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Bilateral investment treaties and sovereign default risk

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Abstract

This paper analyzes the impact of bilateral investment treaties (BITs) on sovereign bond returns of 25 emerging markets from 1993 to 2016. Under a BIT, foreign investors can use an international arbitration scheme to enforce compensation claims against the domestic government in case of direct or indirect expropriation. We focus on the so far unexplored effects of legal risk associated with BITs on sovereign creditworthiness. We find small unconditional effects of BITs on sovereign bond returns. Taking the heterogeneity of BITs and political regimes into account, we find robust and strong negative effects. In countries with high political risk of expropriation (measured by low executive constraints), we find that the implementation of investor-friendly BITs is associated with a significantly negative impact on sovereign bond returns, accounting for roughly 15% of bond returns' standard deviation.

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1 Introduction

A bilateral investment treaty (BIT) provides legal tools to regulate and structure investor-state dispute settlements (ISDS). Under the BIT, foreign investors of the home country can sue the government of the destination country if a foreign investment is directly or indirectly expropriated by the destination country government. A foreign investor can then use an international arbitration scheme court to enforce compensation claims and does not have to rely on domestic courts. In effect, the introduction of a BIT reduces the country risk for the foreign investor. A treaty increases the enforceability of compensation claims in the case of expropriation and commits the sovereign to pursue policies in accordance with treaty provisions. The literature has so far focused on the role of BITs to promote foreign investment.

We aim to contribute to the literature by analyzing the impact of BITs on sovereign risk. The introduction of a BIT can increase the sovereign creditworthiness by attracting foreign investment and the associated positive effects on economic growth and tax revenues. The drawback of BITs may be deterioration of sovereign creditworthiness. BITs incur the legal risk of compensation claims under the BIT's arbitration scheme if the domestic government breaches the treaty rules by expropriating foreign investors, withdrawing licenses, or restricting the business activities of foreign investors.

In a prominent arbitral proceeding, Venezuela was sentenced to pay USD 8366.10 million in compensation for the direct expropriation of three oil production sites (ICSID Case No. ARB/07/30). In another prominent case, Pakistan was found guilty of indirect expropriation for denying an agreed mining lease. In consequence Pakistan was ordered to pay USD 4087.00 million compensation (ICSID Case No. ARB/12/1). Furthermore, less obvious forms of expropriation can be sanctioned through BITs. Following Poland's gambling law of 2009, the operation of slot machines outside of casinos was restricted. This destroyed the business model of a claimant and Poland was sentenced to pay USD 9.30 million in compensation (PCA Case No. 2014-31).

The introduction of BITs therefore constitutes an implicit increase of public expenditure due to the risk of international arbitration claims. If sovereign bond investors recognize this legal risk, the introduction of a BIT may be associated with a decrease in sovereign creditworthiness and a decline in sovereign bond returns. To isolate the legal risk channel of BITs, we control for the reaction of stock returns to BIT related news (aimed to measure to market reaction to positive growth enhancing effects of BITs).

In order to account for the expected costs from arbitration claims against the domestic government, we exploit the cross-country variation in the government's political constraints and the investor-friendliness of the BITs. In particular, governments with low political constraints expropriate foreign investors more likely in order to gain political advantage. Additionally, potential compensation payments and reputation losses from arbitral proceedings are higher if a BIT is particularly investor-friendly. Foreign investors

are then more likely to assert their claims. The expected compensation payments awarded by arbitral tribunals should therefore be positively correlated with political constraints and investor-friendly BITs.

We expect that treaties with low investment protection bear low risk of arbitral proceedings. However, those contracts will hardly spur foreign investments. Independent from a government's political constraints, such BITs are unlikely to affect sovereign default risk. In contrast, treaties that provide extensive rights for foreign investors should attract additional investments from abroad. For the assessment of these treaties a government's political constraints should be crucial. If a government is highly constrained by veto players, the risk of unlawful expropriations should be low. Potential compensation payments and losses of reputation from arbitral proceedings will be negligible. We expect the creditworthiness of a sovereign to improve and consequently the sovereign bond returns to increase in this case. In contrast, the risk of expropriation should be high if a home country's government is hardly constrained by veto players. Potential compensation payments awarded by arbitral tribunals and losses of reputation are likely to be high. We expect the creditworthiness of a sovereign to deteriorate and sovereign bond returns to decrease in this case.

To test the impact of BIT introductions on sovereign bond returns we use a daily panel dataset covering 25 emerging markets in the period 1993-2016.We determine the effects of BITs at three different dates: The day of signature, the day of notification, and the day of entry into force. At the day of signature, investors learn about the existence of a BIT, but it remains unclear, whether the contract will ever become effective. At the date of notification, both countries have mutually confirmed the ratification of the BIT. At this day it becomes clear that the treaty will enter into effect. This date will presumable have the largest informational value for investors. At the last date, the BIT enters into force. In our baseline model we estimate the effect of these three events on sovereign bond returns. Our baseline models indicate a weak negative effect on sovereign bond returns on days of BIT notification, while no significant effects are detected on days of signature and entry into force.

Using interaction models, we exploit the cross-country variation in political constraints and the investor-friendliness of BITs to analyze the effects of BITs on sovereign bond returns. The investor-friendliness of treaties is measured using a hand coded index of treaty provisions that have been used most frequently in arbitral proceedings. Information on political constraints comes from the Polity IV dataset. We find that the introduction of an investor-friendly BIT in countries with low political constraints is associated with a -0.14% reduction in sovereign bond returns (which equals around 15% of the standard deviation of daily returns) in the three days surrounding notification. Thus, there is an economically sizable negative impact of BITs on sovereign's perceived creditworthiness. This result suggests that countries with relatively unconstrained governments are more likely to expropriate foreign investors, which increases the risk of compensation payments in case of investor-friendly BITs. The negative effect is

even more pronounced (with a -0.22% reduction in sovereign bond returns) when the home country of the investor is large compared to the destination country. For large capital exporting countries such as the United States it is more likely that foreign investors assert claims large enough to threaten the sovereign creditworthiness of the destination country. On the contrary, for countries with high political constraints (and a low risk of expropriation of foreign investors), notification of an investor-friendly BIT is associated with 0.07% higher sovereign bond returns, indicating positive effects of BITs.

The remainder is structured as follows. The next section reviews the relevant literature. Section 3 describes the data. Section 4 presents the empirical analysis and discusses its results. Finally, Section 5 concludes.

2 Literature

A large branch of the literature deals with the impact of BITs on foreign direct investment (FDI). Early papers find only weak or no effects of BITs on FDI (e.g. UNCTAD (1998), Hallward-Driemeier (2003), Tobin and Rose-Ackerman (2005), Gallagher and Birch (2006), Yackee (2008, 2009)). The majority of recent studies that find positive effects prevail (e.g. Banga (2003), Egger and Pfaffermayr (2004), Salacuse and Sullivan (2005), Neumayer and Spess (2005), Kim (2007), Egger and Merlo (2007), Büthe and Milner (2009), Kerner (2009), Haftel (2010), Busse et al. (2010) Berger et al. (2011), Berger et al. (2013), Allee and Peinhardt (2011), Tobin and Rose-Ackerman (2011), Dixon and Haslam (2016), Myburgh and Paniagua (2016), Frenkel and Walter (2019)). Only a few of these papers explicitly consider BITs between emerging markets (Banga (2003), Kim (2007), Dixon and Haslam (2016)). The majority of papers focus on treaties between a developed and less developed country (typically justified by the fact that FDI originating in less developed countries are negligible).

Some papers argue that the quality of political constraints should help to prevent policy changes after BITs have been signed. Therefore, political constraints should have positive effects on FDI. Some authors include political constraints as control variable (Büthe and Milner (2009), Haftel (2010), Berger et al. (2013)). Others explicitly consider the interaction of BITs and political constraints (Busse et al. (2010), Neumayer and Spess (2005)). Myburgh and Paniagua (2016) find a greater effect for countries with weaker institutions. Overall, the literature offers inconclusive evidence for the relevance of political constraints.

Other papers focus on the effect of the interplay of firm level characteristics and IIAs. Jandhyala and Weiner, (2014) show that multinational enterprises value investments higher when these are protected by IIAs. Furthermore, the authors show that firm characteristics also play a role by influencing a firm's ability to benefit from investment protection. Therefore, the feasibility of arbitral proceedings is likely to affect investment decisions by foreign investors.

While most papers regarding BITs consider treaties as uniform, some papers take treaty provisions into account to explain different effects on FDI. Yackee (2008) categorizes BITs in accordance to the strength of investor state dispute settlement (ISDS) mechanism, using sovereigns' pre-consent to international arbitration. However, the author finds little to no effects on FDI. Berger et al. (2011) use the same approach and also find no robust effects on FDI. Berger et al. (2013) analyze the effects of BITs and regional trade agreements (RTAs) on FDI. The authors use the same classification for ISDS provision as previous papers, but additionally include the type of admission rules. To distinguish contracts with liberal admission rules, they examine the national treatment provision of treaties. Treaties that extend this provision to the pre-establishment phase of an investment are categorized as liberal. In line with previous studies, the authors do not find significant effects from ISDS provisions on FDI. However, they find positive effects from for liberal admission rules on bilateral FDI. Dixon and Haslam (2016) use a broader approach to consider treaty differences. The authors analyze the effect of various international investment agreements (IIAs) on FDI. To distinguish the strength of an IIA, they use a score based on thirteen different treaty provisions. In accordance to the achieved score, an IIA is categorized as weak, medium, or strong. Their analysis of FDI flows of American countries suggest that strong agreements promote FDI flows. Frenkel and Walter (2019) expand the existing literature by considering a rather broad measure of investor state dispute settlement (ISDS). Based on eight treaty provisions, the authors build a score to measure the strength of a BIT's ISDS mechanism. Their analysis indicates that BITs will attract more FDI if ISDS provisions are stronger.

A second relevant branch is the literature underscores the relevance of political factors for the determination of sovereign default risk. Since sovereign default is ultimately a political decision, political factors are important determinants for sovereign bond yields. Block and Vaaler (2004) find a political business cycle where perceived sovereign increases prior to elections as indicated by higher sovereign yield spreads and worse ratings. In a similar vein, Manasse and Roubini (2009) find that sovereign default risk increases prior to presidential elections, particularly for high levels of short term debt and rigid exchange rate regimes.

Political stability and political constraints affect sovereign default risk. Saiegh (2009) finds that countries governed by a coalition of parties are less likely to reschedule their debts than countries ruled by single-party governments. Boubakri et al. (2011) find that sovereign yield spreads are higher in presidential systems (as compared to parliamentary systems). A government with control of all houses and large government majority in the parliament is associated with lower sovereign yield spreads.

Vaaler et al. (2005) focus on the role of political ideology and find that sovereign bond yield spreads are higher in the run-up to a presidential election day if the market expects right-wing political incumbents

to be replaced by left-wing challengers, while lower bond yield spreads are observed when a left-wing government is expected to be replaced by a right-wing challenger.

Breen and Mcmenamin (2013) find that higher levels of political polarization is associated with lower interest rates if concentration of political power is low, whereas political polarization increases interest rates when concentration is high. Van Rijckeghem and Weder (2009) find that the impact of political and institutional conditions on sovereign default risk depends on macroeconomic conditions. In democratic regimes, parliamentary systems as well as many veto players reduce the likelihood of default on foreign debt, given that macroeconomic conditions are favorable. Eichler (2014) finds that sovereign yield spreads in countries with parliamentary systems and assembly elected presidents are higher than in presidential regimes. Interaction models reveal that sovereign yield spreads are more responsive to political determinants in autocratic regimes than in democratic countries. Eichler and Plaga (2017) reveal that US investors take political conditions into account when deciding on their foreign government bond holdings. They find that US investors reduce their government bond holdings in countries with high levels of political constraints and around elections. For the sample of countries with high default risk, US investors increase their government bond holdings in countries with high levels of political constraints, underlining their role in mitigating politically driven defaults.

The literature on the political determinants of sovereign risk suggests that sovereign bond investors take political factors into account when pricing sovereign bonds and determining sovereign bond portfolios. High levels of political constraints are typically viewed as a device to mitigate the risk of politically driven defaults. In a similar manner, we expect that risk of expropriation is particularly high in countries with relatively unconstrained governments, and therefore the expected costs from arbitrations processes in investor-friendly BITs can be considered high.

3 Data

3.1 Dependent variable: Sovereign bond returns

We use an unbalanced daily panel dataset for 25 emerging markets from 1993 to 2016 (see Table A1 for the countries considered). Definitions and sources of variables are reported in Table A2 in the appendix. Summary statistics can be found in Table 1.

To measure sovereign default risk, we use daily sovereign bond returns taken from JP Morgan's Emerging Market Bond Index Global (EMBIG). The EMBIG includes US dollar denominated sovereign bonds, which rules out exchange rate risk. To be included in the EMBIG, individual bonds must meet minimum standards in terms of maturity and outstanding face value. The EMBIG has a broad and expanding coverage and is widely used to measure sovereign default risk in emerging markets. Our

sample starts with the introduction of the EMBI in 1993. Higher sovereign default risk (and the associated increase yield to maturity) is indicated by lower EMBIG returns.

3.2 Three event dates of a BIT

In order to measure the effects of BITs on sovereign bond returns, we consider three dates of a BIT's life cycle: signature, notification, and entry into force. Typically, BITs are signed during state visits or at meetings of United Nations Conference on Trade and Development (UNCTAD) or World Trade Organization (WTO). These events are usually accompanied by media attention and we can assume that the public learns about the existence and contents of treaties at these dates. However, when a BIT is signed it is not certain whether and when it will be ratified by both contracting countries, which lowers the informational value of the signing date. On average, it takes roughly two years between signature and entry into force of a BIT. However, the variation is large. For example, Morocco and Sweden signed a BIT in 1990, which entered into force in 2008.

To bring a treaty into force, both contracting countries have to fulfill their respective constitutional requirements and ratify the treaty. Afterwards, contractual partners inform each other about the fulfillment of national requirements and confirm this to each other. This is usually done by letters of notification which are transmitted through diplomatic channels. The date a treaty enters into force depends on the arrival of the second letter. Some BITs come into effect immediately after the arrival of second notification, while others foresee a waiting period of several months. Accordingly, we do not expect much information to enter the market when a BIT comes into effect. Instead, we assume that new information enters the market with the arrival of the second notification. At this date, market participants learn that both countries ratified the treaty and the date it will come into effect is determined.

We draw information on these dates from the International Investment Agreements Navigator (UNCTAD, 2020). This database provides information about the date of signature and the date a treaty enters into force. For example, China and Portugal signed a BIT on 9th of December 2005, which entered into force on 26th of July 2008. To gather information about the date of the second notification, we use treaty texts provided in the same database. Usually, BITs contain a paragraph concerning ratification and entry into force of the treaty. These paragraphs state whether the date where a treaty comes into effect is delayed from arrival of the second notification.[1]

[1] For example, the BIT between China and Portugal from 2005 states that the "Agreement shall enter into force on the thirtieth day following the receipt of the last notification in writing and through diplomatic channels, stating that all the internal procedures of both Parties have been fulfilled." From this information we infer that the letter of the second notification arrived at 26th of June 2008. However, some treaties do not state a delay, while others stipulate a delay up to ninety days. However, we cannot figure out the date of the second notification for all treaties. Some BITs use a vague wording to describe the delay. For example, the BIT between Germany and the Philippines states "This Agreement shall enter into force on the first day of the second month following the date of the exchange of the German instruments of ratification and the Philippine notification of approval." Such wording does not allow to deduce the day of notification.

If one of the three events described above takes place on a weekend, we will use the next trading day as event date. The used events dates are available on request. Our empirical event dummies are constructed as a three-day window surrounding the event. Since some of these events took place in a row, we had to exclude several events due to overlapping event windows.

3.3 Political risk

To allow for heterogeneous effects of BITs on sovereign default risk, we include different proxy variables for political risk to account for the country specific risk of treaty violations, see Table 1 for summary statistics. The willingness of governments to violate treaties and to risk compensation claims from arbitration proceedings is likely to differ between countries.

Since democratic regimes expropriate less frequently than autocratic regimes (Li, 2009), the political system of a country may shape the conditional impact of BITs on sovereign default risk. We therefore include polity2 score from Polity IV Database (Marshall, Gurr, & Jaggers, 2016). This score comprises different aspects of a country's political system to a yearly indicator ranging from -10 to +10. Lower values indicate more autocratic regimes. Higher values indicate more democratic regimes. In our analysis, we use an *autocracy dummy* which is equal to 1 if a country's polity 2 score is below the sample median (relatively autocratic) and 0 (relatively democratic) otherwise.

However, as democratic governments also expropriate, this measure is rather crude. Li (2009) argues that the ability to expropriate also depends on political constraints. The effort to implement controversial policies, such as expropriations, is likely to increase with political constraints. A rarely constrained government might expropriate more likely than a government facing many veto players. We use the executive constraints index taken from the Polity IV Database (Marshall et al., 2016). The variable categorizes seven different levels of executive constraints on yearly basis. A value of one will be assigned if the authority of the executive is unlimited. A value of seven indicates that other players have equal or more power than the executive. We again create an *executive constraints dummy*, which is equal to 1 if the executive constraints index is below the sample median (low executive constraints) and 0 (high executive constraints) otherwise.

In addition, we include the political constraints index from Henisz (2002). The POLCON III index covers feasibility of political changes on a yearly basis. The index is based on a model that includes the number of independent branches of government, the alignment of these branches and the extend of preference heterogeneity within these branches. It scores from 0 to 1, where higher values indicate more political constraints. We include a *political constraints dummy* which is equal to 1 if the POLCON III index scores below the sample median (low constraints) and 0 otherwise (high constraints).

3.4 Heterogeneity of treaties

We also account for the heterogeneity in the investor-friendliness of BITs. Some previous studies incorporate measures to distinguish the effectiveness of BITs. Yackee (2009) and Berger et al. (2013) focus on pre-consent to international arbitration. Frenkel and Walter (2019) use a broad measure to assess the strength of investor state dispute settlement provisions. Dixon and Haslam (2016) consider various provisions to assess the overall strength of a treaty.

Given a lacking consensus in the literature about the most important treaty provisions, we take an agnostic approach and use treaty provisions that have been used most frequently in past arbitration proceedings. According to the Investment Dispute Settlement Navigator from UNCTAD (2020), the most frequently breached investment provisions are the following (in a descending order): *fair and equitable treatment (FET), expropriation, prohibition of arbitrary, unreasonable or discriminatory measures (UAD), full protection and security (FPS), umbrella clause (UC), transfer of funds clause (ToF), national treatment (NT), and most favored nation treatment (MFN)*. Figure 1 shows the treaty clauses used in arbitral proceedings decided in favor of a foreign investor until 2016. *FET* and *expropriation* clauses are invoked in most cases. The other clauses play only a minor role.

[Figure 1 here]

In order to classify the investor-friendliness of a BIT, we gather information from the International Investment Agreements Navigator (UNCTAD, 2020). For each provision, we construct a dummy variable indicating investor-friendliness. Some dummies indicate the existence of an investor-friendly clause, while others indicate an investor-friendly formulation of commonly used clauses.

Based on information on single treaty clauses, we construct an *investor-friendliness index* for the BITs. We obtain this measure by adding up the dummy variable values of the eight treaty provisions to an overall score, ranging from 0 to 8. Based on this overall score, we derive an *investor-friendliness dummy*. This dummy variable is equal to 1, if a BIT's *investor-friendliness index* scores above the sample median (investor-friendly BIT) and 0 (less investor-friendly BIT) otherwise. In the following, we present the used clauses and explain the construction of respective dummy variables. Summary statistics of the used clauses are presented in Table 1.

The most frequently used clause in arbitral proceedings refers to the *fair and equitable treatment*. It obligates contracting parties to act reasonably without ambiguity, arbitrariness or discrimination (UNCTAD, 2012a). Many BITs contain such a clause, and all treaties in our sample do so. Therefore, we cannot distinguish contracts via the existence of such a clause. However, *FET* clauses may be qualified with a reference to international law or a list of specific elements which the clause applies for. The absence of such restrictions leads to a broader interpretation of the clause and eases its application

in arbitration proceedings. Thus, we presume that an unqualified *FET* clause is more beneficial to foreign investors. We will assign a value of 1 to the respective dummy variable if the clause is unqualified and a value of 0 if it is referenced to international law or limited to specific elements.

Arbitral tribunals often deal with cases of expropriation. One can distinguish two types of expropriation: direct and indirect. The former refers to the mandatory transfer of private property to the state or a state-mandated party or its physical seizure. The latter refers to deprivation of investments without a formal property transfer or outright seizure (UNCTAD, 2012b). Since the initial aim of BITs is the protection of investments in foreign countries, nearly all BITs include constraints for *direct expropriations* and we therefore cannot exploit this information. We rather focus on *indirect expropriations*. Due to its vague definition, protection against *indirect expropriation* is difficult and not every treaty mentions it explicitly. We assume that the mention of *indirect expropriation* indicates an easier application in arbitral proceedings. We assign a value of 1 to the respective dummy variable if *indirect expropriation* is mentioned and a value of 0 otherwise.

Another frequently used provision in international arbitration aims at protection of foreign investment via *prohibition of unreasonable, arbitrary or discriminatory measures*. While there is no agreed definition of the concept, such provisions are aimed at increasing protection of investors (Kriebaum, 2015). The corresponding dummy variable indicates whether treaties contain a standalone provision that prohibits unreasonable, arbitrary or discriminatory measures.

The standard of *full protection and security* protects foreign investments from civil unrest, public disturbances or similar situations. It obligates contracting parties to compensate damages or losses resulting from those events (UNCTAD, 2005). The corresponding dummy variable indicates if a BIT contains a standard *FPS* clause. The dummy is 0 if the treaty does not contain such an obligation or the used clause is referenced to the domestic law.

The u*mbrella clause* obligates states to respect commitments and obligations from investment related contracts and other forms of agreements. Although arbitral tribunals have used different interpretations, this standard turns a breach of an investment contract potentially into a breach of a BIT and therefore extends applicability of BITs (UNCTAD, 2005). The corresponding dummy variable indicates treaties that contain this clause.

The *transfer of funds* standard permits investors to transfer financial benefits arising from investments out of the country (UNCTAD, 2000). However, the applicability of the standard differs due to its interpretation by arbitral tribunals. Moreover, some treaties restrict the free transfer of funds in case of serious difficulties concerning the balance of payments or in case of other specific circumstances, such

as bankruptcy or criminal offences. We assume that contracts will be more investor-friendly if there are no exceptions from transfer of funds. The corresponding dummy variable indicates the absence of exceptions from the clause.

Some treaty clauses concern granted rights of foreign investors compared to domestic investors or investors from other countries. These relations are usually determined by *national treatment* or *most-favored-nation treatment. National treatment* means that a treatment of foreign investments shall not be less favorable than the one of domestic investments (UNCTAD, 1999). *Most-favored-nation* standard states that a treatment must be at least as favorable as it is for the most favored foreign investment (UNCTAD, 2010). Both standards can protect investments during the pre- or post-establishment phase of an investment or cover both. We expect that a longer coverage of these clauses is more favorable for foreign investors. Therefore, the corresponding dummy variables indicate whether the standard applies for both, the pre- and post-establishment phase of an investment.

Summary statistics reported in Table 1 indicate that provisions on *indirect expropriation*, *transfer of funds*, and *full protection and security* are most frequently used in our sample of BITs, while *national treatment* and *most-favored-nation treatment* are rarely used.

3.5 Control variables

We include several control variables commonly used in the literature on sovereign default risk. The *VIX* index accounts for global risk factors. Market returns for global emerging market bonds are measured by daily returns of the *EMBIG all countries index*. We include *domestic stock returns*, in particular to account for positive effects of BITs such as an expected increase in economic growth. We include dummies for *debt* and *currency crises* taken from Laeven and Valencia (2018). The government *debt to GDP* ratio is taken from Abbas et al. (2010) and IMF (2018).

[Table 1 here]

4 Empirical analysis

4.1 The baseline impact of BITs

To assess the unconditional effects of BIT events on *sovereign bond returns*, we use the following fixed effects panel regression:

$$Sovereign\ bond\ return_{it} = \alpha * BIT_{it} + \sum_{j} \beta_j * Controls_{jit} + \sum_{k} \delta_k * Controls_{kt} + \gamma_i + \eta_{year} + \sum_{q} \theta_q + \varepsilon_{it}\ , \quad (1)$$

where daily *sovereign bond returns* of country *i* at day *t* are regressed on the event dummy, BIT_{it} (indicating the 3-day window surrounding signature, notification or entry into force of a BIT), country-

specific control variables, $Controls_{jit}$, and global control variables, $Controls_{kt}$. Country fixed effects γ_i are used to control time-invariant country-specific determinants of sovereign bond returns. Year fixed effects η_{year} are included to control for global trends. Weekday fixed effects θ_q account for weekday specific investment patterns. The error term is represented by ε_{it}. We use heteroscedasticity- and autocorrelation-robust standard errors that are clustered on the country level.

Table 2 reports the estimation results of the baseline model (Equation 1), for *signature*, *notification* and *entry into force* of a BIT. The coefficient on *signature* is insignificant. With the signature the existence of the BIT becomes public, but it remains unclear whether the contract will ever come into effect. Both countries have to ratify the treaty before it can enter into force. Likewise, the coefficient on *entry into force* of a treaty is also insignificant. After notification, investors are aware that the BIT is ratified and will enter into force. Therefore, it is not surprising that the date of *entry into force* shows no informational value in our regression. The coefficient on the date of *notification* is also insignificant. In the fourth specification, we include all BIT event dummies in the model, and detect a weakly significant negative impact of BIT notifications on sovereign bond returns. During the three trading days around notification, sovereign bond returns are reduced by 0.034%. The negative impact of the BIT notification suggests that investors anticipate net negative effects on sovereign creditworthiness due to the legal risk of compensation claims. The relatively small magnitude may be explained by the heterogeneity of BITs in our sample. We expect that legal risk originating from a BIT is a function of political risk and the investor-friendliness of the BIT. Legal risk should particularly be high for countries with unconstrained governments signing investor-friendly BITs. Since the baseline results do not account for the heterogeneity across BITs and political systems, the average estimated impact is rather small.

The notification date appears to inhibit the greatest informational value, since after notification it becomes apparent that the BIT is ratified and will be implemented. The *signature* appears not to be a relevant pricing factor, probably due to the uncertainty if the BIT will eventually enter into force. The actual *entry into force* also appears to have no informational value since the implementation decision has already been made at the earlier notification date.

Given these baseline results, we use the *notification* as the relevant date for measuring the pricing impact of BITs in our interaction models.

[Table 2 here]

The results for the control variables are largely in line with previous findings in the literature. Higher market returns measured using daily returns of the *EMBIG all countries index* are associated with higher

sovereign bond returns. A higher *VIX*, indicating increasing uncertainty, is surprisingly associated with higher sovereign bond returns.

Higher domestic stock returns indicate improving economic and financial market conditions and are associated with significantly increased sovereign bond returns. Domestic stock returns are particularly meant to control for the positive effects of BIT events via economic growth and additional tax revenues and thus help to identify the legal risks associated with BITs.

The negative coefficient on the *sovereign debt crisis dummy* suggests that average daily *sovereign bond returns* are around 0.3% lower during sovereign debt crises. *Currency crises dummy* appear to have no significant effects.

4.2 The impact of BITs conditional on political risk

The baseline results revealed a small average impact of BITs notification on sovereign bond returns. In this section, we use interaction models to test the pricing impact of BIT notification conditional on the political risk of the destination country government. A potential negative effect of BITs on sovereign creditworthiness stems from the fact that the destination country government may face compensation claims when breaching treaty provisions, such as by expropriating foreign investors. We exploit the cross-country heterogeneity of political risk measures to evaluate the ex-ante likelihood of such liabilities and apply an interaction model to test the conditional pricing impact of BIT notification:

$$Sovereign\ bond\ return_{it} = \alpha_1 BIT_{it} + \alpha_2 Political\ risk_{it} + \alpha_3 BIT_{it} * Political\ risk_{it} + \sum_j \beta_j Controls_{jit} + \sum_k \delta_k Controls_{kt} + \gamma_i + \eta_{year} + \sum_q \theta_q + \varepsilon_{it}\ , \quad (2)$$

where the BIT_{it} notification dummy is interacted with a $Political\ risk_{it}$ dummy, indicating high political risk if 1 and low risk otherwise.

Table 3 presents estimation results of the interaction model (Equation 2) using different measures of political risk. Relatively autocratic governments face low levels of executive or political constraints. Such governments appear to be more likely to breach treaty provisions for political reasons than governments in democratic countries with many veto players and executive constraints. BITs signed with these politically risky governments may therefore be associated higher expected liabilities from arbitration proceedings and therefore should have a more pronounced impact on sovereign default risk. The results do not support this hypothesis as none of the estimated interaction terms reveals significantly negative effects. Thus, bond investors appear not to judge the expected costs of BITs on sovereign creditworthiness based on political risk of the destination country government alone. Using triple interaction models in the next section we analyze the pricing impact of BITs conditional on political risk

of the domestic government and the investor-friendliness of the BIT. In the following models we use the executive constraints dummy as our baseline indicator for political risk.

[Table 3 here]

4.3 The impact of BITs on sovereign bond returns conditional on political risk and investor-friendliness of BITs

So far, we have implicitly assumed that BITs are uniform. However, treaties differ in terms of investor-friendliness, depending on the respective treaty provision. To take different provisions into account, we use the following triple interaction model:

$$\begin{aligned} Sovereign\ Bond\ Return_{it} = {} & \alpha_1 BIT_{it} + \alpha_2 Political\ risk_{\ it} + \alpha_3 BIT_{it} * Political\ risk_{\ it} \\ & + \alpha_4 BIT_{it} * Investor\text{-}friendly\ BIT_{it} + \alpha_5 BIT_{it} * Investor\text{-}friendly\ BIT_{it} * Political\ risk_{it} \\ & + \sum_j \beta_j Controls_{jit} + \sum_k \delta_k Controls_{kt} + \gamma_i + \eta_{year} + \sum_q \theta_q + \varepsilon_{it}\ , \end{aligned} \tag{3}$$

where we interact our dummies for BIT *notification*, *low executive constraints* and i*nvestor-friendliness*.

The first column of Table 4 presents the estimation results of Equation 3 using the score of the *investor-friendliness index* and the *executive constraints dummy*. The results robustly confirm our hypothesis. The significantly negative triple interaction term reveals that investor-friendly BITs reduce sovereign bond returns if the government faces low constraints. Such governments have more leeway to expropriate foreign investors with negative implications for potential compensation claims and sovereign creditworthiness. In the case of high constraints (and the associated low risk of expropriation), investor friendly BITs increase sovereign bond returns.

The second column presents the same model, but includes a dummy variable for investor-friendliness (rather than the score). Again, the negative triple interaction term reveals that investor friendly BITs will reduce sovereign bond returns if executive constraints are low.

[Table 4 here]

Table 5 presents marginal effects of BIT notification on sovereign bond returns conditional on investor-friendliness of treaties and the executive constraints of the government. Sovereign bond returns increase significantly, if countries with high executive constraints enter into an investor-friendly treaty. The marginal effect of such an investor-friendly treaty is + 0.07%, which accounts for roughly 8% of the standard deviation of daily bond returns. Investor-friendly BITs may attract FDI and support economic development with positive effects on sovereign creditworthiness. In this high political constraints

regime, the government will less likely breach BIT provisions and therefore investors expect lower compensation claims from arbitral proceedings.

[Table 5 here]

The impact of an investor-friendly BITs turns out to be negative in low executive constraints regimes. In this case, the marginal effect of an investor-friendly treaty on sovereign bond returns is roughly - 0,14%, which accounts for 15% of daily sovereign bond returns' standard deviation. Low executive constraints increase the likelihood that the government directly or indirectly expropriates foreign investors for political reasons. Investor-friendly BITs facilitate a foreign investors' ability to claim compensation for their losses using arbitral tribunals. The implementation of investor-friendly BITs in countries with low executive constraints will therefore be associated with higher expected costs from compensation claims and a negative effect on sovereign bond returns.

4.4 The impact of BITs on sovereign bond returns conditional on political risk, investor-friendliness of BITs, and market size

In the next step, we investigate the role of market size for the impact of BITs on sovereign bond returns. A treaty between a small destination country, and a large home country may amplify the legal risk channel for the destination country. Large foreign investment received from the home country increases the potential size of compensation claims for the destination country government. Also, companies of large home countries with their larger legal departments and better political connections may be better able to enforce their claims using the arbitration scheme.

To investigate this issue, we perform a sample split. We use the ratio of home country GDP to destination country GDP and split the sample at the median of the ratio. Estimation results are presented in Table 6. The first (second) column reports the results for the subset of observations where the home to destination country GDP ratio is above (below) the sample mean. The results reveal that the triple interaction term is much larger (in absolute terms) for the large home/destination country sample. This result indicates that the legal risk channel, constituted for investor-friendly BITs and low constrained governments, is more pronounced for BITs between large home countries and small destination countries.

[Table 6 here]

We present the marginal effects of BITs on sovereign bond returns for both sub samples in Table 7. The upper (lower) panel shows the results for the subset of observations where the home to destination country GDP ratio is above (below) the sample mean. For the large home to destination country set, the

implementation of an investor-friendly BIT in low executive constrains countries reduces sovereign bond returns by -0.22%. The corresponding effect for the small home to destination country set is only at -0.05% and statistically not different from 0. These results indicate that the legal risk channel of BITs is more pronounced for BITs where the destination country is large relative to the destination country. Bond investors appear to take the size of potential compensation claims into account when pricing the legal risk premium.

[Table 7 here]

5 Conclusion

This paper studies the impact of bilateral investment treaties (BITs) on sovereign bond returns for 25 emerging markets in the period 1993-2016. We find a small unconditional impact of BITs on sovereign bond returns. While the date of signature and entry into force of BITs show no informational value for bond pricing, the date of notification reveals a significantly negative pricing impact on sovereign bonds. We further show that the effect of BITs on sovereign bond returns depends on executive constraints and investor-friendliness of treaties. Low executive constraints increase the risk of politically motivated expropriations and may therefore trigger more arbitration cases. The investor-friendliness of BITs on the other hand determines the degree to which the BIT actually facilitates arbitration proceedings. We categorized BITs according to eight different treaty provisions that have been used frequently in arbitral proceedings. Interaction models reveal that the implementation of investor-friendly BITs in countries with low executive constraints are associated with a significant reduction in sovereign bond returns, which accounts for roughly 15% of the standard deviation of daily returns. For country pairs with large home countries and small destination countries, this legal risk effect is even more pronounced. Sovereign bond investors appear to take potential compensation payments and reputation losses from arbitral proceedings into account when judging the effects of BITs. In countries with low executive constraints treaties with high investment protection might cause arbitral proceedings that threaten sovereign's creditworthiness. In countries with high executive constraints the politically motivated expropriations are less likely and threat for creditworthiness is negligible.

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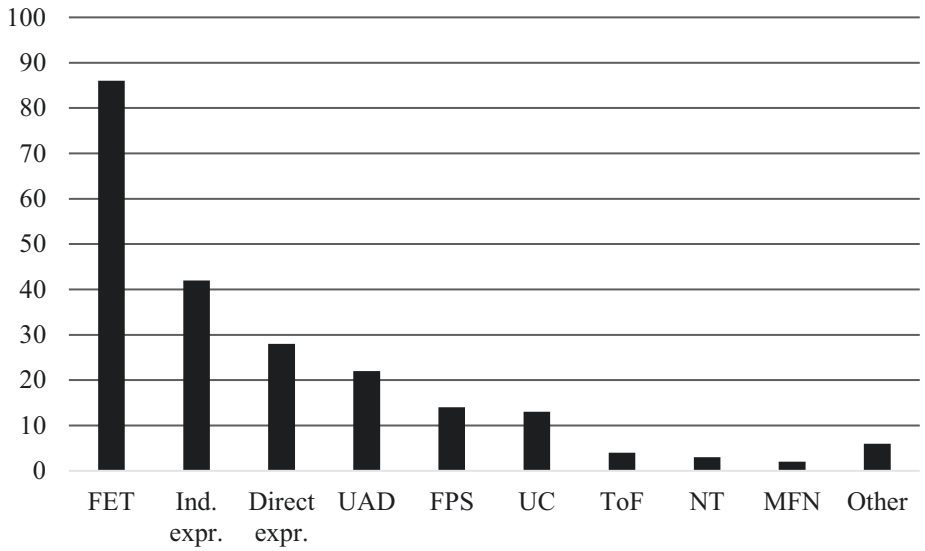
Figures and Tables

Figure 1: Most used treaty clauses in arbitral proceedings decided in favor of a foreign investor until 2016



Source: International Investment Agreements Navigator (UNCTAD, 2020) **Note:** Data basis are 128 arbitration proceedings based on BITs that were concluded by 2016. An arbitration decision can be reasoned with one or several breached treaty clauses.

Table 1: Summary statistics

	N	Mean	Median	Std. Dev.	Min.	Max.
Δln EMBIG	77445	.035	.021	.922	-30.792	22.769
Signature dummy	77445	.015	0	.123	0	1
Notification dummy	77445	.013	0	.113	0	1
Entry into force dummy	77445	.016	0	.125	0	1
FET dummy	335	.737		.441	0	1
Ind. Expr. dummy	335	.967		.178	0	1
UAD dummy	335	.624		.485	0	1
FPS dummy	335	.761		.427	0	1
UC dummy	335	.29		.454	0	1
ToF dummy	335	.791		.407	0	1
NT dummy	335	.048		.214	0	1
MFN dummy	335	.075		.263	0	1
Investor-friendliness index	335	4.293	4	1.264	1	8
Polity2 score	77445	5.184	7	4.912	-7	10
Executive constraints	77445	5.426	6	1.473	2	7
Political constraints	77445	.347	.397	.188	0	.719
Δln EMBIG all countries index	77445	.037	.047	.647	-9.532	9.166
ΔVIX	77445	0	-.02	1.587	-17.36	16.54
Δln Domestic stock index	77445	.022	.015	2.007	-46.081	46.824
Debt to GDP	77445	43.231	41.343	20.815	3.89	164.991
Currency crisis dummy	77445	.037	0	.189	0	1
Sovereign debt crisis dummy	77445	.013	0	.115	0	1

Table 2: Unconditional effects of signature, notification and entry into force dummies on sovereign bond returns

	I	II	III	IV
Signature dummy	0.041			0.041
	(0.034)			(0.034)
Notification dummy		-0.029		-0.034*
		(0.020)		(0.019)
Entry into force dummy			-0.001	0.012
			(0.015)	(0.015)
Δln EMBIG all countries index	0.716***	0.716***	0.716***	0.716***
	(0.106)	(0.106)	(0.106)	(0.106)
ΔVIX	0.015*	0.015*	0.015*	0.015*
	(0.008)	(0.008)	(0.008)	(0.008)
Δln Domestic stock indices	0.046***	0.046***	0.046***	0.046***
	(0.013)	(0.013)	(0.013)	(0.013)
Debt to GDP	0.001**	0.001**	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)
Currency crisis dummy	-0.040	-0.040	-0.040	-0.040
	(0.028)	(0.028)	(0.028)	(0.028)
Sovereign debt crisis dummy	-0.294**	-0.293**	-0.293**	-0.294**
	(0.117)	(0.117)	(0.117)	(0.117)
Constant	-0.051*	-0.048*	-0.049*	-0.051*
	(0.026)	(0.025)	(0.025)	(0.026)
Observations	77445	77445	77445	77445
Number of countries	25	25	25	25
Included BITs	394	335	413	1142
R-squared overall	0.281	0.281	0.281	0.281
R-squared within	0.281	0.281	0.281	0.281
R-squared between	0.077	0.081	0.080	0.077

Notes: All regressions include country, year, and weekday fixed effects. Standard errors are clustered on the country level and are depicted in parentheses. Significance levels are indicated by *, **, and *** which denote significance at the 10%, 5%, and 1% level.

Table 3: The effects of BIT notification on sovereign bond returns conditional on political risk

	I	II	II
Notification dummy	-0.002	0.007	-0.038
	(0.019)	(0.022)	(0.025)
Autocracy dummy	0.006		
	(0.007)		
Notification *Autocracy dummy	-0.075		
	(0.080)		
Low executive constraints dummy		0.024**	
		(0.011)	
Notification * Low executive constraints dummy		-0.093	
		(0.077)	
Political constraints dummy			-0.008
			(0.005)
Notification * Political constraints dummy			0.019
			(0.049)
Observations	77445	77445	77445
Number of countries	25	25	25
Included BITs	335	335	335
R-squared overall	0.281	0.281	0.281
R-squared within	0.281	0.281	0.281
R-squared between	0.098	0.083	0.066

Notes: All regressions include Δln EMBIG all countries index, ΔVIX, Δln domestic stock index, debt to GDP, sovereign debt crisis dummy, currency crisis dummy, and a constant as well as country, year, and weekday fixed effects. Standard errors are clustered on the country level and are depicted in parentheses. Significance levels are indicated by *, **, and *** which denote significance at the 10%, 5%, and 1% level.

Table 4: The effects of BIT notification on sovereign bond returns conditional on low executive constraints and investor-friendliness of treaties

	I	II
Notification dummy	-0.108**	-0.040*
	(0.051)	(0.021)
Low executive constraints	0.024**	0.024**
	(0.011)	(0.011)
Notification dummy * Low executive constraints	0.111	0.002
	(0.141)	(0.078)
Investor-friendliness index	0.028*	
	(0.014)	
Notification dummy * Low executive constraints * Investor-friendliness index	-0.047*	
	(0.027)	
Investor-friendliness dummy		0.111***
		(0.039)
Notification dummy * Low executive constraints * Investor-friendliness dummy		-0.212***
		(0.068)
Observations	77445	77445
Number of countries	25	25
Included BITs	335	335
R-squared overall	0.281	0.281
R-squared within	0.281	0.281
R-squared between	0.083	0.081

Notes: All regressions include Δln EMBIG all countries index, ΔVIX, Δln domestic stock index, debt to GDP, sovereign debt crisis dummy, currency crisis dummy, and a constant as well as country, year, and weekday fixed effects. Standard errors are clustered on the country level and are depicted in parentheses. Significance levels are indicated by *, **, and *** which denote significance at the 10%, 5%, and 1% level.

Table 5: Marginal effects of the notification of a BIT on sovereign bond returns conditional on executive constraints and investor-friendliness

		Investor-friendly treaty		Difference
		No	Yes	
Executive constraints	High	-0.040*	0.071*	0.111***
		(0.021)	(0.036)	0.039
	Low	-0.038	-0.139*	-0.101*
		(0.068)	(0.075)	(0.055)

Notes: Marginal Effects base on regression results from column II of Table 4. Standard errors are clustered on the country level and are depicted in parentheses. Significance levels are indicated by *, **, and *** which denote significance at the 10%, 5%, and 1% level.

Table 6: The effects of BIT notification on sovereign bond returns conditional on low executive constraints and investor-friendliness of treaties – sample split

	I	II
Notification dummy	-0.044	-0.037
	(0.038)	(0.022)
Low executive constraints	0.025**	0.023*
	(0.011)	(0.011)
Notification dummy * Low executive constraints	-0.073	0.058
	(0.158)	(0.039)
Investor-friendliness dummy	0.128**	0.084
	(0.054)	(0.050)
Notification dummy * Low executive constraints * Investor-friendliness dummy	-0.235**	-0.153*
	(0.108)	(0.086)
Observations	77445	77445
Number of countries	25	25
Included BITs	168	167
R-squared overall	0.281	0.281
R-squared within	0.281	0.281
R-squared between	0.082	0.080

Notes: The first (second) column reports the results for the subset of observations where the home to destination country GDP ratio is above (below) the sample mean. All regressions include Δln EMBIG all countries index, ΔVIX, Δln domestic stock index, debt to GDP, sovereign debt crisis dummy, currency crisis dummy, and a constant as well as country, year, and weekday fixed effects. Standard errors are clustered on the country level and are depicted in parentheses. Significance levels are indicated by *, **, and *** which denote significance at the 10%, 5%, and 1% level.

Table 7: Marginal effects of BIT notification conditional on executive constraints and investor-friendliness – sample split

GDP ratio above the sample median				
		Investor-friendly treaty		Difference
		No	Yes	
Executive constraints	High	-0.044	0.084	0.128**
		(0.038)	(0.057)	(0.054)
	Low	-0.117	-0.225*	-0.108
		(0.141)	(0.108)	(0.093)
GDP ratio below the sample median				
		Investor-friendly treaty		Difference
		No	Yes	
Executive constraints	High	-0.037	0.048	0.084
		(0.022)	(0.041)	(0.050)
	Low	0.021	-0.048	-0.069
		(0.031)	(0.053)	(0.071)

Note: Marginal Effects base on regression results from column I and II of Table 6. Standard errors are clustered on the country level and are depicted in parentheses. Significance levels are indicated by *, **, and *** which denote significance at the 10%, 5%, and 1% level.

Appendix

Table A1: Countries in the sample

Country		Start date	End date	Signature	Notification	Entry into force
Argentina	ARG	03jan1994	31dec2002	27	14	27
Bulgaria	BGR	03oct2000	29dec2006	3	9	11
Chile	CHL	31may1999	31dec2012	8	14	12
China	CHN	01apr1994	31dec2013	52	18	47
Colombia	COL	03mar1997	30dec2016	13	6	8
Ecuador	ECU	02jan1995	31dec1999	7	8	14
Egypt	EGY	01aug2001	31dec2010	7	13	14
Croatia	HRV	03jan1997	31dec2003	19	21	24
Hungary	HUN	03jan2000	31dec2008	7	13	14
Indonesia	IDN	31may2004	31dec2009	3	5	4
Morocco	MAR	01jan1999	30dec2016	19	10	12
Mexico	MEX	03jan1994	30dec2016	28	22	26
Malaysia	MYS	01jan1997	30dec2011	5	11	10
Nigeria	NGA	01jan1999	31oct2006	8	4	5
Pakistan	PAK	01jan2002	31dec2010	0	4	4
Panama	PAN	03jan2000	29dec2006	5	5	6
Peru	PER	04jan1994	31dec2010	17	22	23
Philippines	PHL	03jan1994	29dec2006	20	14	20
Poland	POL	02mar1994	31dec1999	8	14	14
Russian Federation	RUS	02jan1995	30dec2016	32	23	25
Serbia	SRB	01jan2007	31dec2015	8	10	10
Turkey	TUR	01jan1997	31dec2013	47	42	44
Ukraine	UKR	01jan2001	31dec2015	10	8	8
Venezuela	VEN	01jan1996	31dec2009	12	14	14
South Africa	ZAF	01jan1997	31dec2010	29	11	17
			Sum	394	335	413

Table A2: Definition and sources of variables

Variable	Definition	Source
Δln EMBIG	The respective country index of JP Morgan's Emerging Market Bond Index Global. Daily returns are computed as differences of natural logarithms.	DataStream
Event dates		
Signature	Date on which two countries signed a treaty. If the event took place on the weekend, we use the next trading day.	Investment Policy Hub – International Investment Agreements Navigator (UNCTAD, 2020)
Notification	Date on which both countries have confirmed the fulfillment of the respective constitutional requirements that are necessary for the entry into force of the BIT. This date is determined using the date of entry into force and the waiting period between notification and entry into force. The waiting period was taken from the respective treaty texts. If the event took place on the weekend, we use the next trading day.	The treaty texts as provide by Investment Policy Hub – International Investment Agreements Navigator (UNCTAD, 2020)
Entry into force	Date on which a BIT enters into force. If the event took place on the weekend, we use the next trading day.	Investment Policy Hub – International Investment Agreements Navigator (UNCTAD, 2020)
Political risk		
Polity2 score	Indicator variable characterizing the political system; indicator ranges from +10 (strongly democratic) to -10 (strongly autocratic)	Polity IV Database (Marshall et al., 2016)
Executive constraints	Indicator variable characterizing constraints on an executive; indicator ranges from 1 (unlimited authority) to 7 (executive parity or subordination)	Polity IV Database (Marshall et al., 2016)
Political constraints	Indicator for the capacity of the government to implement policy change; indicator ranges from 0 (most hazardous) to 1 (most constrained).	POLCON III Henisz (2002)
Investment provisions of BITs		
FET dummy	The Dummy variable is 1 if a BIT contains an unqualified f*air and equitable treatment* (*FET*) clause. The variable is 0 if the *FET* clause has a reference to international law or is limited to specific elements	Investment Policy Hub – International Investment Agreements Navigator – Mapping of IIA Content (UNCTAD, 2020)
Indirect expropriation dummy	The Dummy variable is 1 if a BIT's expropriation clause mentions *indirect expropriations*. The variables is 0 if indirect expropriations are not mentioned.	Investment Policy Hub – International Investment Agreements Navigator – Mapping of IIA Content (UNCTAD, 2020)
UAD dummy	The Dummy variable is 1 if a BIT contains a prohibits the *impairment of investments by unreasonable and/or arbitrary and/or discriminatory (UAD)* measures. The variable is 0 if the treaty does not contain such a clause.	Investment Policy Hub – International Investment Agreements Navigator – Mapping of IIA Content (UNCTAD, 2020)
FPS dummy	The Dummy variable is 1 if a BIT contains a standard f*ull protection and security (FPS)* clause. If the BIT does not contain a *FPS* clause or the clause is referenced to the domestic law the dummy variable will be 0.	Investment Policy Hub – International Investment Agreements Navigator – Mapping of IIA Content (UNCTAD, 2020)
UC dummy	The dummy variable is 1 if a BIT contains an u*mbrella c*lause (*UC*). The variable is 0 if the treaty does not contain an umbrella clause.	Investment Policy Hub – International Investment Agreements Navigator – Mapping

		of IIA Content (UNCTAD, 2020)
ToF dummy	The dummy variable is 1 if the t*ransfer of funds* (*ToF*) clause in a BIT does not contain any exceptions. The dummy is 0 if the clause is restricted. Some treaties allow to restrict free transfer of funds due to balance of payments difficulties. Other treaties provide a list of specific exceptions.	Investment Policy Hub – International Investment Agreements Navigator – Mapping of IIA Content (UNCTAD, 2020)
MFN dummy	This dummy is 1 if the m*ost-favored-nation (MFN)* clause of a BIT applies at the pre- and post-establishment phase of an investment. The Dummy is 0 if the clause only covers the pre-establishment phase.	Investment Policy Hub – International Investment Agreements Navigator – Mapping of IIA Content (UNCTAD, 2020)
NT dummy	This dummy is 1 if the n*ational treatment (NT)* clause of a BIT applies at the pre- and post-establishment phase of an investment. The Dummy is 0 if the clause only covers the pre-establishment phase.	Investment Policy Hub – International Investment Agreements Navigator – Mapping of IIA Content (UNCTAD, 2020)
Control variables		
Δln EMBI all countries	The all countries index of JP Morgan's Emerging Market Bond Index Global. Daily returns are computed as differences of natural logarithms.	DataStream
ΔVIX	Weighted average of the implied volatilities of eight put and call options written on the S&P 500 index. Daily returns are computed as differences of natural logarithms.	Chicago Board Options Exchange, DataStream
Δln Domestic stock indices	Daily returns of US$ denominated national stock indices. The information was collected from different providers. For some countries we had to use national currency indices. Daily returns are computed as differences of natural logarithms	DataStream Total Market Country Indices; S&P BMI (USD), MSCI, National Stock Indices
Currency crisis dummy	Dummy variable that indicates if countries face a currency crisis.	Laeven and Valencia (2018)
Sovereign debt crisis dummy	Dummy variable that indicates if countries face a sovereign debt crisis.	Laeven and Valencia (2018)
Debt to GDP	Data on public debt in percent to GDP from Abbas et al. (2010). Recent years appended with information on general government gross debt as percent of GDP from IMF (2018).	Abbas et al. (2010); IMF (2018)