Consistency and Legal Innovation in the BIT Universe

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Abstract

International investment law is marked by the proliferation of bilateral investment agreements (BITs). Close to 3000 BITs have been concluded by 2014 and virtually every country is a signatory. In this paper we construct a novel data set of 1623 BIT texts and compute *q*-gram string distances between treaty pairs to analyze similarity and dissimilarity in the BIT universe. First, we identify patterns of *legal coherence* (close mutual distances) and find strong support for the hypothesis that Western capital-exporting countries are rule-setters in the treaty-making process. Second, we examine causes of *legal innovation* (change of treaty distance over time for treaty-making countries) and show that being hit by an Investor-State arbitration claim does not lead to a change in treaty design, in contrast to the predictions of previous studies. Our research thereby demonstrates that text as data models of treaty design can be a powerful tool for policy-makers, arbitrators and scholars to trace consistency and innovation within and across individual country's BIT networks.

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Introduction

Bilateral investment agreements (BITs) emerged in the 1950s and proliferated globally in the 1980s and 1990s. Today, virtually every country is signatory to a BIT and close to 3000 treaties exist worldwide.[1] The primary purpose of BITs is to protect foreign investment against the risk of expropriation, discrimination and other types of unfair or arbitrary treatment. By reducing the political risk associated with these types of governmental interventions, BITs strive to stimulate international investment flows and promote their efficient allocation.[2] What makes BITs a particularly significant — and controversial — part of international law is that foreign investors can enforce their investment protection obligations directly through international arbitration and win monetary damages. In 2014, the *Yukos* tribunal, for instance, awarded the record sum over USD 50 billion of compensation to shareholders against the Russian Federation.[3]

In response to rising numbers of investment claims, a few countries have begun terminating their treaties (UNCTAD, 2010). Others have chosen to keep their treaties in place but have refrained from concluding new ones. In spite of the fact that the number of newly concluded agreements has slowed down, UNCTAD (2014, p. 115)'s count of yearly treaties shows that new BITs continue to be concluded at the range of 30 to 40 a year. Hence, while investment treaties may have dwindled in popularity since their heydays in the late 1990s and early 2000s, they are here to stay.

This contribution uses state-of-the-art technology to shed new light on this body of law. In particular, we investigate two elements in treaty design that are crucial for policy-makers and negotiators in managing states' exposure to investment claims: *legal coherence* (similarity between treaties) and *legal innovation* (differences between treaties over time). Consistent treaty networks allow countries to streamline their investment protection commitments. As Chayes and Chayes (1995) have observed, countries sometimes breach treaties inadvertently. Policy-makers or regulators, including at the municipal level, may not be fully aware of a country's treaty commitments, particularly if they diverge starkly across agreements, and thus fail to observe them. A streamlined network of consistent treaties can mitigate the risk of inadvertent breach and foster compliance. Legal innovation, in turn, allows a country to adapt treaties to changing circumstances. In recent years, commentators have observed that states increasingly seek to balance the protection of foreign investment with the need to safeguard policy-space (Spears (2010), Van Aaken (2009), Alschner (2013)).

[1] UNCTAD, *World Investment Report* 2014, p. 114.

[2] The ability of BITs to stimulate foreign investment is subject to debate and has sparked a vast body of empirical research. *See generally* Sauvant and Sachs (2009).

[3] *Hulley Enterprises Limited (Cyprus), Yukos Universal Limited (Isle of Man), Veteran Petroleum Limited (Cyprus) v. The Russian Federation*, UNCITRAL, PCA Case No. AA 226–8, Final Award, 18 July 2014, ¶1827.

In sharp contrast to previous studies of BITs, we do not undergo a coding exercise to quantify treaty design. While we recognize that an informed human coder can uncover subtle differences between treaties, it will be very difficult to develop a uniform coding scheme that will account for the full array of legally meaningful differences. In this paper we treat BIT texts as data that will inform us of latent treaty design. However, unlike most quantitative researchers, we do not adopt a bag-of-words approach (when texts are separated into terms and a resulting term-frequency matrix is analyzed) since this method is uninformed of word order of the treaties. Instead, we follow an unsupervised approach modeled on Spirling (2012). We first identify the number of common 5-grams in each treaty pair and then divide it by the total number of 5-grams in this pair computing a Jaccard distance between sets of treaty 5-grams. This way, we get a continuous 0...1 metric that indicates textual similarity of each pair of treaties and is aware of word order.

The obtained treaty distance metric is unitless and relational, requiring us to conceptualize treaty design in a peculiar way. We offer an example from the U.S. treaty-making practice to illustrate our definition. Consider the U.S.A.–Uruguay (2005) BIT that was the first treaty concluded under the new U.S. Model BIT (2004). Our textual distance metric should display that this treaty is less similar to the treaties struck by the U.S. before the new model agreement was developed. Indeed, the Jaccard distance of this treaty with the U.S.A.–El Salvador treaty of 1999 is 0.58. This figure is not informative unless we factor in the information that the computed distance between the U.S.A.–El Salvador (1999) BIT and the U.S.A.–Bahrain (1999) treaty is 0.12. By looking at the temporal evolution of textual similarity of treaties, we trace legal innovation: how and when treaty texts diverge from preceding treaty practice.

By the same token, the U.S.A.–Uruguay BIT should also appear more similar to the U.S.A.–Rwanda (2008) treaty that is also following the 2004 model. Our computations show that the similarity between the two treaties is 0.12, indicating a close relationship (in comparison with U.S.A.–El Salvador (1999) or U.S.A.–Bahrain (1999)). Not only can our metric uncover treaty innovation, it is also capable of displaying legal coherence. We locate nests of textually similar treaties struck by a country and show whether the treaty-making practice of this country is coherent. In the above example we find that pre- and post-2004 model BIT treaty practice was internally coherent, with U.S.A.–Uruguay (2005) becoming a legal innovation.

Having modeled the notion of legal coherence and innovation, the paper pursues three lines of inquiry. In Section 3, we examine legal coherence and innovation within and across individual countries' BIT networks. Our quantitative representation of treaty networks is able to match the findings of qualitative case studies on the individual country level and

reveals additional insights. We thereby demonstrate that text as data can be a powerful tool for policy-makers, arbitrators and researchers in assessing a country's treaty network. In Section 4 we then ask who writes the rules in the BIT universe. We demonstrate that developed countries have markedly more coherent treaty networks than their developing counterparts, suggesting that wealthier countries are the rule-makers while poorer nations are the rule-takers in the system. Finally, in Section 5 we investigate causal factors underlying treaty innovation probing whether countries change their treaty-making in response to Investor-State disputes. Unlike previous studies, we employ an instrumental variables approach to show that being hit by the first investment claim, instrumented by the preceding expropriation of foreign direct investment, does not lead to spikes in legal innovation, regardless of the country's level of economic development.

1 Motivation

In this section, we introduce three core queries in current investment law scholarship and policy-making that we then tackle in subsequent sections. (1) How coherent and how innovative are BIT networks? (2) Who are the rule-makers and rule-takers in the system? (3) What is the impact of investment arbitration on investment treaty innovation?

Question 1: Balancing consistency and legal innovation

A newcomer to the field of BITs would expect to encounter a very diverse array of bilateral agreements. After all, investment agreements are tools to mitigate political risk predominantly in developing host countries for foreign investment and to serve as substitute for weak domestic legal institutions (Comeaux and Kinsella (1994), Hallward-Driemeier (2003)). Since the degree of political risk as well as the quality of domestic institutions varies from country to country one would expect that these variations are taken into account by negotiating countries. Home countries would be expected to push for strong protection where political risk of host countries is high and the quality of domestic institutions is low. Host countries, in turn, could be expected to resist stronger rules of investment protection in order to preserve policy-space with varying success depending on their bargaining strength. As a result, we should expect a very diverse array of agreements that reflect varying levels of political risk and bargaining power in bilateral relations.

Investment law scholarship, in contrast, has emphasized the high degree of uniformity and convergence found in close to three thousand bilateral investment treaties (Schill, 2011). Dolzer and Schreuer (2012) identify common principles of international investment law.

For Salacuse (2010), investment agreements form a global regime for investment characterized by common principles, norms, rules and decision-making processes. Schill (2009) even contends that a multilateral system of international investment protection has emerged on the basis of largely uniform bilateral treaties. A principle reason behind the perceived uniformity of BITs is that many countries use treaty templates ("model BITs") to negotiate investment treaties (Vandevelde, 2011). In some states, such as Germany, the negotiating ministry produces such a template in-house. In other countries, such as the United States, Norway or South Africa, these model agreements are devised through an extensive process of inter-agency cooperation and public consultations (Muchlinski, 2010). In either case, they reflect what the country considers to be an ideal standard of investment protection making deviation from the model in subsequent negotiation undesirable. The use of model templates thus promotes consistency in a country's BIT network (OECD, 2006, p. 144).

Having consistent treaty networks has two distinct legal advantages. First, for capital exporters, it is advantageous to create a level playing field of investment protection across varying host countries. By avoiding divergent standards, a consistent treaty network prevents market-distortions, promotes the efficient allocation of capital and reduces transactions costs for home country investors. Second, on the capital importing side, consistent treaty standards facilitate compliance with investment treaty obligations. A host country to foreign investors will only have to observe one set of largely uniform commitments making a breach of investment standards less likely and thereby prevent multi-million dollar damage awards (UNCTAD, 2008). Hence, consistency in a country's treaty network is desirable for both source and destination countries of foreign investment.

Consistency, however, is not the only goal a country pursues when negotiating BITs. In response to changing circumstances, a country may decide to update its BIT practice by revising its model BIT. The United States, for instance, renewed its negotiation template eight times between 1982 and 2012 (Vandevelde, 2009b, pp. 769-852). Most of these renewals only incorporated minor adjustments, with exception of the 2004 revision, which resulted in a complete overhaul of the U.S. model BIT (Vandevelde (2009a), Alvarez (2010), Schwebel (2006)). These revised model BITs are then used to negotiate new or (less-often) re-negotiate existing agreements.

In empirical terms, we should thus be able to trace consistency and innovation in countries' BIT networks over time. Policy-makers and negotiators can thus quickly evaluate whether a country has achieved internal consistency or whether legal innovation has successfully been implemented. Furthermore, measuring consistency and innovation is also interesting for researchers investigating a country's BIT program or for disputing parties and arbitrators in evaluating arguments relating to the similarity or differences among a country's BITs.

Question 2: Rule-takers and rule-makers

Countries are expected to vary in their ability to achieve a consistent treaty network. In particular, a developed country is likely to be in a stronger bargaining position to negotiate a treaty based on its model agreements than its developing country counterpart. The more general question thus arises: who makes the rules in the BIT universe? Identifying rule-takers and rule-makers is an important tool in order to evaluate how the current investment system came about, which, in turn, informs its legitimacy and exposes potential biases.

In the literature, we find support for the hypothesis that developed countries are the system's rule-makers and developed countries the rule-takers. European countries were the first to initiate BIT programs starting in the late 1950s and 60s. The 1967 OECD Draft Convention on the Protection of Foreign Property served as a template around which European countries developed their model BITs (Schill, 2009, pp. 35-36). From the perspective of the developed country, a successful negotiation resulted in a final agreement that varied as little as possible from the model proposed (Salacuse (1990, pp. 655, 662), Ruttenberg (1987, pp. 134-137)). Several factors assisted developed countries in negotiating agreements on their models. First, the country with the higher GDP is likely to be in a stronger bargaining position to negotiate a treaty based on its model agreements since it can promise higher capital exports and may assert pressure through foreign aid or preferential tariff agreements giving it an upper hand in negotiations.[4] Second, a developing country may not have the personnel, expertise or resources to fully engage in BIT negotiations. Indeed, a recent empirical study by Poulsen (2014) (and Poulsen (2011)) suggests that developing countries often accepted the treaty template offered by their developed country treaty partner without meaningful negotiation, either because they considered them as mere pieces of paper without legal bite or because they overestimated the benefits of BITs and underestimated their risks. Hence, power asymmetries coupled with a misconception about the true impact of BIT are likely to have turned developed countries into rule-makers and developed countries into rule takers. Section 4 will investigate this claim empirically.

Question 3: Legal innovation and the role of investment claims

What drives legal innovation in investment treaty networks? The literature suggests that changes in treaty design may be linked to the rise of international investment arbitration. Prior to the proliferation of investment claims, many developing countries "had no idea that

[4] Ruttenberg (1987, p. 135), for instance, observed that recipient countries of U.S. foreign aid were more likely to accept the U.S. model template.

[BITs] would have real consequences in the real world".[5] Even developed countries had underestimated the effects of investment treaties. The 2004 overhaul of the U.S. Model BIT, for instance, took place after the U.S. had been subject to several investor-state complaints. Accordingly, the motivation behind the revisions was said to be a desire to re-balance state's rights and obligations in investment treaties and to reduce the exposure of the U.S. to investment claims (Vandevelde, 2009a). Other countries have joined in what Spears (2010) has called a "quest for policy space" concluding a new generation of more balanced investment treaties. Since this new generation of treaties tends to follow the treaty design first introduced in NAFTA and expanded upon in the 2004 U.S. model BIT, this trend has been labeled as an "Americanization" of the BIT universe (Alschner, 2013).

Our final empirical question then is one of causality: do investment arbitration claims lead to innovation in treaty design? The literature suggests two ways in which this causality may work. On the one hand, countries could be Bayesian learners rationally responding to new information about the risks of investment claims. As Poulsen (2011, p. 203-4) explains "The lack of disputes — or publicly available information about disputes — meant that it wasn't until around 2002 that developing countries had clear information available that BITs' ability to expose host states to liabilities was very real and concrete, rather than merely vague and abstract." One would then expect a surge of innovation in the early 2000s as countries adjust their investment policy in response to the first line of investment cases which revealed the true costs of investment treaties. On the other hand, decision-makers may act out of bounded rationality privileging information that is immediate and that elicits an emotional response. In that scenario, one would expect a country to adjust its investment policy only when it is itself hit by a claim. Poulsen and Aisbett (2013) apply the framework to countries' propensity to sign new agreements, finding that countries are bounded rational rather than Bayesian learners, since they tend to sign less new agreements only when they are hit by a claim themselves. Manger and Peinhardt (2013) investigate both hypotheses with respect to a change in treaty design. They similarly find that states are more likely to alter their treaties when they are hit themselves rather than when they learn about treaty claims against third countries. According to them treaties increase in "precision", one of the dimensions of what Abbott et al. (2000) call "legalization", defined as the specificity of treaty commitments and modeled as an index ranging from 0 (low precision) to 1 (high precision), after the home state is hit by a claim or learns about claims against other countries. Section 5 will test this claim empirically with an alternative methodology.

[5] Expert testimony of Prof. Christoph Schreuer, *Wintershall Aktiengesellschaft v. Argentine Republic*, ICSID, Case No. ARB/04/14, Final Award, 8 December 2008, ¶85.

2 Inferring treaty design from texts

To investigate our three questions, we employ a novel research design that models text as data revealing patterns of similarities and differences across agreements.

Data

UNCTAD maintains the information on the universe of signed (including terminated) bilateral investment agreements on a designated website.[6] We use treaty metadata (parties, date of signature and coming into force) scraped from this website as a starting point in our search for English-language treaty full texts. While UNCTAD provides full texts for a number of treaties, most of them originate from optical character recognition of scanned treaty texts. When image quality is low, such exercise produces ineligible texts. We circumvent this problem by attaching UNCTAD treaty metadata to full texts obtained from other sources.

Our primary source of BIT full texts is *Kluwer Arbitration*[7] which features more than 1400 English-language treaties supplied by the research staff at the Penn State Institute of Arbitration. We then complement this data set with more than 100 additional treaties exclusively available at *Investment Claims*[8] and 140+ treaties that are exclusive to UNCTAD. Next, we manually edit the texts, removing non-essential parts[9], correcting typos, optical character recognition errors and other mistakes in underlying data sources.[10] We also unify treaty spelling, converting all British English words into their American English counterparts (e.g. "favour" to "favor") with the aid of spelling variant pairs from VarCon.[11] As a result, we gather 1623 treaty texts spanning from 1959 (Germany–Pakistan BIT) to 2014. To the best of our knowledge, this is the largest data set of bilateral investment agreement texts in the literature.[12]

However comprehensive our data set may be, it represents only 51% of BIT treaty universe. For other treaties, no English-language texts are available. This under-sampling may lead to

[6] `http://investmentpolicyhub.unctad.org`

[7] `http://kluwerarbitration.com`

[8] `http://oxia.ouplaw.com`

[9] Many Canadian and U.S. treaties have Annexes detailing non-conforming measures or reservations. We remove those Annexes as they define national legislation carved out from the treaty scope. We also remove letters to the legislature following the ratification process and any exchanges of letters between the contracting parties if they are related to diplomatic communication. In contrast, we do not remove Protocols and footnotes that form an integral part of the treaties. We also keep Annexes and footnotes clarifying treaty terms.

[10] To ensure replicability of our data cleaning procedure, we set up a version control system that tracked all the changes we introduced to the initial texts.

[11] `http://wordlist.aspell.net/varcon/`

[12] Manger and Peinhardt (2013) perform a data collection effort closest to ours, gathering 1200 treaty texts from *Kluwer Arbitration* and UNCTAD. However, they do not report manual text cleaning procedure.

biased results in our analysis. In Appendix Table A.1 we compare the number of BITs in the UNCTAD universe of treaties with our data. Most notably, we do not have a lion's share of French treaties (101 of 109). In addition, some developing countries are under-represented. A regression of country i's treaty texts coverage ratio $^{treaties\ in\ data_i}/_{treaties\ in\ universe_i}$ on its level of economic development (proxied by World Bank income group) reveals that the only statistically under-sampled group is low income countries. In contrast, we are more likely to have texts of BITs struck by OECD member-states. Other than that, our data is balanced across levels of economic development of BIT signatories.

We also employ explicit ordering of parties in each treaty to reflect differences in bargaining strength between signatories. For every party we collect its GDP per capita at the date of treaty signature[13] and its World Bank country group as of 2014. Then we rearrange signatories of agreements such that a country with higher per capita GDP comes first. Since per capita GDP is an imperfect proxy for bargaining power particularly in negotiations involving small, wealthy states, we force high-income OECD countries and, alternatively BRIC countries to always be the first treaty party in our ordering.[14]

Computing treaty distances

Our primary task is to map BITs into a continuous space based on their texts. Numerous methods exist to represent text as data (Grimmer and Stewart, 2013). Most of them follow a bag-of-words approach. Applied to our context, this approach would entail that each treaty $i \in (1, \ldots, N)$ in the corpus of N agreements is assigned a vector $\mathbf{v}_i$ that counts the number of times each unique word $m \in (1, \ldots, M)$ occurs in this treaty full text: $\mathbf{v}_i = (w_{i,1}, \ldots, w_{i,m} \ldots, w_{i,M})$. Row binding of count vectors $\mathbf{v}_i$ produces a document-term matrix **DTM**. Its $\mathbf{DTM}_{(i,m)}$ element shows how many times word m occurs in document i. Then, multivariate analysis of **DTM** is performed to identify patterns of word use in the corpus and assign a univariate metric to each treaty.

The bag-of-words approach, despite its prominence, has limitations. First, it is not clear which words to include in the dictionary of unique terms used in text corpus. Should we omit common stop-words ("the", "have", "and", "not" etc.) that carry little information? Is it necessary to stem the words to remove their suffixes (so that words "arbitral" and "arbitration" both become "arbitr" while "arbiter" stems to "arbit")? Second, word counts should be appropriately weighted to account for differing treaty lengths. Third, a battery of methods exist to factorize **DTM**: principal components analysis, multidimensional scal-

[13] GDP data comes from the United Nations Statistical Division and covers 1970-2012. We linearly extrapolate this indicator for outside periods.

[14] In an event of a treaty between a high-income OECD-member state and a BRIC country, we assume that the former is the wealthier state and, therefore, should go first in party ordering.

ing, latent Dirichlet allocation. Each method has specific underlying assumptions that may drive end results. The most important limitation, however, concerns the fact that a bag-of-words approach does not incorporate word order information (Spirling, 2012, p. 88). Losing information about a word's context is particularly problematic when analyzing legal language. Suppose there are two documents: one containing a phrase "shall not be permitted" and second containing a phrase "shall be permitted". If we remove stop words "not" and "be" and count word frequencies, the two documents will appear equal.

To circumvent these problems, we follow a completely different approach. For each document we list all its q-character-long substrings and count the number of times each substring occurs in the document. In the above example, the document "shall not be permitted" will contain the following 5-character substrings: "shall", "hall_", "all_n", "ll_no", "l_not", "_not_", "not_b", "ot_be", "t_be_", "_be_p", "be_pe", "e_per", "_perm", "permi", "ermit", "rmitt", "mitte", "itted" ("_" signifies space). The document "shall be permitted" will have similar substrings, except for "all_n", "ll_no", "l_not", "_not_", "not_b", "ot_be", "t_be_". This divergence is caused by the presence of "not" in the first document and can be quantified. We count the number of unique 5-character substrings appearing in both documents and divide it by the total number of unique 5-character substrings in two documents. Subtracting this figure from one yields $\sim$0.48, a measure of dissimilarity between two documents.

Formally, for each treaty text i in our corpus let $\mathcal{Q}(i,q)$ be a set of unique substrings of q consecutive characters, also called q-grams. Then the q-gram Jaccard distance function between treaty texts i and j is defined as

$$J(i,j,q) \equiv 1 - \frac{|\mathcal{Q}(i,q) \cap \mathcal{Q}(j,q)|}{|\mathcal{Q}(i,q) \cup \mathcal{Q}(j,q)|}, \tag{1}$$

where $|\cdot|$ indicates set cardinality (van der Loo, 2014, p. 118). This function obeys the properties of symmetry ($J(i,j,q) = J(j,i,q)$), non-negativity ($J(i,j,q) \geq 0 \ \ \forall i,j,q$), and triangle inequality ($J(i,z,q) \leq J(i,j,q) + J(j,z,q)\, 0 \ \ \forall i,j,z,q$). However, identity property ($J(i,j,q) = 0$ iff $i = j \ \ \forall q$) is not satisfied (Ukkonen, 1992, p. 193). This means that q-gram Jaccard distance can be zero for documents which are not identical. In practical applications, this problem is less pronounced for big strings and large q.

Jaccard distance is a relational and unitless metric. Its absolute value gives us little information about the cleavages between two treaties. We propose to look at *changes* in Jaccard distances across treaties grouped by certain parameters. In what follows each bilateral investment agreement i is treated as a quadruple $\langle text,\ signatory_1,\ signatory_2,\ year\_signed \rangle_i$. Then we could fix one dimension in this quadruple and examine how Jaccard distances change along it. For instance, for each signatory we can compute average distance between

all its agreements to get internal coherence of its treaty network (we provide a formal definition in section 4). Alternatively, we can compute mean Jaccard distance for each year of treaty-making to understand how treaty dissimilarity evolves with time.

In this paper we reduce each treaty text in our data to a lowercase string with no punctuation. Unlike under a bag-of-words approach, we do not perform any other pre-processing of strings as it is not required in our framework.[15] Then we compute 5-gram[16] Jaccard distances of all treaty pairs and organize them in a 1623×1623 symmetric distance matrix $\mathbf{D}$. In this matrix element $\mathbf{D}_{(i,j)} \equiv J(i, j, 5)$ reports 5-gram Jaccard distance between treaties i and j.

3 Consistency and innovation in the BIT universe

In this section we analyze consistency and innovation from a global, country-level and cross-country perspective using the raw Jaccard treaty dissimilarity matrix. On the one hand, our findings corroborate — and are validated by — existing qualitative research on international investment law. On the other hand, our results also yield novel insights and suggest new avenues of future research. This section will feature several similarity heat maps of the BIT universe based on the computed dissimilarity matrix when treaties are ordered alphabetically by the name of wealthier signatory in the pair and then by date of signature. In these figures darker shades represent high levels of similarity (i.e. lower Jaccard distances) whereas lighter shades represent higher levels of diversity (i.e. higher Jaccard distances).

Diversity and uniformity in the BIT universe

A global comparison of BITs reveals three crucial characteristics of the BIT universe. First, individual developed countries tend to have rather uniform BIT networks. Second, there is some similarity across treaties in the BIT universe. Third, our heat map also reveals important patterns of diversity.

[15] One could argue that it is necessary to remove frequent q-grams as analogous to stop word removal from document-term matrix. However, Miao et al. (2005, p. 358) shows that it does not improve performance. The reason is that q-grams have different granularity than words: for small q all q-grams are frequent, and for large q they are scarce. In the same vein, we do not remove country names and other identifying information from treaty strings: influence of their q-grams on overall Jaccard distance is only marginal: U.S.A.–Rwanda (2008) BIT text has 11800 unique 5-grams while string "United States of America" has only 20. Furthermore, removal of any country names will break the word order in treaty texts.

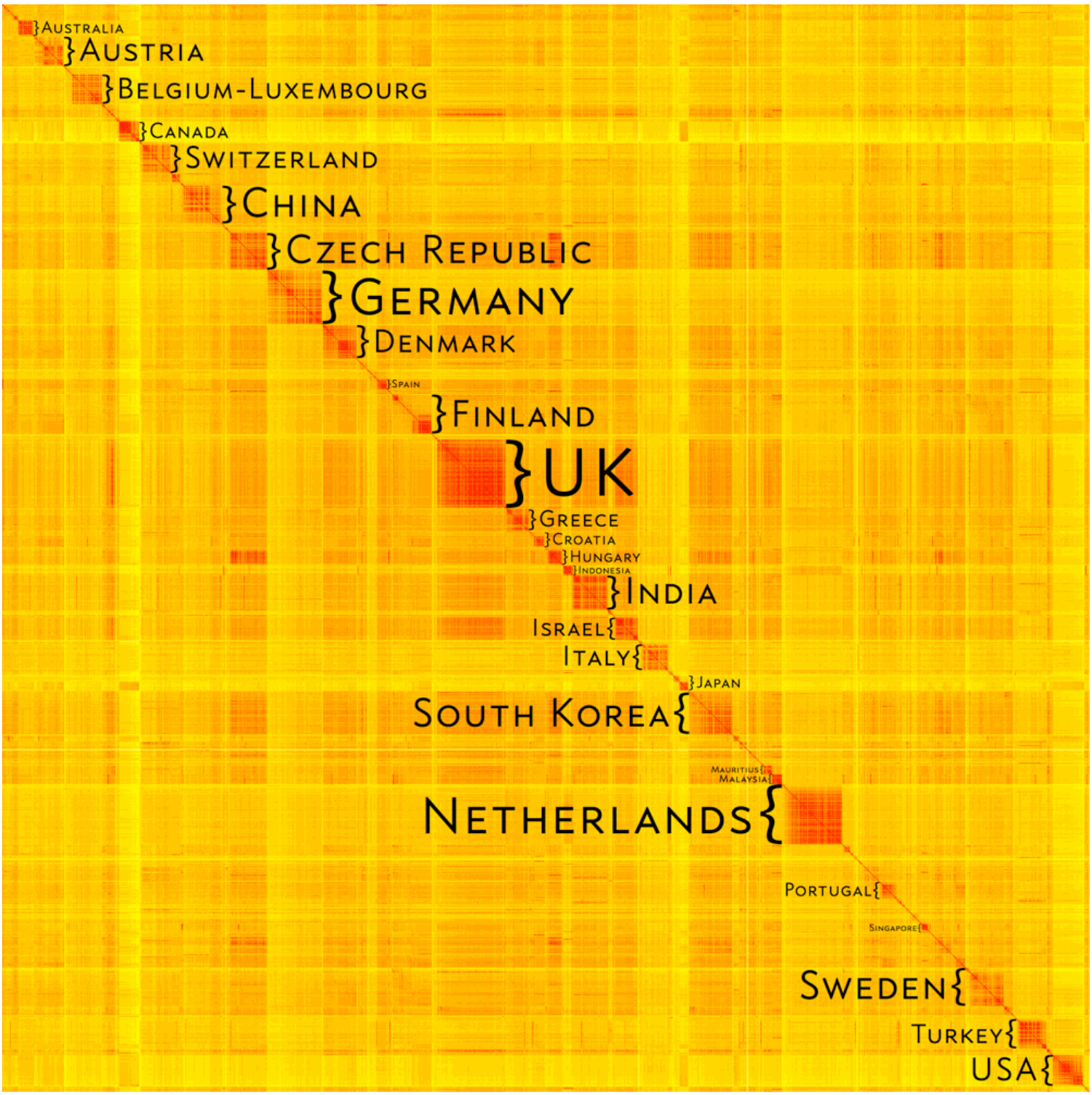
[16] Lodhi et al. (2002, p. 430) point that in the English language text corpus "shorter or moderate non-contiguous substrings are able to capture the semantics better than the longer non-contiguous substrings." For this reason we follow Spirling (2012) in setting q-gram length to 5. In Appendix A.2 we compute distance matrices for other q and show that changing q has little effect on overall distance configuration.

Uniformity within country networks Figure 1 depicts an annotated heat map of the BIT universe ordered by the more wealthy contracting party. The most prominent feature of the heat map are the quadrangles along the diagonal line. They represent individual country's treaty networks. Their dark shade indicates high levels of uniformity within national BIT networks. Conversely, the fact that these quadrangles are delimited along country lines also suggests that each national BIT network contains important idiosyncratic elements that set it apart from another's country treaty network.

Similarity across treaties According to Salacuse (2010, pp. 427, 432) "investment treaties as a group are remarkably similar with respect to structure, purpose, and principles. <…> It is for this reason that one may view these agreements, despite individual differences in text, as constituting a single international regime for investment." This assertion finds partial support in Figure 1. On the one hand, one must be careful not to overstate the homogeneity of BITs as a whole given the differences along country lines that can be clearly observed. On the other hand, darker segments also exist across different countries' network. Indeed, only a fraction of the treaties in the heat map consistently displays low similarity scores visualized as bright lines, which suggests that some common principles underlie investment treaties across the globe.

Diversity within uniformity At the same time, Figure 1 also reveals important patterns of diversity. Appearing as bright streaks in our heat map, the treaty networks of Canada, Japan and the United States display greater diversity from the rest of the BIT universe. As UNCTAD (2009, p. 20) explains, "looking from the perspective of developing countries, there are two BIT models: (a) 'protection only' BITs mostly with European countries and other developing countries; and (b) liberalizing BITs concluded mainly with the United States and Canada, and more recently, with Japan." The fact that differences in treaty design appear so starkly in our heat map, however, suggests that the differences between the two models go well-beyond the protection-liberalization dichotomy suggested by UNCTAD. Rather, as Alschner (2013) argues, they signify a more fundamental divide of how investment protection treaties are to be designed. While European treaties tend to be short and simple focusing on investment protection in isolation, North American and recent Japanese treaties, in contrast, consider investment in its broader context and embed it in more complex and comprehensive treaties.

Figure 1: Heat map of 5-gram distances between BITs ordered by wealthier country in treaty pair



Note: this figure shows a heat map of pairwise similarities of 1623 bilateral investment treaties. Similarities are defined as Jaccard distances between treaty 5-grams and vary from 0 to 1 where zero means full overlap of 5-grams and 1 implies no overlap of 5-grams in two given texts. We color zeros with red and ones with yellow and employ gradient to show values in between. Treaties are ordered by the wealthier country in the pair and date signed. Interactive version of this chart can be accessed at `http://maptreati.es/?l=byparty1&v=1`.

Innovation in individual countries' BIT programs

The measures of treaty similarity and dissimilarity are not only useful to assess consistency and diversity globally, but they can also be used to investigate trends and innovation in a country's investment treaty program. A few country examples help to illustrate this point.

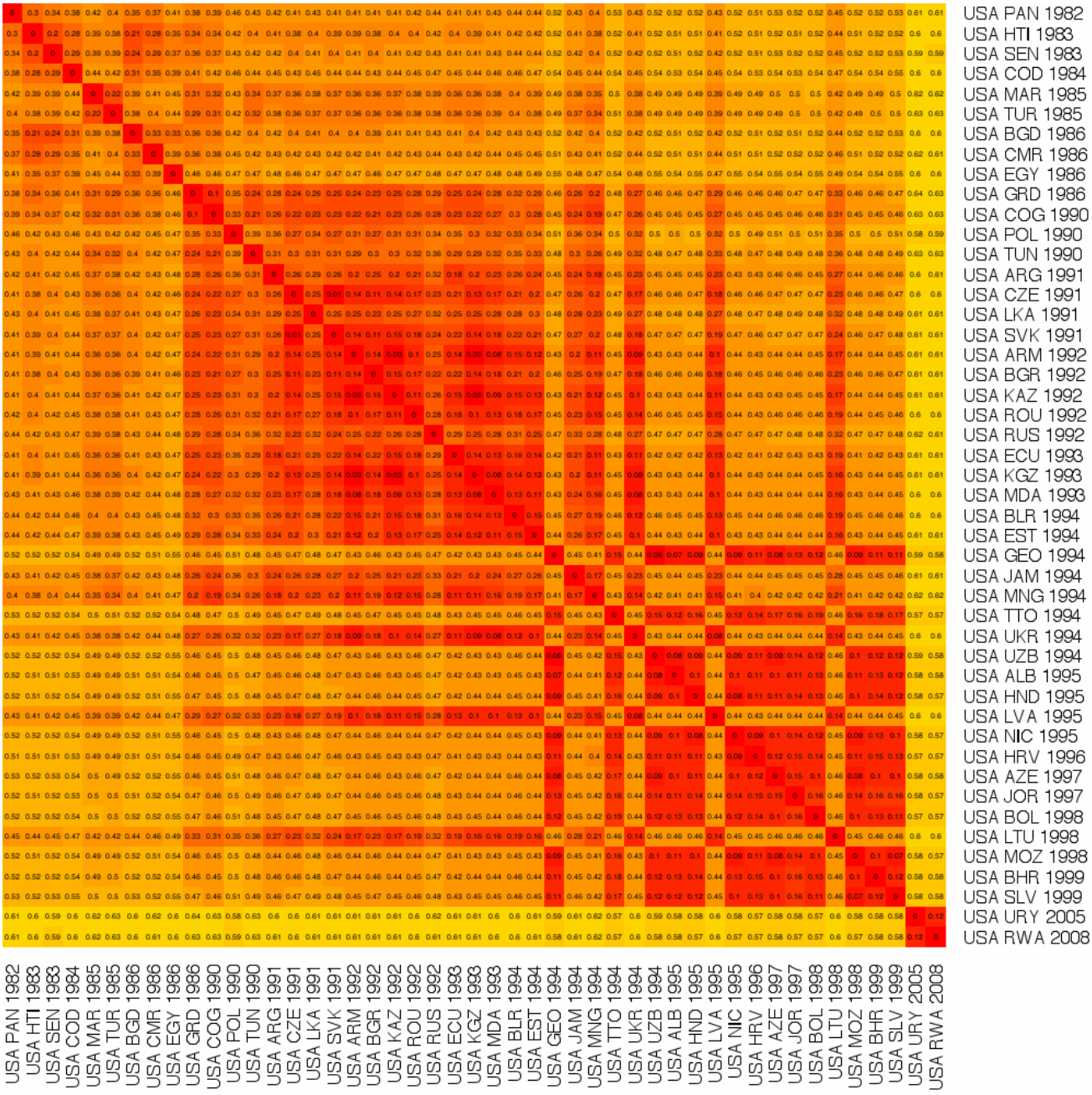
U.S.A. As recounted in subsection 1.2, the United States went through several revisions of its model BIT adapting it to a changing environment. These phases in the U.S. BIT program are visible in Figure 2 as darker shaded quadrangles break at 1986 and 1994. The fact that the adoption of the 2004 U.S. Model BIT marked a drastic change in U.S. treaty design is also clearly reflected in our visualization.

Canada Canada signed its first BIT in 1989 using a negotiation template developed by the OECD (Kinnear and Hansen, 2005). With the conclusion of NAFTA in 1992, however, it completely re-designed its investment treaty program to incorporate innovations from NAFTA Chapter 11 (McIlroy, 2004, pp. 621, 623-629). This first shift is clearly visible in the marked differences of shade in Figure 3. Another wave of innovation occurred in the mid-2000s after Canada had become the respondent in several investment claims under Chapter 11. The new 2004 model text took account of these developments and introduced several procedural innovations, such as enhanced transparency and non-disputing party involvement into its model template (Lévesque, 2006).

Japan Similar to Canada, Japan began its investment treaty practice with an OECD treaty model when it signed its first BIT with Egypt in 1977. Eight more agreements were concluded on that template over the next 25 years. Then, in 2002, as Hamamoto and Nottage (2011) observe, the Japanese treaty program underwent a fundamental overhaul resulting in the conclusion of a "new generation" of investment treaties in the years thereafter. Figure 4 illustrates the break that separates these two "generations" of Japanese treaties.

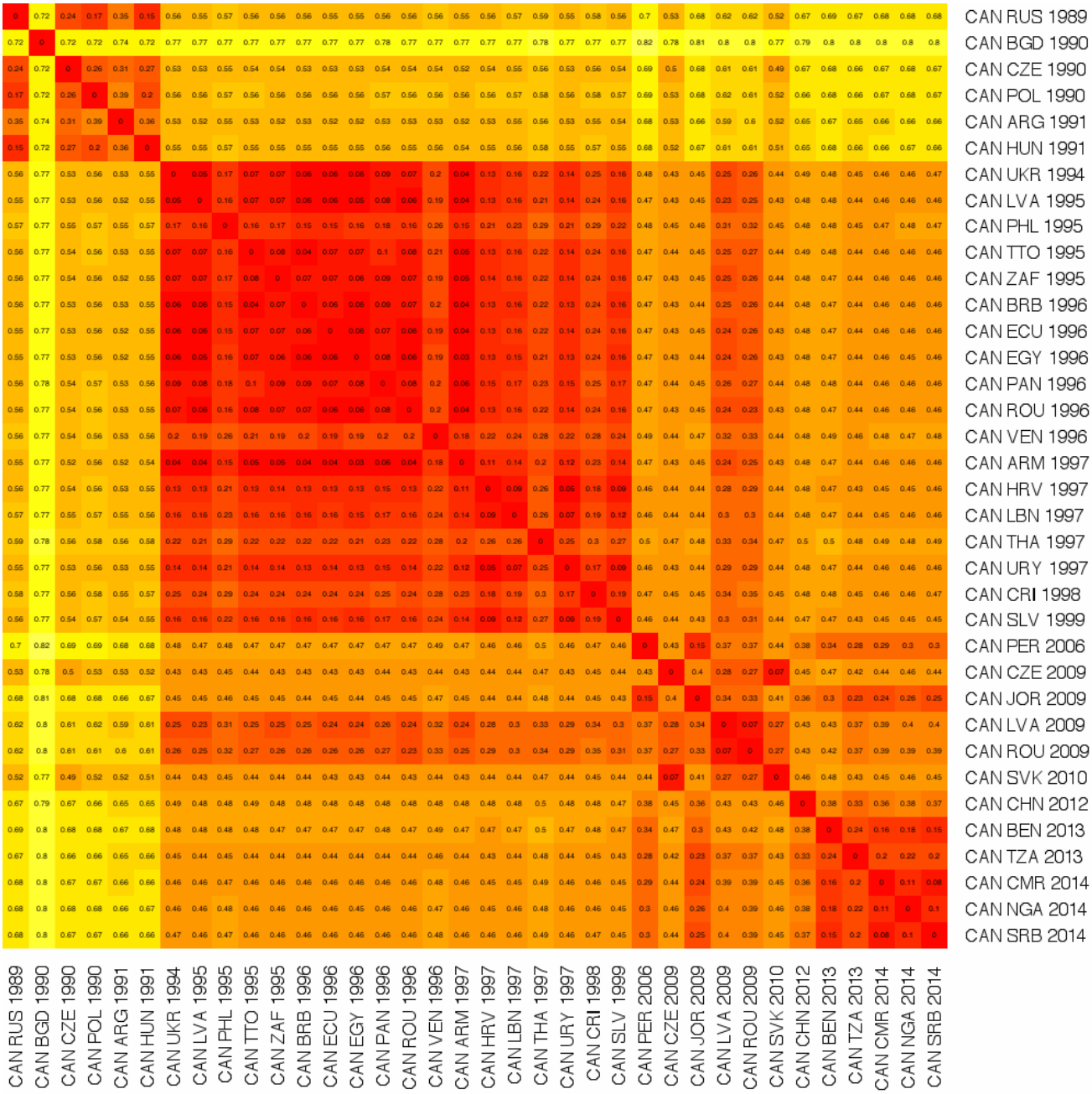
China The Chinese investment treaty program was marked by three stages (Congyan (2009), Berger (2013)). First, between 1982 and 1998, Chinese BITs were driven by capital importing interests and reflected a conservative design that privileged host state rights over investor interests. The second stage after 1998 was dominated by China's outward investment consideration and led to more protective BITs ((Berger, 2008, pp. 14-15), Schill (2007)). Finally, in the current third stage, China has turned towards a treaty design modeled on the recent U.S. treaty practice, which seeks to balance inward and outward investment interests (Congyan (2009, p. 486). This "Americanization", however, is only par-

Figure 2: Heat map of 5-gram distances between BITs where U.S.A. is a party



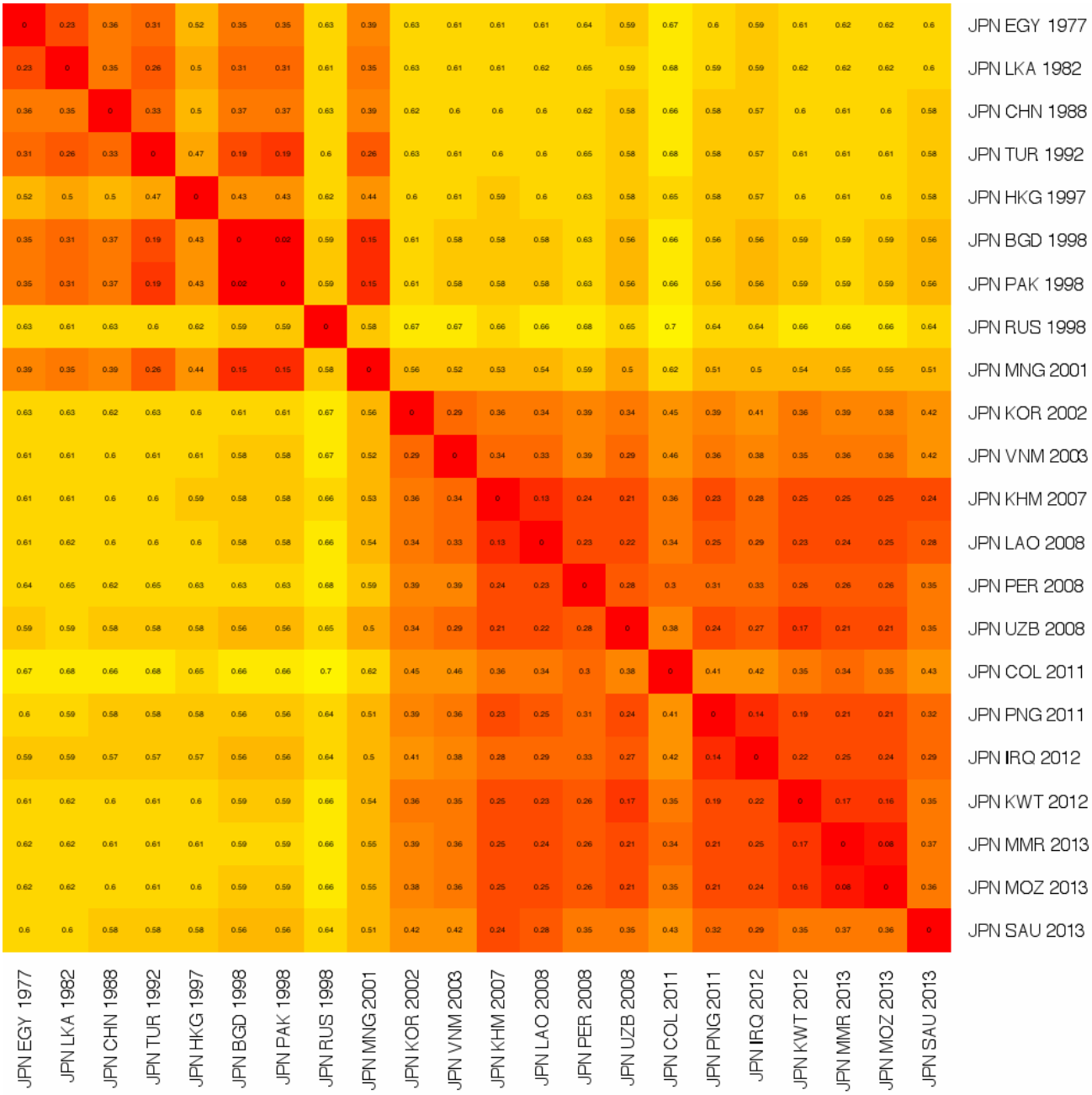
Note: this figure shows a heat map of pairwise similarities of all the bilateral investment treaties where U.S.A. was a signatory. Similarities are defined as Jaccard distances between treaty 5-grams and vary from 0 to 1 where zero means full overlap of 5-grams and 1 implies no overlap of 5-grams in two given texts. We color zeros with red and ones with yellow and employ gradient to show values in between. The actual similarity scores are reported in cells. Treaties are ordered by date of signature. Interactive version of this chart can be accessed at `http://maptreati.es/country?iso=USA`.

Figure 3: Heat map of 5-gram distances between BITs where Canada is a party



Note: this figure shows a heat map of pairwise similarities of all the bilateral investment treaties where Canada was a signatory. Similarities are defined as Jaccard distances between treaty 5-grams and vary from 0 to 1 where zero means full overlap of 5-grams and 1 implies no overlap of 5-grams in two given texts. We color zeros with red and ones with yellow and employ gradient to show values in between. The actual similarity scores are reported in cells. Treaties are ordered by date of signature. Interactive version of this chart can be accessed at `http://maptreati.es/country?iso=CAN`.

Figure 4: Heat map of 5-gram distances between BITs where Japan is a party



Note: this figure shows a heat map of pairwise similarities of all the bilateral investment treaties where Japan was a signatory. Similarities are defined as Jaccard distances between treaty 5-grams and vary from 0 to 1 where zero means full overlap of 5-grams and 1 implies no overlap of 5-grams in two given texts. We color zeros with red and ones with yellow and employ gradient to show values in between. The actual similarity scores are reported in cells. Treaties are ordered by date of signature. Interactive version of this chart can be accessed at `http://maptreati.es/country?iso=JPN`.

tial, as Chinese BITs do not include investment liberalization provisions normally found in American treaties (Berger, 2008)). Figure 5 displays Chinese BITs. Two red quadrangles are clearly visible marking the separation between first and second generation of Chinese treaties. In contrast, the third stage is marked by more variation in China's treaty network. As Berger (2013, p. 14) explains, "China is pursuing a flexible approach that adapts to the BIT models preferred by the relevant partner country." Its 2009 BIT with Switzerland is thus closer in design to Chinese 2nd generation BITs, while the Canada-China Treaty from 2012 closely follows the Canadian Model BIT.

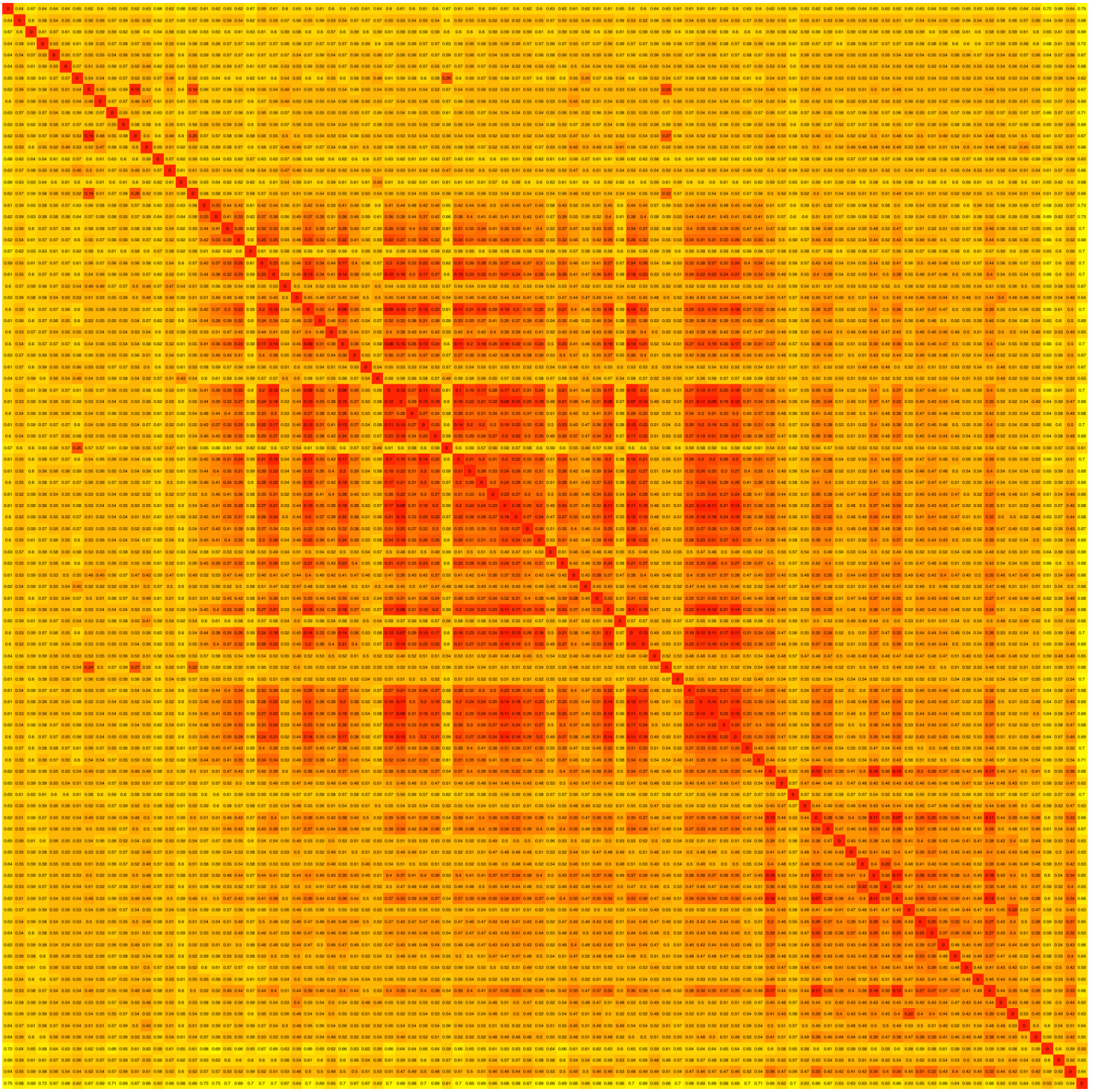
Cross-country perspectives on consistency and innovation

Similarity and dissimilarity measures can also shed light on policy diffusion and learning processes across countries. Three examples serve as illustration and point to new areas of research.

Early experimentation Investment treaty scholarship tends to conceive of the evolution of investment treaties as a somewhat linear process starting with the 1959 Germany–Pakistan BIT. What is often lost sight of is that for many of the early countries joining the BIT universe in the 1960s, their first agreements were subject to considerable experimentation and adaptation. It was often only in the 1980s, 1990s and 2000s that more consistent treaty pattern emerged. Figure 6 shows the early BITs practice of Germany, Switzerland, Belgium and the Netherlands. While the early part of their treaty programs experienced considerable variation, subsequent negotiations streamlined and stabilized those countries' BIT practice. This puts the linear development of BITs somewhat into question and calls for more research into the early days of their inception and proliferation.

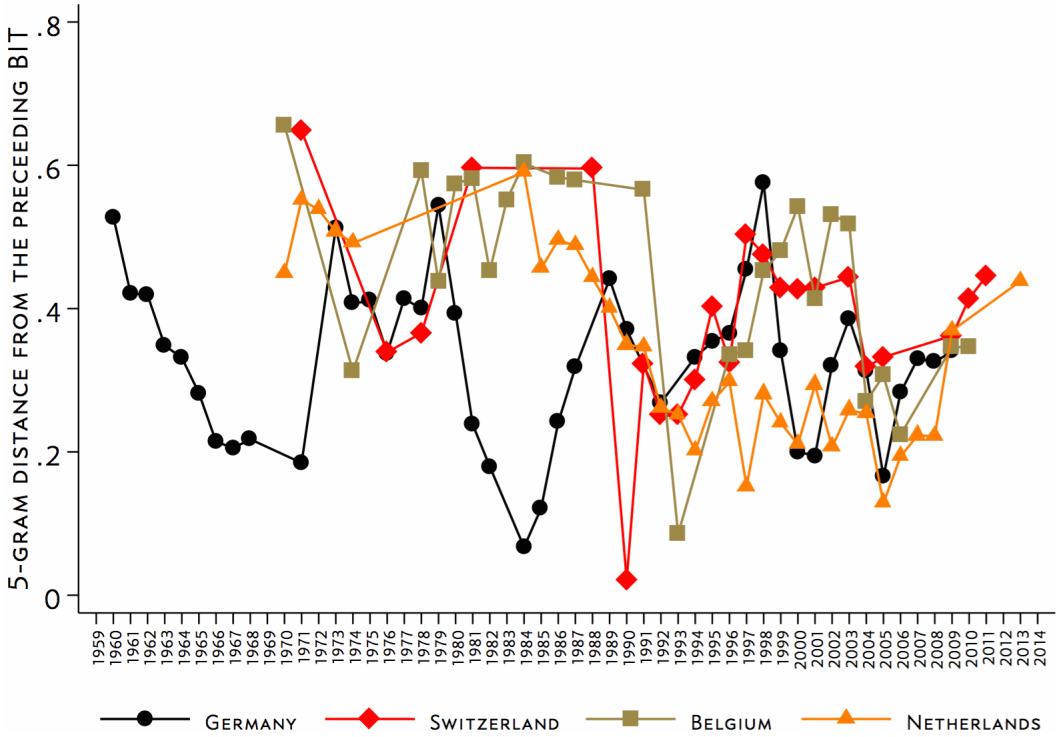
Joining of forces Following the end of the Cold War, Eastern European countries were keen to join the BIT-bandwagon. Western countries, in turn, encouraged this process considering BITs to be one of the instruments that would facilitate the transitions of these countries to market economies (Vandevelde, 1993, pp. 168-169). Our visualization suggests that some of the similarly situated Eastern European countries might have joined forces in developing a market-oriented investment treaty program. Starting in 1992, the BITs of neighboring Czech Republic, Hungary and Slovakia show remarkable similarities in treaty design expressed by the red-shaded overlaps of the respective treaty programs suggesting cooperation among these countries in the process of the BIT template elaboration.

Figure 5: Heat map of 5-gram distances between BITs where China is a party



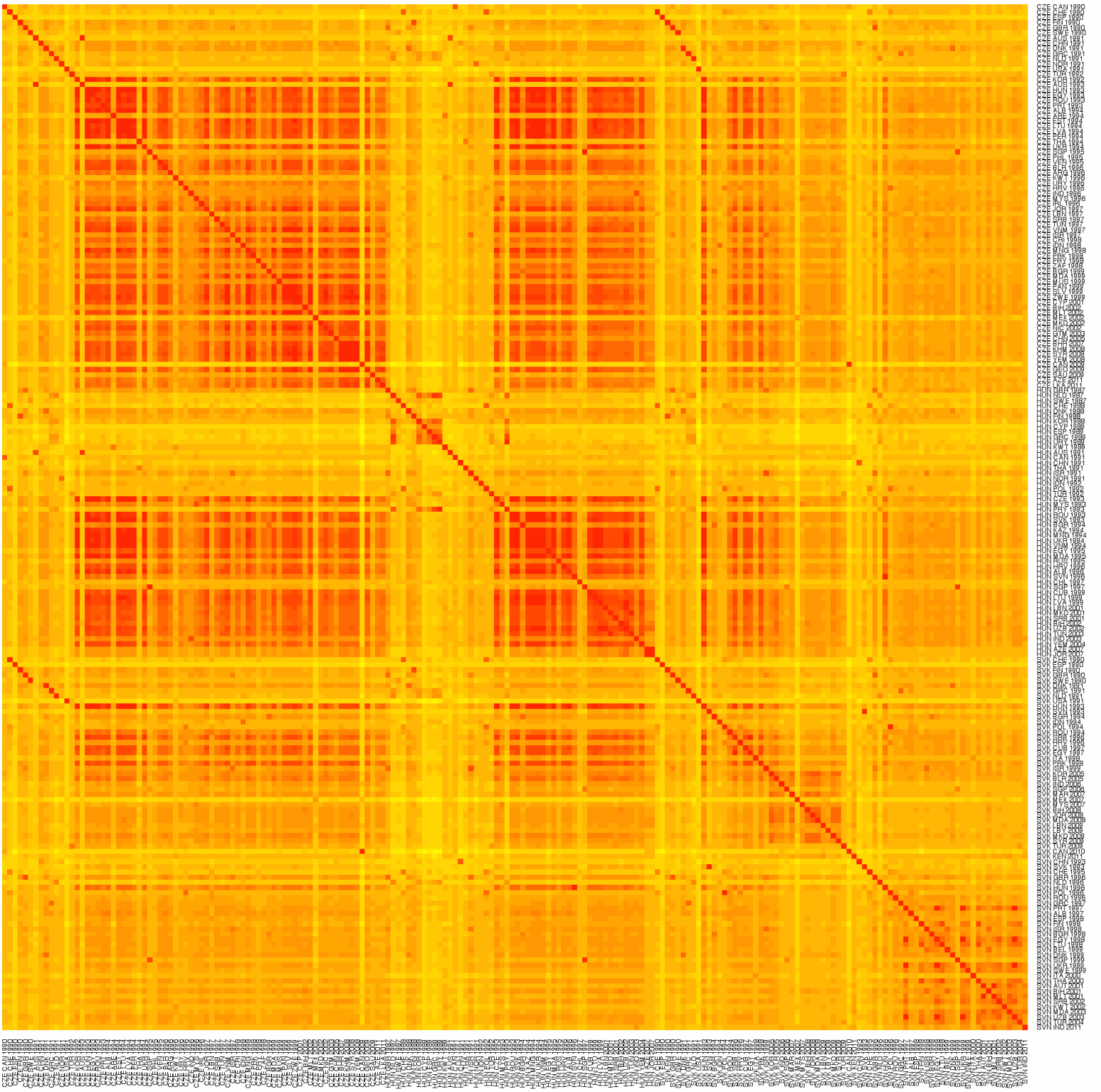
Note: this figure shows a heat map of pairwise similarities of all the bilateral investment treaties where China was a signatory. Similarities are defined as Jaccard distances between treaty 5-grams and vary from 0 to 1 where zero means full overlap of 5-grams and 1 implies no overlap of 5-grams in two given texts. We color zeros with red and ones with yellow and employ gradient to show values in between. The actual similarity scores are reported in cells. Treaties are ordered by date of signature. Interactive version of this chart can be accessed at `http://maptreati.es/country?iso=CHN`.

Figure 6: Legal innovation in treaty design for selected European countries



Note: this figure shows a temporal evolution of mean Jaccard distance of each country's treaties at a given year from the treaties she struck in the preceding year. If no treaties are struck in the preceding year, we obtain similarities with the closest available treaties in previous years and connect the dots with a direct line. Formal definition is given by equation (3).

Figure 7: Heat map of 5-gram distances between BITs where selected Eastern European countries are parties



Note: this figure shows a heat map of pairwise similarities of all the bilateral investment treaties where Czech Republic, Hungary, Slovakia and Slovenia were signatories. Similarities are defined as Jaccard distances between treaty 5-grams and vary from 0 to 1 where zero means full overlap of 5-grams and 1 implies no overlap of 5-grams in two given texts. We color zeros with red and ones with yellow and employ gradient to show values in between. The actual similarity scores are reported in cells. Treaties are ordered by country and date of signature.

Copy-cats Another reason for having similar BITs is not cooperation, but the adaptation of another country's BIT text. One example is Israel. According to Chalamish (2010, pp. 123, 138), Israel relied on "already negotiated or signed investment treaties worldwide" in order to elaborate its model agreement. Our analysis now allows us to be more concrete: Israel largely based its investment treaty program on the U.K.'s treaty practice.[17] The influence of the U.K.'s BIT template may be explained by its language and simplicity. When the U.K. joined the BIT universe in 1975, English became the lingua franca in BITs used even when none of the two negotiating partners were English-speaking. Furthermore, in contrast to the U.S., which began signing BITs in 1982, the U.K.'s treaties were considerably shorter and less complex, making them more intuitive for countries looking for an easy-to-use negotiation template.

4 Rule-takers and rule-makers

In this and the following section, we proceed to a more formal investigation of coherence and innovation in treaty-making. We begin by introducing a formal definition of legal coherence in treaty design. To fix ideas, consider a set $\mathcal{S}$ of treaty signatories. Each signatory $s \in \mathcal{S}$ concludes a subset of $\tau \in \mathcal{T}$ bilateral agreements. A one-to-many participation function $p : s \to \tau$ maps signatories to their concluded agreements. Then we define legal coherence of signatory s as

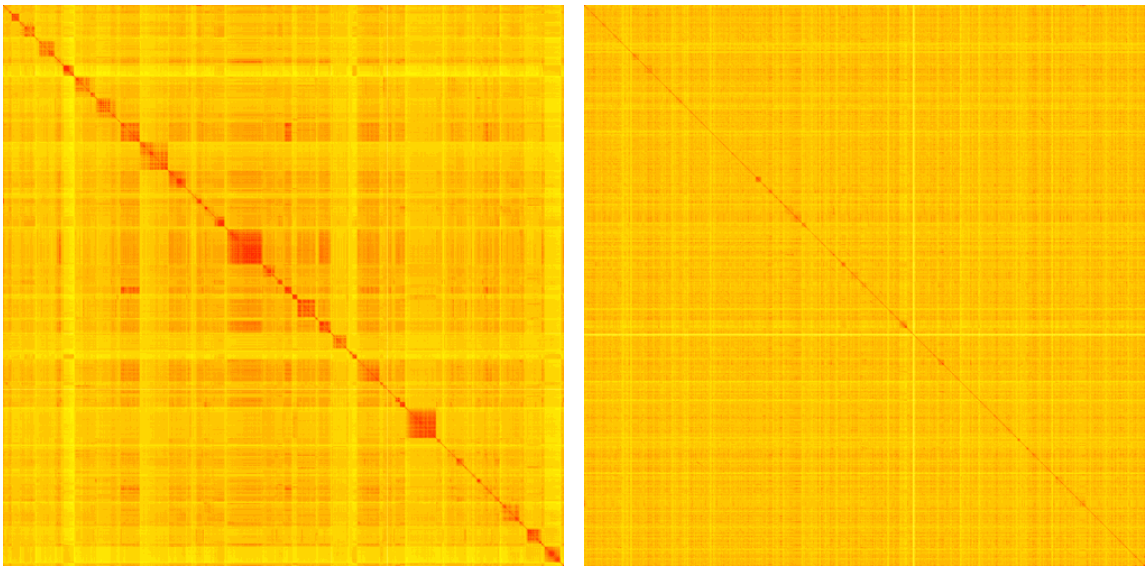
$$\text{coherence}(s) = \frac{1}{|p(s)|} \sum_{i,j \in \mathcal{T}} \mathbb{I}_{i \neq j} \left(\mathbb{I}_{i \in p(s)} J(i,j) + \mathbb{I}_{j \in p(s)} J(i,j) \right), \tag{2}$$

where $|p(s)|$ is cardinality of the participation function $p(s)$ that returns a set τ of agreements concluded by signatory s, $\mathbb{I}_{(\cdot)}$ is an indicator function equal to unity if its condition is satisfied and to nil otherwise, $J(i,j)$ is a 5-gram Jaccard distance between treaties i and j defined in (1). Intuitively, to compute coherence of country s treaty network, in (2) we are averaging distances of all the treaties in which s participates as first or second signatory, excluding zero self-distances on the main diagonal of Jaccard distance matrix (with $\mathbb{I}_{i \neq j}$ condition). The coherence score ranges in 0...1 and is interpreted like the raw Jaccard distances it is based on: values closer to zero indicate more coherent treaty networks.

Developing countries as rule-takers Our analysis supports the hypothesis that developed countries are indeed the rule-makers and developed-countries the rule-takers in the

[17] This is also what Chalamish (2010, p. 178) hints at: "the Israeli model follows the U.K. model's approach in protecting investors only in the post-establishment phase."

Figure 8: Heat map of 5-gram distances between BITs under different sorting schemes



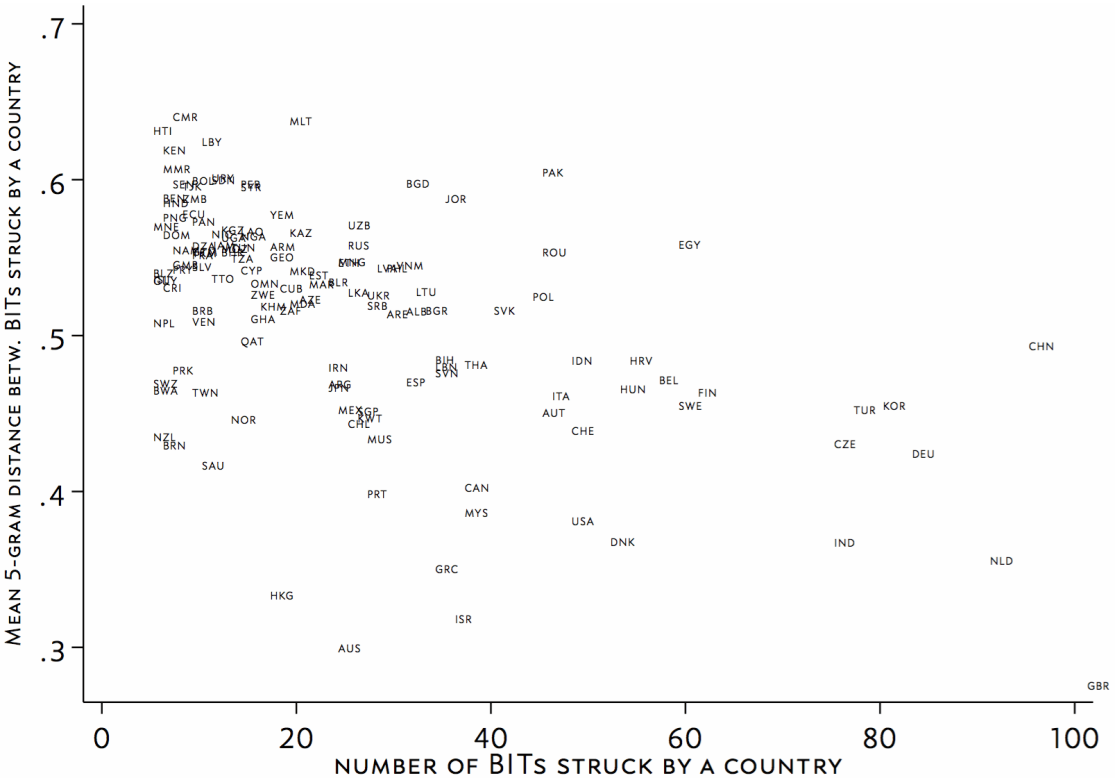
(a) sorted by more developed country in treaty pair (b) sorted by less developed country in treaty pair

Note: this figure shows two heat maps of pairwise similarities of 1623 bilateral investment treaties. Similarities are defined as Jaccard distances between treaty 5-grams and vary from 0 to 1 where zero means full overlap of 5-grams and 1 implies no overlap of 5-grams in two given texts. We color zeros with red and ones with yellow and employ gradient to show values in between. The only difference between subfigure (a) and (b) is treaty order. In subfigure (a) we sort treaties by the country with higher GDP per capita in the pair while in subfigure (b) we sort treaties by the country with lower GDP per capita in the pair. Within countries, treaties are ordered by date of signature. Interactive version of (a) can be accessed at `http://maptreati.es/?l=byparty1&v=1`; (b) at `http://maptreati.es/?l=byparty2&v=1`.

system. Figure 8 compares two heat maps of the BIT universe. On the left, treaties are ordered based on the wealthier contracting party, while on the right they are ordered based on the poorer contracting party. Darker shades represent high levels of similarity whereas lighter shades represent higher levels of diversity. On the left image, we see that dark quadrangles form along the diagonal line, while they are virtually absent on the right image. These quadrangles represent similarities in national BIT programs. While wealthier contracting parties have more coherent treaties, i.e. similar agreements within their BIT networks, the BIT networks of poorer developing countries are more diverse. This shows that developed countries are more successful in using their model BIT in negotiations making them the rule-maker while developing countries are the rule-taker.

Variation within country groupings At the same time, there is some variation of BIT network coherence within the group of developed and developing countries. Figure 9 plots

Figure 9: Scatter plot of internal coherence of country treaty network and its size



Note: this figure shows a scatter plot of mean Jaccard distance of each country's treaties with other treaties in which this country is a party. Graphically, we compute mean treaty similarity within quadrangles off the main diagonal of Figure 1. Countries with less than 4 treaty full texts available were excluded from the computation. Formal definition of the y-axis variable is given by equation (2).

the coherence scores of each country defined in (2) against the number of treaties signed. Leaving aside countries with very small treaty networks like San Marino, the figure shows that Great Britain champions in terms of BIT consistency in spite of its sizable treaty network. The Dutch and German networks, although similar in size, are less coherent, suggesting that there is some variation within the sub-group of developed countries. The same may be said for developing countries. The BIT networks of Hong Kong, Malaysia and India are more coherent than the German BIT network. In contrast, the majority of developing countries are parties to relatively few and incoherent treaties.

To supplement graphical evidence, we also regress country coherence scores on their World Bank 2014 country groups and treaty network size. The results are reported in Table 1. They strongly suggest that treaty network coherence is increasing in level of economic development: low income countries have treaty networks that are 20% less coherent than high-income OECD member countries.

Table 1: Coherence of BIT treaty network and economic development

Dependent variable:	(1) Country BIT coherence score	(2)
High income OECD country	Reference category	
High income non-OECD country	0.0721***	0.0455**
	(0.0212)	(0.0219)
Upper middle income country	0.0857***	0.0630***
	(0.0155)	(0.0160)
Lower middle income country	0.117***	0.0902***
	(0.0155)	(0.0171)
Low income country	0.127***	0.0911***
	(0.0172)	(0.0196)
# treaties signed by country		-0.00114***
		(0.000302)
Intercept	0.436***	0.484***
	(0.0131)	(0.0184)
Countries	133	133
R^2	0.387	0.469

Huber-Eicker-White standard errors in parentheses
Stars show significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note: this table reports coefficients after regressing country-level coherence scores as defined in equation (2) on World Bank country group of those countries. Reference category is High Income OECD country. An additional control variable is treaty network size (# of treaties with full texts per country). Countries with less than 4 treaty full texts available were excluded from the computation. In Appendix Table A.3 we report the results when we set up a higher treaty text availability threshold to exclude countries from the regression.

Evaluation What do these findings mean in legal policy terms? First, the fact that developing countries are predominantly rule-takers should be a source of concern. As suggested above, countries with inconsistent treaty networks will find it more difficult to comply with varying treaty standards, making inadvertent breaches more likely and increasing their exposure to investment claims. Moreover, by being on the receiving end in the law-making process, developing countries have less of a say in shaping the substance and innovation of investment rule. This does not bode well for investment law's legitimacy.

Second, does the skewed law-making process suggest a bias of investment law in favor of developed states? Possibly yes, but not necessarily so. Manger and Peinhardt (2013, p. 19) find that developed countries push towards treaties characterized by greater legal precision and suggest that "[International Investment Arbitration] may be increasingly biased in favor of capital exporting states." At this point, our analysis is agnostic as to the content of investment treaties. But even if we accept their finding of a move towards legal precision to be true, this does not necessarily lead to a greater bias in favor of wealthy states. In fact, the contrary may be the case. Traditionally, investment law has been shaped by a paradigm of asymmetric investment flows between (developed) source countries of investment and (developing) recipient countries. In that world, being a rule-taker meant to feel the full force of this asymmetry. As one former U.S. negotiator notes: "[t]he regulatory burdens of [early U.S. BITs] fell almost entirely on our (LDC) BIT partners." (Alvarez, 2010, p. 3). Today, however, investment flows tend to be increasingly bi-directional. As developed countries like the U.S. conceive themselves as both sources and destinations for foreign investment — and, as such, potential targets for investor-state arbitration claims — they aim at striking a balance in their treaties between protecting investment abroad and safeguarding policy space at home (Alschner, 2013). This move towards more moderate and less asymmetrical agreements ultimately also benefits developing countries, who, as rule-takers, can free-ride on innovation which tends to strengthen the host state's defensive interests. In conclusion, being a rule-taker may not bring about the same disadvantages and biases that it produced in the earlier days of the BIT proliferation.

5 Legal innovation and investment claims

Turning now to our final question whether investment claims drive legal innovation in the BIT universe, we proceed along three steps. First, we define the notion of legal innovation in formal terms. Second, we trace legal innovation over the past four decades to evaluate whether we see a spike in legal innovation that coincides with the emergence and proliferation of investment claims beginning in the late 1990s and early 2000s. Finally, we econo-

metrically test whether investment claims cause legal innovation and evaluate our findings.

Table 2: BITs struck by country group before and after the advent of investment claims

Country group	# countries in group	*of which* # countries ever hit by investment claims	*of which* # countries that stopped signing treaties after first claim			
			in the year of the claim	1 year later	2 years later	3 years later
High income: OECD	30	10	0	0	0	1
High income: non-OECD	23	8	1	2	1	0
Upper middle income	49	25	3	5	4	6
Lower middle income	44	19	2	6	3	5
Low income	32	7	0	0	1	2
Total	178	69	6	13	9	14

Note: this table is created by combining two data sources: (a) the UNCTAD's data on the universe of signed (including terminated) BITs from a designated website (`http://investmentpolicyhub.unctad.org`); (b) UNCTAD's *Database of Investor-State Dispute Settlement* that lists cases against states brought to international investment tribunals by foreign investors in 1987–2012. For each case it provides the name of the claimant, the respondent state, the year this case was filed to a tribunal, the arbitration rules and the outcome of the proceedings. We count the number of cases per respondent-year and merge them with the data on BITs signed. The figures are aggregated by World Bank country group level.

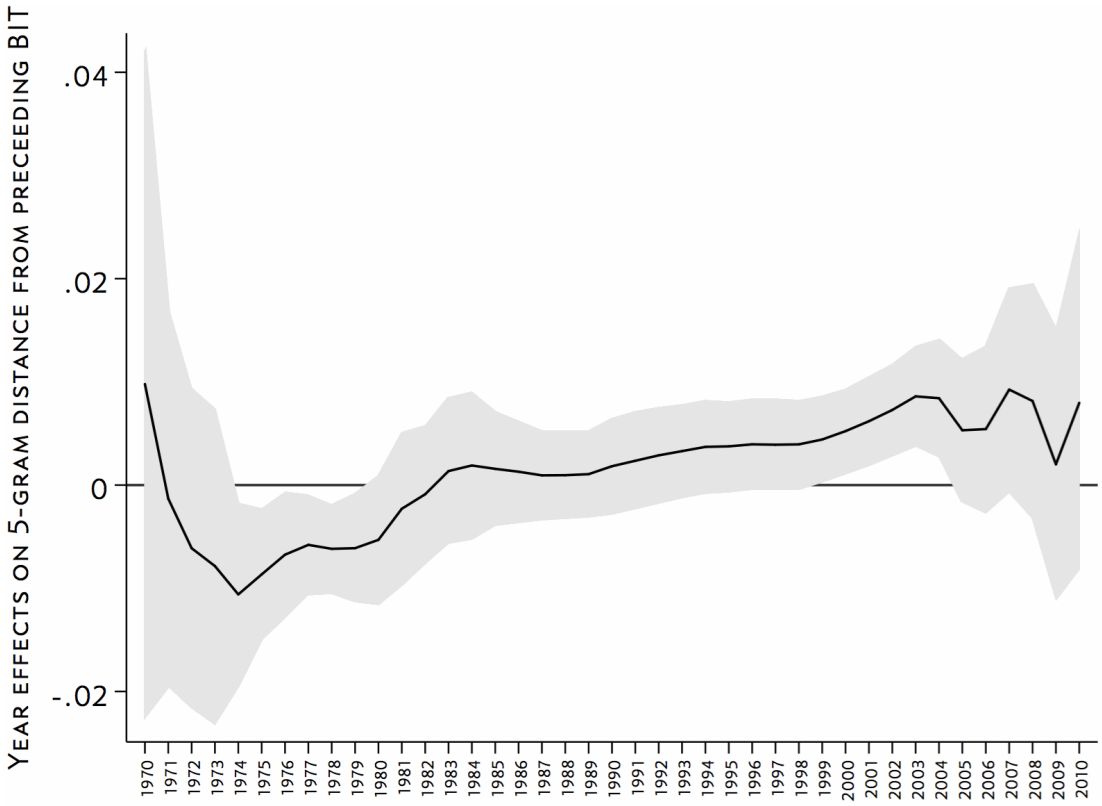
To derive a formal definition of legal innovation, consider, as in Section 4, a set $\mathcal{S}$ of treaty signatories, with each signatory $s \in \mathcal{S}$ striking a subset of $\tau \in \mathcal{T}$ bilateral agreements. One-to-many participation function $p : s \to \tau$ maps signatories to their concluded agreements. In addition, every treaty $t \in \mathcal{T}$ has year of signature $y \in \mathcal{Y}$. Many-to-one timing function $l : t \to y$ maps a treaty to its year of signature. Its inverse $l^{-1}(y)$ will return all treaties struck at a given year y. Then, legal innovation of signatory s at year y is defined as

$$\text{innovation}(s, y) = \frac{1}{\left|l^{-1}(y-1) \cap p(s)\right|} \sum_{i,j \in \mathcal{T}} \mathbb{I}_{i \neq j} \left(\begin{array}{c} \mathbb{I}_{i \in p(s)} \mathbb{I}_{l(i)=y} \mathbb{I}_{l(j)=y-1} J(i,j) + \\ + \mathbb{I}_{j \in p(s)} \mathbb{I}_{l(j)=y} \mathbb{I}_{l(i)=y-1} J(i,j) \end{array} \right), \tag{3}$$

where all terms are defined above or in (2). In words, (3) computes for each signatory s average Jaccard distance between the treaties she struck in the year y and the preceding year $y-1$, iterating over all treaties and selecting only the ones that satisfy this condition set by indicator functions. One can see that innovation(s, y) is a rolling-window version of coherence(s). If innovation$(U.S.A., 2005)$ is large, it means that U.S.A.–Uruguay (2005) BIT (created under new U.S. Model BIT (2004)) represents a drastic change from American treaty practice in previous years.[18] We compute legal innovation for all signatories and

[18] In practice, no treaties were concluded by the U.S. in 2004. First treaty before U.S.A.–Uruguay (2005)

Figure 10: Structural breaks in BIT design



Note: this figure shows δs from a set of panel regressions $\text{innovation}_{i,j} = \alpha_i + \beta j + \gamma \mathbb{I}_{j \geq T} + \delta j \times \mathbb{I}_{j \geq T} + \varepsilon_{i,j}$ where $i = 1, \ldots, N$ is country index; $j = 1959, \ldots, 2014$ is year; $\text{innovation}_{i,j}$ gives for country i the average Jaccard distance between the treaties she struck in the year j and the preceding year $j-1$, as per equation (3); α_i is the country-specific intercept; T is the hypothesized year when treaty design undergoes structural break in all countries; $\mathbb{I}_{j \geq T}$ is an indicator variable equal to unity in the year of the hypothesized break point T and thereafter. We estimate 42 regressions for each $T = 1970, \ldots, 2010$ and report the δs (solid line) and their 95% confidence intervals (shaded area). Intuitively, we perform a Chow test controlling for unobserved heterogeneity between countries.

years, creating an unbalanced country×year panel.

Tracing legal innovation

In order to get a better sense of when countries engage in legal innovation, we use a simple structural break test.

The results from this test displayed in Figure 10 suggest that countries have been engaged in progressively increasing legal innovation since at least the 1980s. With respect to our research focus here — the impact of investment claims — the figure shows a steeper upward

was U.S.A.–El Salvador (1999). In this case $\text{innovation}(U.S.A., 2005)$ will return average distance between U.S.A.–Uruguay (2005) and all the treaties the U.S. struck in 1999.

trend in legal innovation whose beginning coincides with the emergence of investment arbitration in the late 1990s and early 2000s, which could indicate that investment claims cause legal innovation. At the same time, the absence of sharp spikes should lower expectations as to the magnitude of investment claims' impact on treaty design. Rather than sudden and dramatic, legal evolution in the BIT universe seems to have progressed steadily and moderately.

Another explanation for the absence of a spike in legal innovation following the rise of investment arbitration may be that countries simply stop signing treaties after being hit by an investment claim. The findings of Poulsen and Aisbett (2013) indeed show a slow-down in the propensity of developing countries to conclude new BITs after being hit by a claim. Yet, as Table 2 shows, out of 69 countries ever hit by an investment claim in 1987-2012, only 19 countries stopped signing treaties altogether in the year of the claim or one year later. Therefore, 72% of countries continue to negotiate new BITs after being hit by a claim. Hence, countries do not stop signing new treaties altogether, although they tend to become more careful when considering entering into new BITs after being hit by a claim.

Do investment claims lead to legal innovation?

We now turn to formally testing whether investment claims cause legal innovation. To this end, we augment our legal innovation panel with timings of investment claims. UNCTAD provides the *Database of Investor-State Dispute Settlement*[19] that lists cases against states brought to international investment tribunals by foreign investors in 1987–2012. For each case it provides the name of the claimant, the respondent state, the year this case was filed to a tribunal, the arbitration rules and the outcome of the proceedings. We count the number of cases per respondent-year and merge them with our legal innovation panel. We also produce cumulative counts of investment claims to which country has responded in tribunals by a given year. In this setting, testing the hypothesis that Investor-State arbitration causes legal innovation in BIT treaty design would entail regressing our innovation score on a dummy variable equal to unity in a year when country was first hit by an investment claim and thereafter.[20]

Table 3 reports the results of this exercise. In column 1 we run this simple regression and find that being hit with an investment claim is negatively associated with legal innovation. In columns 2–3 we experiment with other indicators of legal innovation, i.e. being hit by

[19] `http://unctad.org/en/Pages/DIAE/ISDS.aspx`

[20] The modelling decision to equate the dummy to unity not only in the year of the first claim but in all the subsequent years means that we are testing for a *permanent* change in treaty-making after the advent of investment claims. In Appendix Table A.4 we report estimation results when we test for the presence of *transitory* changes in treaty-making following investment claims by equating the dummy to one only in the year of the first claim. Our results do not qualitatively change with a transitory change assumption.

investment claim in previous year, or total number of investment claims the country had. Regardless of the indicator used, the results still suggest a negative association. These results also hold once we account for additional factors that may cloud the relationship between claims and treaty innovation. First, it may take time for political processes to digest the impact of investment claims producing a lag of several years before the conclusion of old-style treaties is halted and new-style treaties are adopted. Taking account of such a lag does not alter our findings.[21] Second, countries may not react to the investment claims but to the outcomes of these claims. In that vein, we test whether the award rendered and its outcome, i.e. whether the investor or the host state wins the case, drives treaty innovation. We find that our results are robust to this check.[22]

Unobserved country-level heterogeneity in treaty-making can be one driving force behind this result. If developed countries are less prone to being hit by investment claims (for example, due to better protection of property rights) this correlation can contaminate our result. For this reason in columns 4–5 we add country-level fixed effect to rule out this source of heterogeneity. As it turns out, it is not the case: the strength of the negative association between legal innovation and investment claims barely changes when we add fixed effects, suggesting that time-invariant differences in country characteristics do not contribute to it.

While the direction and statistical significance of this association may seem puzzling when taken at face value, we argue that it is incorrect to interpret it directly. Our models in columns 1–5 suffer from severe endogeneity problem. While we can tame time-invariant unobserved heterogeneity in country treaty-making practices, the same is not possible for time-varying heterogeneity. If both legal innovation and being hit by an investment claim are correlated with a third unknown variable, our inference is wrong. The direction of causality is also hard to establish in this setting: it may well be the case that countries who maintain conservative treaty networks are less likely to be hit by an investment claim for the very reason that their networks are conservative or that a country is more likely to be hit by a claim because it engaged in previous innovation. One possible source of omitted variable bias may be the publicity and knowledge about investment treaty and arbitration. For a long time, investment treaties were a niche field in international law and passed below the radar of the majority of both investors and policy-makers. The increased awareness about BITs among both groups would then lead to more claims by investors and heightened scrutiny of the terms of BITs by policy-makers.

[21] In Appendix Table A.5 we report estimation results with richer lag structures and show that longer lags do not alter our findings.

[22] In Appendix Table A.6 we report estimation results when we consider only the claims where the respondent state lost the case.

Aware of endogeneity concerns, we propose a novel instrumental variable approach to the problem. We argue that the event of expropriation may be an instrument of subsequent investment claim to the responding country. Events of expropriation are strongly correlated with investment claims as they form one of the reasons why such claims are submitted to the tribunals. This results in the *strength* of the proposed instrumental variable. It is also legally justifiable to assume that expropriations have no direct effect on future treaty making of the states: states cannot escape claims for compensation for expropriation by changing a treaty *ex post*. Moreover, irrespective of a treaty, the host state must pay compensation under customary international as well as under most domestic legal orders. Expropriations will thus only affect treaty design indirectly when an investment claim is brought by the deprived investor, which draws attention to the additional liability and direct cause of action under these treaties. This makes expropriation a *valid* instrumental variable.

Hajzler (2012) collected data on the events of expropriation involving foreign investors in 1989–2006. We use his data to construct the proposed instrumental variable that is equal to unity in years following an event of expropriation in the country.[23] Then we merge this data with legal innovation panel and investment claims data. In columns 7–8 we show the results of two stage least squares estimation where the event of investment claim is instrumented by expropriation. In column 9 we use an alternative indicator of being exposed to investment claims: the total number of investment claims the country had responded to by a given year. Reduced-form evidence suggests that expropriation is indeed strongly associated with investment claims, rendering a strong instrument. However, second-stage evidence reveals no statistically significant causal effect of investment claims on legal innovation.

[23] As Hajzler (2012) reports, providing a crisp coding of expropriation is a delicate venture. He offers 3 categories of expropriations: (i) involving divestment of FDI, (ii) "enacted on constitutional or legal grounds that appear to be legitimate, but which are nevertheless contested by the foreign direct investor," (iii) "involving assets that possibly include foreign equity but do not constitute FDI." Our main estimates are based on the expropriation events of categories (i) and (ii). In Appendix Table A.7 we report estimation results by each category. We find that category (ii) appears as the strongest predictor of the subsequent claim being filed by the affected investor.

Table 3: Legal innovation and investment claims

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEPENDENT VARIABLE:	Country c BIT network legal innovation at year y								
PERIOD:	1987–2012					1989–2006			
hit by investment claim$_{c,y}$	-0.015				-0.035**	-0.042**	-0.090		
	(0.010)				(0.014)	(0.016)	(0.077)		
hit by investment claim$_{c,y-1}$		-0.023**						-0.109	
		(0.011)						(0.099)	
total # investment claims$_{c,y}$			-0.005***	-0.004**					-0.026
			(0.002)	(0.002)					(0.023)
							FIRST STAGE		
DEPENDENT VARIABLE:							hit by claim$_{c,y}$	hit by claim$_{c,y-1}$	# claims$_{c,y}$
had expropriation$_{c,y}$							0.270***		
							(0.065)		
had expropriation$_{c,y-1}$								0.225***	0.934***
								(0.067)	(0.297)
Country-years	1,432	1,432	1,432	1,432	1,432	1,190	1,180	1,180	1,180
Countries	148	148	148	148	148	140	130	130	130
Country FE	no	no	no	yes	yes	yes	yes	yes	yes
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	2SLS	2SLS
First-stage F-stat							17.27***	11.15***	9.92***

Huber-Eicker-White standard errors in parentheses
Stars show significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note: this table reports coefficients after regressing country c legal innovation at year y on the event of investment claims filed against this country in corresponding year. Dependent variable is formally defined in equation (3). Countries with less than 4 treaty full texts available were excluded from the computation. Intercepts and year trend are included in the regression but not reported. In columns 1–5 we merge legal innovation data with UNCTAD *Database of Investor-State Dispute Settlement* that documents investment claims against countries in 1987-2012. Regressor $hit\ by\ investment\ claim_{c,y}$ is equal to unity if country c becomes a respondent to its first investment claim at year y and thereafter. Regressor $total\ number\ of\ investment\ claims_{c,y}$ is a cumulative count of investment claims country c had responded to by year y. Columns 4–8 tame unobserved heterogeneity in legal innovation between countries by adding country fixed effects. Columns 6–9 augment UNCTAD data with Hajzler (2012) data on expropriations spanning 1989–2006. Columns 1–6 are estimated with ordinary least squares while columns 7–9 report the results of 2SLS estimation where the event of first investment claim of country c at year y, or $y-1$, or the total number of investment claims the country has responded to by year y is instrumented by the event of expropriation of foreign investment by this country c at year y or $y-1$. First-stage results of this instrumentation are reported in the corresponding panel. "First stage F-stat" is F-statistic for the joint significance of the excluded instruments. Its significance is marked by stars: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Evaluation These results on the relationship between investment claims and treaty innovation suggest that states do not innovate in response to the first claim filed against them. Hence, states do not revise their treaties out of bounded rationality when hit by a claim. Our findings thereby stand in contrast to the earlier study by Manger and Peinhardt (2013) who find that states sign more precise treaties once they are hit by a claim. These differences

in findings may partly be explained by different modelling and identification strategies employed: unlike Manger and Peinhardt (2013), we focus on legal innovation generally, rather than precision, and are examining causal relationships with the aid of an instrumental variable approach.

Our finding does not, however, conclusively rule out the possibility that investment claims impact investment treaty making through a different route. First, as Poulsen and Aisbett (2013) argue, some developing countries may simply stop signing new treaties in response to investment claims rather than innovating their treaty network. As Table 2 suggests, however, this argument is only credible for about one fourth of the countries that were hit by a claim. Second, states may learn from other countries' experience with investment arbitration rather than from claims against themselves. We have not formally tested this alternative Bayesian learner hypothesis. Third, states may react to case law rather than claims filed. Mexico, Canada and the U.S., for instance, being dissatisfied with several arbitral tribunals' reading of NAFTA's minimum standard of treatment provision, issued an authoritative interpretation of the clause through NAFTA's Free Trade Commission in 2002 and clarified the standard in their subsequent treaties accordingly. We have not formally tested whether and to what extent states engage in legal innovation by adjusting their BITs to correct perceived misinterpretations in prior case law.

At the same time, our findings do suggest that even if states are Bayesian learners or adjust their treaties in response to case law, the impact of investment arbitration is unlikely to have revolutionized investment treaties. As Figure 10 showed, the changes of treaty design in the era of investment arbitration form part of a larger trend of increased legal innovation that states have been engaged in over the past thirty-five years. As a result, rather than focusing on the impact of investment arbitration in isolation further empirical work could investigate other, yet unexplored factors driving legal innovation in the BIT universe.

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Appendix 1. Full text coverage of the data set

Table A.1: Number of BITs signed by countries and their full text availability

	(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)
DEU	155	82	HUN	60	52	THA	40	36	PRY	25	6	NAM	14	6	NZL	4	4
CHN	144	94	PRT	60	26	ISR	40	35	SAU	24	9	KEN	14	5	ERI	4	3
CHE	130	47	CUB	60	17	SVN	40	33	PAN	24	8	BRA	14	3	SLE	4	2
EGY	112	58	TUN	59	12	MKD	40	18	SLV	24	8	TCD	14	0	YUG	4	2
FRA	109	8	DNK	58	51	ARM	40	16	PRK	24	6	TTO	13	10	LBR	4	1
GBR	107	100	ARG	58	22	PHL	38	28	AUS	23	23	HND	12	5	CAF	4	0
NLD	107	90	JOR	56	34	LBY	38	9	BOL	23	8	CIV	12	2	SYC	4	0
ITA	105	45	LTU	55	31	OMN	37	14	TWN	23	8	ZMB	11	7	TGO	4	0
BEL	104	56	CHL	53	24	TJK	36	7	JPN	22	22	MDG	11	0	AFG	3	2
KOR	98	79	UZB	53	24	PER	33	13	CRI	22	5	BRB	10	8	LSO	3	1
TUR	98	76	LBN	52	33	URY	33	10	KHM	21	15	AGO	10	1	PSE	3	1
ROU	93	44	QAT	51	13	GEO	32	16	GTM	21	8	MMR	9	5	SUR	3	1
CZE	91	74	PAK	50	44	ZWE	32	14	GIN	21	2	BWA	9	4	TLS	3	1
ESP	89	30	SRB	50	26	ETH	31	23	TZA	20	12	ISL	9	4	ATG	2	2
IND	84	74	AZE	49	19	KGZ	31	11	NIC	20	10	SMR	9	2	DMA	2	2
FIN	82	60	ARE	48	28	SDN	31	10	MRT	20	1	CPV	9	1	GRD	2	2
KWT	80	25	KAZ	48	18	BGD	30	30	MNE	19	4	DJI	9	1	LCA	2	2
RUS	77	24	DZA	48	8	MEX	30	23	COD	19	2	GNQ	9	0	VCT	2	2
MAR	75	20	USA	47	47	BHR	30	11	NOR	18	12	BRN	8	5	MAC	2	1
UKR	74	26	LVA	46	27	VEN	30	8	MLI	18	1	GUY	8	4	SOM	2	1
IDN	71	47	SGP	46	25	LKA	29	24	HKG	17	16	RWA	8	3	VUT	2	1
MYS	71	36	ZAF	46	17	EST	29	20	JAM	17	10	BLZ	7	4	GNB	2	0
BGR	71	32	SYR	45	13	ECU	29	7	CMR	17	6	HTI	7	4	IRL	1	1
SWE	70	58	CAN	44	36	NGA	28	13	COL	17	2	BDI	7	2	TON	1	1
AUT	68	44	GRC	44	33	CYP	27	13	UGA	16	11	IRQ	7	1	BHS	1	0
POL	64	43	ALB	44	30	SEN	27	6	GMB	16	6	PNG	6	5	STP	1	0
IRN	64	22	MNG	43	23	MLT	26	18	BEN	16	5	NPL	6	4	MHL	0	1
VNM	62	29	BIH	41	33	GHA	26	14	GAB	16	1	SWZ	6	4			
SVK	61	39	MUS	41	26	LAO	25	13	DOM	15	5	MWI	6	1			
BLR	61	22	MDA	41	18	MOZ	25	11	COG	15	3	COM	6	0			
HRV	60	53	YEM	41	16	TKM	25	8	BFA	15	1	NER	5	0			

Note: columns (1) of this table report the number of treaties signed by each country as per `http://investmentpolicyhub.unctad.org` data. Columns (2) report the number of those treaties for which we obtained full texts from various sources. The figures doubly count each treaty: for instance, U.S.–Rwanda (2008) will appear both in USA figure and RWA figure. Table is sorted by descending number of treaties signed.

Appendix 2. Robustness checks and sensitivity analyses

Table A.2: Correlations between distance matrices **D** computed under different q

q	*4*	*5*	*6*	*7*
4	1			
5	0.989***	1		
6	0.973***	0.996***	1	
7	0.959***	0.989***	0.998***	1

Note: this table reports Pearson correlations between elements of q-gram Jaccard distance matrices of BIT texts computed under various q. Mantel (1967) tests are performed on each correlation coefficient. Stars show significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.3: Coherence of BIT treaty network and economic development: influence of country treaty network size

	(1)	(2)	(3)	(4)	(5)
DEPENDENT VARIABLE:	Country BIT coherence score				
High income OECD country	Reference category				
High income non-OECD country	0.0444*	0.0644***	0.0567*	0.0643***	0.0682***
	(0.0230)	(0.0240)	(0.0315)	(0.0229)	(0.0184)
Upper middle income country	0.0636***	0.0647***	0.0611***	0.0549***	0.0584**
	(0.0173)	(0.0176)	(0.0187)	(0.0192)	(0.0229)
Lower middle income country	0.0934***	0.0956***	0.0942***	0.0931***	0.0809*
	(0.0187)	(0.0199)	(0.0223)	(0.0241)	(0.0456)
Low income country	0.0895***	0.0933***	0.107***	0.130***	0.146***
	(0.0210)	(0.0215)	(0.0295)	(0.0277)	(0.0213)
# treaties signed by country	-0.00121***	-0.00105***	-0.000857*	-0.000797	-0.00111*
	(0.000326)	(0.000377)	(0.000450)	(0.000486)	(0.000603)
Intercept	0.486***	0.476***	0.468***	0.465***	0.486***
	(0.0207)	(0.0228)	(0.0268)	(0.0283)	(0.0367)
Remove countries that struck less than # treaties:	5	10	15	20	30
Countries	124	95	74	62	38
R^2	0.492	0.478	0.404	0.421	0.400

Huber-Eicker-White standard errors in parentheses

Stars show significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note: this table reports coefficients after regressing country-level coherence scores as defined in equation (2) on World Bank country group of those countries. The reference category is High Income OECD country. An additional control variable is treaty network size (# of treaties with full texts per country). In each column we exclude countries with less than the reported number of treaty full texts available from the computation.

Table A.4: Legal innovation and investment claims: influence of transitory break assumption

	(1)	(2)	(3)	(4)	(5)	(6)
DEPENDENT VARIABLE:	Country c BIT network legal innovation at year y					
PERIOD:	1987–2012			1989–2006		
hit by investment claim$_{c,y}$	-0.031		-0.044***	-0.041***	-0.187	
	(0.021)		(0.013)	(0.013)	(0.244)	
hit by investment claim$_{c,y-1}$		-0.014				1.123
		(0.020)				(6.448)
					FIRST STAGE	
DEPENDENT VARIABLE:					hit by claim$_{c,y}$	hit by claim$_{c,y-1}$
had expropriation$_{c,y}$					0.148	
					(0.119)	
had expropriation$_{c,y-1}$						0.018
						(0.098)
Country-years	1,432	1,432	1,432	1,190	1,180	1,180
Countries	148	148	148	140	130	130
Country FE	no	no	yes	yes	yes	yes
Estimator	OLS	OLS	OLS	OLS	2SLS	2SLS
First-stage F-stat					1.56	0.03

Huber-Eicker-White standard errors in parentheses
Stars show significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note: this table reports coefficients after 2SLS procedure of regressing country c legal innovation at year y on the event of investment claims filed against this country in corresponding year instrumented by the events of expropriation. The dependent variable is formally defined in equation (3). Regressor $hit\ by\ investment\ claim_{c,y-1}$ is equal to unity if country c becomes a respondent to its first investment claim **only** at year $y-1$ and **not** thereafter. This regressor is instrumented by the event of expropriation of foreign investment by this country c at year $y-1$ as per Hajzler (2012) data. Unobserved heterogeneity in legal innovation between countries is accounted for with country fixed effects. Intercepts and year trend are included in the regression but not reported.

Table A.5: Legal innovation and investment claims: influence of lag structures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DEPENDENT VARIABLE:	Country c BIT network legal innovation at year y						
PERIOD:	1987–2012				1989–2006		
hit by investment claim$_{c,y}$	-0.033**				-0.113	-0.215	-0.097
	(0.013)				(0.108)	(0.138)	(0.102)
hit by investment claim$_{c,y-1}$	-0.010	-0.025*					
	(0.011)	(0.015)					
hit by investment claim$_{c,y-2}$	0.004		-0.012				
	(0.019)		(0.016)				
hit by investment claim$_{c,y-3}$	0.012			-0.003			
	(0.019)			(0.015)			
					FIRST STAGE		
DEPENDENT VARIABLE:					hit by claim$_{c,y}$		
had expropriation$_{c,y-1}$					0.216***		
					(0.065)		
had expropriation$_{c,y-2}$						0.187***	
						(0.065)	
had expropriation$_{c,y-3}$							0.218***
							(0.070)
Country-years	1,432	1,432	1,432	1,432	1,180	1,180	1,180
Countries	148	148	148	148	130	130	130
Country FE	yes	yes	yes	yes	yes	yes	yes
Estimator	OLS	OLS	OLS	OLS	2SLS	2SLS	2SLS
First-stage F-stat					11.01***	8.36***	9.59**

Huber-Eicker-White standard errors in parentheses
Stars show significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note: this table reports coefficients after OLS and 2SLS procedures of regressing country c legal innovation at year y on the event of investment claims filed against this country in corresponding year instrumented by the events of expropriation. The dependent variable is formally defined in equation (3). Regressor $hit\ by\ investment\ claim_{c,y-j}$ is equal to unity if country c becomes a respondent to its first investment claim at year $y-j$ and thereafter. This regressor is instrumented by the event of expropriation of foreign investment by this country c at year $y-j$ or $y-j-1$ as per Hajzler (2012) data. Unobserved heterogeneity in legal innovation between countries is accounted for with country fixed effects. Intercepts and year trend are included in the regression but not reported.

Table A.6: Legal innovation and investment claims: influence of claims that were ruled against the respondent state

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DEPENDENT VARIABLE:	Country c BIT network legal innovation at year y								
PERIOD:	1987–2012					1989–2006			
hit by investment claim$_{c,y}$	-0.015				-0.020	-0.031	-0.253		
	(0.012)				(0.018)	(0.022)	(0.272)		
hit by investment claim$_{c,y-1}$		-0.019						-0.149	
		(0.013)						(0.151)	
total # investment claims$_{c,y}$			-0.014***	-0.024***					-0.098
			(0.005)	(0.006)					(0.103)
							FIRST STAGE		
DEPENDENT VARIABLE:							hit by claim$_{c,y}$	hit by claim$_{c,y-1}$	# claims$_{c,y}$
had expropriation$_{c,y}$							0.096*		
							(0.055)		
had expropriation$_{c,y-1}$								0.164***	0.249**
								(0.063)	(0.119)
Country-years	1,432	1,432	1,432	1,432	1,432	1,190	1,180	1,180	1,180
Countries	148	148	148	148	148	140	130	130	130
Country FE	no	no	no	yes	yes	yes	yes	yes	yes
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	2SLS	2SLS
First-stage F-stat							3.11*	6.71**	4.39**

Huber-Eicker-White standard errors in parentheses
Stars show significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Note: this table reports coefficients after regressing country c legal innovation at year y on the event of investment claims filed against this country in corresponding year. The dependent variable is formally defined in equation (3). Countries with less than 4 treaty full texts available were excluded from the computation. Intercepts and year trend are included in the regression but not reported. In columns 1–5 we merge legal innovation data with UNCTAD *Database of Investor-State Dispute Settlement* that documents investment claims against countries in 1987-2012. Regressor $hit\ by\ investment\ claim_{c,y}$ is equal to unity if country c becomes a respondent to its first investment claim at year y that was **not** ruled in her favor and thereafter. Regressor $total\ number\ of\ investment\ claims_{c,y}$ is a cumulative count of investment claims country c had responded to by year y and that were ruled **not** in her favor. Columns 4–8 tame unobserved heterogeneity in legal innovation between countries by adding country fixed effects. Columns 6–9 augment UNCTAD data with Hajzler (2012) data on expropriations spanning 1989–2006. Columns 1–6 are estimated with ordinary least squares while columns 7–9 report the results of 2SLS estimation where the event of first investment claim of country c at year y, or $y-1$, or the total number of investment claims the country has responded to by year y is instrumented by the event of expropriation of foreign investment by this country c at year y or $y-1$. First-stage results of this instrumentation are reported in the corresponding panel. "First stage F-stat" is F-statistic for the joint significance of the excluded instruments. Its significance is marked by stars: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A.7: Legal innovation and investment claims: influence of coding of expropriation events

	(1)	(2)	(3)	(4)
DEPENDENT VARIABLE:	Country c legal innovation at year y			
PERIOD:	1989–2006			
hit by investment claim$_{c,y}$	-0.122	0.120	0.418	-0.118
	(0.081)	(0.298)	(2.644)	(0.095)
	FIRST STAGE			
DEPENDENT VARIABLE:	hit by investment claim$_{c,y}$			
had expropriation$_{c,y}$	0.426***	0.075	-0.019	0.175***
	(0.088)	(0.090)	(0.092)	(0.056)
Expropriation type	Legal	FDI act	No FDI	All
Country-years	1,180	1,180	1,180	1,180
Countries	130	130	130	130
First-stage F-stat	23.28***	0.70	0.04	9.68**

Huber-Eicker-White standard errors in parentheses
Stars show significance: *** p<0.01, ** p<0.05, * p<0.1

Note: this table reports coefficients after 2SLS procedure of regressing country c legal innovation at year y on the event of investment claims filed against this country in corresponding year instrumented by the events of expropriation. The dependent variable is formally defined in equation (3). Regressor $hit\ by\ investment\ claim_{c,y}$ is equal to unity if country c becomes a respondent to its first investment claim at year y and thereafter. This regressor is instrumented by the event of expropriation of foreign investment by this country c at year y as per Hajzler (2012) data. In columns 1–3 we separately consider different types of expropriation defined in Hajzler (2012): (i) "Expropriations or breach of contract enacted on constitutional or legal grounds that appear to be legitimate, but which are nevertheless contested by the foreign direct investor.", (ii) "Expropriations involving divestment of Foreign Direct Investments (FDI)", (iii) "Expropriations involving assets that possibly include foreign equity but do not constitute FDI". In column 4 we merge all types of expropriation in one instrumental variable. Unobserved heterogeneity in legal innovation between countries is accounted for with country fixed effects. Intercepts and year trend are included in the regression but not reported.