A BIT IS BETTER THAN A LOT
Bilateral Investment Treaties and Preferential Trade Agreements

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I. Introduction

THE landscape of the global economy is increasingly dotted with institutions that regulate investment and trade. The number of bilateral investment treaties (BITs) and preferential trade agreements (PTAs) stand out in this regard, with nearly every country a member of at least one of these institutions, if not many. Yet, for all the scholarly attention paid to investment treaties and trade agreements, the relationship between BITs and PTAs remains little understood. We seek to fill in this important gap in the literature, focusing specifically on whether investment treaties with rich governments help poor ones conclude North-South trade agreements.[1]

Our argument is in two parts. First, we conjecture that a BIT between a developed country and a developing one increases the odds that they will subsequently sign a PTA. Second, we further conjecture that this pair of states is less likely to negotiate a PTA if the developing country has many investment treaties or trade agreements with other wealthy states. In other words, we predict a curvilinear relationship between BITs and North-South PTAs, in that having too many of these institutional memberships is likely to decrease the odds of signing another trade agreement. In this sense, a BIT is better than a lot.

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[1] Our argument is specific to BITs and North-South PTAs. As we elaborate below, BITs are signed by pairs of rich and poor states (there are almost no developed-developed country BITs, the main exception being Chapter 11 of NAFTA), and North-South trade agreements matter far more for developing country growth than South-South pacts.

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Why might this be so? Wealthy states want BITs as an institutional check against uncompensated expropriation. They also want PTAs because such institutions make it cheaper for their multinational corporations (MNCs) to get inputs to,[2] and exports from, a "host" country.[3] Since trade agreements are more politically costly to negotiate than investment treaties, given their deeper and reciprocal obligations, wealthy governments have an incentive to supply PTAs only where there are sizable electoral returns from doing so. This is most likely where trade agreements confer exporter rents—excess returns, or supernormal profits, that are insulated from competition by the pact's preferential terms[4]—on domestic multinationals. These exporter rents can be congested by foreign multinationals where a poor government has many investment or trade agreements with other developed countries. This is because greater competition has the effect of undermining this preferential market access.

Developing countries, too, have an incentive to couple BITs and North-South PTAs to attract foreign direct investment (FDI) and increase trade. Yet, for poor governments, investment treaties are not just instrumental in this regard. On the contrary, developing countries see BITs and PTAs with rich governments as serving key political objectives, including shoring up human rights and entrenching democracy—goals that encourage developing countries to sign many of these institutions.[5] The problem, though, is that having too many of these treaties reduces their odds of getting a PTA with a given developed country since, if others enjoy preferential treatment as well, exporter rents can become congested. We test these hypotheses using annual data on pairs of developing and developed countries between 1960 and 2004, and use propensity score matching to contend with possible concerns for endogeneity. The results strongly endorse our argument.

Two implications follow. First, to the extent that entering into a BIT makes it more likely that a pair of countries subsequently signs a North-South PTA, investment treaties can hardly be dismissed as cheap talk. Rather, BITs help set the groundwork for concluding trade agreements with deeper and reciprocal obligations, and in this sense may

[2] Free-trade zones also enable foreign affiliates to import inputs more cheaply, but do not substitute for BITs or PTAs. Unlike BITs, free-trade zones do not extend special legal safeguards on investments and unlike PTAs, they do nothing about protection in the multinational's home market.

[3] As we explain below, our argument builds on the logic of vertical (i.e., dividing production over different countries) as opposed to horizontal (i.e., selling in the target market) foreign direct investment (FDI). This, we insist, makes sense for both theoretical and empirical reasons.

[4] Grossman and Helpman 1995; Krishna 1998.

[5] Hafner-Burton 2005; Pevehouse 2005.

have a greater indirect, as opposed to a direct, effect on attracting FDI than has previously been appreciated. Given that the literature is currently stalemated on the question of whether BITs attract FDI, we submit that analyzing their relationship with PTAs may help clarify the causal mechanism by which these institutions are expected to entice foreign capital. Our theoretical argument suggests why this ought to be the case.

Second, having many investment treaties does not increase the likelihood that a poor government will subsequently get a trade agreement. The tipping point in our sample is five BITs, which, importantly, is roughly two fewer than the number ratified by the average developing country in our study. In fact, for a country like Bangladesh, which has an above-average number of BITs with developed countries, entering into another investment treaty with a rich government actually decreases its odds of forming a North-South PTA. Our findings thus caution against the view that poor governments should negotiate as many BITs or PTAs as possible to signal that they are "open for business" and committed to economic liberalization more generally. Indeed, because developing countries are likely to enjoy greater prosperity where investment and trade reforms coincide,[6] the challenge is to sign the right deals initially, since subsequent deals are less likely to be as appealing to rich governments intent on securing exporter rents for their multinationals.

This article proceeds as follows: Section II elaborates our argument. Section III discusses our research design. Section IV presents our results. And Section V concludes by discussing some of the more salient implications of our work.

II. Argument

In framing our argument, we need to answer three questions: First, what are BITs and PTAs supposed to do? Second, why do developed countries have an incentive to follow up on investment treaties with trade agreements only if developing countries do not already have too many BITs or PTAs with other developed ones? And third, why are developing countries prone to signing more investment treaties and trade agreements than their developed-country partners would prefer? The paper's main theoretical contribution is to explain the tension between the first and second questions—in other words, from a rich government's point of view, why do developing countries often have too many

[6] Egger and Larch 2008.

investment treaties and trade agreements? This logic underpins the curvilinear relationship that we posit between BITs and PTAs.

BITs and PTAs

Despite debuting to little fanfare in the late 1950s, bilateral investment treaties are all the rage today. They obligate a host country to abide by international rules on investment and are backed by third-party enforcement. Among their many provisions, BITs require that countries not expropriate foreign investment without prompt, adequate, and effective compensation; grant foreign investors treatment that is no less favorable than that given to others abroad or at home; and facilitate the entry and exit of a multinational's funds. Perhaps most centrally, BITs provide for dispute settlement before a third-party arbitral body, the aim being to ease foreign investors' concerns about having to make recourse to what they often perceive to be a developing country's underperforming—or underdeveloped—judiciary.

Fundamentally, the hope for BITs is that, if they boost investor confidence, they are likely to result in greater inflows of FDI. And yet, however compelling this logic, the empirical evidence is mixed. Indeed, while some scholars find that these investment treaties do attract footloose capital,[7] others disagree, insisting that additional factors—including the number of BITs signed by neighboring countries—are also at play.[8] This article speaks to this debate, suggesting that BITs are attractive to poor countries precisely because they set the stage for negotiating PTAs,[9] but that poor governments may find it hard to conclude trade agreements if they have already signed many investment treaties or PTAs with other developed countries.

For their part, governments appear convinced that BITs do, in fact, attract FDI. According to the United Nations Conference on Trade and Development (UNCTAD), the number of BITs rose from 385 in 1990 to 2,392 in 1999; by 2005, no fewer than 177 countries had signed at least one investment treaty, with most negotiating far more.[10] Just as telling, providers of political-risk insurance, including the governments of France and Germany, will not underwrite an investment unless a BIT is in place. Similarly, the Multilateral Investment Guarantee Agency encourages countries to adopt BITs to ensure that all investments are sufficiently safeguarded.[11] In fact, developed and developing countries

[7] Salacuse and Sullivan 2004; Neumayer and Spess 2005.
[8] Tobin and Rose-Ackerman 2005; Hallward-Driemeier 2003.
[9] Büthe and Milner 2008.
[10] UNCTAD 2006.
[11] UNCTAD 1998.

are so confident that these institutions deliver the intended results, they have converged on a set of standards within investment treaties[12] such that we can meaningfully talk about BITs without concern for any significant variation in their design.[13]

A great deal has been written on PTAs, but for our purposes the key issue is simply that they extend preferential terms to members versus nonmembers.[14] Indeed, special market access is the hallmark of these institutions. They go beyond the World Trade Organization's (WTO) most-favored-nation (MFN) requirement, which says that all members have the same access to each other's markets, and provide "super-MFN" access to their members—enabling them to conduct commerce on even better terms. Historically, this has been because PTA members have faced lower import barriers, such as tariffs, but more recently it is also because members agree to obligations that are not—or not as strongly—included in the WTO. For example, many PTAs extend terms on intellectual property and traded services that reach much deeper than the multilateral trade regime, obligations that are important to our argument. These terms are allowed under WTO rules, in that Article XXIV of the General Agreement on Tariffs and Trade (GATT) permits super-MFN concessions so long as the PTA covers substantially all trade rather than being sector-specific, and that the special market access afforded to members not result in increased protectionism against nonmembers, who must still be given MFN access. Thus, a multinational with special market access to a developing country could send inputs to, and export back home or to third markets, at less cost than its competitors—constituting what we call an exporter rent.

These exporter rents are crucial because, in contrast to BITs, which impose little political cost on developed countries (whose domestic legal systems are typically up to the task of handling investor disputes), PTAs involve deeper and reciprocal obligations and thus are likely to mobilize antitrade constituents. As a result, without the prospect of excess returns, domestic multinationals are unlikely to support trade agreements and reward governments for supplying them. In this sense, it is perhaps unsurprising that investment treaties have historically outnumbered trade agreements by about ten to one.

[12] Sacerdoti 1997.

[13] We do not mean to suggest that there is no variation in the design of BITs. Allee and Peinhardt (2008) and Yackee (2008) consider differences across dispute settlement procedures, for example. Our point is simply that, by virtue of most favored nation (MFN), and the fact that BITs uniformly provide for dispute settlement (Dolzer and Stevens 1995), these differences are not germane to our argument.

[14] Milner 1997; Bagwell and Staiger 2001.

Of course, none of this is to suggest that poor governments see the relationship between BITs and PTAs in precisely the same way that rich governments do. On the contrary, we contend that developing countries use investment treaties and trade agreements to accomplish broad political objectives as well as economic ones, and that this is why they are at risk of signing too many BITs and PTAs—as viewed from the perspective of developed countries. We establish in Section III the tipping points for investment treaties and trade agreements. It is also important to repeat that our focus is solely on how BITs make North-South PTAs more likely; by no means are we suggesting that our argument explains the relationship between investment treaties and either South-South or North-North trade agreements. That said, we contend that our more narrow focus nonetheless captures most of the action that is unfolding in the global economy today.

Developed Countries and BITs/PTAs

Multinationals in developed countries look to outsource some of their production to developing countries, enticed by cheaper labor and market access.[15] There are two concerns inherent in pursuing this strategy: the risk of expropriation and the transaction costs of getting inputs to and exports from their foreign affiliates. BITs address the first concern, and PTAs the second, which is why they are likely to be coupled together by developed countries. While the intuition of this hypothesis may ring familiar, it has not, to the best of our knowledge, been subjected to empirical scrutiny. That said, it is easy to find cases in which this logic plays out in practice. For example, the U.S. explains that due to Africa's "generally low levels of economic, administrative, and regulatory development," it is using BITs "to transition from U.S.-Africa trade and investment relationships based on one-way trade preferences to deeper, more reciprocal partnerships, such as that established by a trade agreement."[16] Along these same lines, United States Trade Representative Robert Zoellick announced in 2004 that the signing of a BIT with Pakistan would lead to a free-trade agreement between the two countries.[17]

[15] It is important to keep in mind that PTAs impose rules of origin to prevent the transshipment of goods from nonmembers through members. If, in an effort to overcome these rules of origin, a nonmember's multinationals invest in a member's economy, this would be consistent with our argument, since they too would have incentive to demand BITs to protect their investment and would likely have PTAs to get their goods home at lesser cost. Even if they do not export home (and thus do not demand PTAs), this would still be consistent with our argument, since it raises the prospect that exporter rents will be congested, as we explain more fully below.

[16] USTR 2008.

[17] Piracha 2004.

Indeed, provisions for third-party dispute settlement in the event of uncompensated expropriation are the central tenet of investment treaties, while trade agreements lower protection on a reciprocal and preferential basis, enabling firms to more readily trade with their foreign affiliates. The novel twist in our argument, however, is that too many BITs or PTAs between a developing country and a number of rich countries deters a given developed country from entering into such institutions with it.

To start, rich-country MNCs lobby strongly for the adoption of BITs. In fact, even when MNCs can obtain firm-specific concessions on their investment from a host country, it is still important to gain the backing of their home government in sponsoring a BIT. For example, Dow Chemical, which has received special treatment on its investments from developing countries, nonetheless identifies BITs as the pillar of its FDI and trade strategy.[18] This is because BITs lower the overall transaction costs of investing abroad by strengthening the legal environment and ensuring that both its home and host governments are fully and credibly engaged in resolving any disputes.[19] This, in short, is why wealthy states have an incentive to enter into both BITs and PTAs: to protect multinationals' assets from being nationalized without compensation and to lessen the cost of doing business with offshore affiliates.

This line of reasoning is further strengthened by considering two possible concerns. First, one might object that FDI itself ought to induce the developed (home) country to unilaterally cut tariffs on its trade with the developing (host) country in order to reduce transaction costs for its multinationals. In other words, a BIT might accomplish what these MNCs would want from a PTA. Emily Blanchard calls this the "FDI terms of trade effect," associating it to the demands made of rich governments by export-platform FDI.[20] Yet, she offers two reasons to suspect that investment treaties and trade agreements play the roles we posit: first, this effect "cannot persist under threat of expropriation;" and second, it can be strongly undermined by measures that discriminate between the country's own exporters operating abroad and the developing country's exporters. A BIT addresses the first possibility, a PTA the second. Note, too, that where export-platform FDI is focused strictly on selling to third markets and not back to the home market, the need for PTAs is greater still, given opportunities to discriminate among exporters in this case.

[18] http://dowaction.com/legissues/trade/backgrounder.html.
[19] Ramamurti 2001; Tobin and Rose-Ackerman 2005.
[20] Blanchard 2005; see also Milner 1988.

Second, one might object that where multinationals invest abroad strictly to sell to the target market rather than to re-export, coupling a BIT with a PTA is unnecessary. After all, the logic of this "horizontal FDI" would remove any concern on the part of a multinational for (home) protectionism against the foreign (host) market, such that it might be content with just an investment treaty. Yet, both theory and evidence suggest that "vertical FDI," which involves outsourcing production to exploit cost savings, is more important, especially with respect to North-South commerce. Stephen Ross Yeaple, for example, identifies a strong comparative-advantage motive for FDI between countries with large differences in their relative factor abundance.[21] Given our focus on investment and trade between rich and poor states, this would lead us to expect that vertical FDI would be the main motivation for multinationals looking to invest in developing countries, and thus we should expect them to demand PTAs as well as BITs. Various studies bear out this assessment. For example, UNCTAD observes that "[t]oday we see less horizontal FDI and more vertical FDI that seeks the most efficient location."[22] UNCTAD traces this to the liberalization of investment and trade regimes and falling transport costs—the absence of which might otherwise have inspired horizontal FDI. In much the same spirit, Theodore Moran points out that, for rich-country MNCs, vertical networks from developing-country affiliates are more important to their business than selling to host markets.[23] Looking at U.S. MNC-affiliate sales, data from the Bureau of Economic Analysis indicate that for 2006, 80 percent conform to the logic of vertical FDI, whereas only 20 percent match the pattern of horizontal FDI. Thus, for both theoretical and empirical reasons, we contend that it is appropriate to build an argument about North-South BITs and PTAs around the logic of vertical FDI.

Of course, trade agreements are more politically costly than investment treaties for developed countries to sign, such that taking the next step from BITs to PTAs is not pro forma. BITs impose few additional obligations on rich governments, given that curbs on expropriation are already in place, and the efficacy of their courts in handling such cases is rarely called into question. For these reasons, acting on the demands of multinationals for BITs as a check against expropriation is not overly burdensome. Trade agreements, on the other hand, involve deeper and reciprocal obligations, and thus greater legislative action, which in turn can mobilize antifree-trade constituents. This means that PTAs have

[21] Yeaple 2003.
[22] UNCTAD 2008.
[23] Moran forthcoming.

to deliver a sizable windfall for MNCs, who might then be expected to reward their governments for signing a trade agreement.

The main consideration, in this regard, is whether the PTA promises exporter rents. By their nature, PTAs give preferential market access to multinationals in member countries. These preferences are akin to market imperfections and, like entry barriers more generally, prevent profits from being competed away. The multinationals based in member countries can thus earn excess returns that are insulated from competition with MNCs from nonmember countries. For example, the benefits to European car makers from the European Union's PTA with Mexico were seriously called into question once the North American Free Trade Agreement (NAFTA) extended similar concessions to U.S. car makers in 2004, leading Volkswagen to doubt its prospects for selling not only in Mexico, but in other markets as well, including the United States.[24] Our point is that the fewer the member countries in a PTA, the greater the expected exporter rents, since, to put it simply, preferences become less preferential as more firms gain access to them, increasing competition and eroding any excess returns. We refer to this as the congestion of exporter rents.

This logic is well rehearsed in the economics literature on trade agreements. As Gene Grossman and Elhanan Helpman explain, industries have an incentive to support PTAs that are trade diverting since these promise private gain—exporter rents—and make them more politically viable for governments to pursue.[25] Pravin Krishna arrives at the same conclusion, observing that trade-diverting PTAs create rents for producers that are tied to the agreements' preferences, and warns that unless liberalization provides sufficient rents to offset the loss of those preferences, producers are unlikely to support multilateral trade talks.[26] Even in the case of PTAs signed for noneconomic reasons (such as rewarding an ally), Nuno Limão insists that higher preferences are crucial to the bargaining power of the country granting a trade pact, meaning that these, too, are subject to congestion, which is why they are just as likely to impede multilateral liberalization.[27] All of this is to say that having too many PTAs can negatively impact the prospect of signing another trade agreement. But it also indicates that having too many BITs can be a deterrent as well, since investment can substitute for trade and inflows of FDI serve to increase competition in the economy

[24] http://wehner.tamu.edu/mgmt.www/NAFTA/spring98/Groups/03/Assignment3.htm.
[25] Grossman and Helpman 1995.
[26] Krishna 1998.
[27] Limão 2002.

more generally. Both jeopardize exporter rents that rich governments look for in signing PTAs. We test both these conjectures below.

Summing to this point, we argue that developed countries have an incentive to enter into BITs and PTAs with poor governments because multinationals want protection against uncompensated expropriation and they want the ability to get inputs to, and exports from a developing country. The wrinkle in the story, however, is that we expect rich governments to be leery of pursuing a trade agreement with a poor government that has many BITs or PTAs with other wealthy states because of their concern that the additional agreements with those other countries will reduce their exporter rents.

Developing Countries and BITs/PTAs

There is little that is controversial in arguing that developing countries sign BITs as a way to increase inflows of FDI. The intuition is that by forsaking uncompensated expropriation and submitting to provisions for third-party dispute settlement, they are likely to receive more FDI, lower their cost of capital at home, and gain better access to technology and managerial skills. Ever since Pakistan signed the first BIT with Germany in 1959, this has been the main objective of ratifying investment treaties.

But like their rich counterparts, poor governments recognize that PTAs round out this story. Indeed, if, as we argue above, MNCs worry not only about the risk of expropriation, but also about the cost of getting inputs to, and exports from, an investment location, then developing countries, too, have an incentive to enter into both types of institutions. Moreover, since trade agreements include obligations that, as in the case of intellectual property and traded services, are deeper than those under the WTO, they may prove especially effective in recruiting footloose capital.

Other studies also suggest that developing countries that enter both investment and trade agreements may attract more FDI. For example, Tim Büthe and Helen Milner argue that countries with more BITs and PTAs are likely to receive larger inflows of FDI, a conjecture borne out by their results.[28] While we do not examine FDI in this paper, our argument speaks to Büthe and Milner's research in two important respects. First, having an investment treaty makes a North-South trade agreement between the partners more likely in the first place. Developing countries have, themselves, called attention to this linkage. As one senior Uruguayan government official explained just days after completing

[28] Büthe and Milner 2008.

a BIT with the U.S., "[T]he basis for negotiations are already in place and we are sure that there will be a bilateral [trade] agreement before the end of this period."[29] More telling still is the case of Mauritius: despite having a court system that is seen as being more than capable of handling investor disputes,[30] the country has signed several BITs, the goal of which, as one diplomat professed, is to set the stage for PTAs.[31]

Second, as we explain above, having too many of either of these institutions is likely to congest exporter rents and lowers the odds that a pair of states will sign a North-South PTA. In other words, there should be a number beyond which more memberships in both BITs and PTAs proves counterproductive. We estimate this tipping point for BITs and PTAs and find that the average developing country in our sample is well above these threshold values; as such, they are less likely to get an additional PTA with any given developed country. In fact, for countries in the top quartile of BIT formation in our sample, entering into a BIT actually decreases the odds of forming a PTA with that partner.[32]

The final step in our argument, therefore, is to explain why developing countries are at risk of signing more BITs or PTAs than would be optimal from the point of view of developed countries worried about exporter rents. One reason is simple: competition. In hoping to get noticed by foreign investors—let alone attract footloose capital—poor governments often have to vie for attention with their neighbors, match their neighbors' concessions, and promote the view that a greater number of institutional memberships means even less room for backsliding on their commitments. Along these lines, Zachary Elkins, Andrew Guzman, and Beth Simmons show that developing countries are more likely to sign a BIT if rival jurisdictions have already done so, indicating that these investment treaties may sometimes be more about "keeping up with the Joneses" than setting the stage for PTAs per se.[33]

More broadly, though, the feature that makes BITs and PTAs potentially useful in attracting FDI and trade—i.e., their ability to help governments tie hands—makes them relevant to a wide variety of other political objectives that would encourage signing many, not fewer, of these institutions. For example, some observers have asked whether

[29] Fernández 2006, author's translation.

[30] The Heritage Foundation's *2008 Index of Economic Freedom* ranks Mauritius eighteenth in the world with its indices for investment freedom, property rights, and business freedom scoring at least ten percentage points higher than the world average.

[31] Interview with Vinod Busjeet, minister counselor, Embassy of the Republic of Mauritius.

[32] One might ask whether South-South PTAs could substitute for North-South PTAs if they do fall off under these circumstances. The literature suggests not, pointing out that North-South PTAs, in particular, have proven to be catalysts of economic growth for poor governments, in contrast to South-South pacts. See, for example, Venables 1999; Berthelon 2004; Mayda and Steinberg 2008.

[33] Elkins, Guzman, and Simmons 2006.

BITs can substitute for weak domestic institutions both in terms of the content of local investment regimes as well as the very capacity to oversee commercial activities more generally.[34] Perhaps most obviously, the literature on BITs and FDI nearly universally taps into the notion that developing countries enter into greater numbers of BITs to attract greater FDI flows.[35] Similarly, Edward Mansfield shows that countries enter into greater numbers of PTAs to assure their access to foreign markets in case of disruptions to the international trading system.[36]

But the bigger picture is that PTAs are scrutinized as much for what they do politically as economically. By way of example, Emilie Hafner-Burton argues that where PTAs link "hard" human rights standards to commercial sanctions, they may enable repressive governments that wish to change their ways to enforce provisions that would otherwise be opposed domestically.[37] Tapping a similar logic, Jon Pevehouse finds that joining international institutions like PTAs can help autocracies make the transition to democracy where the membership is largely comprised of liberal states. This is because these institutions have conditionality clauses—subject to dispute settlement—and because of the wider reputational cost to be incurred in the event of a defection.[38] These political aims are especially likely to motivate developing countries to sign as many BITs and PTAs as possible, since, unlike in the case of some economic aims, there are few substitute means available for committing to these policies.

Each of these arguments suggests that more institutional memberships help poor governments achieve broader goals, and in this sense, developing countries are unlikely to show the restraint that developed countries, motivated by exporter rents, would like to see on the part of their would-be trade partners. This disconnect is crucial to our argument and underpins the curvilinear relationship that we posit between the number of BITs and PTAs a developing country has signed with other wealthy states and its likelihood of securing another North-South trade agreement with any given developed country.

Our hypotheses are the following:

> —H1. If a developing country has a BIT with a developed country, the two states are more likely to sign a PTA.

[34] Tobin and Rose-Ackerman 2005.

[35] See, for example, Hallward-Driemeier 2003; Neumayer and Spess 2005; Salacuse and Sullivan 2004; Tobin and Rose-Ackerman 2005.

[36] Mansfield 1998.

[37] Hafner-Burton 2005, 598.

[38] Pevehouse 2005.

Corollary 1. This positive association will decrease as the overall number of BITs signed by the developing country with other wealthy states increases.

—H2. If a developing country has relatively few BITs with other wealthy states, it is more likely to sign a PTA with a given developed country, but if it has many BITs with other wealthy states, it is less likely to sign a PTA with a given developed country.

—H3. If a developing country has relatively few PTAs with other wealthy states, it is more likely to sign a PTA with a given developed country, but if it has many PTAs with other wealthy states, it is less likely to sign a PTA with a given developed country.

III. Research Design

We estimate a model of the determinants of North-South PTAs, focusing on the role played by BITs in particular. While there is no generalizable model of PTA formation, our specification follows from our argument and includes controls identified in the literature as being especially influential in this regard. Our model takes the following form: a North-South PTA depends on dyad-specific characteristics (d); host-country specific characteristics (z); regional characteristics (r); fixed time effects (τ); and an error term (ε). Our theory leads us to believe that PTA formation also depends on: (1) the existence of a BIT in force between a rich and a poor country (*BIT*); (2) the number of BITs in force in the host country (*BITsum*), minus the BIT with the partner, if it exists; (3) the square of that term, in order to gauge whether the relationship between BITs and PTAs is, in fact, nonlinear (*BITsum*^{2}); (4) the interaction between the *BITsum* and the individual investment treaty, to assess whether the effect of an individual country-pair BIT on PTA formation is conditional on the number of BITs a developing country signs more generally (*BIT* * *BITsum*); and (5) the number of PTAs in force in the host country (*PTAsum)* as well as the square of that term to gauge its linearity (*PTAsum*^{2}):

$$PTA_{ij,t} = B_o + B_1 BIT_{ij,t-2} + B_2 BITsum_{i,t-2} + B_{22}\,(BITsum^2)_{i,t-2} + B_{12}\,(BIT * BITsum)_{i,t-2} + \quad (1)$$
$$B_3 PTAsum + B_{33}\,(PTAsum^2) + B_4 \mathbf{d}_{ij,t} + B_5 \mathbf{z}_{i,t} + B_6 \mathbf{r}_i + \tau_t + \varepsilon_{ij,t}$$

Each of the variables is indexed by countries (i) and/or (j) and time (t). The dependent variable, *PTA*, is coded 1 the year that a developed and developing pair of countries, i and j, enters into a trade agreement and 0 otherwise. Once a country pair forms a PTA they drop from the analysis in subsequent years.

The vector d contains a series of dyad-specific characteristics: *trade* (trade flows between the dyad partners); *distance* (geographic distance between the dyad partners); *skill* (skill difference between the dyad partners, as a proxy for the similarity of factor endowments); *income* (difference between the dyad partners' gross domestic product [GDP] per capita, to gauge the similarity of their economies); and *alliance* (membership of the dyad partners in a formal alliance).

The vector z contains a series of country-specific variables that we always include for the developing country and, for purposes of robustness, later include for the developed country: *WTO* (membership in the World Trade Organization or its predecessor institution, the General Agreement on Tariffs and Trade); *GDP per capita* (a proxy for the strength of the economy); *polity* (the country's level of democracy, as a proxy for political risk); and the *natural log of population* (a proxy for the market size of the economy).

The vector r contains a series of regional dummies to capture the possibility of unmeasured regional influences on the propensity to form PTAs. Summary statistics for all variables are available in Appendix 1(a and b).

Variables

As the focus of our analysis is on the formation of a PTA between specific countries based on whether that dyad has a BIT in place, our unit of analysis is the country dyad-year. We analyze only North-South dyads for two reasons. First, as we explain above, PTAs signed between two poor governments typically have different origins and effects than those between other pairings, as the theoretical and empirical literatures on the subject make abundantly clear. Second, and perhaps more important, BITs between developing countries are quite different from those signed between a developed and a developing country. Until the 1990s, poor governments rarely signed investment treaties with each other. Currently, BITs between two developing countries, while growing in popularity, are often signed for reasons other than attracting investment flows. Developed countries are excluded as host countries from the analysis, since wealthy states (almost) never sign BITs with each other.[39] In 2004, for example, the four largest foreign investors in the U.S. were Britain, France, Japan, and the Netherlands, yet the United States did not have (nor does it have plans to negotiate) a BIT with any of these countries. In short, states with confidence in each other's

[39] One prominent exception to this rule is NAFTA , which includes both the United States and Canada, and contains a BIT as part of its chapter on investment.

investment environments do not conclude investment treaties. Our goal is to understand how efforts to increase this level of confidence, through a BIT, might set the stage for subsequently signing a trade agreement.

Our dependent variable, *PTA*, is coded 1 in the year that a trade agreement between dyad partners went into force and 0 otherwise. New countries entering an existing PTA are scored 1 in the year that the host country enters the PTA and 0 in prior years. Once a country pair has entered into a PTA they drop out of the analysis in subsequent years. We include all types of PTAs (for example, free trade agreements, customs unions, common markets, and economic unions)[40] reported to the World Trade Organization or made publicly available by the partner states. This results in a total of 204 agreements in our data set.[41]

We measure BITs in two ways. First, our *BIT* variable is measured 1 in the year that an investment treaty between dyad partners takes effect and each subsequent year, and 0 otherwise. Second, our *BITsum* variable is equal to the count of BITs in effect between the host country and all OECD countries in each time period minus the BIT between the dyad partner, if one exists. Any PTA between a dyad that includes an investment chapter equivalent to an investment treaty is also counted as a BIT (so that the dyad drops out of the data set in the year that the PTA enters into force; the PTA is being counted, but the BIT is not counted as preceding the PTA). The individual *BIT* variable is lagged by two years to account for any possibility (nearly nonexistent in the data set) that PTAs may be a determinant of BITs.[42] Similarly, our *PTAsum* variable is equal to the count of PTAs in effect between the host country and all other OECD countries in each time period.

To assess the relationship between BITs and PTAs, we must also control for other factors that are likely to lead to trade agreements between a developing and a developed country. Since our unit of analysis is the country pair, we control for factors that are both dyad and host specific. Paul Krugman and Jeffrey Frankel et al. show that greater distance between countries indicates increased transportation, transaction, and contracting costs, and thus should lower the likelihood of trade flows and, as a result, of a PTA.[43] Thus, the greater the geographic distance between countries, the lower the probability that the country pair will

[40] Regional PTAs, which tend to be concluded between developing countries, were not included in the analysis. However, PTAs such as NAFTA or between the EU and a developing country that serve as a series of bilateral PTAs, were included.

[41] The WTO currently lists 421 agreements in their database. Our data set excludes agreements between developing countries, which accounts for the difference in number.

[42] The results are nearly identical regardless of whether we include a one- or three-year lag.

[43] Krugman 1991; Frankel, Stein, and Wei 1995.

form a PTA. The variable *distance* measures the geographic distance between dyad partners' capital cities and follows the great-circle formula articulated by Thierry Mayer and Soledad Zignago, which uses the relevant latitudes and longitudes.[44]

A number of authors have speculated that PTAs may be as much a response to trade as a source of it.[45] We account for this by including a measure of trade flows between country pairs, the idea being that the greater this volume of commerce, the higher the probability that the dyad will form a PTA. The variable *trade* measures exports flowing from the host country to the partner country in millions of constant U.S. dollars, lagged two years.[46] The data are from Kristian Gleditsch.[47] It is a compilation of the International Monetary Fund annual time series and the World Export Data.[48]

Scott Baier and Jeffrey Bergstrand find that PTAs are more likely between country pairs when those countries have the economic characteristics that theory predicts would enhance trade between those countries.[49] Specifically, countries with larger and more similar economies and factor endowments are more likely to enter into PTAs. Countries with large domestic markets have less need to access foreign markets and those with similar economies tend to trade more with each other. We account for these considerations with a measure of the size and purchasing strength of the economy, GDP per capita, measures for differences in the size of the economy, and available factor endowments. The variable *skill difference* is the difference between the percentage of the labor force in the partner and host country that have a tertiary education (available from World Development Indicators).[50] *Income*, a measure of the difference in the size of the dyad partners' economies, is the difference in GDP per capita between the partner and host country two years earlier (available from World Development Indicators).

Finally, in terms of dyad characteristics, Edward Mansfield and Joanne Gowa theorize and find that countries involved in alliances are more likely to form PTAs because they can better "internalize" the security externalities of trade, meaning that allies are less concerned

[44] Mayer and Zignago 2006.

[45] Lawrence 1998.

[46] We also ran our estimations with exports from the partner country to the host country as well as the sum of exports in both directions. Neither resulted in significant changes in our results.

[47] Gleditsch 2002.

[48] Faber and Nierop 1989.

[49] Baier and Bergstrand 2004.

[50] All data from World Development Indicators available at: http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,menuPK:232599~pagePK:64133170~piPK:64133498~theSitePK:239419,00.html.

about how trade bolsters each other's military strength.[51] Thus, dyads involved in a political-military alliance are expected to be more likely to form PTAs. The variable *alliance* is from the Correlates of War Formal Alliance data.[52] It identifies all formal alliances between dyads in each year of the data set.

In addition to these dyadic factors, several country-level characteristics help to determine the formation of PTAs. Mansfield, Milner, and Peter Rosendorf show that as countries become more democratic, leaders gain from forming trade agreements.[53] Specifically, PTAs offer a credible signal for political leaders to demonstrate their policy choices over trade. Thus, we would expect that as a country becomes more democratic, its probability of forming a PTA increases.[54] We use the ratings from the Polity IV project two years prior to the current period as a measure of democracy.[55] *Polity* is the difference between a country's democracy and autocracy scores, both on ten-point scales, so that the resulting variable ranges from -10 to 10.[56] *Population* is the log of total population measured in the middle of the year, available from the World Development Indicators.

Similarly, Mansfield and Eric Reinhardt show that countries that are members of the WTO are more likely to enter into PTAs.[57] The authors argue that the uncertain nature of multilateral negotiations drives countries into smaller and regional trading blocs in order to improve their bargaining position in trade rounds and to protect themselves from commercial disruptions and disputes. Thus, we would expect that host-country members of the WTO/GATT are more likely to form PTAs. *WTO* equals 1 in the year of accession to the GATT or WTO and each subsequent year, and 0 otherwise. Membership data are available from the WTO.[58]

Finally, *Africa*, *Latin America and the Caribbean*, and *Asia and the Pacific* are regional dummies for Africa, Latin America and the Caribbean, and Asia-Pacific generally, with Eastern and Central Europe serving as the excluded category.

Our data cover a balanced panel of 132 low- and middle-income host countries and twenty-three OECD partner countries from 1960 to 2004. To test our models of PTA formation, we initially use a logistic

[51] Mansfield 1993; Gowa 1994.
[52] Gibler and Sarkees 2004.
[53] Mansfield, Milner, and Rosendorff 2002.
[54] Mansfield and Pevehouse 2006, 2008; Jensen 2003.
[55] Marshall and Jaggers 2004.
[56] Following imputation, the polity variable ranges from -28 to 26.
[57] Mansfield and Reinhardt 2003.
[58] http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm.

regression that included robust standard errors clustered by country so that multiple observations for each country are deemed to be independent. Four important issues exist within our data set that must be dealt with in order to estimate the model using a logistic regression technique: serial correlation, rare events, a high degree of missing data, and endogeneity. We deal with each of these issues in turn.

Method

First, it is clear from the issues we are studying that our data set exhibits temporal dependence. Thus, running a standard logistic regression analysis would result in at least incorrect estimations of our standard errors and at worst biased estimates of our coefficients. To correct for the possibility of autocorrelation, we follow the lead of Nathaniel Beck, Jonathan Katz, and Richard Tucker and include a natural spline function[59] (the number of years from the beginning of our data coverage) to test and account for the possibility of temporal dependence. Tests of time dependence proved to be an issue, and thus we include a natural spline with 5 knots in each of our estimations (results available from the authors).[60]

Second, Gary King and Langche Zeng demonstrate that finite sample bias exists when the number of events being analyzed is small or unbalanced.[61] Our data set is not small, but it is unbalanced, since far fewer dyads have entered into PTAs than have not. In our analysis, the full data set includes fewer than 2 percent of cases where our dependent variable is equal to 1. To account for this bias, we use a rare-events correction for our logistic regression.

Third, data on many variables were unavailable for some country-years. If we use listwise deletion to remove all observations with missing data, our sample size would be reduced by more than 100 countries, most of which fall into the lowest income category. Any inferences made from an analysis using listwise deletion would thus be inefficient. More important, because the missing values are not missing at random,

[59] We use Newson's (1994) b-spline program to calculate natural splines and knots.

[60] Beck, Katz, and Tucker (1998) show that problems stemming from temporal dependence can be solved by including dummy variables for each time period in the data set. These time variables would be equivalent to a baseline hazard or the probability for a respective country when all independent variable values are equal to zero. One problem with including each year dummy is that the baseline hazard jumps around from year to year; we would expect changes over time to be smooth, rather than jagged. To smooth the baseline-hazard function, we employ natural splines that are basically smooth functions of our time dummies. Employing these splines ameliorates any issues of time dependence in our model while maintaining a smooth baseline hazard rate. Our results do not vary if, rather than a natural spline, we include year-to-year dummy variables.

[61] King and Zeng 2001.

our inferences would be biased. The data-generation process for our data set falls into the category of missing at random. That is, although the lower-income countries are more likely to have missing data than higher-income countries, we are able to predict this difference from other variables in our data set. Therefore, deletion could introduce substantial bias into our study.[62] To deal with this, we use the Amelia[63] program for multiple imputation to replace missing data with the best predictions of the data.[64] Amelia uses the known values of certain variables and correlations across independent variables to generate five data sets with unique values for missing observations.[65] To reflect the level of uncertainty of the estimated values, we use the program Clarify[66] to combine the estimated results from each of the five estimations.

Next, we perform a number of tests to be sure that our results were not unduly affected by any outlying observations and eliminate any small island nations with population below one million. This leaves us with data on 132 countries over the period 1960–2004. A complete list of countries included in our study is in Appendix 2.

Propensity Score Matching

An obvious concern in a study like this is that there exists the possibility that BITs are endogenously determined. We may, for example, expect that country pairs that form BITs are substantively different from country pairs that do not. If this were indeed the case, then our two groups would not be directly comparable in our estimates of PTA formation. The data support this fear. Table 1 shows average values of our control variables based on whether a country pair has formed a BIT. In most cases there is a significant difference in the indicator for country pairs that have formed a BIT than for those that have not. Trade flows between country pairs are significantly higher for those that have formed a PTA. The skill difference between developing and developed countries is greater for pairs that have not formed a BIT. Also, developing countries that have entered into a BIT have higher democracy scores, higher income levels per capita, and are more likely to have joined the WTO. Unexpectedly, the difference in the income level between poor and rich governments is greater for country pairs that have signed a BIT. Finally, little difference exists in population and whether countries have formed an alliance.

[62] King et al. 2001.

[63] Honaker et al. 2003.

[64] Listwise deletion estimates are available from the authors. Results did not change substantially, but are not included because of potential bias.

[65] King et al. 2001.

[66] Tomz, Wittenberg, and King 2003.

TABLE 1
MEAN VALUES OF COVARIATES FOR COUNTRY-PAIRS WITH AND WITHOUT BITS

Covariates	*BIT*	*No BIT*
Trade	0.39	0.07
Distance	6.09	7.64
Skill Difference	8.37	14.73
Income	19950	14013
Alliance	0.03	0.02
WTO	0.75	0.45
GDP	1.85	1.56
Polity	0.71	–2.27
Population	16.46	15.55

Endogeneity of this form is typically dealt with using either two-stage least squares instrumental variable (2SLS-IV) estimation or a Heckman selection model. In each of these cases it would be necessary to have an instrument exogenous to PTAs that explains BIT formation. Unfortunately, good instruments for BITs are elusive and weak at best.[67]

Instead of 2SLS-IV or Heckman selection, we use propensity score matching to deal with the possibility of endogeneity. Propensity score matching, while relatively unused in the international political economy literature, is commonly used in American politics and in economics. The idea is to imitate a randomized experiment with a treatment and control group where both groups are substantively similar. The "treatment" in our case is BIT formation. Therefore, our treatment group is each country pair with a BIT. We then search among our population of country pairs that do not have a BIT in place for a "control group" with characteristics similar to that of the treatment group—that is, we match our treatment group to a control group. In other words, if the relevant differences between the treatment and control groups can be

[67] Following Büthe and Milner (2008) as well as Elkins, Guzman, and Simmons (2006), we did estimate equation (1) using instrumental variables (IV) with the number of BITs signed by a country's neighbors. This measure is in fact highly correlated with a country's own BITs, but not with the number of PTAs signed by a country. Unfortunately, two problems with IV estimation persisted. Most important, tests of the instrument failed standard tests of strength. Specifically, the Hansen J test rejected the hypothesis that there is no relationship between the instrument and the residuals, indicating that results from the estimation would be biased. Additionally, because our model contains a quadratic term for BITs, an interaction term, as well as two measures of PTAs, we were in need of several instruments. The only additional instrument available in the literature (the probability that two countries in a dyad will become members of a PTA/BIT in that year, from Büthe and Milner 2008) was, naturally, correlated with our dependent variable.

captured by observable characteristics, then we can match our groups so that the distribution of observed variables within each group is as similar as possible.[68] If we can find an appropriate control group, assignment to the treatment group approximates a random assignment, and we no longer have to worry about endogeneity.

The likelihood of being able to match precisely on each of the observed characteristics is very small. However, matching on the average treatment effect works as consistently as and more efficiently than matching on all covariates.[69] To match on this average treatment effect, we create a propensity score—in this case a probability of treatment, based on observable characteristics.[70] Our propensity score is the probability that a country pair in a certain year has formed a BIT. This variable reduces the relevant information from all of our control variables to a single variable.[71] To estimate our propensity score, we include each of the individual covariates outlined above and run a rare events logistic regression (to account for the rarity of BIT formation). The results of the logistic regression are shown in Table 2.

Next we must match our observations based on their propensity scores. There are a number of methods available to match propensity scores, each with benefits and costs. We use the following three: nearest-neighbor matching, kernel-based matching, and radius matching. The results of equation (1) for all three techniques (as well as an estimation without matching) are provided in Appendix 3 for comparison purposes. We discuss the alternative matching techniques below, but our main analysis presents the results from radius matching, as it proves the best technique for maximizing efficiency while reducing bias in our estimates.

Nearest-neighbor matching matches each country pair that has a BIT to the non-BIT country pair with the closest propensity score and discards the remaining data pairs. Although nearest-neighbor matching reduces bias by selecting distinct pairs to match on, it results in a very high degree of variance because of the large amount of information that is discarded.[72] Kernel-based matching relates each country pair that has a BIT to a weighted sum of individuals with similar propensity scores but without BITs. Those BIT country pairs with propensity scores closest to the propensity score of the treatment pair are given the highest

[68] Imai 2005.

[69] Rosenbaum and Rubin 1983.

[70] For a detailed exposition on propensity score matching, see Rosenbaum and Rubin (1983) and Ho et al. 2007.

[71] Rosenbaum and Rubin 1983.

[72] Smith and Todd 2005.

TABLE 2
PROPENSITY SCORE RESULTS BY RARE EVENTS LOGISTIC REGRESSION

Variable	*Results*
Trade	0.69**
	(0.07)
Distance	−0.14**
	(0.02)
Skill Difference	−0.02**
	(0.002)
Income	0.00**
	(0.00)
Alliance	−0.57*
	(0.29)
WTO	1.08**
	(0.19)
GDP	0.07**
	(0.02)
Polity	0.013
	(0.01)
Population	0.18**
	(0.06)
Africa	−0.33
	(0.23)
Asia and Pacific	0.28
	(0.28)
Latin America and Caribbean	−0.43
	(0.29)
Constant	−4.81**
	(1.09)
Observations	126498

* significant at 5%, ** significant at 1%; robust standard errors in parentheses; dependent variable, BIT

weight; the weight diminishes the farther the propensity score of the treatment pair is from the propensity score of the BIT country pair. Although this method significantly lowers the variance of estimates by using all available country pairs, there is a distinct possibility of weak matches within our data set, and their use in this method would increase the possibility of bias.

In radius matching, all country pairs with propensity scores within a predetermined radius of a treatment pair's propensity score are matched, while those outside the radius of all treatment-pair propensity scores

TABLE 3
COMPARISON ACROSS COVARIATES FOR ORIGINAL AND RADIUS-MATCHED DATA SETS

	Original Data Set			*Radius-Matched Data Set*		
Variable	*Difference in Means*	*Standard Deviation*	*Variance Ratio*	*Difference in Means*	*Standard Deviation*	*Variance Ratio*
Trade	0.32	0.01	93.95	0.23	0.01	1.15
Distance	−1.55	0.04	11.18	−0.83	0.04	0.97
Skill Difference	−6.36	0.17	13.45	−4.86	0.18	0.98
Income	5936	80	11.14	3653	83	0.83
Alliance	0.01	0.002	19.96	0.008	0.002	1.49
WTO	0.30	0.005	10.63	0.20	0.01	0.76
GDP	0.29	0.03	15.73	0.25	0.03	1.22
Polity	2.97	0.08	15.68	2.84	0.08	1.10
Population	0.91	0.02	12.44	0.78	0.02	0.90

are excluded from the analysis.[73] The advantage of this approach is that when a number of good matches are available, it uses all of the information in those pairs while minimizing the possibility of bad matches when fewer good matches are available.

Table 3 looks at the differences across covariates for the two matched groups from our radius matching, and compares the differences to the original sample. From this it is clear that although the difference in means of the covariates has not gone away completely (something that would be nearly impossible to accomplish), it has decreased substantially. More important, the variance ratio has been considerably reduced through the application of matching. Thus, in all of the results that follow, we use rare events logit estimation on the data matched through radius matching.

IV. RESULTS

The results lend considerable support for all three of our hypotheses. Specifically, we find that a BIT between a developed and developing country increases the predicted probability that this dyad will subsequently conclude a North-South PTA. In fact, up to a point, as a poor government enters into more BITs with rich ones, its predicted probability of forming a PTA with a given wealthy state increases. However,

[73] Dehejia and Wahba 1999.

both of these positive findings are contingent on the number of BITs that the developing country has overall. The same is true of PTAs generally. That is, as a poor government enters into greater numbers of BITs and PTAs, the positive impact on PTA formation of having an investment treaty or a trade agreement actually falls.

Table 4 reports the results of equation (1) where all three of our hypotheses as well as Corollary 1 are tested. First, we examine the positive relationship between BITs and PTAs. The dyadic BIT has a strong, positive influence on PTA formation and gives support to our first hypothesis: if a developing country has an investment treaty with a developed one, these pairs are more likely to sign a trade agreement. Further, the *BITsum* is jointly significant and positive, lending credence to the first part of our second hypothesis: as a poor government enters into BITs with other rich ones it is, at first, more likely to get a PTA with a given developed country, but both of these relationships are contingent on the total number of investment treaties the developing country has already signed with other wealthy states. These findings raise our central question: is having more BITs better?

To answer, we start by examining the contingent relationship between the individual dyadic BIT and the number of additional BITs the developing county has entered into with other rich governments. The interaction term between the dyadic BIT and the sum of host country BITs (*dyadic BIT* * *BITsum*) is negative and significant, lending support to Corollary 1 that the positive association between a country pair BIT and their probability of forming a PTA decreases as the host country enters into a greater number of BITs with other developed countries. Although the probability of forming a PTA between a dyad pair will almost always remain positive, the point is that this positive effect diminishes considerably as the developing country enters into more BITs.

We next examine our hypothesis that there may be a nonlinear relationship between the number of BITs a developing country enters into and its likelihood of securing a North-South PTA. As noted earlier, the sum of BITs is jointly significant and positive. We add to this the square of the total BITs signed with other wealthy states ($BITsum^2$), which is significant and negative. This confirms our second hypothesis that if a developing country has a few BITs with other developed countries, this pair is more likely to form a PTA, but as that developing country signs greater numbers of BITs, this positive effect declines, forming an inverted U-shaped relationship. In particular, after about five BITs, this positive effect begins to decline. (Appendix 4 lists our included developing countries and the number of BITs they have with developed

TABLE 4
EQUATION 1 BY RARE EVENTS LOGISTICS REGRESSION

Variable	*Results*
Dyadic BIT	1.427***
	(0.378)
BITsum	0.028^
	(0.064)
BITsum^2	–0.002*
	(0.001)
Dyadic BIT * BITsum	–0.150***
	(0.046)
PTAsum	0.628***
	(0.170)
PTAsum^2	–0.031***
	(0.010)
Trade	0.109*
	(0.058)
Distance	–0.220***
	(0.077)
Skill Difference	–0.009
	(0.006)
Income	–0.000**
	(0.000)
Alliance	0.377
	(0.580)
WTO	1.206
	(0.816)
GDP	0.080**
	(0.035)
Polity	0.009
	(0.042)
Population	0.435**
	(0.215)
Africa	–2.086*
	(1.166)
Asia and Pacific	–2.376***
	(0.832)
Latin America and Caribbean	–0.318
	(0.802)
Constant	–11.097**
	(4.458)
Observations	97108
Pseudo R^2	0.36

*significant at 10%, ** significant at 5%, *** significant at 1%, ^jointly significant at 5%; robust standard errors in parentheses; dependent variable, dyadic PTA

ones.) This tipping point is rather striking because the average number of investment treaties for our sample is 6.5, and many have more. Indeed, countries like Algeria, Rwanda, and Uganda are nearing the point where signing additional BITs will actually reduce their probability of forming additional PTAs with other developed countries. More worrisome still, many countries in our sample are already well past that point.

We turn now to our third hypothesis: there may also be a nonlinear relationship between the number of PTAs a developing country enters into with other developed countries and its likelihood of securing a North-South PTA. As with BITs, the *PTAsum* variable has a positive, significant impact on dyadic PTA formation, but the square is significant and negative. This says that forming additional PTAs has a positive impact up to a point—nine, to be precise—after which the impact declines. In short, our argument about congestion is just as relevant to trade agreements as it is to investment treaties, the implication being that more of either type of institution erodes the chances of getting an additional North-South PTA.

To better understand the magnitude of our effects, we derive the predicted probability of a dyad forming a PTA at each level of the sum of other developed country BITs, holding all other variables in the model constant. Figure 1 uses the results of Table 4 and holds all countries at the average values of their samples to graphically show the predicted probability results of the interaction term. In it, the predicted probability of PTA formation is always positive but this decreases drastically as a country ratifies more investment treaties.

We are also interested in how these probabilities change from the benchmark case in which a developing country has no BITs at all. Table 5 takes this up, comparing this benchmark case to a country with one BIT, and to a country with seven, which is roughly the average in our sample. With no other investment treaties in place, the predicted probability of forming a PTA increases from 0.01 to 0.05 when a given dyad enters into a BIT. This probability decreases, however, as a country enters into BITs with other developed countries, falling by over half to 0.02 in the case of seven BITs, our sample average.

To further tease out these substantive effects, we randomly selected a country from each quartile of BITs in the sample and used their current characteristics to predict the probability of them forming a PTA with a developed country. Table 6 lists each of the four countries and their odds of getting a trade agreement with and without a BIT in place. For Chad and Colombia, the probability of forming a PTA is higher when these countries anchor a dyad that has a BIT, versus no BIT. How-

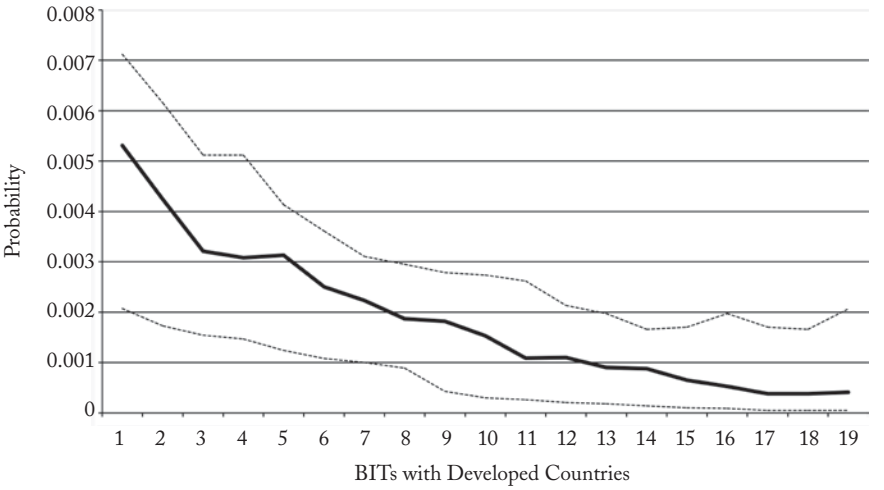

FIGURE 1
PREDICTED PROBABILITY OF PTA FORMATION

TABLE 5
INFLUENCE OF BITS ON PREDICTED PROBABILITY OF PTA FORMATION [a]

BIT Regime	*Predicted Probability of Dyad Forming a BIT*
No dyadic BIT	0.01
Dyadic BIT, but no other BITs	0.05
Dyadic BIT and seven other BITs	0.02

[a] Estimates based on Table 4, with all other variables held at their means.

ever, for Thailand, a country just above the mean of our sample, having a dyadic BIT has no effect on its probability of entering into a PTA. Interestingly, for Bangladesh, the country with the highest number of BITs in this exercise, the likelihood of signing a PTA actually decreases when it participates in a dyad that has a BIT, as opposed to one that has no BIT. These results lend further support to our hypotheses. Indeed, when a country has a BIT in place with a partner country, the predicted probability of forming a PTA is always positive. However, as we move into quartiles with greater numbers of BITs, the difference in predicted probabilities shrinks, and in the highest quartile, a country like Bangladesh has a higher predicted probability of forming a PTA with a developed country with which it does not have a BIT.

TABLE 6
PREDICTED PROBABILITY OF PTA FORMATION WITH AND WITHOUT A BIT FOR SELECTED COUNTRIES[a]

Country	*Probability with Dyadic BIT*	*Probability without Dyadic BIT*	*BITs as of 2004*
Colombia	0.06	0.02	0
Chad	0.03	0.01	3
Thailand	0.01	0.01	9
Bangladesh	0.02	0.03	12

[a]Estimates based on Table 4. All variables held at 2004 levels for all country-specific variables and at 2004 averages across dyads for dyadic variables.

It is also interesting to note the direction and significance of the control variables included in our model. Although coefficient estimates from logistic regressions are not highly informative, we are able to get some idea of the relationship and degree of significance of these variables on the formation of a PTA. The level of trade between the host and partner countries has the expected positive impact on the formation of a PTA. Geographic distance is, as expected, negatively signed; as countries are farther apart geographically, the probability of the dyad forming a PTA goes down. Distance is a significant negative predictor of PTA formation. Similarly, income difference is significant and negative, but its impact on PTA formation is minor. The level of skill difference within the dyad is similarly negative, but insignificant. A political-military alliance between the dyad has the predicted positive sign, but again is insignificant.

Turning to host-country characteristics, we see that the level of democracy has an insignificant impact on PTA formation, perhaps because of the way our sample is constructed (i.e., we only examine developing countries as hosts). Similarly, membership in the GATT/WTO has the expected positive sign, but is not significant in our estimation. Finally, population is positive and significant, indicating that the larger the host-country market, the more likely a dyad is to form a PTA.

ROBUSTNESS CHECKS

We ran a number of checks on the robustness of our results. First, we eliminated all variables that were not significant in the final estimation of the model. Table 7 (column 2) presents the results of this estimation. Here, eliminating theoretically important but statistically insignificant variables had no discernable impact on our results.

TABLE 7
ROBUSTNESS CHECKS

Variable	*Eliminated Variables*	*GDP Weighted*	*U.S.–BIT*
Dyadic BIT	1.402***	3.416*	1.616*
	(0.345)	(1.820)	(0.978)
BITsum	0.077	0.736	–0.021
	(0.051)	(1.784)	(0.089)
BITsum^2	–0.001	–0.127	–0.002
	(0.001)	(0.802)	(0.001)
Dyadic BIT * BITsum	–0.144***	–2.500	–0.056
	(0.043)	(1.566)	(0.090)
PTAsum	0.579***		
	(0.134)		
PTAsum^2	–0.027***		
	(0.008)		
Trade	0.094*	0.077	0.081*
	(0.056)	(0.093)	(0.045)
Distance	–0.235***	–0.192***	–0.202**
	(0.075)	(0.068)	(0.091)
Skill Difference		–0.005	–0.010*
		(0.006)	(0.006)
Income	–0.000*	–0.000*	–0.000*
	(0.000)	(0.000)	(0.000)
Alliance		0.304	0.572
		(0.816)	(0.642)
WTO		0.691	0.911
		(0.807)	(0.776)
GDP	0.125***	0.110**	0.127**
	(0.035)	(0.051)	(0.054)
Polity		0.000	–0.002
		(0.056)	(0.045)
Population	0.390*	0.312	0.440**
	(0.225)	(0.248)	(0.200)
Africa	–1.387	–1.476	–1.789
	(1.070)	(1.339)	(1.196)
Asia and Pacific	–1.835**	–1.812**	–1.952**
	(0.735)	(0.902)	(0.802)
Latin America and Caribbean	0.446	–0.012	–0.314
	(0.625)	(0.764)	(0.862)
Constant	–10.292**	–8.264	–11.319**
	(4.327)	(6.032)	(4.428)
Observations	97108	94424	97108

* significant at 10%, ** significant at 5%, *** significant at 1%; robust standard errors in parentheses; dependent variable, dyadic PTA

Second, we assessed the importance of using a count of BITs versus weighting a BIT by the importance of the home country. To do this we re-ran equation (1), first looking only at whether a country had a BIT with the United States. Second, we substituted our BIT count variable with a BIT count weighted by the GDP of the home country. We used the United States (the country with the largest GDP in the data set) as our reference point and reduced the weight of all other BITs by the difference between that country's GDP and that of the United States. In other words, a country that had a BIT with the United States received a 1 in the year that the BIT was signed and in each subsequent year. But, for example, a country that had a BIT with Japan in 2003 receives only 0.47 because Japan's GDP that year was 47 percent of the United States'. Table 7 (columns 3 and 4) presents the results of these estimations. Again, there was no discernable impact on our results, indicating that BITs have the same effect on PTAs regardless of the economic strength of the home country.

Finally, we ran two additional tests whose results we do not include because of their similarity to the results in Table 4. We re-ran equation (1) including the developed country characteristics that were originally included for the developing country. The results were insignificantly different from those shown in Table 4. Further, because of the high degree of collinearity between the *BIT* variable and the interaction term as well as the $BITsum^2$ variable, its square, and the interaction term, we re-ran equation (1) using mean-centered versions of the interaction term and $BITsum^2$ term. Again, the results—while slightly moderated—were not significantly different from the results presented in Table 4.

V. Conclusion

BITs and PTAs are among the most scrutinized institutions in the global economy, yet the relationship between them has received scant attention. We argue that investment treaties and trade agreements make North-South PTAs more likely, but only up to a point. The reason is that there is a disconnect between the incentives for rich and poor governments to pair these institutions. Developed countries act on the demands of multinationals to offset the risk of uncompensated expropriation and the cost of getting inputs to and exports from a developing country. But whereas BITs are relatively easy to provide as an answer to the first concern, PTAs are a more costly response to the second. Indeed, trade agreements involve deeper and reciprocal obligations than investment treaties, and are thus likely to meet political resistance from antitrade

constituents. As a result, wealthy states are likely to supply PTAs only where they can expect an electoral reward for doing so, which we expect to be a function of the exporter rents they bestow upon multinationals. Yet, because the preferences that insulate these exporter rents can be congested by foreign competitors, what really matters, in this regard, is how many BITs and PTAs the developing country has already concluded with other developed ones.

For their part, poor governments have an incentive to sign investment treaties and trade agreements with rich governments for political as well as economic reasons, including to shore-up a human rights regime or consolidate democracy, for example. Indeed, BITs and PTAs enable these governments to credibly tie their hands by pointing to the commercial costs of noncompliance. As a result, they are at risk of concluding more of these institutions than would be ideal from the point of view of developed countries, reducing or even reversing their odds of completing a North-South PTA with any given wealthy state. Thus, we hypothesize, and show, that the relationship between BITs and North-South PTAs is curvilinear, and find, in particular, that the tipping point is five BITs, or roughly two fewer than the average developing country in our sample has concluded. Related to this, the relationship between a country's PTAs with other developed countries and the prospect of signing an additional North-South PTA is also curvilinear, with the tipping point at nine. Two implications follow.

First, while the literature on BITs is stalemated on whether they actually increase FDI, our results suggest that their relationship to North-South PTAs may shed new light on this debate. Indeed, by making trade agreements more likely, these investment treaties may have a greater indirect effect than the literature has looked for. Recent scholarship suggests that BITs, along with PTAs, are especially conducive to attracting FDI, whereas our research implies that this may be because investment treaties make trade agreements more likely in the first place. In this sense, for all the doubts observers raise about BITs, BITs cannot be dismissed as mere cheap talk, since they raise the prospects of getting a North-South PTA with all the deeper and reciprocal obligations that these entail.

Second, the positive effect that a BIT has on the chances of getting a trade agreement does not mean that more is better in this regard. There is a widely held view among scholars and policymakers that many institutional memberships more credibly signal that a country is "open for business." While more affiliations may undoubtedly serve other political objectives, they do not linearly boost the odds of secur-

ing a North-South PTA. Our results indicate that after five BITs this positive effect begins to fall, and that for countries like Bangladesh, which has twelve, the relationship actually reverses. This means that in pursuit of an additional PTA, Bangladesh would be better off if it had no investment treaties at all. Given the growing body of evidence that developing countries are likely to enjoy greater economic prosperity where investment and trade reforms coincide,[74] the implication is that poor governments need to carefully consider which PTAs they want—since the challenge is to sign the right few—before rich governments begin to turn away from the negotiating table.

[74] Egger and Larch 2008.

Appendix 1
Summary Statistics (a)

Variable	*Obervations*	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
PTA	97108	0.002	0.05	0	1
PTAsum	97108	0.07	0.38	0	7
Dyadic BIT	97108	0.08	0.28	0	1
BITsum	97108	1.95	3.33	0	19
Trade	97108	0.13	0.61	−2.43	58
Distance	97108	7.13	3.64	0.06	19.63
Skill	97108	13.34	15.47	−50.68	81.67
Income	97108	15957	7725	−12580	41790
Alliance	97108	0.02	0.13	0	1
WTO	97108	0.54	0.50	0	1
GDP	97108	1.61	2.40	−13	23
Polity	97108	−1.95	6.60	−28	22
Population	97108	15.71	1.66	11	21
Africa	97108	0.39	0.49	0	1
Asia and Pacific	97108	0.16	0.36	0	1
Latin America and Caribbean	97108	0.19	0.39	0	1

PAIRWISE CORRELATIONS (b)

Variable	*PTA*	*Dyadic BIT*	*BITsum*	*BITsum²*	*Dyadic BIT* BITsum*	*Trade*	*Distance*	*Skill*	*Income*	*Alliance*	*WTO*	*GDP*	*Polity*
Dyadic BIT	0.05												
BITsum	0.08	0.52											
BITsum²	0.01	0.11	0.22										
Dyadic BIT * BITsum	0.06	0.82	0.68	0.17									
Trade	0.02	0.13	0.14	0.04	0.16								
Distance	−0.03	−0.09	0.02	−0.07	−0.08	−0.05							
Skill	−0.03	−0.10	−0.10	−0.08	−0.12	−0.03	0.18						
Income	0.01	0.16	0.20	−0.02	0.12	0.03	0.07	0.05					
Alliance	0.02	0.02	0.05	0.05	0.05	0.02	−0.10	−0.02	0.05				
WTO	0.02	0.13	0.25	0.05	0.12	0.00	0.24	0.07	0.09	0.06			
GDP	0.04	0.03	0.06	0.07	0.07	0.03	0.01	−0.17	−0.31	0.05	−0.02		
Polity	0.03	0.12	0.24	0.05	0.18	0.00	0.16	−0.06	0.13	0.11	0.23	0.10	
Population	0.02	0.14	0.27	0.20	0.17	0.09	−0.01	−0.02	0.06	0.05	0.18	−0.06	0.04

Appendix 2

Host Countries Included in Estimations

Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Azerbaijan
Bangladesh
Belarus
Belize
Benin
Bhutan
Bolivia
Bosnia and Herzegovina
Botswana
Brazil
Bulgaria
Burkina Faso
Burundi
Cambodia
Cameroon
Cape Verde
Central African Republic
Chad
Chile
China
Colombia
Comoros
Congo
Congo, DR
Costa Rica
Croatia
Cuba
Côte d'Ivoire
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Ethiopia
Fiji
Gabon
Gambia
Georgia
Ghana
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hungary
India
Indonesia
Iran
Iraq
Jamaica
Jordan
Kazakhstan
Kenya
Korea, DPR
Kyrgyzstan
Lao
Latvia
Lebanon
Lesotho
Liberia
Libya
Lithuania
Macedonia
Madagascar
Malawi
Malaysia
Maldives
Mali
Mauritania
Mauritius
Mexico
Moldova
Mongolia
Morocco
Mozambique
Myanmar
Namibia
Nepal
Nicaragua
Niger
Nigeria
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Romania
Russia
Rwanda
Sao Tome and Principe
Senegal
Serbia and Montenegro
Sierra Leone
Singapore
Slovakia
Solomon Islands
Somalia
South Africa
Sri Lanka
Sudan
Suriname
Swaziland
Syria
Tajikistan
Tanzania
Thailand
Togo
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
Uruguay
Uzbekistan
Venezuela
Vietnam
Yemen
Zambia
Zimbabwe

APPENDIX 2, *cont.*

Partner Countries Included in Estimations		
Australia	Greece	Norway
Austria	Iceland	Portugal
Belgium	Ireland	Spain
Canada	Italy	Sweden
Denmark	Japan	Switzerland
Finland	Korea, Republic of	United Kingdom
France	Netherlands	United States
Germany	New Zealand	

APPENDIX 3
PROPENSITY SCORE MATCHING

Equation 1 by Rare Events Logistic Regression				
Variable	*No Matching*	*Radius*	*Nearest Neighbor*	*Kernel*
Dyadic BIT	1.430***	1.427***	0.858*	1.430***
	(0.378)	(0.378)	(0.471)	(0.378)
BITsum	0.028^	0.028^	–0.049	0.028^
	(0.064)	(0.064)	(0.112)	(0.064)
BITsum^2	–0.002	–0.002*	–0.002	–0.002
	(0.001)	(0.001)	(0.002)	(0.001)
Dyadic BIT * BITsum	–0.150***	–0.150***	–0.087**	–0.150***
	(0.046)	(0.046)	(0.040)	(0.046)
PTAsum	0.628***	0.628***	0.054	0.628***
	(0.169)	(0.170)	(0.321)	(0.169)
PTAsum^2	–0.031***	–0.031***	0.001	–0.031***
	(0.010)	(0.010)	(0.019)	(0.010)
Trade	0.108*	0.109*	–0.175	0.108*
	(0.057)	(0.058)	(0.176)	(0.057)
Distance	–0.223***	–0.220***	–0.225**	–0.223***
	(0.076)	(0.077)	(0.104)	(0.076)
Skill Difference	–0.009	–0.009	–0.009	–0.009
	(0.006)	(0.006)	(0.015)	(0.006)
Income	–0.000**	–0.000**	–0.000	–0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Alliance	0.370	0.377	0.625	0.370
	(0.581)	(0.580)	(1.028)	(0.581)
WTO	1.209	1.206	2.091*	1.209
	(0.815)	(0.816)	(1.116)	(0.815)

Appendix 3, *cont.*

Population	0.435**	0.435**	0.519**	0.435**
	(0.214)	(0.215)	(0.264)	(0.214)
Africa	−2.076*	−2.086*	−2.650*	−2.076*
	(1.170)	(1.166)	(1.406)	(1.170)
Asia and Pacific	−2.365***	−2.376***	−4.097***	−2.365***
	(0.835)	(0.832)	(1.171)	(0.835)
Latin America and Caribbean	−0.302	−0.318	−0.069	−0.302
	(0.807)	(0.802)	(1.070)	(0.807)
Constant	−11.111**	−11.097**	−9.467*	−11.111**
	(4.454)	(4.458)	(5.091)	(4.454)
Observations	115423	97108	15543	115423
Pseudo R^2	0.36	0.36	0.35	0.34

* significant at 10%, ** significant at 5%, *** significant at 1%, ^ jointly significant at 5%; robust standard errors in parentheses; dependent variable, PTA.

Appendix 4
Included Developing Countries' BITs with All Developed Countries, as of 2004

Included Country	*BITs*	*Included Country*	*BITs*	*Included Country*	*BITs*
Afghanistan	0	Gabon	3	Belarus	9
Angola	0	Guinea	3	Ecuador	9
Bhutan	0	Haiti	3	Georgia	9
Botswana	0	Iran	3	Kazakhstan	9
Brazil	0	Kenya	3	Moldova	9
Colombia	0	Liberia	3	Oman	9
Comoros	0	Namibia	3	Thailand	9
Fiji	0	Nepal	3	Jordan	10
Honduras	0	Papua New Guinea	3	Mexico	10
Iraq	0	Rwanda	3	Morocco	10
Malawi	0	Sudan	3	Paraguay	10
Maldives	0	Turkmenistan	3	Venezuela	11
Myanmar	0	Algeria	4	Albania	12
Sao Tome/Principe	0	Burkina Faso	4	Bangladesh	12
Solomon Islands	0	Congo, DR	4	Bolivia	12
Suriname	0	Madagascar	4	Lebanon	12
Belize	1	Uganda	4	Philippines	12
Djibouti	1	Zimbabwe	4	Uruguay	12

APPENDIX 4, *cont.*

Included Country	*BITs*	*Included Country*	*BITs*	*Included Country*	*BITs*
Eritrea	1	Cape Verde	5	Uzbekistan	12
Gambia	1	Congo	5	Mongolia	13
Guinea-Bissau	1	Croatia	5	Pakistan	13
Libya	1	Ghana	5	South Africa	13
Sierra Leone	1	Mauritius	5	Vietnam	13
Somalia	1	Nigeria	5	India	14
Tajikistan	1	Syria	5	Indonesia	14
Cambodia	2	Tanzania	5	Malaysia	14
Central African Rep.	2	Azerbaijan	6	Peru	14
Dominica	2	Cameroon	6	Sri Lanka	14
Dominican Rep.	2	Kyrgyzstan	6	Tunisia	14
Equatorial Guinea	2	Mozambique	6	Bulgaria	15
Ethiopia	2	Singapore	6	Chile	15
Guatemala	2	Yemen	6	Russia	16
Guyana	2	Costa Rica	7	Turkey	16
Korea, DPR	2	Nicaragua	7	Ukraine	16
Lesotho	2	Senegal	7	Argentina	17
Mali	2	Serbia/Montenegro	7	China	17
Mauritania	2	Bosnia/Herzegovina	8	Cuba	17
Niger	2	Côte d'Ivoire	8	Egypt	17
Swaziland	2	El Salvador	8	Slovakia	17
Togo	2	Jamaica	8	Hungary	18
Zambia	2	Laos	8	Lithuania	18
Benin	3	Macedonia	8	Poland	18
Burundi	3	Panama	8	Latvia	19
Chad	3	Armenia	9	Romania	19
Average of sample	6.58				

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