chaisse & Bellak, 2011). We categorized the content of each section in the IIA Mapping Project data into three indicators: breadth, depth, and NES.

3.2.1. BITs breadth

The BITs breadth index is measured based on the mapping elements of the Scope and Definitions, Treaty Duration, Amendment and Termination components of the IIA Mapping Project. The Scope and Definitions map the definitions of investment and investor that apply to the treaty, and the broader definitions mean that a more comprehensive range of investments and investors are covered. However, there is no shortage of limitations and specifications of the definitions of investment and investor, as well as limitations on the substantive scope of the treaty, which reduces the scope of application of the BITs. Moreover, the Denial of Benefits clause, which allows contracting states to prevent investors using shell companies to enjoy the BITs by denying protection to investors who lack substantial business activity or are from states without diplomatic relations (Côté, 2020), is also included. The Treaty Duration, Amendment and Termination section focuses on the temporal scope of BITs' application, reflecting the investment environment's permanence and stability. Longer treaty duration (i.e., years of the initial treaty term) and the period of automatic renewal after the initial treaty term ends increase investor confidence for long-term investments, whereas termination and modification bring uncertainty. Refer to Appendix Table A2 for more details on the assignment criteria of BITs breadth.

3.2.2. *BITs depth*

The BITs depth index indicates the degree of protection and treatment and the level of liberalization available to investors in the host country. It consists of three components, the first of which is the Standards of Treatment. The types of clauses, such as National treatment (NT), Most-favored-nation (MFN) treatment, and Fair and equitable treatment (FET), determine the extent to which foreign investors are treated fairly compared to host country investors and third-country investors during the admission and establishment (Neumayer et al., 2016). The mention and refinement of the expropriation clause can show the strength of the BITs' commitment to protect investors from expropriation and other political risks in the host country. In addition, this section includes other essential clauses affecting the degree of liberalization, such as the Transfer of funds and the Prohibition of performance requirements (PRs). The second part of BITs depth, Exceptions, consists mainly of clauses allowing the host country to derogate from treaty obligations under certain exceptions, the existence of which weakens the depth of protection and treatment of foreign investors. State-State Dispute Settlement (SSDS) and investor-state investment dispute settlement (ISDS) are also relevant to BITs depth. ISDS provides investors with the means to enforce the above protections by granting them direct access to dispute resolution mechanisms at the international level, such as arbitration (Egger et al., 2023). Refer to Appendix Table A3 for details on the assignment criteria of BITs depth.

3.2.3. *BITs non-economic standards*

The BITs NES index measures the content of three sections: the Preamble, Other Provisions, and Institutional Issues, most of which relate to NES (Chaisse & Bellak, 2011). We examined whether the preamble and the text refer to the right to regulate, sustainable development, social investment (e.g., labor, health, CSR), environment, and corruption. The more these standards are included in the BITs, the more investment costs investors incur to comply with them and the more unfavorable the effect of NES on FDI (Chaisse & Bellak, 2011). Thus, if the treaty mentions these standards or similar concepts, each clause is assigned a value of 0; otherwise, 1. The Other Provisions section also includes clauses on transparency, not lowering standards, subrogation, and non-derogation. We have assigned value to each according to the principle that it benefits the investor. Finally, the BITs NES index also includes institutional issues such as consultation mechanisms, institutional framework, and technical cooperation/capacity building. Refer to Appendix Table A4 for the assignment criteria of BITs NES. Additionally, the BQ index is calculated by summing the scores of all 101 elements, which is the sum of breadth, depth, and NES.

Figure 1 presents the distribution and annual mean trend graphs of the BITs quality indicators, including breadth, depth, NES, and BQ. It can be observed that the mean values of BITs quality indicators have shown an upward trend over the years, followed by a decline around 2010.

3.3. *Moderating variable*

FDI tends to favor countries and regions with stable and excellent institutional environments, as such environments effectively reduce investment risks and costs, protect intellectual property rights, facilitate contract compliance, maintain a level

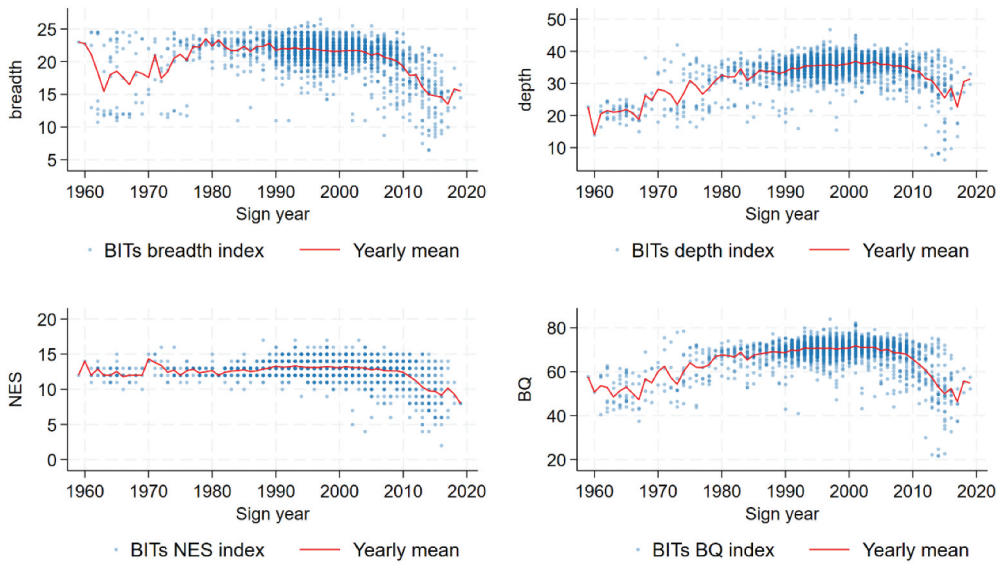


Figure 1. Trends and distribution of BITs quality indicators.

playing field, and thereby increase investment returns (Aleksynska & Havrylchyk, 2013). However, other studies argue that certain types of FDI target countries and regions with poorer institutional environments (Buckley et al., 2007; Cheung & Qian, 2009). BITs, as supranational institutions, along with the host country's national institutions, jointly form the institutional environment influencing FDI firms, potentially reinforcing or conflicting with each other (Hartmann et al., 2022). To assess the heterogeneous impact of BITs quality in host countries with varying institutional qualities and to explore whether BITs and host country institutions function as substitutes or complements, we use data from the Worldwide Governance Indicators (WGI) to measure the institutional quality of host countries, calculated as the average value of six WGI dimensions: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption.

3.4. Control variables

Free trade agreements (FTAs) have a distinct and significant impact on FDI. Therefore, we control for FTAs across all specifications (Jang, 2011). Additionally, we incorporate geographic distance, shared borders, common language, and common colonizer as control variables in the standard gravity model. All data for these variables are sourced from the CEPII Gravity database (Conte et al., 2022).

3.5. Estimation

In the selection of the estimation method, considering that there are many zeros in the dependent variable and that the OLS method is prone to biasing the regression results, we

used the PPML estimator (Silva & Tenreyro, 2006). The PPML method can deal with the common zero-value problem in the investment amount. Also, it can produce consistent estimation results even in the presence of heteroskedasticity. Using the following Equation (1) for our baseline regression:

$$FDI_{ijt} = \beta_0 + \beta_1 BITquality_{ijt} + \beta_2 FTA_{ijt} + \mu_{it} + \mu_{jt} + \mu_{ij} + \varepsilon_{ijt} \quad (1)$$

where, FDI_{ijt} represents the share of FDI stock from home country i to host country j relative to the host country's GDP in period t . $BITquality_{ijt}$ denotes the quality indicators of BITs in effect between the two countries. FTA_{ijt} is a dummy variable indicating whether a preferential trade agreement exists between the two countries. μ_{it} represents the time-varying fixed effect for the home country, while μ_{jt} denotes the time-varying fixed effect for the host country. μ_{ij} is the set of country-pair fixed effects, capturing any other unobserved, time-invariant bilateral determinants of FDI. To test the robustness of our results, we additionally employ an alternative approach – the standard gravity Equation (2):

$$FDI_{ijt} = \beta_0 + \beta_1 BITquality_{ijt} + \beta_2 FTA_{ijt} + \beta_3 Indist_{ij} + \beta_4 contig_{ij} + \beta_5 comlang_{ij} + \beta_6 comcol_{ij} + \mu_{it} + \mu_{jt} + \varepsilon_{ijt} \quad (2)$$

we replace the country pair fixed effect in the baseline regression with a time-invariant bilateral control variable. The variables are based on Bradley et al. (2023); Gurshev and Hamza (2021) and include *Indist* (the logarithm of the geographical distance between the two countries' capitals), *contig* (dummy that whether the two countries share a border), *comlang* (dummy that whether share an official language), and *comcol* (dummy that identifies a common colonizer after 1945).

4. Empirical results

4.1. Descriptive statistics and correlation matrix

Table 1 presents descriptive statistics and correlation matrix for each variable in the analysis. Breadth, depth, NES, and BQ have high correlation coefficients, which indicates that the signing of high-quality BITs between country pairs seeks to deepen economic cooperation in terms of breadth, depth, and NES. This also led us to regress breadth, depth, NES, and BQ separately.

4.2. Baseline empirical results

Table 2 presents the analysis results on the impact of BITs quality indicators on FDI. In the baseline regression, OFCs are excluded.

Column 1 shows that the breadth of the BITs positively affects FDI at the 1% significance level. As mentioned before, the breadth of BITs mainly includes the scope of the definition of foreign investment and the temporal scope of application. BITs that cover a more comprehensive range of investments (investors) have promoted investment in various forms and purposes. Similarly, reducing closed lists and limitation clauses also broadens the scope of investments the BITs protect, thereby increasing FDI.

Table 1. Descriptive statistics and correlation matrix.

	1	2	3	4	5	6	7	8	9	10
1. FDI	1									
2. breadth	0.011***	1								
3. depth	0.010***	0.988***	1							
4. NES	0.011***	0.991***	0.988***	1						
5. BQ	0.011***	0.996***	0.998***	0.995***	1					
6. FTA	0.009***	0.251***	0.253***	0.253***	0.253***	1				
7. Indist	-0.016***	-0.260***	-0.266***	-0.267***	-0.265***	-0.422***	1			
8. contig	0.013***	0.053***	0.055***	0.059***	0.055***	0.199***	-0.397***	1		
9. comlang	0.051***	-0.016***	-0.008***	-0.014***	-0.012***	0.037***	-0.082***	0.118***	1	
10. comcol	0.001	-0.047***	-0.045***	-0.045***	-0.046***	0.031***	-0.112***	0.096***	0.373***	1
Mean	0.00594	3.761423	6.127179	2.28001	12.16861	0.185012	8.670846	0.023883	0.116423	0.059568
SD	0.143458	8.188871	13.34861	4.948272	26.3944	0.388308	0.826909	0.152686	0.320732	0.236685

Table 2. Baseline PPML estimation results for BITs quality indicators.

	FDI				
	(1)	(2)	(3)	(4)	(5)
breadth	0.0092** (0.0040)				
depth		0.0061** (0.0025)			
NES			0.0163** (0.0070)		
BQ				0.0031** (0.0013)	
BITdummy					0.1894** (0.0792)
FTA	0.0552 (0.1578)	0.0569 (0.1575)	0.0551 (0.1577)	0.0559 (0.1576)	0.0536 (0.1581)
Constant	−0.7948*** (0.0467)	−0.7983*** (0.0475)	−0.7991*** (0.0475)	−0.7983*** (0.0473)	−0.7944*** (0.0459)
Observations	113,587	113,587	113,587	113,587	113,587
R-squared	0.657	0.657	0.657	0.657	0.657
RESET test p-value	0.267	0.269	0.389	0.289	0.355
Home-year FE	YES	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES	YES
Country Pair FE	YES	YES	YES	YES	YES

The regression includes home-time fixed effects, host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level, in parentheses. Due to separation by fixed effects, 103,302 observations were dropped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

Furthermore, FDI is often presented as relatively irreversible in the short run (Julio & Yook, 2016), and large-scale investments are particularly prudent. Thus, the longer the temporal scope of the application is, the longer the time is left for the investor to invest and adjust, giving the investor the confidence to make long-term, large-scale investments. Column 2 shows that the depth of BITs significantly contributes to FDI. This suggests that the more profound the degree of relative standard treatments (as NT and MFN) and absolute standard treatments (as FET) (Claxton, 2020) investors receive measured by the BITs depth, the more attractive the BITs. Furthermore, stricter international dispute resolution provisions have attracted FDI by giving investors a higher chance of compensation when faced with a breach of BITs (Frenkel & Walter, 2019). On the other hand, the expropriation clauses protected investors from being deprived of their assets by the host country, and the transfer of funds clauses guaranteed investors the ability to transfer their investments to the host country or repatriate their investments and returns (Chaisse & Bellak, 2015). Column 3 result indicates that the BITs' level of NES also significantly affects FDI. NES have generated compliance costs and additional expenses for MNCs' business activities, which are deterred by high labor standards and corporate social responsibility (Duanmu, 2014). Therefore, minimizing such clauses in the BITs can attract FDI. Institutional issues clauses in NES, such as investment promotion, mechanism for consultations, and institutional framework, have also enabled the BITs to operate well and maximize the promotion of FDI flows. The coefficient of BQ in column (4) indicates that for every one-unit increase in BITs quality (i.e., adding one beneficial provision or removing one restrictive provision), inward FDI grows by 0.306% ($(e^{0.0030577} - 1) * 100\%$). Based on the average BITs quality in our sample, which is 67.293, it can be inferred that BITs increase FDI by an average of 20.608%. This finding is similar

to previous research in the magnitude of FDI growth caused by BITs,⁹ while further demonstrating that higher-quality BITs have a more pronounced positive effect on FDI, underscoring that the quality of BITs is an important factor for FDI. In column (5), we replaced the BITs quality indicators with the BITs dummy to measure the existence of BITs. The result indicates that BITs increase FDI by 20.853% ($(e^{0.1894028} - 1) \times 100\%$), which is consistent with previous studies and provides preliminary confirmation of the correctness of the model specification.

In addition, we also use the standard gravity equation. As shown in Table 3, *contig*, *comlang*, and *comcol* significantly promote FDI, as expected, while *Indist* hinders FDI. The quality indicators of BITs, such as breadth, depth, noneconomic, and BITquality, also significantly promote FDI, as in the baseline results. However, in terms of the coefficients, not controlling for unobservable time-invariant factors may have led to overestimating the impact of BITs on FDI.

Haftel (2008) argues that only BITs that have entered into force (i.e., BITs that both parties have ratified) positively impact FDI. However, some studies show that BITs can

Table 3. Standard gravity estimation results for BITs quality indicators.

	FDI			
	(1)	(2)	(3)	(4)
breadth	0.0210** (0.0085)			
depth		0.0116** (0.0050)		
NES			0.0375*** (0.0142)	
BQ				0.0064** (0.0026)
FTA	0.3539*** (0.1265)	0.3496*** (0.1293)	0.3566*** (0.1254)	0.3510*** (0.1276)
Indist	-1.0690*** (0.1027)	-1.0740*** (0.1032)	-1.0657*** (0.1023)	-1.0708*** (0.1029)
contig	0.2534 (0.1772)	0.2355 (0.1781)	0.2598 (0.1784)	0.2476 (0.1778)
comlang	0.6950*** (0.1568)	0.7085*** (0.1554)	0.6929*** (0.1564)	0.7010*** (0.1560)
comcol	0.6064* (0.3194)	0.5960* (0.3223)	0.6053* (0.3219)	0.6003* (0.3213)
Constant	6.8860*** (0.8519)	6.9366*** (0.8582)	6.8481*** (0.8485)	6.9024*** (0.8544)
Observations	212,985	212,985	212,985	212,985
R-squared	0.581	0.581	0.581	0.581
RESET test p-value	0.972	0.859	0.907	0.963
Home-year FE	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES
Country Pair FE	NO	NO	NO	NO

The regression includes home-time fixed effects and host-time fixed effects. Standard errors are clustered at the country pair level, in parentheses. Due to separation by fixed effects, 1,208 observations were dropped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

⁹See Chaisse and Bellak (2011), Egger and Pfaffermayr (2004), Falvey and Foster McGregor (2017), and Reiter and Bellak (2021).

promote FDI even if they have only been signed but have not yet entered into force (Egger & Pfaffermayr, 2004; Kox & Rojas-Romagosa, 2020). We advance the year of the indicator used to measure BITs quality in the baseline regression from the year of entry into force to the year of signing, i.e., before the BITs are signed, the BITs quality indicators are 0. After the treaty is signed, the variables reflect the corresponding quality level of BITs. As shown in Table 4, even if the BITs are only signed, their quality indicators (such as *breath_sign*, *depth_sign*, *NES_sign*, and *BQ_sign*) also have a significant positive impact on FDI.

We next consider whether the impact of BITs quality depends on the host country's institutional environment characteristics. In this way, we identify whether BITs quality has a complementary or substitutive relationship with the host country's domestic institutions. Table 5 presents the estimation results of the BITs breadth index interacting with the host country's institutional environment. The interaction term *breadth* $\times$ *IQ* in column (1) is significant and has the same sign as the main effect, indicating that the breadth index of the BITs has a greater effectiveness on FDI in host countries with high institutional quality. Our results inherit from previous research¹⁰ and add new insights to the viewpoint through new methods. A higher BITs breadth index provides broader and longer-term protection for FDI. However, effective implementation of BITs requires a favorable institutional environment in the host country. Additionally, due to the irreversible and high sunk costs of FDI, investors rely on BITs to reduce uncertainty by binding the host country to its commitments. However, in host countries with weak law and order, the binding effect of BITs lacks credibility (Tobin & Rose-Ackerman, 2011).

Table 4. Impact of BITs quality indicators at signing stage on FDI.

	FDI			
	(1)	(2)	(3)	(4)
<i>breath_sign</i>	0.0101** (0.0046)			
<i>depth_sign</i>		0.0059** (0.0029)		
<i>NES_sign</i>			0.0171** (0.0077)	
<i>BQ_sign</i>				0.0032** (0.0015)
FTA	0.0501 (0.1522)	0.0482 (0.1493)	0.0514 (0.1528)	0.0491 (0.1507)
Constant	−0.8024*** (0.0600)	−0.7984*** (0.0622)	−0.8048*** (0.0601)	−0.8024*** (0.0619)
Observations	113,587	113,587	113,587	113,587
R-squared	0.657	0.657	0.657	0.657
RESET test p-value	0.545	0.782	0.719	0.739
Home-year FE	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES
Country Pair FE	YES	YES	YES	YES

The regression includes home-time fixed effects and host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level, in parentheses. Due to separation by fixed effects, 103,302 observations were dropped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

¹⁰See footnote 4.

Table 5. Interaction effects of BITs quality indicators and host country institutional environment on FDI.

	FDI			
	(1)	(2)	(3)	(4)
breadth	0.0063 (0.0042)			
breadth×IQ	0.0147** (0.0064)			
depth		0.0048* (0.0026)		
depth×IQ		0.0087** (0.0040)		
NES			0.0105 (0.0072)	
NES×IQ			0.0291*** (0.0112)	
BQ				0.0022* (0.0013)
BQ×IQ				0.0047** (0.0020)
FTA	0.0476 (0.1532)	0.0508 (0.1538)	0.0456 (0.1523)	0.0487 (0.1533)
Constant	−0.8054*** (0.0471)	−0.8101*** (0.0477)	−0.8131*** (0.0477)	−0.8101*** (0.0476)
Observations	113,587	113,587	113,587	113,587
R-squared	0.657	0.657	0.657	0.657
RESET test p-value	0.030	0.449	0.002	0.079
Home-year FE	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES
Country Pair FE	YES	YES	YES	YES

The regression includes home-time fixed effects, host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level. Robust standard errors in parentheses. The moderating variable IQ is omitted due to collinearity with the host-time fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

Column (2) analyzes the interaction between BITs depth and the host country's institutional environment. Similar to the estimates in Column (1), the interaction term between BITs depth and host country institutional quality ($depth \times IQ$) shows positive and significant coefficients. The results suggest that host countries with weak governance lack credibility and reputation (Berger et al., 2013), and compared to them, well-institutionalized host countries are more capable and likely to bind their sovereignty to make credible promises against discriminatory and discretionary treatment by signing BITs in exchange for credibility with foreign investors than host countries with weak institutions (Rose-Ackerman & Tobin, 2005). Therefore, the BITs depth index is more effective in promoting FDI in host countries with high institutional quality.

We also test whether the impact of the BITs NES index on FDI is conditional on the host country's institutional environment, and column (3) demonstrates the results. In host countries with higher institutional quality, the BITs NES index has more of a boosting effect on FDI. Therefore, as the quality of the host country's institutions improves, with stricter legal regulations and more effective law enforcement, FDI enterprises incur higher costs in complying with the host country's NES related to environmental protection, corporate social responsibility, and labor standards. Consequently, when restrictions on NES are eased, host countries with well-established institutions become more attractive to FDI compared to those with weaker institutional frameworks.

In addition, institutional issues in NES can facilitate coordination and cooperation between home and host countries to guarantee the functioning of the BITs, particularly in the case of host countries with robust institutions.

In addition, we examine the heterogeneous effects of BITs overall quality (i.e., the sum of breadth, depth, and NES) in host countries with varying institutional environments. The results are consistent with the previous three columns. In summary, this finding supports to some extent the view that BITs can be a complement for the host country's domestic institutions to promote FDI. On this basis, our study concludes that not only BITs, which are measured as a dummy variable or stock, but also the quality of BITs has a complementary relationship with the institutional quality of the host country in promoting FDI.

4.3. Robustness tests

In robustness checks, we expand the sample of OFCs and apply a uniform share of real FDI stock across all counterpart economies, i.e., we adjust the FDI values by including only 5% of the nominal stock value in the sample. And refer to Gurshev and Hamza (2021) to increase the real FDI share of OFCs to 10%. As shown in Table 6, columns (1) to (4) report the results using the original decomposition ratio of 5% proposed by Damgaard et al. (2019), and the coefficients of each variable are similar to those in Table 2. Columns (2) to (5) report the results when the real FDI stock share in OFCs is increased to 10%. The slight decrease in the coefficient indicates that the importance of

Table 6. PPML estimation results for BITs quality indicators using varying shares of real FDI in offshore financial centers.

	5%				10%			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
breadth	0.0087** (0.0038)				0.0081** (0.0037)			
depth		0.0059** (0.0024)				0.0055** (0.0024)		
noneconomic			0.0157** (0.0065)				0.0146** (0.0063)	
BQ				0.0029** (0.0012)				0.0027** (0.0012)
FTA	0.0627 (0.1412)	0.0641 (0.1410)	0.0621 (0.1411)	0.0632 (0.1411)	0.0612 (0.1305)	0.0624 (0.1304)	0.0603 (0.1305)	0.0616 (0.1305)
Constant	-0.8137*** (0.0408)	-0.8174*** (0.0414)	-0.8181*** (0.0411)	-0.8172*** (0.0413)	-0.6924*** (0.0372)	-0.6960*** (0.0377)	-0.6963*** (0.0371)	-0.6956*** (0.0375)
Observations	132,032	132,032	132,032	132,032	132,032	132,032	132,032	132,032
R-squared	0.657	0.657	0.657	0.657	0.667	0.667	0.667	0.667
RESET test	0.269	0.266	0.388	0.286	0.322	0.323	0.440	0.341
p-value								
Home-year FE	YES	YES	YES	YES	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country Pair FE	YES	YES	YES	YES	YES	YES	YES	YES

The regression includes home-time fixed effects, host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level, in parentheses. Due to separation by fixed effects, 109,051 observations were dropped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

BITs decreases as the share of real FDI stock of OFCs increases, confirming the rationality of excluding OFCs in the baseline regression. In short, the baseline regression results are also robust when considering the sample of OFCs.

Compared to the more volatile flow data, although using stock as the dependent variable can significantly reduce the interference of negative values on the estimation, some observations are still negative. Drawing on Kox and Rojas-Romagosa (2020), we use two- and three-year averages to address the issue of negative values and smooth the fluctuations in FDI stock. As shown in Table 7, columns (1) to (4) report the two-year averages, and columns (5) to (8) report the three-year averages. The BITs quality indicators are all significant, indicating the robustness of the baseline results.

Investors may make strategic adjustments before the BITs come into force to take advantage of the favorable conditions under the new environment after the BITs are formally implemented. There may also be a delay in policy implementation and investor confidence building, which will cause the growth of FDI to appear gradually after the BITs come into force. Therefore, as another robustness test, we refer to Kox and Rojas-Romagosa (2020) and introduce lagged and lead values for the quality indicators of BITs into the baseline model to examine whether the specific impact of BITs may be manifested a few years before or after the protocol takes effect. Table 8 presents the regression results of adding one to three lags and leads. All regression analyses include the FTA dummy variable. All lag and lead variables show positive and significant coefficients, indicating that BITs have both expected and lagged effects on FDI. The impact of BITs

Table 7. PPML estimation results for BITs quality indicators using 2-year average FDI and 3-year average FDI.

	2-year average				3-year average			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
breadth	0.0085** (0.0040)				0.0073* (0.0040)			
depth		0.0057** (0.0026)				0.0049* (0.0026)		
NES			0.0153** (0.0071)				0.0134* (0.0071)	
BQ				0.0028** (0.0013)				0.0025* (0.0013)
FTA	0.0320 (0.1497)	0.0335 (0.1495)	0.0318 (0.1496)	0.0327 (0.1495)	0.0025 (0.1419)	0.0037 (0.1417)	0.0021 (0.1418)	0.0029 (0.1418)
Constant	−0.8645*** (0.0457)	−0.8680*** (0.0465)	−0.8692*** (0.0465)	−0.8679*** (0.0464)	−0.9185*** (0.0442)	−0.9224*** (0.0451)	−0.9233*** (0.0450)	−0.9220*** (0.0449)
Observations	116,936	116,936	116,936	116,936	118,744	118,744	118,744	118,744
R-squared	0.650	0.650	0.650	0.650	0.644	0.644	0.644	0.644
RESET test	0.243	0.338	0.428	0.317	0.133	0.939	0.752	0.638
p-value								
Home-year FE	YES	YES	YES	YES	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country Pair FE	YES	YES	YES	YES	YES	YES	YES	YES

The regression includes home-time fixed effects, host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level, in parentheses. Due to separation by fixed effects, 106,471 observations in columns (1) to (4) and 108,516 observations in columns (5) to (8) were dropped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

Table 8. PPML estimation results for BITs quality indicators using FDI with lags and leads.

		Estimated coefficient	Standard error
breadth	Lagged 1 year	0.0122***	(0.0044)
	Lagged 2 years	0.0123***	(0.0041)
	Lagged 3 years	0.0083**	(0.0040)
	Forward 1 year	0.0103***	(0.0034)
	Forward 2 years	0.0080**	(0.0032)
	Forward 3 years	0.0069**	(0.0034)
depth	Lagged 1 year	0.0077***	(0.0026)
	Lagged 2 years	0.0072***	(0.0024)
	Lagged 3 years	0.0045*	(0.0024)
	Forward 1 year	0.0063***	(0.0023)
	Forward 2 years	0.0047**	(0.0022)
	Forward 3 years	0.0038*	(0.0021)
NES	Lagged 1 year	0.0207***	(0.0074)
	Lagged 2 years	0.0199***	(0.0067)
	Lagged 3 years	0.0133**	(0.0065)
	Forward 1 year	0.0188***	(0.0060)
	Forward 2 years	0.0149***	(0.0056)
	Forward 3 years	0.0126**	(0.0057)
BQ	Lagged 1 year	0.0039***	(0.0014)
	Lagged 2 years	0.0038***	(0.0012)
	Lagged 3 years	0.0024**	(0.0012)
	Forward 1 year	0.0033***	(0.0011)
	Forward 2 years	0.0025**	(0.0011)
	Forward 3 years	0.0021*	(0.0011)

The regression includes home-time fixed effects, host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level, in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

quality indicators on FDI becomes evident three years before the BITs enter into force and persists for three years afterward. Notably, the coefficients are slightly higher in the year preceding and the year following the entry into force.

We constructed the multilateral resistance (MR) term as shown in Equation (3) and included it in the baseline regression as part of the robustness checks¹¹

$$MR_{ijt} = \sum \text{Indist}_{iv} \times \frac{GDP_{vt}}{\sum_v GDP_{vt}}, i \neq j \neq v \quad (3)$$

where, MR_{ijt} is the weighted distance between host country i and other home countries v , aiming to represent the bilateral frictions between i and v . Indist_{iv} is the natural logarithm of the geographic distance between host country i and other home countries v . GDP_{vt} represents the GDP of other home country v at time t , serving as a component of the world GDP, $\sum_v GDP_{vt}$. MR_{ijt} is expected to be positive because, all else being equal, the farther host country i is from all other home countries v (especially those representing larger economies), the more FDI host country i receives from home country j (Bradley et al., 2023). As shown in Table 9, the quality indicators of BITs do not change significantly. The sign of MR is positive as expected but not significant, indicating that omitted variable bias does not have a major impact on this study.

Additionally, we include only observations with positive FDI (excluding both zero and negative values). As shown in Table 10, consistent with previous research (Falvey & Foster McGregor, 2017), when considering only positive FDI, the coefficient slightly

¹¹In gravity regressions, ignoring MR constitutes the “gold medal mistake” (Baldwin & Taglioni, 2006; Yotov, 2024):.

Table 9. PPML estimation results with multilateral resistance term for BITs quality indicators.

	FDI			
	(1)	(2)	(3)	(4)
breadth	0.0091** (0.0041)			
depth		0.0061** (0.0026)		
NES			0.0162** (0.0071)	
BQ				0.0030** (0.0013)
FTA	0.0554 (0.1599)	0.0571 (0.1597)	0.0553 (0.1598)	0.0562 (0.1598)
MR	0.6055 (0.7361)	0.6138 (0.7362)	0.6038 (0.7358)	0.6098 (0.7361)
Constant	−4.6175 (4.6731)	−4.6744 (4.6747)	−4.6117 (4.6721)	−4.6489 (4.6739)
Observations	110,728	110,728	110,728	110,728
R-squared	0.659	0.659	0.659	0.659
RESET test p-value	0.505	0.436	0.525	0.475
Home-year FE	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES
Country Pair FE	YES	YES	YES	YES

The regression includes home-time fixed effects, host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level, in parentheses. Due to separation by fixed effects, 100,246 observations were dropped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

Table 10. PPML estimation results for BITs quality indicators using FDI data excluding zero values.

	FDI (positive values only)			
	(1)	(2)	(3)	(4)
breadth	0.0089** (0.0039)			
depth		0.0060** (0.0025)		
NES			0.0159** (0.0068)	
BQ				0.0030** (0.0013)
FTA	0.0429 (0.1373)	0.0445 (0.1371)	0.0427 (0.1373)	0.0436 (0.1372)
Constant	−0.7671*** (0.0423)	−0.7711*** (0.0430)	−0.7719*** (0.0430)	−0.7709*** (0.0429)
Observations	84,908	84,908	84,908	84,908
R-squared	0.642	0.642	0.642	0.642
RESET test p-value	0.277	0.323	0.459	0.328
Home-year FE	YES	YES	YES	YES
Host-year FE	YES	YES	YES	YES
Country Pair FE	YES	YES	YES	YES

The regression includes home-time fixed effects, host-time fixed effects, and country pair fixed effects. Standard errors are clustered at the country pair level, in parentheses. Due to separation by fixed effects, 1,079 observations were dropped. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. As PPML is a nonlinear estimation method, the R^2 cannot be computed. The R^2 reported here is McFadden's pseudo- R^2 .

decreases but remains significant, confirming the robustness of the baseline regression results.

5. Conclusion

As FDI firms go global, they are often exposed to formidable counterparts in the host country and risks in the investment environment, which need to be mitigated through the legal commitment of BITs to guarantee fair and equitable treatment and protection. Acknowledging the importance of the quality of treatment and protection provided by BITs, as well as the critical role of the host country's domestic institutional environment, our study examines the impact of BITs quality on FDI. We assign values to 101 treaty elements using data from the IIA Mapping Project, which is provided by UNCTAD's International Investment Agreements Navigator. This process yields four quality indicators: BITs breadth, BITs depth, BITs NES, and BQ. Using panel data covering 203 home countries and 196 host countries between 2009 and 2021, we provide strong evidence that improvements in BITs quality indicators significantly contribute to increased FDI. Specifically, a one-unit increase in BITs' quality (i.e., adding one beneficial provision or removing one restrictive provision) leads to a 0.306% increase in FDI. BITs of average quality can boost FDI by 20.608%. This result remains highly robust across different model specifications and sample sizes. In addition, we explore the heterogeneity of the impact of the BITs quality indicators on FDI to host countries with different institutional environments, suggesting that the promotion effect of FDI brought about by the improvement of the quality of BITs is more pronounced in host countries with higher institutional quality.

This study contributes to extant research in two ways. First, this study responds to the debate on the relationship between BITs and FDI. Previous studies have presented two different views of the impact of BITs on FDI: one that emphasizes facilitation, and another that points to either a negative impact or no significant effect. We demonstrate the impact of BITs quality indicators such as breadth, depth, and NES on the promotion of FDI from a quality-based perspective, contributing to a fresh understanding of the role of BITs in protecting the internationalization. This provides policy implications for policymakers to enhance BIT quality in order to maximize the FDI promotion effect. Second, it also provides a novel look at another crucial question: the relationship between BITs and the host country's institutional environment, as the limited literature is inconclusive on whether BITs and host countries' domestic institutions are substitutes or complements each other. This study enhances the literature on the interaction between BITs and host country institutions by demonstrating that BITs, as supranational institutions, are qualitatively complemented by the host country's domestic institutions.

This study has several limitations, which can also be considered as ideas for future research. First, we gave equal weight to the 101 elements, as each was capped at a value of 1. However, MFN clauses are far more crucial than clauses about the treaty's duration, so the weight given to these clauses should be different (Chaisse & Bellak, 2015). Nevertheless, we relax this premise when formulating our indicators. Second, although our country-level-based analysis finds that the BITs quality indicators have a facilitating effect on FDI as a whole, the heterogeneous impact of BITs quality on different FDI still deserves to be explored in depth. Future research can

gain a more in-depth understanding of this topic by distinguishing between greenfield and cross-border M&A FDI, horizontal and vertical FDI, or by exploring the firm-level characteristics based on firm-level analyses. Another issue that needs to be considered is “over-institutionalization.” While these factors can play a role in activating FDI at an appropriate level, over-institutionalization could inadvertently elevate transaction costs for firms, thereby exerting a harmful impact on FDI, necessitating a review.

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References

- Aleksynska, M., & Havrylchyk, O. (2013). FDI from the south: The role of institutional distance and natural resources. *European Journal of Political Economy*, 29, 38–53. <https://doi.org/10.1016/j.ejpoleco.2012.09.001>
- Baldwin, R., & Taglioni, D. (2006). *Gravity for dummies and dummies for gravity equations*. National bureau of economic research Cambridge, Mass.
- Banga, R. (2003). Impact of government policies and investment agreements on FDI inflows. *Indian council for research on international economic relations (ICRIER), working paper no. 116*.
- Berger, A., Busse, M., Nunnenkamp, P., & Roy, M. (2013). Do trade and investment agreements lead to more FDI? Accounting for key provisions inside the black box. *International Economics & Economic Policy*, 10(2), 247–275. <https://doi.org/10.1007/s10368-012-0207-6>

- Bergstrand, J. H., & Egger, P. (2007). A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises. *Journal of International Economics*, 73(2), 278–308. <https://doi.org/10.1016/j.jinteco.2007.03.004>
- Blonigen, B. A. (2005). A review of the empirical literature on FDI determinants. *Atlantic Economic Journal*, 33(4), 383–403. <https://doi.org/10.1007/s11293-005-2868-9>
- Bradley, S., Carril-Caccia, F., & Yotov, Y. V. (2023). Reassessing the effects of corporate income taxes on mergers and acquisitions using empirical advances in the gravity literature. *CESifo, working paper no.10863*. <https://doi.org/10.2139/ssrn.4692415>
- Buckley, P. J., Clegg, L. J., Cross, A. R., Liu, X., Voss, H., & Zheng, P. (2007). The determinants of Chinese outward foreign direct investment. *Journal of International Business Studies*, 38(4), 499–518. <https://doi.org/10.1057/palgrave.jibs.8400277>
- Busse, M., Königer, J., & Nunnenkamp, P. (2010). FDI promotion through bilateral investment treaties: More than a bit? *Review of World Economics*, 146(1), 147–177. <https://doi.org/10.1007/s10290-009-0046-x>
- Büthe, T., & Milner, H. V. (2008). The politics of foreign direct investment into developing countries: Increasing FDI through international trade agreements? *American Journal of Political Science*, 52(4), 741–762. <https://doi.org/10.1111/j.1540-5907.2008.00340.x>
- Büthe, T., & Milner, H. V. (2009). Bilateral investment treaties and foreign direct investment: A political analysis. In K. P. Sauvant & L. E. Sachs (Eds.), *The effect of treaties on foreign direct investment: Bilateral investment treaties, double taxation treaties, and investment flows* (pp. 171–224). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195388534.003.0006>
- Chaisse, J., & Bellak, C. (2011). Do bilateral investment treaties promote foreign direct investment? Preliminary reflections on a new methodology. *Transnational Corporations Review*, 3(4), 3–10. <https://doi.org/10.1080/19186444.2011.11658306>
- Chaisse, J., & Bellak, C. (2015). Navigating the expanding universe of international treaties on foreign investment: Creation and use of a critical index. *Journal of International Economic Law*, 18(1), 79–115. <https://doi.org/10.1093/jiel/jgv008>
- Cheung, Y. W., & Qian, X. (2009). Empirics of China's outward direct investment. *Pacific Economic Review*, 14(3), 312–341. <https://doi.org/10.1111/j.1468-0106.2009.00451.x>
- Choi, S. W. (2009). The effect of outliers on regression analysis: Regime type and foreign direct investment. *Quarterly Journal of Political Science*, 4(2), 153–165. <https://doi.org/10.1561/100.00008021>
- Choi, S. W., & Samy, Y. (2008). Reexamining the effect of democratic institutions on inflows of foreign direct investment in developing countries. *Foreign Policy Analysis*, 4(1), 83–103. <https://doi.org/10.1111/j.1743-8594.2008.00059.x>
- Claxton, J. M. (2020). The standard of most-favored-nation treatment in investor-state dispute settlement practice. *Handbook of International Investment Law and Policy*, 1–31. https://doi.org/10.1007/978-981-13-5744-2_8-1
- Conte, M., Cotterlaz, P., & Mayer, T. (2022). *The cepii gravity database* (CEPII Working Paper No. 2022-05). https://cepii.fr/PDF_PUB/wp/2022/wp2022-05.pdf
- Côté, C. E. (2020). Piercing the corporate veil in international investment law: Problems with the denial of benefits clause. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3523769>
- Damgaard, J., Elkjaer, T., & Johannesen, N. (2019). *What is real and what is not in the global FDI network?*. International Monetary Fund.
- de Mello, L. R., Jr. (1999). Foreign direct investment-led growth: Evidence from time series and panel data. *Oxford Economic Papers*, 51(1), 133–151. <https://doi.org/10.1093/oep/51.1.133>
- Desbordes, R. (2016). A granular approach to the effects of bilateral investment treaties and regional trade investment agreements on foreign direct investment. Paper Presented at the 2016 Asian Development Bank Conference on Economic Development: The Role of Foreign Direct Investment in Economic Development, University of Hong Kong.
- Duanmu, J. L. (2014). A race to lower standards? Labor standards and location choice of outward FDI from the BRIC countries. *International Business Review*, 23(3), 620–634. <https://doi.org/10.1016/j.ibusrev.2013.10.004>

- Egger, P., & Pfaffermayr, M. (2004). The impact of bilateral investment treaties on foreign direct investment. *Journal of Comparative Economics*, 32(4), 788–804. <https://doi.org/10.1016/j.jce.2004.07.001>
- Egger, P., Pirotte, A., & Titi, C. (2023). International investment agreements and foreign direct investment: A survey. *World Economy*, 46(6), 1524–1565. <https://doi.org/10.1111/twec.13429>
- Falvey, R., & Foster McGregor, N. (2017). Heterogeneous effects of bilateral investment treaties. *Review of World Economics*, 153(4), 631–656. <https://doi.org/10.1007/s10290-017-0287-z>
- Frenkel, M., & Walter, B. (2019). Do bilateral investment treaties attract foreign direct investment? The role of international dispute settlement provisions. *World Economy*, 42(5), 1316–1342. <https://doi.org/10.1111/twec.12743>
- Gallagher, K. P., & Birch, M. B. (2006). Do investment agreements attract investment?: Evidence from Latin America. *The Journal of World Investment & Trade*, 7(6), 961–974. <https://doi.org/10.1163/221190006X00063>
- Gómez-Mera, L., & Varela, G. (2024). Emerging market multinationals and international investment agreements. *International Business Review*, 33(3), 102252. <https://doi.org/10.1016/j.ibusrev.2023.102252>
- Gurshev, O., & Hamza, S. (2021). Bits, colony ties, and offshore centers: The case of United Kingdom outward FDI. *Journal of Economic Integration*, 36(2), 203–226. <https://doi.org/10.11130/jei.2021.36.2.203>
- Haftel, Y. Z. (2008). *The effect of US BITs on FDI inflows to developing countries: Signaling or credible commitment?* [Unpublished]. U of Illinois.
- Hallward-Driemeier, M. (2003). Do bilateral investment treaties attract foreign direct investment? only a bit and they could bite. *World bank policy research, working paper No. 3121*.
- Hartmann, S., Lindner, T., Müllner, J., & Puck, J. (2022). Beyond the nation-state: Anchoring supranational institutions in international business research. *Journal of International Business Studies*, 53(6), 1282–1306. <https://doi.org/10.1057/s41267-022-00537-3>
- Haug, A. A., Nguyen, A. T., & Owen, P. D. (2023). Do the determinants of foreign direct investment have a reverse and symmetric impact on foreign direct divestment? *Empirical Economics*, 64(2), 659–680. <https://doi.org/10.1007/s00181-022-02263-z>
- Hsiao, F. S., & Hsiao, M. C. W. (2006). FDI, exports, and GDP in East and Southeast Asia—Panel data versus time-series causality analyses. *Journal of Asian Economics*, 17(6), 1082–1106. <https://doi.org/10.1016/j.asieco.2006.09.011>
- Jacobs, M. N. (2013). *An investigation of the internal dynamics of bilateral investment treaties: Every BIT counts*. University of Nevada.
- Jacobs, M. N., & Ostergard, R. L. (2019). An investigation of variation in bilateral investment treaties: Exploring every BIT. *Transnational Corporations Review*, 11(1), 24–37. <https://doi.org/10.1080/19186444.2019.1578159>
- Jäkel, I. C., Østervig, S., & Yalcin, E. (2024). The effects of heterogeneous sanctions on exporting firms: Evidence from Denmark. *Review of International Economics*, 32(1), 161–189. <https://doi.org/10.1111/roie.12705>
- Jang, Y. J. (2011). The impact of bilateral free trade agreements on bilateral foreign direct investment among developed countries. *World Economy*, 34(9), 1628–1651. <https://doi.org/10.1111/j.1467-9701.2011.01356.x>
- Jensen, N., & McGillivray, F. (2005). Federal institutions and multinational investors: Federalism, government credibility, and foreign direct investment. *International Interactions*, 31(4), 303–325. <https://doi.org/10.1080/03050620500303365>
- Julio, B., & Yook, Y. (2016). Policy uncertainty, irreversibility, and cross-border flows of capital. *Journal of International Economics*, 103, 13–26. <https://doi.org/10.1016/j.jinteco.2016.08.004>
- Keller, W. (2010). International trade, foreign direct investment, and technology spillovers. In *Handbook of the economics of innovation* (Vol. 2, pp. 793–829). Elsevier. [https://doi.org/10.1016/S0169-7218\(10\)02003-4](https://doi.org/10.1016/S0169-7218(10)02003-4)
- Kerner, A. (2018). What can we really know about BITs and FDI? *ICSID Review - Foreign Investment Law Journal*, 33(1), 1–13. <https://doi.org/10.1093/icsidreview/six038>

- Kox, H. L., & Rojas-Romagosa, H. (2020). How trade and investment agreements affect bilateral foreign direct investment: Results from a structural gravity model. *World Economy*, 43(12). <https://doi.org/10.1111/twec.13002>
- Li, S., & Zhao, L. (2021). Bilateral investment treaties and foreign direct investment: Evidence from emerging market firms. *Research in International Business and Finance*, 58, 101480. <https://doi.org/10.1016/j.ribaf.2021.101480>
- Liu, P., Lu, Y., Sheng, B., Das, K. C., & Li, L. (2021). Can foreign direct investment promote BIT signing? *Journal of Asian Economics*, 75, 101324. <https://doi.org/10.1016/j.asieco.2021.101324>
- Neumayer, E., Nunnenkamp, P., & Roy, M. (2016). Are stricter investment rules contagious? Host country competition for foreign direct investment through international agreements. *Review of World Economics*, 152(1), 177–213. <https://doi.org/10.1007/s10290-015-0231-z>
- Neumayer, E., & Spess, L. (2005). Do bilateral investment treaties increase foreign direct investment to developing countries? *World Development*, 33(10), 1567–1585. <https://doi.org/10.1016/j.worlddev.2005.07.001>
- Nguyen, H. T. V., Vinh, C., & Trang, L. (2014). The impact of heterogeneous bilateral investment treaties (BIT) on foreign direct investment (FDI) inflows to Vietnam. *SSRN Electronic Journal*, 3. <https://doi.org/10.2139/ssrn.2618451>
- Reiter, L., & Bellak, C. (2021). Effects of BITs on FDI: The role of publication bias. *Handbook of International Investment Law and Policy*, 181–208. https://doi.org/10.1007/978-981-13-3615-7_123
- Riffel, C. (2022). Indirect expropriation and the protection of public interests. *International & Comparative Law Quarterly*, 71(4), 945–974. <https://doi.org/10.1017/S0020589322000343>
- Rose-Ackerman, S., & Tobin, J. (2005). Foreign direct investment and the business environment in developing countries: The impact of bilateral investment treaties. *Yale Law & Economics Research Paper*, 293. <https://doi.org/10.2139/ssrn.557121>
- Rosendorff, B. P., & Shin, K. (2012). *Importing transparency: The political economy of BITs and FDI flows*. New York University Political Science Department. <https://files.nyu.edu/bpr1/public/papers/RosendorffShinAPSA2012.pdf>
- Salacuse, J. W., & Sullivan, N. P. (2005). Do BITs really work: An evaluation of bilateral investment treaties and their grand bargain. *Harvard International Law Journal*, 46(1), 67–130.
- Sauvant, K. P., & Sachs, L. E. (2009). *The effect of treaties on foreign direct investment: Bilateral investment treaties, double taxation treaties, and investment flows*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195388534.001.0001>
- Scott, W. R. (1995). *Institutions and organizations*. Thousand Oaks: Sage Publications.
- Sharman, J. C. (2012). Chinese capital flows and offshore financial centers. *The Pacific Review*, 25(3), 317–337. <https://doi.org/10.1080/09512748.2012.685093>
- Silva, J. M. C. S., & Tenreiro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, 88(4), 641–658. <https://doi.org/10.1162/rest.88.4.641>
- Swenson, D. L. (2005). Why do developing countries sign BITs. *UC Davis Journal of International Law and Policy*, 12(1), 131.
- Tobin, J. L., & Rose-Ackerman, S. (2011). When BITs have some bite: The political-economic environment for bilateral investment treaties. *The Review of International Organizations*, 6(1), 1–32. <https://doi.org/10.1007/s11558-010-9089-y>
- UNCTAD. (2007). *Treaties 1995–2006. Trends in investment rulemaking*. United Nations.
- Varblane, U., Mickiewicz, T., & Radosevic, S. (2003). The value of diversity: Foreign direct investment and employment in Central Europe during economic recovery. *SSRN Electronic Journal*, 12(1), 53–90. <https://doi.org/10.2139/ssrn.418541>
- Yackee, J. W. (2007). Do BITs really work? Revisiting the empirical link between investment treaties and foreign direct investment. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1015083>
- Yotov, Y. V. (2024). The evolution of structural gravity: The workhorse model of trade. *Contemporary Economic Policy*, 42(4), 578–603. <https://doi.org/10.1111/coep.12666>

Appendix

Table A1. List of sample countries.

Afghanistan, Islamic Rep. of	Djibouti	Libya	Seychelles
Albania	Dominica	Liechtenstein	Sierra Leone
Algeria	Dominican Rep.	Lithuania	Singapore
Andorra, Principality of	Ecuador	Luxembourg	Slovak Rep.
Angola	Egypt, Arab Rep. of	Madagascar, Rep. of	Slovenia, Rep. of
Antigua and Barbuda	El Salvador	Malawi	Solomon Islands
Argentina	Equatorial Guinea, Rep. of	Malaysia	Somalia
Armenia, Rep. of	Eritrea, The State of	Maldives	South Africa
Australia	Estonia, Rep. of	Mali	South Sudan, Rep. of
Austria	Eswatini, Kingdom of	Malta	Spain
Azerbaijan, Rep. of	Ethiopia, The Federal Dem. Rep. of	Marshall Islands, Rep. of the	Sri Lanka
Bahamas	Fiji, Rep. of	Mauritania, Islamic Rep. of	St. Kitts and Nevis
Bahrain, Kingdom of	Finland	Mauritius	St. Lucia
Bangladesh	France	Mexico	St. Vincent and the Grenadines
Barbados	Gabon	Micronesia, Federated States of	Sudan
Belarus, Rep. of	Gambia	Moldova, Rep. of	Suriname
Belgium	Georgia	Monaco	Sweden
Belize	Germany	Mongolia	Switzerland
Benin	Ghana	Montenegro	Syrian Arab Rep.
Bermuda	Greece	Morocco	Tajikistan, Rep. of
Bhutan	Grenada	Mozambique, Rep. of	Tanzania, United Rep. of
Bolivia	Guatemala	Myanmar	Thailand
Bosnia and Herzegovina	Guinea	Namibia	Timor-Leste, Dem. Rep. of
Botswana	Guinea-Bissau	Nauru, Rep. of	Togo
Brazil	Guyana	Nepal	Tonga
Brunei Darussalam	Haiti	Netherlands	Trinidad and Tobago
Bulgaria	Honduras	New Zealand	Tunisia
Burkina Faso	Hungary	Nicaragua	Turkmenistan
Burundi	Iceland	Niger	Tuvalu
Cabo Verde	India	Nigeria	Türkiye, Rep. of
Cambodia	Indonesia	North Macedonia, Republic of	Uganda
Cameroon	Iran, Islamic Rep. of	Norway	Ukraine
Canada	Iraq	Oman	United Arab Emirates
Cayman Islands	Ireland	Pakistan	United Kingdom
Central African Rep.	Isle of Man	Palau, Rep. of	United States
Chad	Israel	Panama	Uruguay
Chile	Italy	Papua New Guinea	Uzbekistan, Rep. of
China, P.R.: Hong Kong	Jamaica	Paraguay	Vanuatu
China, P.R.: Macao	Japan	Peru	Venezuela
China, P.R.: Mainland	Jordan	Philippines	Vietnam
Colombia	Kazakhstan, Rep. of	Poland, Rep. of	Yemen, Rep. of
Comoros, Union of the	Kenya	Portugal	Zambia
Congo, Dem. Rep. of the	Kiribati	Qatar	Zimbabwe

(Continued)

Table A1. (Continued).

Congo, Rep. of	Korea, Rep. of	Romania	Anguilla*
Costa Rica	Kuwait	Russian Federation	British Virgin Islands*
Croatia, Rep. of	Kyrgyz Rep.	Rwanda	Gibraltar*
Cuba	Lao People's Dem. Rep.	Samoa	Guernsey*
Cyprus	Latvia	San Marino, Rep. of	Jersey*
Czech Rep.	Lebanon	Saudi Arabia	Korea, Dem. People's Rep. of*
Côte d'Ivoire	Lesotho, Kingdom of	Senegal	São Tomé and Príncipe*
Denmark	Liberia	Serbia, Rep. of	

The sample includes 196 host countries and 203 home countries. *indicate countries that only serve as home countries for FDI.

Table A2. BITs breadth assignment criteria.

Scope and Definitions			
Definition of investment	Type of definition		1 if marked "Asset-based definition"
	Limitations to the definition of investment	Excludes portfolio investment	1 if marked "NO"
		Excludes other specific assets (e. g. sovereign debt, ordinary commercial transactions, etc.)	1 if marked "NO"
		Lists required characteristics of investment	1 if marked "NO"
		Contains "in accordance with host State laws" requirement	1 if marked "NO"
		Sets out closed (exhaustive) list of covered assets	1 if marked "NO"
Definition of investor	Definition included		1 if marked "YES"
	Specifying natural persons covered	Includes permanent residents	1 if marked "YES"
		Excludes dual nationals	1 if marked "NO"
	Specifying legal entities covered	Includes requirement of substantial business activity	1 if marked "NO"
Denial of benefits (DoB)	DoB clause included	Defines ownership and control of legal entities	1 if marked "NO"
			4 if marked "NO"
	Content of the DoB clause	Substantive business operations criterion	1 if marked "NO" when DoB clause is included
		Applies to investors from States with no diplomatic relations or under economic/trade restrictions	1 if marked "NO" when DoB clause is included
		Discretionary ("Party may deny") or mandatory ("benefits shall be denied")	1 if marked "Jointly discretionary" 0.75 if marked "Unilaterally discretionary", and 0 if marked "Mandatory" when DoB clause is included.
Substantive scope of the treaty	Limiting substantive scope of the treaty	Excludes taxation	1 if marked "NO"
		Excludes subsidies, grants	1 if marked "NO"
		Excludes government procurement	1 if marked "NO"
		Excludes other subject matter	1 if marked "NO"

(Continued)

Table A2. (Continued).

Temporal scope of the treaty	Investments covered		1 if marked "Applies to both preexisting and post-BIT investments", 0.5 if marked "Applies to post-BIT investments only", and 0 if marked "Not stipulated"
	Disputes covered		1 if marked "Not stipulated", 0 if marked "Carves out pre-existing disputes"
Treaty Duration, Amendment and Termination			
Treaty duration	Years of initial treaty term		1 if marked "20 years", 0.75 if marked "15 years", 0.5 if marked "10 years", 0.25 if marked "5 years" or "Other", and 0 if marked "None"
Automatic renewal			1 if marked "Indefinite term" or "20 years", 0.75 if marked "15 years", 0.5 if marked "10 years", 0.25 if marked "5 years" or "2 years" or "Other fixed term", and 0 if marked "None"
Amendment and termination	Unilateral termination	Includes modalities for unilateral termination	2 if marked "NO"
		Length of notice period	1 if marked "One-year prior notice", 0.5 if marked "Six months prior notice", 0.25 if marked "Other period", and 0 if marked "None" when the modalities for unilateral termination is included.
	Includes modalities for amendment or renegotiation		1 if marked "NO"
	Survival/"sunset" clause length		1 if marked "20 years", 0.75 if marked "15 years", 0.5 if marked "10 years", 0.25 if marked "5 years" or "Other", and 0 if marked "None"

Table A3. BITs depth assignment criteria.

Standards of Treatment			
National treatment (NT)	Type of NT clause		1 if marked "Pre- and post-establishment", 0.5 if marked "Post-establishment" or "Pre-establishment only", and 0 if marked "None"
	Reference to "like circumstances" (or similar)		1 if marked "YES"
Most-favored-nation (MFN) treatment	Type of MFN clause		1 if marked "Pre- and post-establishment", 0.5 if marked "Post-establishment" or "Pre-establishment only", and 0 if marked "None"
	Exceptions from MFN obligation	Economic integration agreements	1 if marked "NO"
Fair and equitable treatment (FET)	Type of FET clause	Taxation treaties	1 if marked "NO"
		Procedural issues (ISDS)	1 if marked "NO"
			3 if marked "FET unqualified", 0 if marked "FET qualified" or "None"
	FET qualified	By reference to international law	1 if marked "International law / principles of international law", 0.5 if marked "Customary international law (CIL)", 0.25 if marked "CIL/minimum standard of treatment", and 0 if marked "None" when the FET clause is qualified,
		By listing FET elements (exhaustive or indicative list)	1 if marked "YES" when the FET clause is qualified.
	FET modifiers		1 if marked "FET combined with NT or MFN"
Full protection and security			1 if marked "Standard", 0.5 if marked "With reference to domestic law", and 0 if marked "No clause"
Prohibition on unreasonable, arbitrary or discriminatory measures			1 if marked "YES"
Expropriation	Scope of measures covered		1 if marked "Indirect expropriation not mentioned", 0.5 if marked "Indirect expropriation mentioned", and 0 if marked "No expropriation clause"
	Refining expropriation clause	Indirect expropriation defined	1 if marked "YES"
		Carve-out for general regulatory measures	1 if marked "NO" ¹
		Carve-out for compulsory licenses in conformity with WTO	1 if marked "NO"
Protection from strife	Specifications	Relative right to compensation (comparator)	1 if marked "MFN and NT", 0.5 if marked "MFN only" or "NT only", and 0 if marked "None"
		Absolute right to compensation in certain circumstances	1 if marked "YES"

(Continued)

Table A3. (Continued).

Transfer of funds	Includes transfer of funds		1 if marked "YES"
	Exceptions to the transfer of funds obligation	Balance-of-payments exception	1 if marked "NO"
		Other specific exceptions (e.g. to protect creditors, etc.)	1 if marked "NO"
Prohibition of performance requirements (PRs)	Includes prohibition of PRs		1 if marked "Explicit PR clause ", and 0 if marked "No explicit PR clause"
	Type of PR clause		1 if marked "List of prohibited PRs", and 0.5 if marked "TRIMS reference"
Umbrella clause			1 if marked "YES"
Entry and sojourn of personnel (subject to local laws)			1 if marked "YES"
Senior management (nationality)			1 if marked "YES"
Exceptions			
Essential security exception	Exception included		3 if marked "NO"
	Exception defined (exceptional circumstances described in more detail)		1 if marked "Yes", and 0 if marked "No" when the essential security exception clause is included
	Exception self-judging		1 if marked "No", and 0 if marked "Yes" when the essential security exception clause is included
General public policy exceptions	Public health and environment		1 if marked "NO"
	Other public policy exceptions (e.g. cultural heritage, public order, etc.)		1 if marked "NO"
Prudential carve-out (concerns financial measures)			1 if marked "NO"
Scheduling and reservations (in treaty texts and annexes)			1 if marked "None", 0.75 if marked "Negative-list reservations", 0.25 if marked "Both positive list commitments and negative list reservations", and 0 if marked "Positive-list commitments"
State-State Dispute Settlement (SSDS)			
SSDS included			1 if marked "YES"
Investor-State Dispute Settlement (ISDS)			
ISDS included			1 if marked "YES"
Alternatives to arbitration			1 if marked "Voluntary ADR (conciliation / mediation)", 0.5 if marked "Compulsory ADR (conciliation / mediation)", and 0 if marked "None"

(Continued)

Table A3. (Continued).

Scope and consent	Scope of claims: general approach (chapeau paragraph of ISDS clause)		1 if marked "Covers any dispute relating to investment", 0.75 if marked "Lists specific bases of claim beyond treaty (e.g. contractual disputes)", 0.5 if marked "Covers treaty claims only", and 0 if marked "Other"
	Limitations to the scope of ISDS	Limitation of provisions subject to ISDS	1 if marked "NO"
		Exclusion of policy areas from ISDS	1 if marked "NO"
		Special mechanism for taxation or prudential measures	1 if marked "NO"
	Type of consent to arbitration		1 if marked "Provides express or implied consent", and 0 if marked "Requires case-by-case consent"
Forums	ISDS forum options	Domestic courts of the host State	1 if marked "YES"
		ICSID	1 if marked "YES"
		UNCITRAL	1 if marked "YES"
		Other forums	1 if marked "YES"
	Relationship between forums		1 if marked "Local remedies first", 0.75 if marked "Preserving right to arbitration after domestic court proceedings", 0.5 if marked "No U turn (waiver clause)", 0.25 if marked "Fork in the road", and 0 if marked "No reference"
Other specific ISDS features	Limitation period for submission of claims		1 if marked "NO"
	Provisional measures		1 if marked "YES"
	Consolidation of claims		1 if marked "NO"
	Limited remedies (specifying available types of remedies)		1 if marked "NO"
	Treaty interpretation	Affirms binding interpretation by contracting parties or their joint committee	1 if marked "NO"
		Requires certain questions to be submitted to contracting parties (renvoi)	1 if marked "NO"
		Regulates submissions by non-disputing State party	1 if marked "YES"
		Requires documents to be made publicly available	1 if marked "YES"
	Transparency in arbitral proceedings	Requires hearings to be open to the public	1 if marked "YES"
		Regulates amicus curiae submissions by third (non-disputing) parties	1 if marked "YES"

Because carve-out limits the scope of indirect expropriation, the host countries do not have to pay compensation to foreign investors for such measures that are not expropriatory (Riffel, 2022).

Table A4. BITs non-economic standards assignment criteria

Preamble		
Reference to right to regulate (e.g. regulatory autonomy, policy space, flexibility to introduce new regulations)		1 if marked "NO"
Reference to sustainable development		1 if marked "NO"
Reference to social investment aspects (e.g. human rights, labor, health, CSR, poverty reduction)		1 if marked "NO"
Reference to environmental aspects (e.g. plant or animal life, biodiversity, climate change)		1 if marked "NO"
Other Clauses		
Transparency	Directed at States (obligation to publish laws and regulations)	1 if marked "YES"
	Directed at investors	1 if marked "NO"
Health and environment (any mentioning in the text, except preamble)		1 if marked "NO"
Labor standards (any mentioning in the text, except preamble)		1 if marked "NO"
Right to regulate (any mentioning in the text of this or similar concepts, except preamble)		1 if marked "NO"
Corporate social responsibility (any mentioning in the text, except preamble)		1 if marked "NO"
Corruption (any mentioning in the text, except preamble)		1 if marked "NO"
Not lowering of standards (typically environment and/or labor standards)		1 if marked "NO"
Subrogation clause		1 if marked "YES"
Non-derogation clause (in case of IIA's conflict with other norms, more favorable rules apply to investors)		1 if marked "YES"
Investment promotion	Reference to specific promotion activities in text of agreement (not preamble)	1 if marked "YES"
Institutional Issues		
Mechanism for consultations between State parties		1 if marked "YES"
Institutional framework (committee)		1 if marked "YES"
Technical cooperation/capacity building		1 if marked "YES"