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What makes countries negotiate away their corporate tax base?

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Abstract: Qualitative case studies suggest that the outcomes of tax treaty negotiations are determined by power politics and negotiating capability. In contrast, quantitative studies have tended to depart from a model that implies absolute gains, full rationality, and perfect information on the part of both treaty signatories. This paper bridges the gap by replicating two existing quantitative studies, introducing new, more sophisticated data. New fiscal data are drawn from the ICTD Government Revenue Dataset, while treaty content is measured using the ActionAid Tax Treaties Dataset. It finds that developing countries that raise more corporate income tax are more likely to sign tax treaties with wealthier countries, and more likely to negotiate higher withholding tax rates in those treaties, but not more likely to obtain a better negotiated result overall. In contrast, developing countries that raise more revenue in total are more likely to negotiate better outcomes in other clauses of the treaty that are more obscure and technically complex. There is also a strong learning effect, with better outcomes across the board as a developing country gains experience of signing tax treaties. Finally, greater asymmetries in investment stocks and material capabilities lead to worse outcomes for developing countries.

Keywords: developing countries, foreign direct investment, corporate taxation, double taxation treaties, multinational corporations

JEL classification: F53, H25, K34, O23

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1 Introduction

Over 2000 bilateral tax treaties (BTTs) have at least one developing country signatory. Often referred to as ‘double taxation agreements’, these tax treaties’ main effect is to constrain developing countries’ ability to tax inward investors, ostensibly to relieve double taxation and hence to attract inward investment. Quantitative studies of tax treaty negotiation proceed from this starting point, yet qualitative case studies, admittedly anecdotal, have repeatedly suggested that developing countries’ approach to negotiating tax treaties, as for bilateral investment treaties, has been ‘boundedly’ rational at best. In a bounded rationality framework, negotiators and policy makers accord a greater weight to information that is ‘more available’ because it is easier to understand or obtain.

This paper replicates two quantitative studies that analyse tax treaty formation from a more rationalist perspective. Barthel and Neumayer (2012) develop a model that suggests competition for inward investment drives developing countries’ decisions to enter into tax treaties. Rixen and Schwartz (2009) study the negotiated content of tax treaties, suggesting that developing countries negotiate harder when the fiscal sacrifice entailed by a treaty will cost them more. The replication incorporates two new sources of data. The ICTD Government Revenue Dataset (Prichard et al. 2014) allows data on the developing country’s tax performance and reliance on corporate tax to be incorporated. The ActionAid Tax Treaties Dataset (Hearson 2016b) provides a more comprehensive and detailed assessment of treaty content, across a larger breadth of treaties than has been available before.

The notion of bounded rationality is operationalized as follows. The salience of the revenue sacrifice in a tax treaty is measured using fiscal data, which gives an idea of how much a country can afford to sacrifice tax revenue. This notion is further developed by comparing the effects of these variables on different components of the treaty: withholding tax rates, which are more striking and easily understood, compared with other, more obscure treaty provisions. Power and investment asymmetries between signatories, the latter a proxy for the likely fiscal cost of sacrifices made by the developing country, are also taken into account. The improvement in negotiating capability over time is also measured through the number of treaties a country has already signed.

This paper informs a growing international debate about the appropriateness of existing networks of tax treaties for developing countries. South Africa, Rwanda, Argentina, Mongolia, Zambia, and Malawi are among the developing countries who have cancelled or renegotiated tax treaties in recent years, while others, such as Uganda, are undertaking reviews (Hearson 2015). Perhaps in response to the international debate and the threat of further cancellations, the Netherlands and Ireland have also reviewed the impact of their treaty networks on developing countries (IBFD 2015; Netherlands Ministry of Finance 2013). The OECD (2014b) has produced guidance to ‘make it easier for countries to justify their decisions not to enter into tax treaties with certain low or no-tax jurisdictions’. The International Monetary Fund (IMF 2014a: 24) states that developing countries ‘would be well-advised to sign treaties only with considerable caution’. Non-governmental organizations including Tax Justice Network Africa, ActionAid, and SOMO have published reports critical of tax treaties from a development perspective (Hearson 2015; McGauran 2013; Weyzig and Van Dijk 2007).

The next section gives some context by setting out the debates in existing literature on the wisdom of signing treaties for developing countries. Section 3 then summarizes the existing studies on the determinants of tax treaty negotiation outcomes. Section 4 sets out the bounded rationality

framework through a series of hypotheses to be tested. In sections 5 and 6, the results of the two replications are reported. Section 7 provides a robustness test, and section 8 concludes.

2 The questionable case for tax treaties

The formal function of BITs, reflected in the commonly used term ‘double taxation agreement’, and in the title of most treaties (‘agreement for the relief of double taxation...’) is to promote trade and investment by reducing the potential that companies operating in the two countries will be taxed twice on the same income. For example, the commentary to the OECD Model Tax Convention on Income and Capital (‘the OECD model’), which is the starting point for almost all negotiated BITs, states that: ‘The principal purpose of double taxation conventions is to promote, by eliminating international double taxation, exchanges of goods and services, and the movement of capital and persons’ (OECD 2014a: 59).

BITs set boundaries on when and how each country is entitled to tax income earned in one treaty partner by residents of the other, most usually multinational companies. In a stylized negotiation between a developing country (capital importer, or ‘source’ country) and a developed country (capital exporter, or ‘residence’ country), the developing country accepts constraints on its ability to tax inward investors. These constraints can be considered in three categories:

- **Withholding tax (WHT) rates.** The most visible and easy-to-understand effect of a tax treaty is to fix a maximum rate at which the capital importing country can tax dividends, interest payments, royalties, and fees for management, technical, and consultancy services (‘service fees’) paid to residents of the treaty partner. These maximum rates are usually lower than the rates in domestic law, and sometimes they are even zero, giving special tax treatment to the foreign resident.
- **Permanent establishment (PE).** Another major aspect of tax treaties, PE is a minimum level of activity that a foreign resident must have in the source country before it can be liable for tax there on its profits. Some aspects of the PE definition are binary distinctions. For example, delivery warehouses and the collection of insurance premiums may be ruled in or out of the definition, depending on the outcome of negotiations. In general, the PE definition in treaties states that the taxpayer must operate through a fixed place of business. There are also quantitative criteria that, like the WHT rates, are the subject of negotiations over the precise figures. The minimum number of days before a construction site constitutes a PE is the most common quantitative criterion.
- **Other provisions.** Many of the other variations within the treaty are in clauses that rule particular types of income earned in the source country from taxation there. This typically includes certain types of capital gains, pensions, social security payments, and salaries.

In return for these concessions, the developed country agrees to bear the cost of eliminating any remaining double taxation incurred by its outward investors, by making allowances for the taxes they pay in the developing country. In practice, rather than relieving double taxation, the most significant effect of a BIT between a developed and a developing country is to shift the burden of doing so from the former to the latter (Avi-Yonah 2009; Dagan 2000; Irish 1974; Thuronyi 2010). This is because most developed countries already take unilateral steps to relieve double taxation on their investors, either by giving them a credit for taxes paid abroad, or increasingly by exempting foreign-source income from domestic tax altogether (PWC 2013). Indeed, a developed

country that uses the credit system may raise more tax revenue as a result of the treaty, because the tax liability in the developing country, and hence the credit against home country tax, falls. This has led critical legal scholars to describe the rationale for BTIs as ‘a myth’ (Dagan 2000) or ‘aid in reverse’ (Irish 1974).

This legal argument notwithstanding, the view that tax treaties will stimulate investment into developing countries is pervasive (Hearson 2015). Yet the evidence for such an effect is inconclusive. Until 2009, academic studies found a mixed effect of tax treaties on investment flows: positive, neutral, or in some instances negative, the latter attributed to tax evading investors likely to be put off by the improved enforcement powers provided by tax treaties (Blonigen and Davies 2004; Coupé et al. 2009; Davies 2004; Egger et al. 2006; Louie and Rousslang 2008; Millimet and Kumas 2009; Neumayer 2007). Positive effects on investment were more commonly found for treaties between developed countries than those involving a developing country. Since then, the balance has tipped towards studies finding positive effects through the use of more comprehensive bilateral investment data (Barthel et al. 2009; Lejour 2014) and foreign affiliate microdata (Blonigen et al. 2014; Davies et al. 2009; Egger and Merlo 2011).

There is, however, room to draw different conclusions from the results of these studies. Those that use aggregate investment data employ a dyadic approach, which means that they assess the extent to which a treaty between A and B corresponds to higher investment into A from B. None controls fully for treaty shopping, in which investors from C into A use an intermediate vehicle in B to take advantage of the treaty, a phenomenon for which Lejour (2014) finds support, and which Weyzig (2013) documents using Dutch microdata. Firm-level data avoid this difficulty, but coverage of developing countries is poor, a problem given the differential effects found in earlier studies. Only Davies et al. (2009) have sufficient coverage of sub-Saharan countries, for example, to be able to draw any conclusions about that region. These studies are all also susceptible to endogeneity concerns.

All in all, we cannot say with certainty that tax treaties have generated new investment into their developing country signatories, nor can we say that there is a compelling legal rationale to motivate the conclusion of tax treaties given their costs. The challenge, in that case, is to explain why so many BTIs have been concluded by developing countries, and why many of these BTIs appear to have, as Irish (1974) observed 40 years ago, a bias towards residence taxation.

3 Existing studies of tax treaty negotiations

Given the unsound empirical basis of the case for tax treaties, policy makers in developing countries must act under uncertainty. If their competitors have signed tax treaties with key capital exporting countries, this may lead to strategic interaction despite this uncertainty (Baistrocchi 2008). To date, the only study to have explicitly investigated the causes of BTI diffusion is a survival analysis performed by Barthel and Neumayer (2012). In this result, competition between countries is found to have a significant effect on the likelihood that a particular pair of countries will conclude a tax treaty when it is measured using two ‘spatial lags’, which weight the impact of a given treaty conclusion by different factors that proxy competition between countries.¹ The weighting of the first spatial lag compares the makeup of products exported by the two countries that signed a treaty with that of the two countries in the dyad on whom competitive pressure is

¹ A third spatial lag, export market similarity, is found to be non-significant.

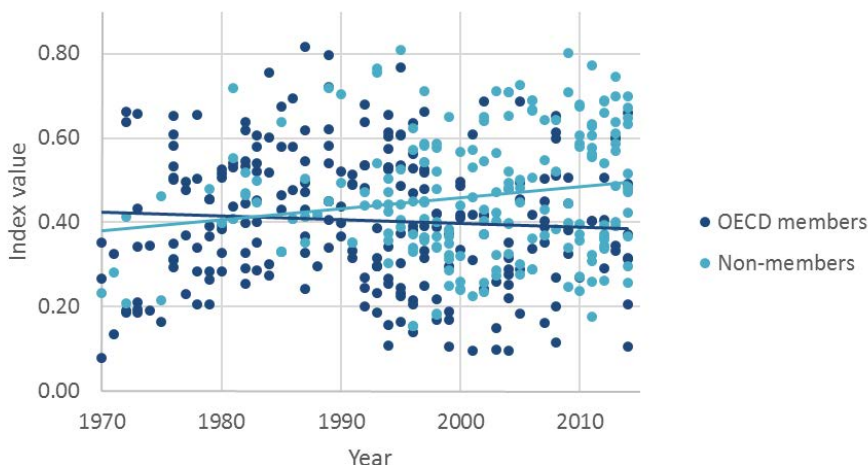
being measured. For example, if a country whose exports are dominated by sugar signs a BTT, this will increase the likelihood of signature in all other dyads that include a country for whom sugar exports are important. The second spatial lag takes into account treaty signatures by countries in the same region: a treaty between Ghana and Germany increases the likelihood of signature in all other dyads including both sub-Saharan African and European countries. The authors assumed that in both competition scenarios it is the capital importer in the dyad on which the competition acts.

Other authors have investigated the determinants of negotiation outcomes. For one school of thought, negotiation outcomes reflect the rational preferences of the countries negotiating. Chisik and Davies (2004) and Rixen and Schwarz (2009) studied how the WHT rates in tax treaties varied with the balance of foreign direct investment (FDI) stocks between the two signatories, the former using US treaties and those between OECD members, and the latter German treaties. Both studies found that WHT rates were higher where the FDI stocks between the treaty partners were less symmetrical. Rixen and Schwarz (2009) also tested the effect of investment asymmetry on the PE definition, but found only a weak effect, which could be because their operationalization was limited to only one aspect of the definition, the number of months' presence required for a construction site to become taxable. Nonetheless, both studies' findings with respect to withholding taxes seem to confirm Goldberg's (1983) observation that 'treaty partners having unequal income flows will allocate jurisdiction to tax so as to achieve a more even balance between the two extremes'.

Support for this viewpoint can be found in an International Bureau for Fiscal Documentation (IBFD) survey analysing 30 provisions of 1,811 tax treaties signed since 1997. These provisions include the main variations between the two main international model conventions used in negotiations: the OECD and UN models (Wijnen and de Goede 2013). The UN model allows developing countries to retain more of their source taxation rights than the OECD model, and so can be regarded as a better outcome for a developing country that wishes to conclude a treaty while retaining its taxing rights over foreign investors. At 37 per cent of total provisions, the UN model was more common in treaties between non-OECD countries than in treaties between OECD countries, where it made up 25 per cent of provisions. Treaties between OECD and non-OECD countries, which may be a proxy for treaties between countries that have a predominantly one-way FDI relationship, were on average composed of 30 per cent UN provisions (Wijnen and de Goede 2013: 66).

Hearson (2016a) examined these trends in more detail using a new dataset of tax treaties signed by low and lower middle-income countries between 1970 and 2014, discussed below. This study found a widening gap in the content of treaties between developing countries and OECD member states, compared to those with non-OECD states, with the latter becoming more 'source' based, leaving more of the developing countries' taxing rights intact (Figure 1). Disaggregation by type of provision indicated that the overall increase in the 'source' tax orientation of tax treaties was driven by more expansive 'permanent establishment' provisions, and masked a decline in the maximum WHT rates stipulated by the treaties (Figure 2). Disaggregation by region and income group also indicated differential trends. Treaties signed between sub-Saharan countries and OECD member states had become more 'residence' based, imposing greater constraints on the developing countries' ability to tax inward investors. African least-developed countries, whose treaties were significantly more residence based in the 1970s, now negotiated on a par with their regional neighbours. Asian countries' treaties had become more source-based across the board, except for treaties with OECD countries, where there had been no change over time.

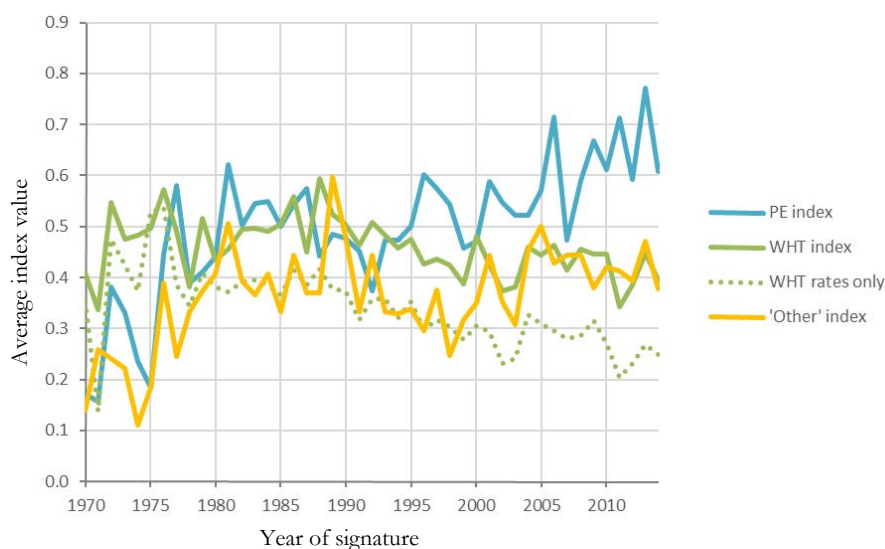
Figure 1: Change in index reflecting overall tax treaty content over time, by type of treaty partner



Note: 0 = more residence based, 1= more source based.

Source: Hearson (2016a), reproduced with permission.

Figure 2: Change in indices reflecting tax treaty content over time, by type of treaty provision



Note: 0 = more residence based, 1= more source based.

Source: Hearson (2016a), reproduced with permission.

Another school emphasizes differentials in analytical capability, negotiating skill, and economic power, suggesting that rational actor models alone are insufficient. In an early essay on the subject, Irish (1974) argues that developing countries are ‘unaware’ of the disadvantages of tax treaties, and ‘have or believe they have a relatively weak bargaining position’, and that developed countries ‘have a propensity to take advantage’ of these two deficits. Aukonobera (2012) argues that ‘Uganda has a weak tax treaty negotiation team that concludes treaties more intensively reflecting the position of the other contracting state’, while Quinones Cruz (2012) reports that in Colombia in the 2000s a policy of ‘attracting investment at any price’ led to poorly prepared negotiations that resulted in an outcome that was less favourable to Colombia than might otherwise have resulted. Dauer and

Krever (2012) survey tax treaties in 11 African countries. Their survey finds marked differences between some countries, and notes that ‘as a group, these African countries appear not to have been as successful as Asian countries in retaining taxing rights’.

4 Hypotheses to be tested

This paper replicates two of the main studies cited above: Barthel and Neumayer (2012) and Rixen and Schwartz (2009). While each of these papers contains numerous robustness checks using different specifications, the focus here is on the two main preferred models. The first of these papers finds evidence that competition between countries increases the likelihood of signing a tax treaty, using a model that incorporates a number of control variables, such as diplomatic and trade links between the two countries. Fiscal data are missing from this model. Since all tax treaties entail a revenue sacrifice for the developing country signatory, we might expect that developing country governments that are struggling to raise tax from companies would be more reticent to sign tax treaties. In contrast, countries that already raise more corporate tax may be more willing to sign tax treaties, because they have a larger corporate tax base and so can afford the fiscal costs of tax treaties:

H₁: countries that depend more on corporate tax are more likely to sign tax treaties.

The Rixen and Schwartz (2009) paper finds that WHT rates in tax treaties, but not PE provisions, tends to be more generous to the net capital importing country in a dyad when the FDI relationship is more asymmetrical, in other words when the capital importer has more to lose. This supports the idea that a higher fiscal cost leads to a tougher negotiating stance by a developing country, but only for the easiest provisions to understand. This can be contextualized by adding in fiscal data, since the fiscal cost may be more or less salient to policymakers in a developing country government depending on how much it needs the revenue:

H₂: countries that depend more on corporate tax are more likely to protect their tax base in negotiations, especially in more salient (easier to understand) areas such as withholding tax rates.

Two competing (or complementary) explanations can be tested alongside this. A power-based explanation of treaty negotiation outcomes suggests that countries with greater material capabilities are more likely to negotiate treaties reflecting their interests. This is a view that has some support in the area of bilateral investment treaties (Allee and Peinhardt 2014). When Rixen and Schwartz (2009) tested for this, they found no effect, but it will be tested for again here:

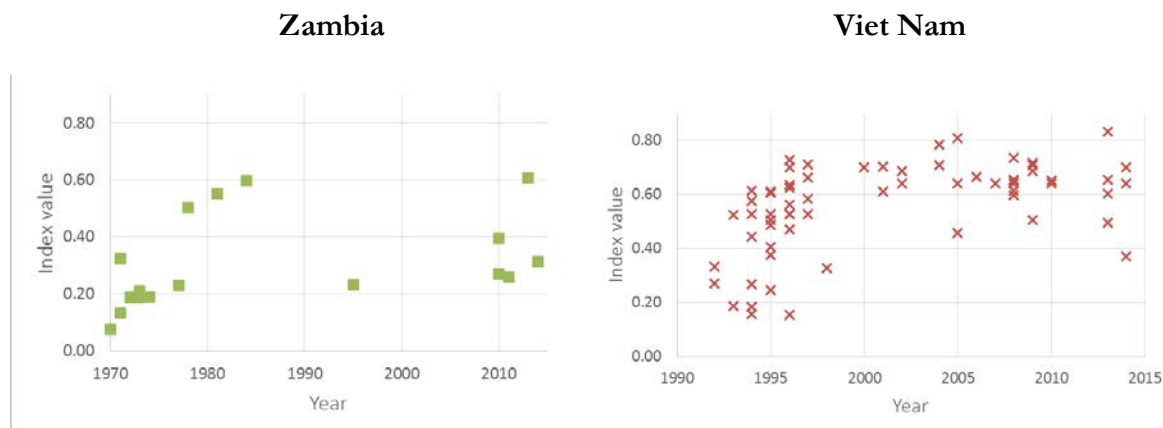
H₃: the greater the power asymmetry in negotiations, the more the treaty content reflects the interests of the more powerful signatory.

A second explanation is that of Rixen and Schwartz (2009) that greater asymmetries in investment will lead to increased source taxing rights in the treaty. This, they argue, is because the capital importing country will face a greater fiscal cost from restrictions on source taxation, and seek to mitigate that cost before it is willing to conclude a treaty:

H₄: the greater the FDI asymmetry, the more the treaty content reflects the interests of the net capital importer.

Finally, as some studies cited earlier suggested, lack of knowledge and negotiating experience capacity may be one reason that developing countries sign treaties costing them significant amounts of revenue. Figure 3 illustrates that developing countries whose negotiated treaties were less source based when they first negotiated them became more source based over time, suggesting that these countries had improved their negotiating performance as they learned.

Figure 3: Change in negotiated content over time for individual countries



Note: 0 = more residence based, 1 = more source based.

Source: Hearson (2016b), reproduced with permission.

This leads to a final hypothesis. We might expect to see a learning effect, especially in elements of the treaty whose importance an inexperienced negotiator might not be aware of:

H₅: the more treaties that a developing country has signed, the better negotiating outcomes it obtains, especially for less salient, more technically obscure treaty provisions.

5 Treaty diffusion

5.1 Data and methods

This part of the paper replicates the article by Barthel and Neumayer (2012), beginning from the replication dataset made available by Eric Neumayer. In this model, the ‘failure’ means that a given dyad of countries concludes a treaty, and the Cox proportional hazard model measures the likelihood of failure as follows:

$$h(t|X_{ijt}Y_{ijt}) = h_0(t)\exp(\beta X_{ijt} + \gamma Y_{ijt})$$

where $h_0(t)$ is the baseline hazard function, X_{ijt} represents the control variables, and Y_{ijt} represents the ‘spatial lag’ variables capturing the competition effects (Neumayer and Plümer 2010); i and j are the two dyad members (i being the first alphabetically), and t is the year.

The replication dataset runs from 1969 to 2005, while some of the other datasets used in this replication cover only recent years. I therefore recreated the replication dataset, including the spatial lags, for the period 1969 to 2012 (Table 1), re-estimating the model (column 2 of Table 2).

Although some of the model coefficients change in magnitude and significance, the orders of magnitude are broadly the same. These changes seem to represent underlying changes in the role of explanatory variables since 2005, rather than errors in the re-estimated data: the 2004 values of the spatial lags (explanatory variables) from the original and extended datasets have an 88 per cent correlation, and the predicted survivals generated by the two models for 2004, where the new and original data overlap, are 93 per cent correlated.

To operationalize dependence on corporation tax, three explanatory variables have been added in turn, based on the ICTD Revenue Dataset. While the variables in the original dataset are largely dyadic, this variable should apply to the capital importing country, the one that would make most of the revenue sacrifice by signing a treaty. A simple approach was taken to identify the capital importer in each dyad: countries were assigned to their respective World Bank income groups, and the country in the dyad that was the lower income of the two was identified as the capital importer. Where the countries were in the same income group, no fiscal data were added, so these dyads dropped out of the sample along with those for which data were not available. This means that all dyads in the subsample with fiscal data include one low- or middle-income country. A better approach may have been to use dyadic data to ensure the correct identification of capital importers and exporters, but the lack of comprehensive, historical dyadic data would have significantly reduced the number of observations, which were already reduced by 90 per cent in order to include the fiscal data.

In the first specification, dependency on corporation tax is operationalized through total government revenue as a share of gross domestic product (GDP) ('Revenue/GDP'),² which measures the extent of a government's ability to raise revenue overall. The expected outcome following from H_1 is that a higher value of this variable increases the likelihood that a government will be willing to sign tax treaties, because the revenue sacrifice entailed is less significant as a share of total government revenues. The second specification uses corporate tax as a share of GDP ('CIT/GDP').³ The expected outcome following from H_1 is that the higher the value of this variable, the more likely a country is to sign tax treaties, because it has a larger corporate tax base and can afford the revenue sacrifice more. The third specification uses corporate tax as a share of total revenue ('CIT/Revenue'). The expected outcome following from H_1 is that a higher value of this variable reduces the likelihood that a government will be willing to sign treaties, because the revenue sacrifice is more important as a share of total revenue.

5.2 Results

Including the fiscal variables in the sample significantly reduces the number of available observations, from 289,226 in column 2 to 26,163 in column 3 of Table 2. Despite this, most of the coefficients in the subsample column 3 stay at a similar magnitude, sign, and significance, with the notable exception of export product similarity (one of the spatial legs measuring competition), whose sign changes in the subsample. This would mean that countries are less sensitive to tax treaty-based competition when the competitor exports more similar products to them, which is a

² 'Total government revenue, excluding grants and social contributions.'

³ 'Total income and profit taxes on corporations, including taxes on resource firms.' It would have been preferable to include capital gains taxes, the other main corporate tax regulated by tax treaties, within this analysis, but the ICTD Government Revenue Dataset does not provide such a figure for companies separately from that for individuals.

counterintuitive result, but this variable also becomes less significant when its sign changes in the subsample.

The revenue/GDP ratio does not have a significant effect on the likelihood of signing a treaty (column 4), but the shares of corporation tax in GDP (column 5) and in total revenue (column 6) do have a significant effect. The effect is positive in both cases, but with a smaller magnitude for CIT/Revenue as anticipated. H_1 predicted that countries that raise more corporation tax may be more willing to sign tax treaties, because they have more revenue to give away. We might have expected, however, that countries whose revenue base is more dependent on corporate income tax (CIT/Revenue) might be more reluctant to conclude treaties that give it away, but this is not the finding here. As CIT/GDP and CIT/Revenue have a correlation coefficient of 0.91, however, the matching signs are not surprising, and it is unlikely that they would allow us to operationalize a distinction between the amount of corporate tax revenue raised and a government's dependence on it.

Table 1: Descriptive statistics for first replication

| | Full sample | | | | | Sample with fiscal data available | | | | |
|---------------------------------------|--------------|-------|----------|-------|---------|-----------------------------------|-------|----------|-------|---------|
| | Observations | Mean | Std. Dev | Min | Max | Observations | Mean | Std. Dev | Min | Max |
| BTT signed | 289,226 | 0.006 | 0.08 | 0 | 1 | 26,163 | 0.016 | 0.127 | 0 | 1 |
| Common region (product) (t-1) | 289,226 | 0.064 | 0.108 | 0 | 1 | 26,163 | 0.123 | 0.164 | 0 | 1.000 |
| Export product similarity (sum) (t-1) | 289,226 | 0.12 | 0.055 | 0.012 | 0.253 | 26,163 | 0.151 | 0.041 | 0.025 | 0.249 |
| Product of populations (ln) | 289,226 | 31.52 | 2.421 | 21.9 | 41.53 | 26,163 | 31.53 | 2.57 | 23.30 | 39.66 |
| Product of GDPs per capita (ln) | 289,226 | 15.13 | 2.155 | 9.37 | 22.34 | 26,163 | 16.21 | 1.84 | 10.30 | 20.91 |
| Bilateral trade (ln, t-1) | 289,226 | 10.29 | 7.48 | 0 | 25.24 | 26,163 | 11.83 | 7.08 | 0 | 25.05 |
| Product of openness to trade | 289,226 | 6,245 | 5,457 | 65.34 | 108,338 | 26,163 | 8,794 | 7,006 | 247 | 108,338 |
| Bilateral Investment Treaty | 289,226 | 0.056 | 0.231 | 0 | 1 | 26,163 | 0.107 | 0.309 | 0 | 1 |
| Regional Trade Agreement | 289,226 | 0.093 | 0.291 | 0 | 1 | 26,163 | 0.098 | 0.298 | 0 | 1 |
| Offshore Financial Centre | 289,226 | 0.228 | 0.419 | 0 | 1 | 26,163 | 0.255 | 0.436 | 0 | 1 |
| Diplomatic representation | 289,226 | 0.274 | 0.446 | 0 | 1 | 26,163 | 0.278 | 0.448 | 0 | 1 |
| Distance (ln) | 289,226 | 0.125 | 0.186 | 0 | 0.786 | 26,163 | 0.178 | 0.215 | 0 | 0.694 |
| Product of political constraints | 289,226 | 8.792 | 0.696 | 4.54 | 9.90 | 26,163 | 8.885 | 0.663 | 4.91 | 9.88 |
| OECD-OECD dyad | 289,226 | 0.007 | 0.081 | 0 | 1 | 26,163 | 0 | 0 | 0 | 0 |
| OECD-non-OECD dyad | 289,226 | 0.248 | 0.432 | 0 | 1 | 26,163 | 0.270 | 0.444 | 0 | 1 |
| Min. years of independence | 289,226 | 39.71 | 17.59 | 2 | 87 | 26,163 | 47.94 | 18.82 | 5 | 87 |
| Max. number of BTT (t) | 289,226 | 29.91 | 27.14 | 0 | 126 | 26,163 | 42.16 | 26.27 | 0 | 126 |
| Cumulative BTTs, country i (t-1) | 289,226 | 17.62 | 24.04 | 0 | 126 | 26,163 | 27.18 | 26.78 | 0 | 126 |
| Cumulative BTTs, country j (t-1) | 289,226 | 17.8 | 23.58 | 0 | 126 | 26,163 | 26.02 | 25.25 | 0 | 126 |
| Revenue/GDP ratio (t-1) | | | | | | 26,163 | 0.228 | 0.088 | 0.082 | 0.646 |
| CIT/GDP ratio (t-1) | | | | | | 26,163 | 0.028 | 0.027 | 0.003 | 0.317 |
| CIT/Revenue ratio (t-1) | | | | | | 26,163 | 0.125 | 0.095 | 0.014 | 0.879 |

Source: Author's own calculations.

Table 2: Original and re-estimated coefficients for first replication

| | Original dataset, 1969–2005 | Extended dataset, 1969–2012 | Sample of extended dataset for which fiscal data available | | | |
|--|--------------------------------|--------------------------------|--|-------------|-------------|-------------|
| | | | (3) | (4) | (5) | (6) |
| Spatial lags: | | | | | | |
| Common region (product) (t-1) | 1.229*** | 1.287*** | 1.271*** | 1.238*** | 1.389*** | 1.398*** |
| Export product similarity (sum) (t-1) | 11.38*** | 6.018** | -8.796* | -8.953* | -8.415* | -8.548* |
| Product of populations (ln) | 0.0855*** | 0.0994*** | -0.0215 | -0.0195 | -0.0209 | -0.0174 |
| Product of GDPs per capita (ln) | 0.0234 | 0.1500*** | 0.0912 | 0.102* | 0.0928 | 0.108* |
| Bilateral trade (ln, t-1) | 0.137*** | 0.0813*** | 0.0524*** | 0.0523*** | 0.0516*** | 0.0516*** |
| Product of openness to trade | 6.92e-05*** | 4.34e-05*** | 3.00e-05*** | 3.05e-05*** | 2.96e-05*** | 2.96e-05*** |
| Bilateral Investment Treaty | 1.310*** | 1.365*** | 1.176*** | 1.173*** | 1.188*** | 1.188*** |
| Regional Trade Agreement | -0.174 | -0.134 | 0.107 | 0.106 | 0.102 | 0.101 |
| Offshore Financial Centre | -0.463*** | -0.346*** | -0.393*** | -0.396*** | -0.383*** | -0.380*** |
| Diplomatic representation ³ | 1.201*** | 0.8945*** | 0.885*** | 0.886*** | 0.888*** | 0.888*** |
| Distance (ln) | -0.255*** | -0.302*** | 0.586** | 0.563** | 0.664*** | 0.656*** |
| Product of Political Constraints | 0.640*** | 0.313** | -0.250** | -0.257** | -0.239** | -0.246** |
| OECD-OECD dyad | -0.143 | -0.244 | - | - | - | - |
| OECD-non-OECD dyad | -0.504*** | -0.628*** | -0.873*** | -0.870*** | -0.897*** | -0.908*** |
| Min. years of independence | -0.00605*** | -0.00469*** | 0.00119 | 0.000889 | 0.000963 | 0.000465 |
| Max. number of BTT (t) | -0.0356*** | -0.0349*** | -0.0384*** | -0.0390*** | -0.0371*** | -0.0371*** |
| Cumulative number of BTTs, country i (t-1) | 0.0430*** | 0.0400*** | 0.0492*** | 0.0498*** | 0.0476*** | 0.0475*** |
| Cumulative number of BTTs, country j (t-1) | 0.0417*** | 0.0394*** | 0.0470*** | 0.0475*** | 0.0454*** | 0.0453*** |
| Revenue/GDP ratio (t-1) | | | | -0.640 | | |
| CIT/GDP ratio (t-1) | | | | | 4.041** | |
| CIT/Revenue ratio (t-1) | | | | | | 1.437*** |
| Institutional quality | | | | | | |
| Observations | 198,820 | 289,226 | 26,163 | 26,163 | 26,163 | 26,163 |

Note: *p<0.1, **p<0.05, and ***p<0.01.

Source: Barthel and Neumayer (2012) and author's own calculations.

6 Effect of tax performance on decision to sign treaties

6.1 Data and methods

Dependent variables

The starting point for this second replication is Rixen and Schwartz's (2009) study of German tax treaties. The study included 45 German treaties for which investment data were available. In the first specification, the dependent variable was the WHT rate, with dummies added for the type of withholding tax such that each treaty constituted four or five observations (depending on whether the treaty included different WHTs for certain dividends). In the second specification, the minimum number of months for a construction site to count as a PE was used as the dependent variable.

For the replication, a new dataset had to be created, because the overlap between German tax treaties and countries for which the other data were available in the relevant years was very small. In particular, the dependent variables are drawn from the ActionAid Tax Treaties Dataset (Hearson 2016b). This includes 519 tax treaties signed by low and lower middle-income countries in sub-Saharan Africa and Asia. In contrast, most of the 45 treaties in Rixen and Schwartz's dataset were between Germany and developed countries, and only one treaty, between Germany and Pakistan, appears in both datasets. In the ActionAid Tax Treaties Dataset, 24 standardized variations within the treaties are coded between zero and one, where one means a provision through which the developing country retains more of its taxing rights, and zero a provision through which it retains less. Aggregate indices are then calculated as the average value across all or a subset of these 24 clauses. A higher value in any of these indices means a negotiation in which the developing country has accepted fewer restrictions on its tax base, at least in the provisions included within the index.

Four different indices are used as dependent variables (Table 3). An overall 'source index' incorporates all 24 provisions, and gives a general overview of how much the developing country retains its taxing rights in the treaty. Three sub-indices are also used here: WHT rates, PE, and 'Other' clauses. The WHT rates index includes all five of the values used by Rixen and Schwartz (2009), plus an additional one, service fees. Rather than treating each WHT value as an independent observation in the replication, the index—effectively the average across all six WHT values—is used as a single observation. The PE index aggregates nine entries, only one of which is the length of time for a construction site used by Rixen and Schwartz (2009).

Explanatory variables

The same tax variables as in the first replication are used. If developing countries that raise more corporation tax are more likely to give it away (H_2), the coefficient of revenue/GDP should be positive, while there is not such an obvious prediction for the coefficients of other fiscal variables. Because of the limited coverage of fiscal data and bilateral FDI data, these variables cannot be included in the same model while retaining sufficient observations to draw meaningful conclusions.

To measure the effect of power on the negotiated outcome, following Rixen and Schwartz (2009), I use the ratio of countries' capabilities, based on the Correlates of War project's Composite Index

of National Capability, which incorporates military expenditure, industrial production, and population size variables. To obtain the ratio, the capability of the capital exporter is divided by the sum of the two countries' capabilities. A higher value of this ratio means that the capital exporting country has more capabilities relative to the capital importer. If power is a factor in negotiations (H_3), the coefficient of this variable should be negative, meaning that the treaty restricts the developing country's taxing rights more when it is less powerful relative to the treaty partner.

To measure the effect of investment asymmetries on negotiations, bilateral data on FDI stocks is taken from the IMF's Coordinated Direct Investment Survey (CDIS) (IMF 2014b). As with capabilities, the FDI asymmetry is calculated as the stock of FDI from the treaty partner in the developing country, divided by the sum of bilateral FDI stocks. Where different values are reported by the two countries, the mean of the FDI stocks in each direction is used to calculate the ratio. The CDIS is the best available source of bilateral FDI data, but it only covers recent years. The figures used here are for 2012, the year with the best coverage, regardless of the year of signature.⁴ Following Rixen and Schwartz (2009), the coefficient of this variable should be positive, meaning that developing countries are more concerned to retain more of their taxing rights over inward investment in treaties where they are overwhelmingly net importers of capital (H_4).

To assess the effect of learning on developing countries' negotiations, the total number of treaties already signed by the developing country, taken from the ActionAid Tax Treaties Dataset, is used. If developing countries become tougher negotiators as their experience of negotiation grows, this variable should have a positive coefficient (H_5).

The control variables included are the year of signature, region of the developing country (0 if Asia, 1 if Africa), and whether or not the treaty partner is an OECD member. All of these variables are shown in Hearson (2016a) to have affected the negotiated content of tax treaties.

Table 3: Descriptive statistics for second replication

| Variable | Observations | Mean | Std. Dev. | Min | Max |
|----------------------------------|--------------|-------|-----------|-------|-------|
| Source index | 537 | 0.420 | 0.136 | 0.090 | 0.760 |
| PE index | 537 | 0.533 | 0.269 | 0.030 | 0.970 |
| WHT rates index | 537 | 0.322 | 0.117 | 0.000 | 0.800 |
| 'Other' index | 537 | 0.377 | 0.231 | 0 | 1 |
| Learning | 520 | 15.84 | 15.56 | 0 | 63 |
| Capability asymmetry | 524 | 0.607 | 0.326 | 0 | 1 |
| FDI asymmetry | 138 | 0.776 | 0.290 | 0 | 1 |
| Revenue/GDP | 176 | 0.194 | 0.076 | 0.046 | 0.545 |
| CIT/GDP | 103 | 0.033 | 0.019 | 0.002 | 0.095 |
| CIT/Revenue | 103 | 0.168 | 0.093 | 0.025 | 0.391 |
| Developing country Africa region | 537 | 0.389 | 0.488 | 0 | 1 |
| Treaty partner OECD member | 537 | 0.453 | 0.498 | 0 | 1 |
| Year of signature | 537 | 1996 | 11.53 | 1970 | 2014 |

Source: Author's own calculations.

⁴ An alternative would be to use data on FDI stocks reported by OECD countries in the year of signature, and these data were used in a robustness test, not reported here, with no difference to the overall result

6.2 Results

Table 5 gives the results of 16 specifications. Four different dependent variables were used: the overall source index, and the three sub-indices for WHT rates, PE, and other provisions. Each of these were tested in specifications that included the share of bilateral FDI stocks that are received by the developing country ('FDI share'), and three different fiscal variables: Revenue/GDP ratio, CIT/GDP ratio, and CIT/Revenue ratio. A summary of the relationships between these four explanatory and dependent variables is given in Table 4.

Table 4: Summary results from second replication

| | Source Index | WHT rates index | PE index | 'Other' index |
|---------------|-----------------|--------------------|-------------|------------------|
| FDI asymmetry | -- | | --- | |
| Revenue/GDP | +++ | | +++ | + |
| CIT/GDP | | ++ | | |
| CIT/Revenue | | + | | |

Note: -/+ : $p < 0.1$, --/++ : $p < 0.05$, ---/+++ : $p < 0.01$. Sign shows direction of effect.

Source: Author's own calculations.

There is a negative relationship between the FDI asymmetry and the overall source index, and more specifically the PE definition. A higher FDI share means a more imbalanced FDI relationship, and hence a greater cost to the developing country of restrictions on its source taxing rights. Yet this result suggests that developing countries give away more taxing rights in precisely those situations where the cost of doing so is greater, the opposite of H_4 . Concretely, a change in the FDI share from 0.5 (perfectly symmetrical FDI stocks) to 1.0 (perfectly asymmetrical FDI stocks) would lead to a reduction in the PE index of 0.09. Because the index comprises nine clauses, this corresponds to approximately one less clause that protects the developing country's taxing rights.

Rixen and Schwartz's (2009) finding was that net capital importing countries retained more of their taxing rights in WHT rate clauses when the FDI relationship was more imbalanced. The results with this data and specification suggest the opposite effect, but for PE, rather than WHT. There is also a negative and significant effect of the capability asymmetry on the PE and Other indices in all specifications except those including the FDI asymmetry. This seems to add weight to a power-based hypothesis (H_3): although the FDI and capability asymmetries are not highly correlated (0.31), both could be measuring economic power in some way. Rixen and Schwartz (2009) found no significant effect for the capability asymmetry on WHT rate or PE length. The different conclusions between this study and Rixen and Schwartz (2009) for both FDI and capability could result from either the different specification, larger sample size, or sample composition. The latter seems quite likely: power may be a more important factor in negotiations with developing countries, and the power asymmetries are greater in the treaties studied here than those in the earlier study, which included few developing country treaties.

As for the fiscal variables, the corporate tax variables appear to act only on WHT rates. Countries that mobilize more corporate tax as a share of GDP (and, to a lesser extent, raise more corporate tax as a share of total revenue) retain more taxing rights with respect to WHT rates, consistent with H_2 . (It is hard to give an interpretation of this coefficient because the WHT index is an amalgamation of several continuous variables). This would seem to support the rationalist negotiating model, as employed by Rixen and Schwartz (2009), that when countries stand to lose

more from tax treaties, they retain more source taxing rights. Because a larger corporate tax base also increases the likelihood of signing a treaty overall, however, one interpretation is that more corporate tax revenue makes countries more susceptible to certain incomplete ideas about tax treaties: that signing them provides net benefits, provided the country negotiates firmly on the easily understood WHT provisions. Expressed simply, these countries may believe they have negotiated good deals, as they have obtained good results on WHT rates, but they obtained worse results in less salient parts of the treaty to balance this out.

In contrast, two indicators of effective technical negotiating capacity, the overall source index and the PE definition in the treaty, are positively affected by the government's overall capacity to raise revenue, the revenue/GDP ratio. The PE provisions, along with other components of the overall index, are more technically obscure and less salient to negotiators with less technical expertise than WHT rates. Countries with a larger revenue base overall are more likely to obtain better outcomes in these measures when signing treaties. Based on the coefficient of 0.88, an increase in the revenue/GDP ratio of 0.076 (one standard deviation) corresponds to an increase in the PE index of 0.067, which corresponds to approximately 0.6 more clauses protecting source taxation. This outcome is unexpected. It could be because a higher revenue/GDP is attributable to a better technical capacity, or that it reflects bargaining strength, both of which may lead to increased negotiating capability.

Turning to the other explanatory variables, the 'learning' variable is consistently positive throughout most specifications (H_5). In particular, it has a significant and positive effect on the 'other' provisions index, which suggests that the learning effect is most relevant to these more obscure provisions of the treaty. The coefficient of the learning variable on the 'other' dependent variable ranges from 0.004 to 0.01 in the different specifications. This means that after a country has signed 15 treaties (the standard deviation) the 'other' index will be between 0.056 and 0.15 higher. Because the 'other' index is made up of nine clauses, this corresponds to between 0.5 and 1 additional provisions that retain the developing country's taxing rights.

Table 5: full results from second replication

| | (1) Source Index | (2) WHT rates index | (3) PE index | (4) 'Other' index | (5) Source Index | (6) WHT rates index | (7) PE index | (8) 'Other' index |
|----------------------------------|------------------------|----------------------------|---------------------|--------------------------|-------------------------|----------------------------|---------------------|--------------------------|
| Learning | 0.00234** | 0.00125 | 0.00290 | 0.00377** | 0.00263*** | 0.00244*** | 0.000247 | 0.00561*** |
| Capability asymmetry | 0.0152 | 0.00994 | 0.0299 | 0.00984 | -0.103*** | -0.0124 | -0.270*** | -0.109* |
| FDI asymmetry | -0.0853** | -0.0443 | -0.179*** | -0.0499 | | | | |
| Revenue/GDP | | | | | 0.369*** | 0.0781 | 0.880*** | 0.422* |
| CIT/GDP | | | | | | | | |
| CIT/Revenue | | | | | | | | |
| Developing country Africa region | -0.0157 | 0.00314 | -0.0142 | -0.0837* | -0.0662** | -0.0127 | -0.188*** | -0.0232 |
| Treaty partner OECD member | -0.127*** | -0.0410** | -0.235*** | -0.144*** | -0.0409** | -0.00873 | -0.0897** | -0.0348 |
| Year of signature | -0.00227** | -0.00454*** | -0.000204 | -0.000707 | -0.000268 | -0.00598*** | 0.00998** | -0.00235 |
| Constant | 5.036** | 9.426*** | 1.142 | 1.841 | 0.907 | 12.21*** | -19.39** | 4.940 |
| Observations | 133 | 133 | 133 | 133 | 168 | 168 | 168 | 168 |
| R-squared | 0.316 | 0.184 | 0.306 | 0.251 | 0.367 | 0.227 | 0.290 | 0.287 |
| | (9) Source Index | (10) WHT rates index | (11) PE index | (12) 'Other' index | (13) Source Index | (14) WHT rates index | (15) PE index | (16) 'Other' index |
| Learning | 0.00477*** | 0.00154 | 0.00609* | 0.0101*** | 0.00559*** | 0.00230** | 0.00739** | 0.0106*** |
| Capability asymmetry | -0.152*** | -0.0163 | -0.341*** | -0.203*** | -0.152*** | -0.0185 | -0.342*** | -0.201*** |
| FDI asymmetry | | | | | | | | |
| Revenue/GDP | | | | | | | | |
| CIT/GDP | 1.219 | 1.285** | 1.857 | 0.535 | | | | |
| CIT/Revenue | | | | | 0.135 | 0.181* | 0.191 | 0.0105 |
| Developing country Africa region | -0.00751 | 0.00538 | -0.0603 | 0.0516 | -0.0131 | 0.00284 | -0.0701 | 0.0450 |
| Treaty partner OECD member | -0.0713*** | -0.0419** | -0.106** | -0.0459 | -0.0693*** | -0.0404** | -0.103** | -0.0441 |
| Year of signature | -0.00758** | -0.00611*** | -0.00371 | -0.0140*** | -0.00848*** | -0.00699*** | -0.00511 | -0.0145*** |
| Constant | 15.57** | 12.47*** | 8.071 | 28.40*** | 17.39*** | 14.23*** | 10.89 | 29.39*** |
| Observations | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 |
| R-squared | 0.444 | 0.254 | 0.324 | 0.360 | 0.435 | 0.240 | 0.319 | 0.359 |

Note: *p<0.1, **p<0.05, and ***p<0.01.

Source: Author's own calculations.

7 Robustness checks using bureaucratic capacity

The amount of corporate tax raised by a developing country might reflect the quality and size of its tax policy-making and administrative functions. If so, we might expect this to translate into a greater capacity to negotiate tax treaties, resulting in greater propensity to sign treaties and a more source based outcome in negotiations. This is an alternative explanation for the results obtained above. While it is not possible conclusively to ascertain the causative mechanism using a large-N cross-country study such as this one, this section attempts to test this additional explanation by controlling for the capacity of the country's bureaucracy. To do this it uses the bureaucratic capacity component of the *International Country Risk Guide*, a widely used dataset beginning in 1984 (The PRS Group 2017).⁵ This indicator is based on expert assessments, and its authors state that it measures the strength and expertise of a bureaucracy, which is considered to lead to a degree of autonomy from political pressures. A higher score on this measure could mean that tax treaty policy-making is undertaken by specialist civil servants with greater technical knowledge, and thus less beholden to the whims of 'boundedly rational' non-specialists, especially politicians.

Table 6 gives the results of an alternative specification for the first replication, which measured the effect of tax performance on the decision to sign a treaty, here incorporating bureaucratic quality. Columns 2a to 6a replicate columns 2 to 6 of Table 2, with the bureaucratic quality measure added in. As column 2a shows, quality has by itself a significant positive effect on the likelihood of a treaty when the fiscal data variables are excluded. Column 3a reflects the same specification but only for observations where fiscal and quality data are both available. For this subsample there is no significant effect for bureaucratic quality, and levels of significance are reduced for a number of variables in the model; nonetheless, in column 6a, corporate tax as a share of total tax still produces a positive effect with this subsample.

Bureaucratic quality is incorporated into the second replication, which measures the effect of tax performance on negotiated outcomes, in Table 7. Again, quality only seems to have a significant effect—here on WHT rates—when the fiscal variables are excluded, which may be connected to the smaller sample for which fiscal data are available. The inclusion of the bureaucratic quality variable reduces the level of significance for some of the fiscal variables, but does not change their sign or magnitude to any great degree.

Given the uncertain validity of the bureaucratic quality measure used for tax treaty negotiation capacity, and the difficulties created by incomplete coverage, we cannot draw any firm conclusions from these robustness checks. It appears that bureaucratic quality may have a positive effect on both the likelihood that a developing country will negotiate a tax treaty and on its content, but the effect on negotiated outcomes occurs only for the easiest part of the treaty to understand. This suggests that the quality variable does not capture an increase in tax technical capacity, but may capture an increase in negotiating capabilities. Including fiscal variables in the model appears to eliminate this effect, so is it possible that the fiscal variables act as proxies for negotiating capacity? The variables are not strongly correlated, and two further reasons suggest that this interpretation is unlikely to be correct. First, measures of total tax and corporate tax as a share of GDP tell us little about a country's absolute negotiating capacity, since this depends much more on total government revenue than on any indicator as a share of GDP. Second, the significant effect of corporate tax as a share of total tax on the propensity to sign treaties is unlikely to be related to

⁵ The data are used monadically here, reflecting the institutional quality in the developing country only, rather than a comparison of the two signatories, in keeping with the way fiscal data were used earlier.

bureaucratic quality, since it is a measure of the composition of the resourcing for government capacity, not the size of that capacity.

A further note of caution relates to the idiosyncratic nature of tax treaties. International tax policy tends to be a small, specialist function within most governments, with treaty negotiations frequently led by one individual. A general indicator of bureaucratic quality across the whole of government may not therefore reflect the knowledge or capabilities of the individual or handful of individuals responsible for negotiations. Indeed, it may serve to measure how constrained these individuals are within a system of bureaucratic checks and balances. In an ideal world it would be better to construct a bespoke indicator based on the number, years of experience, and specialist training of such staff.

Table 6: Robustness check with bureaucratic quality variable included

| | Original dataset, 1969–2005 | Extended dataset, 1969–2012 | Sample of extended dataset for which quality data available | Sample of extended dataset for which fiscal and quality data available | | | |
|--|--------------------------------|--------------------------------|--|---|------------|------------|------------|
| | (1) | (2) | (2a) | (3a) | (4a) | (5a) | (6a) |
| Spatial lags: | | | | | | | |
| Common region (product) (t-1) | 1.229*** | 1.287*** | 1.353*** | 1.540*** | 1.497*** | 1.626*** | 1.635*** |
| Export product similarity (sum) (t-1) | 11.38*** | 6.018** | -1.106 | -6.525 | -6.839 | -6.166 | -6.234 |
| Product of populations (ln) | 0.0855*** | 0.0994*** | 0.0542 | -0.0345 | -0.0323 | -0.0297 | -0.0242 |
| Product of GDPs per capita (ln) | 0.0234 | 0.1500*** | -0.0118 | 0.0167 | 0.0295 | 0.0195 | 0.0341 |
| Bilateral trade (ln, t-1) | 0.137*** | 0.0813*** | 0.0476*** | 0.0543** | 0.0550** | 0.0534** | 0.0535** |
| Product of openness to trade ¹ | 6.92e-05*** | 4.34e-05*** | 4.35e-05*** | 2.66e-05** | 2.71e-05** | 2.66e-05** | 2.65e-05** |
| BIT | 1.310*** | 1.365*** | 1.397*** | 1.215*** | 1.215*** | 1.223*** | 1.224*** |
| RTA | -0.174 | -0.134 | -0.117 | 0.0122 | 0.0123 | 0.00522 | 0.00672 |
| OFC ² | -0.463*** | -0.346*** | -0.404*** | -0.375** | -0.377** | -0.366** | -0.362** |
| Diplomatic representation ³ | 1.201*** | 0.8945*** | 0.820*** | 0.868*** | 0.867*** | 0.864*** | 0.860*** |
| Distance (ln) ² | -0.255*** | -0.302*** | -0.368*** | -0.200* | -0.208* | -0.198* | -0.206* |
| Product of political constraints | 0.640*** | 0.313** | 0.228 | 0.404 | 0.369 | 0.466* | 0.469* |
| OECD-OECD dyad ² | -0.143 | -0.244 | - | - | - | - | - |
| OECD-non-OECD dyad ² | -0.504*** | -0.628*** | -0.639*** | -0.947*** | -0.947*** | -0.964*** | -0.980*** |
| Min. years of independence ² | -0.00605*** | -0.00469*** | 0.000105 | 0.00140 | 0.00104 | 0.00133 | 0.000998 |
| Max. number of BTT (t) | -0.0356*** | -0.0349*** | -0.0297*** | -0.0349*** | -0.0358*** | -0.0340*** | -0.0341*** |
| Cumulative number of BTTs, country i (t-1) | 0.0430*** | 0.0400*** | 0.0400*** | 0.0494*** | 0.0502*** | 0.0482*** | 0.0480*** |
| Cumulative number of BTTs, country j (t-1) | 0.0417*** | 0.0394*** | 0.0389*** | 0.0454*** | 0.0460*** | 0.0443*** | 0.0442*** |
| Revenue/GDP ratio (t-1) | | | | | -0.807 | | |
| CIT/GDP ratio (t-1) | | | | | | 3.051 | |
| CIT/Revenue ratio (t-1) | | | | | | | 1.131** |
| Bureaucratic quality | | | 0.212*** | 0.101 | 0.0961 | 0.112 | 0.109 |
| Observations | 198,820 | 289,226 | 34,214 | 18,357 | 18,357 | 18,357 | 18,357 |

Note: *p<0.1, **p<0.05, and ***p<0.01.

Source: Author's own calculations.

Table 7: Robustness check using bureaucratic quality

| | (i) Source Index | (ii) WHT rates index | (iii) PE index | (iv) 'Other' index | (1a) Source Index | (3a) PE index | (5a) Source Index | (7a) PE index | (8a) 'Other' index | (10a) WHT rates index | (14a) WHT rates index |
|-------------------------------------|------------------------|-------------------------------|----------------------|--------------------------|-------------------------|---------------------|-------------------------|---------------------|--------------------------|--------------------------------|--------------------------------|
| Learning | 0.00345*** | 0.00204*** | 0.00358*** | 0.00595*** | 0.00329*** | 0.00339 | 0.00228** | -0.00149 | 0.00625*** | 0.00247* | 0.00315** |
| Capability asymmetry | -0.0162 | 0.00526 | -0.0383 | -0.032 | 0.0527 | 0.0807 | -0.0982*** | -0.256*** | -0.0945 | -0.0225 | -0.0257 |
| Bureaucratic quality | 0.00762 | 0.0223*** | -0.00637 | -0.00796 | -0.00268 | -0.00737 | 0.0254 | 0.0692 | -0.0169 | 0.00118 | -0.00216 |
| FDI asymmetry | | | | | -0.0702* | -0.195** | | | | | |
| Revenue/GDP | | | | | | | 0.404** | 0.988*** | 0.708** | | |
| CIT/GDP | | | | | | | | | | 1.332** | |
| CIT/Revenue | | | | | | | | | | | 0.217* |
| Developing country Africa region | -0.021 | 0.0118 | -0.0781** | -0.0193 | -0.00868 | -0.0315 | -0.0536 | -0.181** | 0.000245 | 0.0175 | 0.011 |
| Treaty partner OECD member | -0.0550*** | 0.00739 | -0.138*** | -0.0612*** | -0.130*** | -0.244*** | -0.0418** | -0.0972** | -0.0415 | -0.0405** | -0.0401** |
| Year of signature | - | - | 0.00195 | -0.00327* | -0.00326* | -5.43E-05 | 0.000101 | 0.0135** | -0.00448 | - | - |
| Constant | 0.00324*** | 0.00643*** | | | | | | | | 0.00889*** | 0.00952*** |
| Observations | 6.861*** | 13.09*** | -3.299 | 6.885** | 6.971* | 0.834 | 0.124 | -26.60** | 9.172 | 18.00*** | 19.27*** |
| R-squared | 370 | 370 | 370 | 370 | 103 | 103 | 157 | 157 | 157 | 92 | 92 |
| | 0.271 | 0.257 | 0.216 | 0.214 | 0.348 | 0.317 | 0.347 | 0.281 | 0.273 | 0.304 | 0.298 |

Note: *p<0.1, **p<0.05, and ***p<0.01.

Source: Author's own calculations.

8 Conclusions

This paper has replicated two studies of tax treaty negotiations, integrating fiscal data drawn from the ICTD Revenue Dataset, and tax treaty content data drawn from the ActionAid Tax Treaties Dataset. The findings add further nuance to our understanding of developing countries' decision-making over tax treaty negotiations, and in some cases challenge the results of these previous studies. First, Barthel and Neumayer's (2012) study of the determinants of tax treaty formation was replicated, adding in fiscal data for the less wealthy country in each potential treaty-signing dyad. Second, Rixen and Schwartz's (2009) study of the determinants of tax treaty content was replicated, using the ActionAid Tax Treaties Dataset's more comprehensive view of treaty content, combined with the fiscal data. As a replication study, the aim was not to make significant changes to the models or design new ones, but rather to improve on published studies by introducing these new data.

Combining the results, we can tell the following story. Developing countries that depend more on corporate income tax within their tax base are more likely to sign tax treaties with wealthier countries, and more likely to negotiate higher WHT rates in those treaties, but no more likely to obtain better results overall. This applies whether dependence on corporate income tax is measured through the amount raised as a share of GDP, or the amount raised as a share of total tax revenue. Because WHT rates are the most prominent parts of tax treaties to non-specialists, this supports a 'salience' argument: policy makers in countries that depend more on corporate tax are willing to support a policy of signing tax treaties, so long as higher WHT rates are negotiated, while ignoring other, less easily understood parts of the treaty. In keeping with this argument, a generic measure of bureaucratic capacity—which is unlikely to measure technical capacity—appears to lead to more treaty conclusions and better WHT outcomes, but not to better results overall on more technical aspects of the treaty.

In contrast, developing countries that raise more tax revenue overall are more likely to negotiate better clauses in an area that is less easily understood by non-specialists, PE, as well as a better overall balance across all provisions of the treaty. Greater tax revenue overall thus leads to better negotiation, but it does not make a country more or less likely to sign tax treaties. Furthermore, the more obscure clauses are less likely to be favourable to developing countries when the FDI relationship between the two countries is more one-sided, with the developing country more of a net importer of capital from the treaty partner. This is the opposite of Rixen and Schwartz's (2009) finding, which was that the negotiated content of tax treaties reflects a rational compromise between the two signatories, which protects the revenue base of the capital importer more when it has more to lose. It could be that the higher tax/GDP and smaller FDI asymmetry translates into greater bargaining strength in negotiations.

Finally, there is a significant and consistent learning effect across most of the specifications in the second replication: the more treaties a country has signed, the better negotiated outcomes it obtains, across all types of provision. Taken together with the other results, this suggests that the decision to negotiate and the eventual negotiated content are a function of power and knowledge-based variables, such as how salient the losses from the treaty are to policy makers in a country, the technical capacity, knowledge and experience of negotiators, as well as relative bargaining power. This makes a strong case for developing countries to revisit their existing treaty networks as their understanding of the fiscal costs grows.

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