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## Do Trade Agreements Stimulate International Trade Differently? Evidence from 296 Trade Agreements

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### 1. INTRODUCTION

TRADE agreements (TAs) are becoming an increasingly popular policy instrument to regulate international economic integration. The rules of the World Trade Organization (WTO) allow these trade agreements despite the fact that they can interfere with the most favoured nation principle. The reason is that these agreements are viewed as a step in the right (free trade) direction. The proliferation of TAs has sparked substantial theoretical and empirical interest into the effects of these agreements (see, among others, Krugman, 1993; Bhagwati and Panagariya, 1996; Baldwin, 1997; Krishna, 1998; Baier and Bergstrand, 2004, 2007, 2009; Egger and Larch, 2008). Although the WTO allows for the existence of TAs, the effects are not always thought to be positive. One reason is that a TA might be a substitute for full implementation of WTO rules. Another reason is that a TA can result in trade diversion rather than trade creation and interfere with general WTO effects. Ever since the seminal contribution of Rose (2004), in which his findings questioned the assumed positive influence of the WTO on international trade, studying the effects of TAs on international trade has been high on the research agenda.

In subsequent research, and by using different data sets and different econometric techniques and dealing with the 'zero' trade flows problem, the findings of Rose (2004) have been modified, and the consensus seems that the WTO effect on international trade is positive as is assumed *a priori* (see Subramanian and Wei, 2007; Tomz et al., 2007; Liu, 2009; Chang and Lee, 2011; Herz and Wagner, 2011). However, a key characteristic in this literature is the fact that TAs, including the WTO, are treated rather simplistically as a binary dummy variable. This approach in essence captures whether a TA exists, but not the details of an agreement.

Gradually, more evidence appears that the specific details of an agreement to some extent explain differences in the effects. Kohl (2014) finds indicative evidence that deeper and more extensive agreements tend to be more effective. Baier et al. (2014) demonstrate that the extent to which TAs affect trade volumes can be related to the 'type' of agreement. They systematically categorise TAs by their level of economic integration and identify six types of agreements, ranging in depth from non-reciprocal preferential trade agreements (NRPTAs) to more extensive agreements such as reciprocal preferential trade agreements (PTAs), free trade agreements (FTAs), customs unions (CUs), common markets (CMs) and economic unions (EUs). The authors demonstrate that deeper integration agreements yield stronger trade-promoting effects (also see Kohl and Trojanowska, 2015).

However, and this is a contribution of this study, the contents and scope of TAs differ widely in ways that go beyond a simple categorisation by the type of agreement. By implementing various coding strategies, a number of scholars have started opening the black box of TAs. These studies account for heterogeneity in the design of particular TAs, such as provisions on dispute settlement, investment, services or trade remedies (Leshner and Miroudot,

2006; Houde et al., 2007; Fink and Molinuevo, 2008; Kucik, 2012; Mansfield and Milner, 2012). Other examples investigate the use of TAs with respect to international cooperation (Estevadeordal and Suominen, 2008) or regional integration (Horn et al., 2010; Hicks and Kim, 2012; Haftel, 2013). The findings from this literature reveal that explicitly acknowledging the design of trade agreements is warranted and describing participation in a TA by rudimentary binary variable no longer seems sufficient (for a discussion, also see Orefice and Rocha, 2014).

So far, the empirical trade literature does, however, neglect to address the heterogeneous design of trade agreements explicitly. The use of a binary variable that only accounts for the presence of an agreement between pairs of countries has the virtue of simplicity but ignores heterogeneity in terms of institutional design and legal enforceability. The purpose of this study was to deal with this heterogeneity explicitly and to link these differences to their potentially different impact on international trade. Our study makes three contributions. First, it develops a publicly available database that contains 296 trade agreements.<sup>1</sup> Building on the methodological approach followed by Horn et al. (2010) and Orefice and Rocha (2014)<sup>2</sup> – henceforth referred to as HMS and OR, respectively – the data set provides a comprehensive coverage of 296 trade agreements for the period 1948–2011. It accounts for 17 trade-related policy domains and distinguishes between provisions that can and cannot be considered to be legally enforceable commitments in a court of international law. An important novelty in our data set is that we also survey TAs of countries that did not participate in the WTO in the year that the TA was enforced. Second, we provide some initial stylised facts to explain the heterogeneity and reveal, for example, that TAs are already much more comprehensive even if only one participant is also involved in the WTO. Finally, we address the question whether TAs stimulate international trade and, most importantly, whether TA heterogeneity is relevant for international trade. We find that the latter is indeed the case.

The set-up of the study is as follows. In Section 2, we describe the database on TA heterogeneity in some detail and illustrate the extent to which major trade-related policy domains are covered and legally enforceable. Most important for our purpose is that we observe heterogeneity in the design and enforceability of TAs. In Section 3, we develop several indices to measure TA heterogeneity and we look into some correlates of trade agreements. The extent to which the composition of trade agreements actually affects international trade is dealt with in Section 4. By estimating a gravity model, we show that more comprehensive trade agreements are better in stimulating trade. We also find that not all provisions contained in TAs are beneficial for trade. Provisions that are in line with WTO regulations are shown to be trade promoting, while measures that go beyond the WTO's current mandate may actually have no discernible impact at all. In Section 5, we explore the robustness of our results by using an alternative panel data technique to account for endogeneity bias and to control for anticipation and phase-in effects. Section 6 concludes.

## 2. THE DATABASE ON TRADE AGREEMENTS

HMS provide a systematic study of 17 TAs involving the European Community (EC), and 14 involving the USA. The authors take stock of the various policy domains that are covered

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<sup>1</sup> The database is available at [www.tristankohl.org](http://www.tristankohl.org).

<sup>2</sup> Orefice and Rocha (2014) rely on the data set that was collected for and discussed in WTO (2011).

by the undertakings laid out in these agreements. In doing this, attention is paid to (i) the legal enforceability of the provisions and (ii) the extent to which the undertakings are included in the WTO's mandate.

For each provision identified by HMS, they not only account for a provision being covered by a TA, but also for its legal enforceability. This is important because a policy domain could be covered, but formulated only in such general terms that no legal obligation would follow from it. This makes potential dispute settlement proceedings pointless. Provisions are considered to be legally enforceable only if the undertaking 'specified at least some obligation that is clearly define, and that is likely to effectively bind the Parties' (Horn et al. 2010, p. 1572). It may also be the case that undertakings are not legally enforceable because they are explicitly excluded from the TA's dispute settlement procedures.<sup>3</sup>

Provisions that confirm countries' existing multilateral obligations and that may also deepen such commitments are categorised as WTO<sup>+</sup> provisions. Examples of WTO<sup>+</sup> provisions are measures on anti-dumping, restrictions on state aid and the liberalisation of trade in services. In contrast, WTO<sup>X</sup> provisions involve policy domains that are not covered by the WTO's current mandate and may compromise the WTO's ability to expand into these legal territories with binding, non-discriminatory policy. Examples range from anti-terrorism to environmental and labour market regulations.

HMS find that both the EC and USA are strongly committed to legally enforceable WTO<sup>+</sup> undertakings, although the EC emphasises obligations on state trading enterprises (STEs) more than the USA. In turn, the USA focuses on trade-related investment measures (TRIMs), technical barriers to trade (TBT) and trade in services (GATS). WTO<sup>X</sup> provisions feature more prominently in the EC's agreements, but often lack enforceability. However, both trade powers also have credible WTO<sup>X</sup> commitments. The World Trade Report (WTO 2011) extends HMS's coverage to 96 TAs and shows that traditional WTO<sup>+</sup> provisions on tariff liberalisation are abundant and legally enforceable. This also applies to the newer WTO<sup>+</sup> policy domains such as intellectual property rights (IPR) and investment and WTO<sup>X</sup> domains on competition policy and capital mobility.

We include almost all agreements that have been enforced to date. It builds on HMS and OR by examining the coverage and legal enforceability of 13 WTO<sup>+</sup> and 4 WTO<sup>X</sup> policy domains. Note that the present study is the first to date that indicates the coverage and legal enforceability of such a vast number of TAs. Earlier studies by HMS and OR rely on restricted samples of 31 and 96 TAs, respectively. We relegate our coding procedure to Appendix A, including a comparison of our coding procedure to that of HMS. Both data sets lead to very similar qualitative conclusions. The difference between our data set and OR is that we systematically allow for differences between provisions that may or may not be legally enforceable. This is because we do not presume *a priori* that the economic impact of TAs with a higher proportion of legally enforceable provisions is necessarily different from agreements with a lower degree of legal enforceability, but include the differences in our estimations. For example, provisions are sometimes not classified as legally enforceable because they are already covered in complementing treaties with a functioning dispute settlement system. In other cases, governments may refrain

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<sup>3</sup> In a related study, Dür et al. (2014) cover 587 agreements between 1945 and 2009. Although they cover more TAs, they only provide a 'depth' index. In contrast, our data set is entirely publicly available, with detailed information about provisions covered and provisions legally enforceable per policy area. Moreover, our coding approach builds on HMS and OR, which facilitates comparison.

TABLE 1  
Descriptive Statistics of Provisions' Coverage and Legal Enforceability

<i>Type</i>	<i>Provision</i>	(1) <i>Number Covered</i>	(2) <i>Number Enforceable</i>	(3) <i>Sample Covered (%)</i>	(4) <i>Sample Enforceable (%)</i>	(5) <i>Column 2/Column 1 (%)</i>
WTO <sup>+</sup>	Agriculture	189	188	64	64	99
	AD and CVM	220	217	74	73	99
	Customs administration	216	214	73	72	99
	Export restrictions	256	256	86	86	100
	Import restrictions	292	292	99	99	100
	Intellectual property rights	191	180	65	61	94
	Investment	162	85	55	29	52
	Public procurement	172	103	58	35	60
	Sanitary and phytosanitary	182	163	61	55	90
	Services	168	86	57	29	51
	State aid	190	187	64	63	98
	State trading enterprises	162	149	55	50	92
	Technical barriers to trade	187	138	63	47	74
	WTO <sup>x</sup>	Capital mobility	212	212	72	72
Competition		209	181	71	61	87
Environment		89	66	30	22	74
Labour		48	43	16	15	90

from 'tough' legal language to foster an effective working relationship that promotes economic integration, rather than adhering to the letter of the law at all costs. Furthermore, integration might already be substantial and the TA might already confirm 'good' relations. Empirically distinguishing between 'hard' and 'soft' commitments is also a straightforward way to ascertain the robustness of our findings.

The results are presented in Table 1. Almost all TAs in the sample contain provisions on import restrictions, with an equally high rate of legal enforceability. The same applies to other fundamental WTO<sup>+</sup> domains such as anti-dumping and countervailing measures, customs administration and export restrictions.

Other WTO<sup>+</sup> policy domains are present in approximately 60 per cent of the sample but vary in their enforceability. On the one hand, provisions with a high rate of enforceability cover the domains of agriculture, IPR, sanitary and phytosanitary (SPS) measures, state aid, STEs and TBT. On the other hand, almost half of the provisions on investment, public procurement and services are not enforceable.

Turning to WTO<sup>x</sup> policy domains, provisions on capital mobility and competition laws are present in roughly 70 per cent of the TAs. However, environmental issues are present in less than a third of the sample and labour policies in just one out of six agreements. Despite their differences in coverage, these provisions enjoy a high rate of legal enforceability. The coding suggests that although the fundamental WTO<sup>+</sup> policy domains are well represented and enforceable in most TAs, there is still considerable room for more binding measures on newer WTO<sup>+</sup> and WTO<sup>x</sup> topics.

This section provided a taxonomy of WTO<sup>+</sup> and WTO<sup>x</sup> provisions found in 296 trade agreements. In doing so, the descriptive statistics of the data set confirm that TAs are heterogeneous by design.

## 3. AN INDEX OF TRADE AGREEMENT HETEROGENEITY

Instead of using a simple binary dummy variable that indicates whether a TA is present, in this section, we develop various indices to measure trade agreement heterogeneity. We will also relate these indices to various indicators such as income, developmental status and location. As described in Section 2, there are two basic types of regulation –  $WTO^+$  and  $WTO^X$ . We first consider each of these types separately.

For  $WTO^+$  provisions, agreement  $A$ 's total number of  $WTO^+$  provisions is divided by the maximum number of provisions that can be covered. The maximum number is 13. Hence, the index for  $WTO^+$  coverage is as follows:

$$IWTO_A^{+,z} = \sum WTO_A^{+,z} / 13, \quad (1)$$

where superscript  $z$  ( $z = C, E$ ) is  $C$  for provisions that are covered by agreement  $A$  regardless of their legal enforceability, and  $E$  for only those provisions that are legally enforceable.  $IWTO^+$  ranges between 0 (incomprehensive; no coverage of  $WTO^+$  provisions) and 1 (comprehensive; full coverage of  $WTO^+$  provisions).

Similarly, the index for  $WTO^X$  coverage is based on a maximum of four provisions and is as follows:

$$IWTO_A^{X,z} = \sum WTO_A^{X,z} / 4. \quad (2)$$

An advantage of keeping the indices separate is that it allows us to consider whether extensive coverage of one type of policy is motivated by the same characteristics as another. The results presented below show that this is not the case.

The individual provisions in equations 1 and 2 are weighted equally. We do not have a theoretical basis to justify the relative importance of one provision over another. For  $WTO^+$  provisions, for example, it is unknown whether measures on anti-dumping matter more to policymakers than trade in services. Investigating whether policymakers attach different values to provisions is beyond the scope of this study.

Next, the two indices can easily be combined to construct an overall measure of TA heterogeneity, TAI:

$$TAI_A^z = \frac{1}{2} (IWTO_A^{+,z} + IWTO_A^{X,z}). \quad (3)$$

Note that the separate indices of  $WTO^+$  and  $WTO^X$  are equally weighted, again because we do not have a theoretical motivation. We assume that both components are equally important to a TA's comprehensiveness. However, an alternative measure is to take the simple average of all 17 provisions. We examine the robustness of our findings by also using this alternative measure of heterogeneity, which is indicated by a superscript asterisk and defined as follows:

$$TAI_A^{z*} = \frac{1}{17} \left( \sum WTO_A^{+,z} + \sum WTO_A^{X,z} \right). \quad (4)$$

Tables 2 and 3 provide descriptive statistics of the variables discussed so far. The first six variables all reflect the total number of provisions covered, superscript  $C$ , or legally enforceable, superscript  $E$ , per type of regulation. The other variables are (components of) the heterogeneity indices. As explained above, the number of covered  $WTO^+$  and  $WTO^X$  provisions drops when their legal enforceability is taken into account. Pairwise correlation in Table 3

TABLE 2  
Descriptive Statistics

Variable	<i>N</i>	Of which 0 (%)	Mean	SD	Min.	Max.
Total <sup>C</sup>	296	2 (0.7)	10.625	4.147	0	17
Total <sup>E</sup>	296	2 (0.7)	9.324	3.752	0	16
WTO <sup>+, C</sup>	296	3 (1.0)	8.740	3.388	0	13
WTO <sup>+, E</sup>	296	3 (1.0)	7.628	3.053	0	13
WTO <sup>X, C</sup>	296	42 (14.2)	1.885	1.150	0	4
WTO <sup>X, E</sup>	296	47 (15.9)	1.696	1.043	0	4
TAI <sup>C</sup>	296	2 (0.7)	0.572	0.242	0	1
TAI <sup>E</sup>	296	2 (0.7)	0.505	0.220	0	0.962
TAI <sup>C*</sup>	296	2 (0.7)	0.625	0.244	0	1
TAI <sup>E*</sup>	296	2 (0.7)	0.548	0.221	0	0.941
IWTO <sup>+, C</sup>	296	3 (1.0)	0.672	0.261	0	1
IWTO <sup>+, E</sup>	296	3 (1.0)	0.587	0.234	0	1
IWTO <sup>X, C</sup>	296	42 (14.2)	0.471	0.287	0	1
IWTO <sup>X, E</sup>	296	47 (15.9)	0.424	0.261	0	1

TABLE 3  
Pairwise Correlations of Indices

	TAI <sup>C</sup>	TAI <sup>E</sup>	TAI <sup>C*</sup>	TAI <sup>E*</sup>	IWTO <sup>+, C</sup>	IWTO <sup>+, E</sup>	IWTO <sup>X, C</sup>	IWTO <sup>X, E</sup>
TAI <sup>C</sup>	1							
TAI <sup>E</sup>	0.9398	1						
TAI <sup>C*</sup>	0.9609	0.8990	1					
TAI <sup>E*</sup>	0.9157	0.9622	0.9403	1				
IWTO <sup>+, C</sup>	0.8719	0.8122	0.9734	0.9052	1			
IWTO <sup>+, E</sup>	0.8428	0.8752	0.9205	0.9739	0.9305	1		
IWTO <sup>X, C</sup>	0.8960	0.8486	0.7380	0.7236	0.5639	0.5778	1	
IWTO <sup>X, E</sup>	0.8275	0.9000	0.6886	0.7472	0.5331	0.5768	0.9123	1

highlights differences between coverage and legal enforceability, but also between WTO<sup>+</sup> and WTO<sup>X</sup> provisions.<sup>4</sup>

We have established that TAs are heterogeneous. What determines these differences? Can we relate, for example, legally enforceable provisions to certain groups of countries, or are they related to WTO membership? We now turn to some analyses of our heterogeneity index,  $TAI_A^z$ .

The comprehensiveness of  $TAI_A^z$  and its components can be expected to differ between groups of countries. Developed countries, for example, have well-defined legal institutions that make the enforceability of provisions easier to control than in countries where legal institutions are less well developed. Based on the World Bank (2014) income and development

<sup>4</sup> Descriptive statistics and pairwise correlations for non-zero values are not substantively different. Results are available from the authors upon request.

classification, we distinguish between various groups of countries. Income categories are high income (HI), upper middle income (UMI), lower middle income (LMI) and lower income (LI). Similarly, countries are identified as developed, developing or least developed countries (LDCs).

The data in Table 4 show that TAs related to low(er middle) income categories regulate significantly fewer WTO<sup>+</sup> issues compared to their wealthier counterparts. However, these differences do not pertain to WTO<sup>X</sup> provisions. The index reflects that wealthier countries have more extensive trade agreements. Using a North–South perspective, we find that South–South agreements have significantly lower indices for all types of provisions, compared to North–South and North–North agreements (also see OR). An alternative specification is by using countries' development status. Agreements among developed countries or developed and developing countries are more extensive than those of developing and/or LDCs. These differences relate to both WTO<sup>+</sup> and WTO<sup>X</sup> provisions.

The prevalence of TAs between countries can also be related to cultural or geographical 'closeness'. Using the World Bank's (2014) regional classification system, we can distinguish seven groups of geographical related countries, which are East Asia and Pacific (EAP), Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), Middle East and North Africa (MENA), North America (NAM), South Asia (SA) and Sub-Saharan Africa (SSA). Interregional agreements are signed between countries from different regions, and (intra)regional agreements involve signatories from one and the same region. Data on common borders and languages are from Mayer and Zignago (2011).

According to the data in Table 4, interregional agreements are more extensive with respect to WTO<sup>+</sup> and WTO<sup>X</sup> measures. However, these differences do not hold with respect to WTO<sup>X</sup> provisions after accounting for their legal enforceability.

The differences are more pronounced when the presence of common borders is taken into account. When most participants in an agreement share a common border (i.e. the mode equals 1), they are found to have less extensive WTO<sup>+</sup> and WTO<sup>X</sup> provisions compared to the situation when the majority of participants are not contiguous. Similarly, agreements in which the majority of participants have a language in common (i.e. the mode equals 1) tend to be less extensive with respect to WTO<sup>+</sup> and WTO<sup>X</sup> provisions compared to agreements in which the majority of participants do not share a common language.

The number of participants might affect coverage. The lower the number of participants, the easier it is to reach an agreement. We distinguish between bilateral and plurilateral agreements. Examples of plurilateral agreements are ASEAN, CAFTA-DR-US and MERCOSUR. Examples of bilateral agreements include Armenia-Moldova, EC-South Korea and MERCOSUR-SACU.

The descriptive statistics in Table 4 indicate that bilateral agreements provide less coverage of WTO<sup>+</sup> domains, even when correcting for their legal enforceability. There are no apparent differences with respect to WTO<sup>X</sup> provisions once their enforceability is accounted for. Overall, the indices suggest that plurilateral agreements are more extensive than those that are bilateral.

With respect to WTO membership, three groups of TAs are identified. The first group of TAs only contains countries that did not participate in the WTO at the time that the TA came into force. The second group involves at least one WTO participant and one non-member, and the third group exclusively consists of WTO members. From Table 4, it follows that the second (mixed) and third (members only) groups include more WTO<sup>+</sup> and WTO<sup>X</sup> provisions than agreements without any WTO participants. There are no clear differences when



TABLE 4  
Comparisons of Group Means

Variable	(1) $TAI^C$	(2) $TAI^E$	(3) $TAI^{C*}$	(4) $TAI^{E*}$	(5) $IWTO^{+,C}$	(6) $IWTO^{+,E}$	(7) $IWTO^{X,C}$	(8) $IWTO^{X,E}$	(9) N
Income category									
(a) High income (HI)	0.64 ± 0.02	0.66 ± 0.01	0.57 ± 0.02	0.59 ± 0.01	0.68 ± 0.01	0.6 ± 0.01	0.61 ± 0.03	0.55 ± 0.03	99
(b) HI and upper middle income (UMI)	0.63 ± 0.02	0.67 ± 0.02	0.55 ± 0.02	0.59 ± 0.02	0.7 ± 0.02	0.63 ± 0.02	0.55 ± 0.03	0.48 ± 0.03	51
(c) HI and lower middle income (LMI)	0.54 ± 0.04	0.56 ± 0.04	0.48 ± 0.04	0.49 ± 0.03	0.57 ± 0.05	0.5 ± 0.03	0.52 ± 0.06	0.47 ± 0.05	25
(d) HI and Lower income (LI)	0.48 ± 0.08	0.51 ± 0.09	0.46 ± 0.07	0.49 ± 0.07	0.54 ± 0.09	0.51 ± 0.07	0.42 ± 0.08	0.42 ± 0.08	3
(e) UMI	0.47 ± 0.04	0.55 ± 0.04	0.42 ± 0.04	0.48 ± 0.04	0.62 ± 0.04	0.53 ± 0.04	0.33 ± 0.05	0.32 ± 0.05	24
(f) UMI and LMI	0.41 ± 0.03	0.46 ± 0.03	0.37 ± 0.02	0.42 ± 0.02	0.51 ± 0.03	0.46 ± 0.03	0.32 ± 0.04	0.29 ± 0.03	48
(g) UMI and LI	0.3 ± 0.1 <sup>a,b</sup>	0.29 ± 0.1 <sup>a,b</sup>	0.29 ± 0.1 <sup>a,b</sup>	0.28 ± 0.09 <sup>a,b</sup>	0.29 ± 0.11 <sup>a-c,e</sup>	0.27 ± 0.1 <sup>a,b,d,e</sup>	0.31 ± 0.12	0.31 ± 0.12	4
(h) LMI	0.24 ± 0.03 <sup>a-c</sup>	0.25 ± 0.02 <sup>a-e</sup>	0.23 ± 0.03 <sup>a-c</sup>	0.24 ± 0.02 <sup>a-e</sup>	0.26 ± 0.02 <sup>a-e</sup>	0.24 ± 0.02 <sup>a-e</sup>	0.23 ± 0.06 <sup>a</sup>	0.22 ± 0.05	15
(i) LMI and LI	0.31 ± 0.04 <sup>a,b</sup>	0.33 ± 0.04 <sup>a,b</sup>	0.29 ± 0.04 <sup>a,b</sup>	0.3 ± 0.03 <sup>a,b</sup>	0.34 ± 0.04 <sup>a,b,e</sup>	0.31 ± 0.04 <sup>a,b</sup>	0.27 ± 0.05	0.27 ± 0.05	23
(j) LI	0.4 ± 0.14	0.35 ± 0.12 <sup>a,b</sup>	0.37 ± 0.15	0.34 ± 0.13 <sup>a,b</sup>	0.31 ± 0.11 <sup>a-c,e</sup>	0.31 ± 0.11 <sup>a,b</sup>	0.5 ± 0.18	0.44 ± 0.19	4
North-South									
(a) South-South	0.4 ± 0.02	0.44 ± 0.02	0.36 ± 0.02	0.39 ± 0.02	0.47 ± 0.02	0.42 ± 0.02	0.33 ± 0.02	0.3 ± 0.02	108
(b) North-South	0.59 ± 0.02 <sup>a</sup>	0.61 ± 0.02 <sup>a</sup>	0.52 ± 0.02 <sup>a</sup>	0.54 ± 0.02 <sup>a</sup>	0.63 ± 0.02 <sup>a</sup>	0.55 ± 0.02 <sup>a</sup>	0.55 ± 0.03 <sup>a</sup>	0.48 ± 0.02 <sup>a</sup>	131
(c) North-North	0.62 ± 0.02 <sup>a</sup>	0.66 ± 0.02 <sup>a</sup>	0.57 ± 0.02 <sup>a</sup>	0.6 ± 0.02 <sup>a,b</sup>	0.69 ± 0.02 <sup>a</sup>	0.62 ± 0.02 <sup>a,b</sup>	0.56 ± 0.03 <sup>a</sup>	0.52 ± 0.03 <sup>a</sup>	57
Development status									
(a) Developed	0.62 ± 0.02	0.66 ± 0.02	0.57 ± 0.02	0.6 ± 0.02	0.69 ± 0.02	0.62 ± 0.02	0.56 ± 0.03	0.52 ± 0.03	57
(b) Developing	0.43 ± 0.02 <sup>a</sup>	0.48 ± 0.02 <sup>a</sup>	0.4 ± 0.02 <sup>a</sup>	0.43 ± 0.02 <sup>a</sup>	0.51 ± 0.02 <sup>a</sup>	0.46 ± 0.02 <sup>a</sup>	0.36 ± 0.03 <sup>a</sup>	0.33 ± 0.02 <sup>a</sup>	84
(c) Developed and Developing	0.61 ± 0.02 <sup>b</sup>	0.63 ± 0.02 <sup>b</sup>	0.54 ± 0.02 <sup>b</sup>	0.55 ± 0.01	0.64 ± 0.02	0.57 ± 0.01 <sup>b</sup>	0.57 ± 0.02 <sup>b</sup>	0.51 ± 0.02	122
(d) Developing and LDC	0.28 ± 0.03 <sup>a-c</sup>	0.3 ± 0.03 <sup>a-c</sup>	0.24 ± 0.03 <sup>a-c</sup>	0.26 ± 0.03 <sup>a-c</sup>	0.31 ± 0.04 <sup>a-c</sup>	0.28 ± 0.03 <sup>a-c</sup>	0.24 ± 0.05 <sup>a-c</sup>	0.2 ± 0.05 <sup>a-c</sup>	24
(e) All	0.31 ± 0.1 <sup>a,c</sup>	0.35 ± 0.1 <sup>a-c</sup>	0.25 ± 0.09 <sup>a-c</sup>	0.3 ± 0.09 <sup>a,c</sup>	0.39 ± 0.09 <sup>a,c</sup>	0.34 ± 0.08 <sup>a,c</sup>	0.22 ± 0.12 <sup>a-c</sup>	0.17 ± 0.12 <sup>a-c</sup>	9
Regional focus									
(a) Intra-regional	0.5 ± 0.02	0.53 ± 0.02	0.46 ± 0.01	0.48 ± 0.01	0.55 ± 0.02	0.5 ± 0.01	0.44 ± 0.02	0.42 ± 0.02	198
(b) Inter-regional	0.59 ± 0.02 <sup>a</sup>	0.61 ± 0.02 <sup>a</sup>	0.5 ± 0.02	0.53 ± 0.02 <sup>a</sup>	0.63 ± 0.02 <sup>a</sup>	0.56 ± 0.02 <sup>a</sup>	0.54 ± 0.03 <sup>a</sup>	0.44 ± 0.03	98

TABLE 4 Continued

Variable	(1) $TAI^C$	(2) $TAI^E$	(3) $TAI^{C*}$	(4) $TAI^{E*}$	(5) $IWTO^{+,C}$	(6) $IWTO^{+,E}$	(7) $IWTO^{X,C}$	(8) $IWTO^{X,E}$	(9) N
Border									
(a) Not common	0.55 ± 0.01	0.58 ± 0.01	0.49 ± 0.01	0.51 ± 0.01	0.6 ± 0.01	0.53 ± 0.01	0.5 ± 0.02	0.44 ± 0.02	248
(b) Common	0.41 ± 0.03 <sup>a</sup>	0.45 ± 0.03 <sup>a</sup>	0.38 ± 0.03 <sup>a</sup>	0.41 ± 0.03 <sup>a</sup>	0.48 ± 0.04 <sup>a</sup>	0.43 ± 0.03 <sup>a</sup>	0.34 ± 0.04 <sup>a</sup>	0.32 ± 0.04 <sup>a</sup>	48
Language									
(a) Not common	0.57 ± 0.01	0.59 ± 0.01	0.51 ± 0.01	0.53 ± 0.01	0.61 ± 0.01	0.55 ± 0.01	0.53 ± 0.02	0.48 ± 0.02	232
(b) Common	0.37 ± 0.03 <sup>a</sup>	0.42 ± 0.03 <sup>a</sup>	0.33 ± 0.02 <sup>a</sup>	0.38 ± 0.02 <sup>a</sup>	0.47 ± 0.03 <sup>a</sup>	0.42 ± 0.03 <sup>a</sup>	0.27 ± 0.04 <sup>a</sup>	0.23 ± 0.03 <sup>a</sup>	64
Type									
(a) Bilateral	0.4 ± 0.05	0.41 ± 0.04	0.37 ± 0.04	0.39 ± 0.04	0.43 ± 0.04	0.4 ± 0.04	0.38 ± 0.06	0.35 ± 0.05	38
(b) Plurilateral	0.54 ± 0.01 <sup>a</sup>	0.58 ± 0.01 <sup>a</sup>	0.49 ± 0.01 <sup>a</sup>	0.51 ± 0.01 <sup>a</sup>	0.6 ± 0.01 <sup>a</sup>	0.54 ± 0.01 <sup>a</sup>	0.49 ± 0.02 <sup>a</sup>	0.44 ± 0.02	258
Members in WTO									
(a) None	0.36 ± 0.03	0.35 ± 0.03	0.35 ± 0.03	0.33 ± 0.03	0.35 ± 0.03	0.32 ± 0.03	0.38 ± 0.04	0.38 ± 0.04	36
(b) Mix	0.5 ± 0.02 <sup>a</sup>	0.53 ± 0.02 <sup>a</sup>	0.45 ± 0.02 <sup>a</sup>	0.48 ± 0.02 <sup>a</sup>	0.57 ± 0.02 <sup>a</sup>	0.5 ± 0.02 <sup>a</sup>	0.42 ± 0.03	0.4 ± 0.03	105
(c) All	0.59 ± 0.02 <sup>a,b</sup>	0.62 ± 0.01 <sup>a,b</sup>	0.51 ± 0.01 <sup>a</sup>	0.55 ± 0.01 <sup>a</sup>	0.64 ± 0.01 <sup>a</sup>	0.58 ± 0.01 <sup>a,b</sup>	0.53 ± 0.02 <sup>a</sup>	0.45 ± 0.02	155
Notified to WTO									
(a) No	0.57 ± 0.02	0.61 ± 0.02	0.52 ± 0.02	0.55 ± 0.02	0.65 ± 0.02	0.58 ± 0.02	0.49 ± 0.02	0.47 ± 0.02	103
(b) Yes	0.5 ± 0.02 <sup>a</sup>	0.52 ± 0.02 <sup>a</sup>	0.44 ± 0.01 <sup>a</sup>	0.47 ± 0.01 <sup>a</sup>	0.54 ± 0.02 <sup>a</sup>	0.49 ± 0.01 <sup>a</sup>	0.46 ± 0.02	0.4 ± 0.02 <sup>a</sup>	193
WTO provision									
(a) Enabling	0.26 ± 0.04	0.29 ± 0.04	0.23 ± 0.03	0.26 ± 0.03	0.31 ± 0.04	0.29 ± 0.03	0.22 ± 0.05	0.18 ± 0.05	24
(b) Enabling and GATS	0.33 ± 0.07	0.41 ± 0.07	0.3 ± 0.1	0.37 ± 0.1	0.49 ± 0.07	0.44 ± 0.11	0.17 ± 0.08	0.17 ± 0.08	3
(c) GATT	0.5 ± 0.02	0.51 ± 0.02	0.43 ± 0.02	0.44 ± 0.02	0.53 ± 0.02	0.45 ± 0.02	0.47 ± 0.03	0.42 ± 0.03	86
(d) GATT and GATS	0.59 ± 0.02 <sup>a,b</sup>	0.61 ± 0.02 <sup>a</sup>	0.52 ± 0.02 <sup>a,b</sup>	0.56 ± 0.02 <sup>a</sup>	0.63 ± 0.02 <sup>a</sup>	0.59 ± 0.02 <sup>a</sup>	0.55 ± 0.04 <sup>b</sup>	0.45 ± 0.03	80

Notes:

(i) Group means ± standard errors of the mean.

(ii) A mean marked superscript a/b/c/d/e is significantly different from the mean in the row marked a/b/c/d/e. Group means were compared using ANOVA, *t* and Tukey's HSD tests. Statistical output is available from the authors upon request.

(iii) GATS is General Agreement on Trade in Services.

accounting for WTO<sup>X</sup> provisions' enforceability; however, the overall indices indicate that the extensiveness of TAs increases with the number of participants in the WTO. We will further explore the implications of TA participants' involvement in the WTO empirically in Section 4.

The number of enforceable WTO<sup>+</sup> and WTO<sup>X</sup> provisions contained in TAs that have been notified to the WTO Secretariat is actually lower compared to the TAs that have not been notified. However, the differences are small. TAs that have been notified to the WTO and enforced under the Enabling Clause (Goods only) contain fewer WTO<sup>+</sup> and WTO<sup>X</sup> provisions than those that have been enforced under the GATT and GATS (Goods and Services). Although TAs enforced under the GATT contain on average more provisions than those launched under the Enabling Clause, the differences are not significant. There are no differences when accounting for the enforceability of WTO<sup>X</sup> provisions.

To conclude, the group comparisons from this section suggest that the extensiveness of TAs is positively associated with (i) their level of economic development, (ii) their lack of geographic focus, (iii) the number of participants and (iv) the participants' affiliation with the WTO.<sup>5</sup>

#### 4. DO TRADE AGREEMENTS PROMOTE INTERNATIONAL TRADE?

The workhorse model to assess the impact of TAs on trade is the gravity model (see van Bergeijk and Brakman, 2010; Head and Mayer, 2015 for surveys). The standard applications of the gravity model do, in general, thus far not explicitly deal with the heterogeneity of TAs, and mostly account for TAs with a binary dummy variable that equals 1 when a country pair has a TA and 0 otherwise. A paper close to ours is OR, who also deal with TA heterogeneity in a gravity model. However, their focus is different. The main purpose of their study is to analyse and establish a possible link between deeper agreements and production networks. This is particularly important given both the recent increase in TAs and the rise in (globally) slicing-up-the-value chain in production (see Brakman et al., 2015; for a survey of the literature). The inclusion of production networks provides a new explanation for the popularity of TAs: tailor-made TAs between limited groups of countries might correlate with production networks which are particularly important for the members. This, *inter alia*, might explain the difficulties in reaching global agreements such as the WTO Doha Round, which do not include these production networks explicitly and makes global agreements less relevant for individual countries. Our study is more in line with the literature that was inspired by Rose (2004) and Baier and Bergstrand (2007), who study the linkages between institutional membership and international trade flows. Our main aim was to determine whether a binary dummy captures the effects of TAs on international trade or whether explicitly capturing TA heterogeneity is important.

The benchmark gravity specification is as follows:

$$\ln(M_{ijt}) = \alpha + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(Distance_{ij}) + \beta_4 TA_{ijt} + F_{it} + F_{jt} + F_{ij} + \varepsilon_{ijt}, \quad (5)$$

<sup>5</sup> Appendix B of our working study provides some tentative regression analyses, following Baier and Bergstrand (2004), into the determinants of trade agreements that by and large confirm the conclusions in the main text.

where  $M$  is real bilateral imports by importer  $i$  from exporter  $j$  in year  $t$ ,  $GDP$  is real GDP, and  $Distance$  is bilateral distance.<sup>6</sup>  $TA$  is a binary dummy variable that is 1 if the dyad has a TA and 0 otherwise. Our empirical strategy is based on Baier and Bergstrand's (2007) – henceforth referred to as BB – specification of the gravity equation with time-varying multilateral resistance terms, which are represented by the importer-year ( $F_{it}$ ), exporter-year ( $F_{jt}$ ) and country pair ( $F_{ij}$ ) fixed effects. The advantage of this method is that it controls for both time-varying unobservables (such as prices) and dyad-specific unobservables that may be correlated with the error term, thereby potentially introducing an endogeneity bias. As BB explain, the combination of fixed effects controls for the possibility that countries with relatively high volumes of trade are more likely to select into deeper TAs. An additional feature of this specification is that the importer's (exporter's) GDP is perfectly collinear with the importer-year (exporter-year) effects, and the dyadic fixed effects capture bilateral distance. Therefore, following BB, we employ a theoretically justified specification of the gravity equation with time-varying multilateral resistance terms that controls for possible endogeneity,

$$\ln(M_{ijt}) = \alpha + \beta_1 TA_{ijt} + F_{it} + F_{jt} + F_{ij} + \varepsilon_{ijt}. \quad (6)$$

Note here some technical differences between OR and the present study. OR focus on the impact of the number of provisions in a TA on production networks' trade, while our focus is on comparing and contrasting the trade effects of the traditional dummy variable to the heterogeneity indices introduced in this study.<sup>7</sup> Moreover, OR discuss that they had to reduce their number of fixed effects due to computational challenges in their model specification. Specifically, they rely on importer-period, exporter-period and annual fixed effects instead of importer-year and exporter-year fixed effects, with a period denoting five years. In contrast, we use novel estimation techniques that allow for the theoretically justified fixed effects to be specifically and correctly estimated.<sup>8</sup>

Our panel data set covers a maximum of 221 countries and contains observations for the period 1948–2011. The panel is arranged by country pair and year, regardless of missing or zero values. Each country pair is represented twice, once as  $ij$  and once as  $ji$  because bilateral imports are used as the dependent variable. This yields a maximum of 3,111,680 potential observations. However, 12,702 observations (0.41 per cent of the sample) are excluded from the analysis because they involve country pairs with a TA for which we do not have detailed information with which to construct an index.

Bilateral imports and exports are from IMF (2013). Nominal GDP and GDP deflators are provided by the World Bank (2013). Real imports, exports and GDP were calculated by using the GDP deflators. Bilateral geodesic distance (in kilometres), whether countries share a common major/official language, and whether countries share a border are from Mayer and Zignano (2011). Details on the sources of the TA variable are provided in Appendix A. Data

<sup>6</sup> Aggregate trade data are used because the TAs are economy-wide agreements. In future research, the effects of sector-specific provisions may be explored using disaggregate trade data.

<sup>7</sup> Our findings are robust to the inclusion of the number of provisions as opposed to our indices. The results are available from the authors upon request.

<sup>8</sup> Head and Mayer (2015) provide an overview of methods used to estimate structural gravity equations. Following the authors' recommendation, we employ the *reg3hdfe* package to deal with three-dimensional fixed effects. A complementary package, *lfe*, was also used. See Carnerio et al. (2012) and Gaure (2014) for details. To our knowledge, this study is the first to estimate a structural gravity equation for a data set this size.

on countries' WTO participation status are from Tomz et al. (2007). A number of updates were necessary, mostly for a number of countries that became formal WTO members in the period 2000–11. Updates were obtained from the WTO's Website. Additional information about the data set is provided in Appendix B.

The first step is to obtain a benchmark estimate of the gravity equation, where *TA* is a binary dummy variable. The heterogeneity of TAs is ignored when estimating regionalism's effect on cross-border trade flows. Ordinary least squares (OLS) estimates of equation 5 are presented in Table 5, column 1. Second, column 2 shows the results when the heterogeneity index replaces the *TA* dummy, for all provisions covered and column 3 for provisions that are legally enforceable. Columns 4 and 5 repeat these steps for the alternative heterogeneity indices.<sup>9</sup> The final step is to split the TAI into its two components of the WTO<sup>+</sup> index and WTO<sup>X</sup> index. Column 6 shows the results for provisions that are covered, while column 7 considers only the provisions that are legally enforceable.

Our initial results are as expected. In Table 5, column 1 shows that groups of countries with a *TA* observe trade increase with  $e^{0.443} - 1 \approx 55$  per cent compared to those without a *TA*. This is a fairly standard result in the gravity equation literature (see, e.g., van Bergeijk and Brakman, 2010).

More comprehensive trade agreements stimulate international trade. Note, in particular, that the indices account for measurement error imposed by the standard *TA* dummy variable. Accounting for the TAs' comprehensiveness in terms of provisions covered in column 2 suggests a positive relation between the comprehensiveness of an agreement and its effect on international trade. This finding is reinforced after correcting for the provisions' legal enforceability in column 3. Very similar conclusions can be drawn when the alternative heterogeneity indices are employed in columns 4 and 5.

Heterogeneity matters. A breakdown of the overall TAI into the components in column 6 shows that both WTO<sup>+</sup> and WTO<sup>X</sup> provisions are trade promoting. However, this result changes when the legal enforceability of the provisions is accounted for in column 7. Doing so leads to the finding that WTO<sup>X</sup> provisions do not affect cross-border trade, while trade-promoting effects can still be ascribed to WTO<sup>+</sup> provisions. Clearly, not all types of provisions contained in TAs are trade promoting by definition. This is further evidence that the standard 'all or nothing' approach in the literature is misleading. For example, the results suggest that TAs with mostly WTO<sup>X</sup> provisions will not have as positive an outcome on trade as TAs with predominantly WTO<sup>+</sup> provisions.

Overall, the findings suggest that explicitly taking *TA* heterogeneity into account matters. Provisions affect trade in different ways: WTO<sup>+</sup> provisions are found to be trade promoting, in contrast to WTO<sup>X</sup> provisions. Explicitly introducing *TA* heterogeneity is important to address measurement error in *TA* dummy variables.

Our earlier analyses of the heterogeneity indices revealed that the extent to which *TA* participants are involved in the WTO might influence the extensiveness of the *TA* in question. We therefore explore the robustness of our findings by including an interaction term with the extent to which *TA* participants are also involved with the WTO. Note, here, that the analyses do not focus on the impact of WTO membership at the level of the country pair, but on the

<sup>9</sup> In the event that a country pair is involved in multiple TAs, we assume that the most liberal of these will be enforced and so the *TA* with the highest value of  $TAI^E$  is used.

TABLE 5  
Main Results

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
TA	0.443*** (0.025)						
TAI <sup>C</sup>		0.521*** (0.033)					
TAI <sup>E</sup>			0.511*** (0.033)				
TAI <sup>C*</sup>				0.593*** (0.037)			
TAI <sup>E*</sup>					0.606*** (0.037)		
IWTO <sup>+, C</sup>						0.166*** (0.083)	
IWTO <sup>X, C</sup>						0.354*** (0.084)	
IWTO <sup>+, E</sup>							0.545*** (0.093)
IWTO <sup>X, E</sup>							0.062 (0.091)
R <sup>2</sup>	0.928	0.928	0.928	0.928	0.928	0.928	0.928
Adj. R <sup>2</sup>	0.922	0.922	0.922	0.922	0.922	0.922	0.922
N	601,986	601,986	601,986	601,986	601,986	601,986	601,986

Notes:

(i) Dependent variable:  $\ln(M)_{ijt}$ . Model estimated with OLS, importer-year, exporter-year and importer-exporter fixed effects. Robust standard errors (clustered by dyad) are in parentheses.

(ii) Coefficients marked \*\*\*/\*\*/\* are statistically significant at the 1/5/10% level. Other regressors are perfectly collinear with the fixed effects. Fixed effects not reported for brevity.

extent to which other countries belonging to the TA are in the WTO.<sup>10</sup> We control for the three categories defined above: (i) none of the TA participants are in the WTO ('None in WTO'); (ii) at least one of the TA participants is in the WTO and at least one is not ('Mixed Membership'); and (iii) all of the TA participants are also in the WTO ('All in WTO'). Results are presented in Table 6.

We find supporting evidence of our earlier inference from Table 4; that is, WTO members seem to significantly impact the extent to which WTO<sup>+</sup> provisions are contained in TAs that are signed with non-WTO members. In fact, mixed membership of TA itself will have beneficial trade effects for TA participants, even if those participants themselves are not necessarily in the WTO. Having all TA participants in the WTO does not automatically lead to even greater trade effects; what seems to matter most is that at least one of the TA members is also in the WTO. Regarding the interaction terms, we find that there is a positive interaction between the extensiveness of the TA and all of the TA's participants being in the WTO. Overall, controlling for TA participants' WTO status, we again find that TA heterogeneity matters for international trade.<sup>11</sup>

## 5. ROBUSTNESS AND EXTENSION

We now proceed using an alternative solution to control for potential endogeneity bias in our estimates. BB demonstrate that their theoretically motivated specification of the gravity equation with time-varying multilateral resistance terms can also be estimated using first differences. We employ the following specification, which is based on equation 6, as a robustness check:

$$d\ln(M_{ij,t-(t-1)}) = d\beta_1 TA_{ij,t-(t-1)} + dF_{i,t-(t-1)} + dF_{j,t-(t-1)} + v_{ij,t-(t-1)}, \quad (7)$$

where  $v_{ij,t-(t-1)} = \varepsilon_{ijt} - \varepsilon_{ij,t-1}$  is assumed to be white noise. As in the previous section, GDP is collinear with the time-varying effects, while dyad-specific effects cancel out altogether by construction.

An additional feature of this approach is that leads and lags are easily included to account for anticipation and phase-in effects, respectively. In doing so, we control for TAs' effect on trade to occur within a longer time frame, thereby minimising the risk of underestimating TAs' long-run effect on cross-border trade. Indeed, previous studies have found evidence of phase-in effects during a 10- to 15-year period after a TA's enforcement, while evidence of anticipation effects is less common (see Baier and Bergstrand, 2007; Kohl, 2014). This gives

$$d\ln(M_{ij,t-(t-1)}) = \beta_1 dTA_{ij,t-(t-1)} + \beta_2 dTA_{ij,(t-1)-(t-2)} + \beta_3 TA_{ij,t+1} + dF_{i,t-(t-1)} + dF_{j,t-(t-1)} + v_{ij,t-(t-1)}, \quad (8)$$

where  $\beta_1$  and  $\beta_2$  provide the 10-year phase-in effect.  $\beta_3$  captures the five-year anticipation effect, which is a future *level* (not difference) so as to ensure the assumption of strict

<sup>10</sup> We are grateful to an anonymous referee for suggesting this line of investigation. In the case of bilateral TAs, controlling for the number of countries in the country pair involved in the WTO will coincide with controlling for the extent to which TA participants are also WTO members. Results for only controlling explicitly for WTO membership at the level of the country pair are available from the authors upon request.

<sup>11</sup> Interacting the heterogeneity indices with the number of participants or the North-South orientation of the TA does not change our overall findings. Results are available from the authors upon request.

TABLE 6  
Interaction with WTO Membership of Trade Agreements' (TA) Participants

<i>Variable</i>	(1)	(2)	(3)	(4)
TAI <sup>C</sup>	-1.099*** (0.348)			
TAI <sup>E</sup>		-1.169*** (0.385)		
TAI <sup>C*</sup>			-1.014*** (0.316)	
TAI <sup>E*</sup>				-1.123*** (0.374)
Mixed membership	0.732*** (0.061)	0.745*** (0.060)	0.814*** (0.066)	0.798*** (0.065)
All in WTO	0.157* (0.091)	-0.068 (0.080)	0.299*** (0.101)	-0.017 (0.091)
TAI <sup>C</sup> × mixed membership	0.415 (0.360)			
TAI <sup>C</sup> × all in WTO	1.633** (0.367)			
TAI <sup>E</sup> × mixed membership		0.402 (0.397)		
TAI <sup>E</sup> × all in WTO		2.143*** (0.402)		
TAI <sup>C*</sup> × mixed membership			0.208 (0.329)	
TAI <sup>C*</sup> × all in WTO			1.337*** (0.342)	
TAI <sup>E*</sup> × mixed membership				0.265 (0.387)
TAI <sup>E*</sup> × all in WTO				1.994*** (0.395)
R <sup>2</sup>	0.928	0.928	0.928	0.928
Adj. R <sup>2</sup>	0.922	0.922	0.922	0.922
N	601,986	601,986	601,986	601,986

## Notes:

(i) Dependent variable:  $\ln(M)_{ijt}$ . Model estimated with OLS, importer-year, exporter-year and importer-exporter fixed effects. Robust standard errors (clustered by dyad) are in parentheses.

(ii) Coefficients marked \*\*\*/\*\*/\* are statistically significant at the 1/5/10% level.

(iii) Other regressors are perfectly collinear with the fixed effects.

(iv) Fixed effects not reported for brevity.

exogeneity is not violated; that is, potential endogeneity bias cannot be ruled out if this parameter estimate is statistically significant (see Wooldridge, 2002). Equation 8 is estimated at five-year intervals for simplicity of notation, which implies that we study data points in the years 1950, 1955, . . . , 2010 and only include TAs that were enforced by 2000 at the latest. Table 7 presents the parameter estimates when first differencing is used as an alternative check for endogeneity bias and to allow for anticipation and phase-in effects.

The positive and significant estimated parameters for  $\beta_1$  and/or  $\beta_2$  confirm the existence of phase-in effects over a 10-year period when the dummy TA variable or heterogeneity indices are used (column 1–5). The estimated impact of TAs on trade is again larger when measurement error in the binary TA variable is accounted for by means of our (alternative) indices, a



TABLE 7  
First Differences

	(1) TA	(2) TAI <sup>C</sup>	(3) TAI <sup>C*</sup>	(4) TAI <sup>E</sup>	(5) TAI <sup>E*</sup>	(6) IWTO <sup>+, C</sup>	(7) IWTO <sup>X, C</sup>	IWTO <sup>+, E</sup>	IWTO <sup>X, E</sup>
$\beta_1$	0.036 (0.049)	0.225*** (0.071)	0.243*** (0.069)	0.269*** (0.076)	0.283*** (0.074)	0.359*** (0.151)	-0.114 (0.156)	0.335* (0.178)	-0.047 (0.181)
$\beta_2$	0.100** (0.043)	0.201*** (0.065)	0.197*** (0.063)	0.209*** (0.069)	0.208*** (0.067)	0.067 (0.150)	0.139 (0.160)	0.119 (0.177)	0.092 (0.187)
$\beta_3$	0.101*** (0.020)	0.161*** (0.032)	0.159*** (0.031)	0.161*** (0.033)	0.165*** (0.033)	-0.0003 (0.076)	0.158*** (0.077)	0.062 (0.089)	0.100 (0.088)
$R^2$	0.412	0.412	0.412	0.412	0.412	0.412	0.412	0.412	0.412
Adj. $R^2$	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390	0.390
N	70,988	70,988	70,988	70,988	70,988	70,988	70,988	70,988	70,988

Notes:

- (i) Dependent variable:  $\Delta \ln(M)_{j,t-(t-1)}$ .
- (ii) Model estimated according to equation 8, where  $\beta_1$  and  $\beta_2$  represent phase-in effects and  $\beta_3$  the anticipation effect. Each column shows the nature of the independent variable used in the particular specification of equation 8; that is, the TA dummy was used in column 1, while all IWTO<sup>C</sup> (IWTO<sup>E</sup>) indices were used instead of the TA dummy in column 6 (7), respectively. Robust standard errors (clustered by dyad) are in parentheses.
- (iii) Coefficients marked \*\*\*/\*\*/\* are statistically significant at the 1/5/10% level. Fixed effects not reported for brevity.

finding which is consistent with our main results discussed in the previous section. Taking these results together, we conclude that both the heterogeneous nature of trade agreements and the possibility of their being phased in over time are important considerations when estimating a TA's effect on international trade.

Unfortunately, there are also statistically significant anticipation effects for the TA variable and most of the heterogeneity indices. So, even if the overall phase-in effects seem plausible, endogeneity concerns cannot be entirely ruled out. Nevertheless, once we break the overall indices down into their subcomponents in column 6–7, we find, once again, that WTO<sup>+</sup> provisions matter more for trade than their WTO<sup>X</sup> counterparts. Note that this result holds especially once we consider the legal enforceability of WTO<sup>+</sup> and WTO<sup>X</sup> provisions in column 7, in which case insignificant anticipation effects reveal that we have successfully addressed the endogeneity concerns.

Overall, we conclude that our main findings are robust when using first differences and allowing for anticipation and phase-in effects as an alternative panel data technique to control for endogeneity bias in the parameter estimates.

## 6. CONCLUSIONS

The seminal article of Rose (2004) revived interest in the effects of trade institutions on international trade. A key characteristic of this literature is the overly simplistic way in which trade agreements are treated, as a binary dummy variable. However, trade agreements come in many different forms and shapes. This study addresses this heterogeneity in trade agreements. Using a database of 296 agreements, we distinguish 13 policy domains that are within the present scope of the WTO's mandate (i.e. WTO<sup>+</sup> provisions) and four policy domains that are not (i.e. WTO<sup>X</sup> provisions). Furthermore, the possibility that these undertakings may or may not be legally enforceable is accounted for.

We show that the degree to which governments negotiate comprehensive trade agreements is positively related to their level of economic development. Moreover, the number of WTO members in a TA and its comprehensiveness are positively associated. This is because many provisions contained in trade agreements generally build on existing WTO policies. Strikingly, our empirical findings suggest that WTO members use TAs not to undermine or circumvent the WTO, but rather to build on the trade-promoting, non-discriminatory policies embedded in the multilateral system – even when not all TA participants are WTO members.

Our extensive taxonomy of trade agreements enables us to shed some light on whether trade agreement heterogeneity affects international trade differently. Using a gravity model, we find that trade agreement heterogeneity indeed matters in order to grasp the impact of TAs on international trade. The 'all provisions are equal' approach in the literature is therefore only of limited use. Distinguishing between various types of provisions confirms that they have different effects on international trade. Standard trade provisions that are part of the WTO's mandate (WTO<sup>+</sup> policies) are found to be trade promoting, whereas more modern provisions that are beyond the scope of the WTO are not. We also find that trade agreements' effectiveness in promoting trade crucially depends on whether the provisions covered in a TA are actually legally enforceable. The overall conclusion is thus that trade agreement heterogeneity matters for international trade.

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## APPENDIX A

### CODING PROCEDURE OF TRADE AGREEMENTS

The data set in this study draws on the Global Preferential Trade Agreements Database (GPTAD), which was developed by the World Bank and the Tuck Centre for International Business (World Bank 2011). GPTAD is an extensive database that contains the legal texts of virtually all trade agreements that have been enforced in the post-war period. Its unique feature is that it makes the agreements' text searchable for a large number of keywords. Table A1 lists the 344 Trade agreements (TAs) that are or have been enforced in the period 1948–2011. Of these agreements, 296 have been classified by GPTAD and are therefore included in this study.

Contrary to HMS and following WTO (2011), agreements with non-WTO members are included. This is useful to investigate possible differences or similarities between the nature and number of provisions contained in (non)WTO members' trade policy commitments. Moreover, the sample is not restricted to only those agreements that have been notified to the WTO. The reason for this is because notification is neither a legal prerequisite for governments to be able to enforce a TA, nor some form of WTO endorsement that it is a 'real' TA. Of the 296 TAs in the sample, 193 have been notified to the WTO. Finally, agreements are

TABLE A1  
Trade Agreements by Year of Enforcement

<i>Year</i>	<i>Trade Agreement</i>
<1950	Belgium-Netherlands-Luxembourg Customs Union (Benelux) (1957),* Southern African Customs Union (SACU)
1958	European Community (EC)
1960	European Free Trade Association (EFTA)
1961	Central American Economic Integration Agreement (CAEIA) (1966)*
1966	Central American Common Market (CACM) (1970)*
1968	Association of Southeast Asian Nations (ASEAN) Free Trade Agreement (AFTA)
1971	EC-Malta (2004), EC-Overseas Countries and Territories (EC-OCT)
1973	Caribbean Community (CARICOM), Costa Rica-Panama, EC-Cyprus (2004), EC-Egypt, EC-Iceland, EC-Norway, EC-Switzerland-Liechtenstein, Honduras-Panama
1976	Asia Pacific Trade Agreement (APTA), Australia-Papua New Guinea (PATCRA), EC-Algeria
1977	EC-Syria
1981	Gulf Cooperation Council (GCC), India-Maldives, Latin American Integration Association (LAIA), South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA/PACER)
1982	Australia-New Zealand (ANZCERTA), Organisation of Eastern Caribbean States (OECS)*
1984	China-India
1985	Economic Community of Central African States (ECCAS), Economic Cooperation Organisation (ECO), Israel-US
1988	Andean Community (Cartanega)
1989	Arab Maghreb Union (AMU), Canada-US Free Trade Agreement (CUSFTA) (1994)*
1990	Central American Common Market (CACM) (revival)
1991	EC-Andorra, India-Nepal, Laos-Thailand, Mercado Comun del Sur (MERCOSUR)
1992	Armenia-Russia, Belarus-Ukraine, Czech Republic-Slovak Republic (2004), EC-Czech Republic (2004), EC-Hungary (2004), EC-Poland (2004), EC-Slovak Republic (2004), EFTA-Czech Republic (2004), EFTA-Slovak Republic (2004), EFTA-Turkey, Faroe Islands-Norway, Kyrgyz Republic-Russia
1993	Armenia-Moldova, Bolivia-Chile, CARICOM-Venezuela, Chile-Venezuela, EC-Bulgaria (2007), EC-Romania (2007), Economic Community of West African States (ECOWAS), EFTA-Bulgaria (2007), EFTA-Israel, EFTA-Poland (2004), EFTA-Romania (2007), Russia-Ukraine
1994	Armenia-Kyrgyz Republic, Armenia-Ukraine, Baltic Free Trade Area (BAFTA) (2004)*, Bolivia-Mexico*, Central European Free Trade Agreement (CEFTA), Common Market for Eastern and Southern Africa (COMESA), Commonwealth of Independent States (CIS), Costa Rica-Mexico, European Economic Area (EEA), Faroe Islands-Switzerland, Georgia-Russia, Kazakhstan-Ukraine, Melanesian Spearhead Group (MSG), Moldova-Romania (2007), North American Free Trade Agreement (NAFTA), Turkmenistan-Ukraine, Ukraine-Uzbekistan, West African Economic and Monetary Union (WAEMU)
1995	Armenia-Cyprus (2004)*, Armenia-Georgia, Armenia-Iran, Armenia-Turkmenistan, Association of Caribbean States (ACS)*, Azerbaijan-Ukraine, CARICOM-Colombia, Colombia-Mexico-Venezuela*, EC-Estonia (2004), EC-Latvia (2004), EC-Lithuania (2004),

TABLE A1 *Continued*

<i>Year</i>	<i>Trade Agreement</i>
1996	EFTA-Slovenia (2004), Estonia-Ukraine (2004), Georgia-Ukraine, Kazakhstan-Kyrgyz Republic, Kyrgyz Republic-Moldova, Kyrgyz Republic-Ukraine, South Asian Preferential Trade Agreement (SAFTA) (2006) Azerbaijan-Georgia, Canada-Chile, Canada-Israel, Croatia-Macedonia, Czech Republic-Estonia (2004), Czech Republic-Israel (2004), Czech Republic-Latvia (2004), Czech Republic-Lithuania (2004), EC-Turkey, EFTA-Estonia (2004), EFTA-Latvia (2004), EFTA-Lithuania (2004), Estonia-Slovak Republic (2004), Estonia-Slovenia (2004), Georgia-Turkmenistan, Israel-Turkey, Kyrgyz Republic-Uzbekistan, Latvia-Slovak Republic (2004), Latvia-Slovenia (2004), Lithuania-Poland (2004), Lithuania-Slovak Republic (2004), Lithuania-Slovenia (2004), Macedonia-Slovenia (2004)
1997	Armenia-Canada*, Croatia-Slovenia (2004), Czech Republic-Turkey (2004), EC-Faroe Islands, EC-PLO, EC-Russia*, EC-Slovenia (2004), Estonia-Faroe Islands (2004), Estonia-Turkey (2004), Eurasian Economic Community (EAEC), Georgia-Kazakhstan, Hungary-Israel (2004), Hungary-Turkey (2004), Israel-Poland (2004), Israel-Slovak Republic (2004), Lithuania-Turkey (2004), MERCOSUR-Bolivia, Mexico-Nicaragua, Romania-Turkey (2007), Slovak Republic-Turkey (2004)
1999	Armenia-Kazakhstan, Bulgaria-Macedonia (2007), Chile-Costa Rica, Chile-El Salvador, Chile-Guatemala*, Chile-Honduras*, EFTA-Morocco, EFTA-PLO, Macedonia-Turkey, Poland-Turkey (2004)
2001	Albania-Macedonia, Bosnia and Herzegovina-Macedonia, Bosnia and Herzegovina-Macedonia, Bosnia and Herzegovina-Slovenia (2004), Bulgaria-Estonia (2004), Bulgaria-Israel, Bulgaria-Lithuania (2004), Canada-Costa Rica, Central America-Mexico, EC-Macedonia, EFTA-Macedonia, EFTA-Mexico, Israel-Romania (2007), Macedonia-Ukraine, Mexico-Northern Triangle, Northern Triangle*, Tajikistan-Ukraine, Vietnam-US
2002	Albania-Bosnia and Herzegovina*, Albania-Bulgaria (2007), Albania-Croatia, Armenia-Estonia (2004)*, Bosnia and Herzegovina-Romania (2007), Bosnia and Herzegovina-Serbia and Montenegro*, Bosnia and Herzegovina-Turkey, Bulgaria-Latvia (2004), CARICOM-Dominican Republic, Croatia-Turkey, EC-Croatia, EC-Jordan, EC-San Marino, EFTA-Croatia, EFTA-Jordan, El Salvador-Panama, Guatemala-Panama*, Japan-Singapore, Pakistan-Sri Lanka
2003	Afghanistan-India, Albania-Moldova, Albania-Romania (2007), Albania-Serbia and Montenegro*, ASEAN-China, Australia-Singapore, Bosnia and Herzegovina-Bulgaria (2007), Bosnia and Herzegovina-Moldova, Bulgaria-Moldova (2007)*, Bulgaria-Serbia and Montenegro (2007)*, CEFTA-Croatia (2007)*, Chile-South Korea, Chile-US, China-Hong Kong, China-Macao, Croatia-Lithuania (2004), Croatia-Moldova, Croatia-Serbia and Montenegro, Dominican Republic-Panama, EC-Chile, EC-Lebanon, EFTA-Singapore, Mexico-Uruguay*, Moldova-Serbia and Montenegro, Moldova-Ukraine, Pacific Island Countries Trade Agreement (PICTA), Romania-Serbia and Montenegro (2007), Singapore-US
2004	Australia-Thailand, Australia-US, Bosnia and Herzegovina-Croatia, CARICOM-Costa Rica, Common Economic Zone (CEZ), EC-Fiji-Papua New Guinea*, EC-Serbia and Montenegro*, EFTA-Chile, Japan-Mexico, Jordan-Singapore, Macedonia-Moldova, Macedonia-Romania (2007), Morocco-Turkey, Morocco-US, Panama-Taiwan, Syria-Turkey, Tunisia-Turkey
2005	Bahrain-US, Bhutan-India, CARICOM-Cuba, Chile-China, EFTA-Tunisia, Egypt-Turkey, Faroe Islands-Iceland, India-Singapore, Japan-Malaysia, MERCOSUR-Colombia-Ecuador*, MERCOSUR-Peru*, MERCOSUR-SACU*, PLO-Turkey, New Zealand-Thailand,

TABLE A1 *Continued*

<i>Year</i>	<i>Trade Agreement</i>
	Singapore-South Korea
2006	ASEAN-South Korea, Bangladesh-India, Central America-Dominican Republic-US, Chile-India, Chile-Peru, EC-Albania, EFTA-South Korea, Guatemala-Taiwan*, MERCOSUR-Mexico*, Panama-Singapore, South Asian Free Trade Agreement (SAFTA)*, Trans-Pacific Strategic Economic Partnership (TPSEP)
2007	Chile-Japan, China-Pakistan, EFTA-Egypt, EFTA-Lebanon, Japan-Thailand, Mauritius-Pakistan
2008	Albania-Turkey, ASEAN-Japan, Brunei-Japan, Chile-Panama, China-New Zealand, EC-Bosnia and Herzegovina, EC-CARIFORUM States EPA, EC-Montenegro, EFTA-SACU, El Salvador-Honduras-Taiwan, Georgia-Turkey, Indonesia-Japan, Japan-Philippines, Malaysia-Pakistan, Nicaragua-Taiwan*
2009	Australia-Chile, Canada-Peru, Chile-Colombia, China-Singapore, EC-Cameroon, EC-Côte d'Ivoire, EFTA-Canada, Japan-Switzerland, Japan-Vietnam, MERCOSUR-India, Oman-US, Peru-Singapore, Peru-US
2010	ASEAN-Australia-New Zealand, ASEAN-India, EFTA-Albania*, EFTA-Serbia*, India-South Korea, Montenegro-Turkey*, Peru-China, Serbia-Turkey*
2011	Canada-Colombia, Chile-Turkey*, EC-South Korea*, EFTA-Colombia, EFTA-Peru*, Hong Kong-New Zealand*, India-Japan, India-Malaysia*, Jordan-Turkey*, Peru-South Korea*

## Notes:

(i) TAs marked \* were not indexed due to missing information in the GPTAD.

(ii) Years of expiration or transition to another TA are in parentheses.

Source: McGill University (2009), Tuck (2009), WorldTradeLaw.net (2009), World Bank (2011) and WTO (2014).

TABLE A2  
Description of Provisions by Type

<i>Type</i>	<i>Provisions</i>	<i>Description</i>
WTO <sup>+</sup>	Agriculture	Agreement to liberalise trade in agricultural commodities by reducing/abolishing barriers to trade such as tariffs, quotas and subsidies. Agreement to harmonise agricultural policies may also be included. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the GATT 1994/WTO Agriculture Agreement
WTO <sup>+</sup>	Anti-dumping and countervailing measures (AD and CVM)	Agreement with rules on anti-dumping and countervailing measures that specify the conditions under which parties may deviate from their liberalisation commitments to offset injury caused by dumping. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the GATT 1994/WTO Agreement on Subsidies and Countervailing Measures (SCM Agreement)
WTO <sup>+</sup>	Customs administration	Agreement to reduce administrative barriers to trade by simplifying customs administration with respect to issues such as import licensing requirements, valuation and nomenclature. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the GATT 1994/WTO Agreement on Import Licensing Procedures
WTO <sup>+</sup>	Export restrictions	Agreement to liberalise duties, charges and/or quantitative restrictions on exported goods. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the GATT 1994
WTO <sup>+</sup>	Import restrictions	Agreement to liberalise duties, charges and/or quantitative restrictions on imported goods. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the GATT 1994
WTO <sup>+</sup>	Intellectual property rights (IPR)	Agreement on the protection of IPR (copyrights, patents, trademarks, etc.) in foreign markets. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the WTO Agreement on Trade-Related Aspects of IPR (TRIPS Agreement)
WTO <sup>+</sup>	Investment	Agreement to prohibit discriminatory trade-related investment practices such as local content requirements, trade balancing requirements and foreign exchange restrictions. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the WTO Agreement on Trade-Related Investment Measures (TRIMS)
WTO <sup>+</sup>	Public procurement	Agreement to grant access to foreign parties and further liberalise the market for public procurement. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the WTO Agreement on Government Procurement (GPA)
WTO <sup>+</sup>	Sanitary and phytosanitary measures (SPS)	Agreement to simplify and/or harmonise import requirements with respect to food safety and animal and plant health. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the WTO SPS Agreement
WTO <sup>+</sup>	Services	Agreement to liberalise trade in services. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the General Agreement on Trade in Services (GATS)
WTO <sup>+</sup>	State aid	Agreement to restrict any form of aid that could give rise to unfair competitive advantages. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the GATT 1994/WTO Agreement on Subsidies and Countervailing Measures (SCM Agreement)
WTO <sup>+</sup>	State trading enterprises (STE)	Agreements to ensure market access and non-discriminatory behaviour by governmental enterprises. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the GATT 1994.



TABLE A2 *Continued*

<i>Type</i>	<i>Provisions</i>	<i>Description</i>
WTO <sup>+</sup>	Technical barriers to trade (TBT)	Agreements to reduce barriers to trade by simplifying and harmonising standards and technical barriers such as testing and certification procedures. Undertakings may be in line with, deepen and/or broaden the scope of provisions specified in the WTO Agreement on TBT
WTO <sup>x</sup>	Capital mobility	Agreement to improve capital mobility by relaxing restrictions on foreign capital and facilitating cross-border financial transfers.
WTO <sup>x</sup>	Competition	Agreements on competition policy to restrict or prohibit monopolies' activities to promote undistorted competition
WTO <sup>x</sup>	Environment	Agreement to uphold environmental laws, provided that they are not used as disguised barriers to trade. Commitments to enforce environmental laws so as not to attract (foreign) business activity that would exploit environmental resources
WTO <sup>x</sup>	Labour	Agreement to uphold labour laws so as not to attract (foreign) business activity that would exploit employees and/or to facilitate labour mobility

Source: World Bank (2011).

included even if they have already expired. This is because these agreements also contain information about the domains for which their governments (at some point in time) enforced the specific trade policies that are of interest in this study.

GPTAD classifies the provisions of every agreement according to WTO criteria, which allows the user to compare provisions across agreements. So, a researcher interested in measures on anti-dumping and countervailing measures may search the database with these keywords. All agreements containing provisions on this topic will then be listed, along with the relevant chapters, titles and/or articles for each agreement.

As discussed in WTO (2011), the number of policy domains depends on the identification strategy. HMS, for instance, use chapter and article headings of the agreements in their sample to reach a total of 52 policy domains. An alternative would be to compile a detailed list of each and every single policy domain that could conceptually be included in a TA. Although this approach has the merit of exhaustiveness and precision, which is arguably a preferred route when analysing a limited set of agreements, it introduces even more complexity when the objective of a study such as this one is to identify the key domains of importance for a substantial number of TAs.

What are the provisions identified in the present study? GPTAD features 13 WTO<sup>+</sup> policy domains. These provisions, all of which are part of the WTO's current mandate, are listed in Table A2, along with a brief intuition of how it relates to trade. In addition, it describes the purpose of an additional four WTO<sup>X</sup> policy domains that extend beyond the scope of the WTO.

Having identified the provisions that can be extracted from GPTAD, every TA can now be coded. GPTAD is used to assign a binary variable to each policy domain that is covered by the TA under investigation. Policy domains for which the agreement contains a provision are coded 1 and 0 otherwise. In order for a provision to be considered 'covered' (C) and scored 1, all that is needed is for the provision to reflect agreement by both parties to somehow cooperate with a view of trade liberalisation. The issue of legal enforceability is not relevant at this stage. Hence, a provision calling for an exchange of Parties' information on their environmental policies would score a 1, but so would provisions that give rise to obligations to protect natural resources. The odd provisions that only state that Parties reserve the right to protect their natural resources are scored 0 because such measures are essentially protectionist and do not require any form of cooperation.

A provision that is also deemed to be legally enforceable scores 1 for 'enforceability' (E). The criteria build on those laid down in HMS. These provisions typically use the word 'shall'. For example: 'Parties shall grant service providers treatment no less favourable than that accorded to their own'. Timing is also important. A provision calling for gradual liberalisation of government procurement policies, without indicating the date by which the liberalisation must be complete, scores 0. This is because it is unclear when the Party must be able to meet that particular requirement. Provisions stating that Parties 'shall negotiate', 'shall consider' or 'shall cooperate' are also difficult to be enforced. Negotiations may still fail and not abolish trade barriers. It also seems very unlikely that it would be able to prove that Parties have not given due consideration to a matter or that they have not cooperated. For clarity and ease of replication, several excerpts from actual trade agreements are provided below. Table A3 shows examples of WTO<sup>+</sup> provisions and WTO<sup>X</sup> provisions and classifies them as being either enforceable or non-enforceable, based on the criteria discussed above.

It is useful to reflect on some of the comments on HMS's notion of legal enforceability discussed in WTO (2011). First, the question whether an undertaking is sufficiently formu-

TABLE A3  
Coding Examples

<i>Type</i>	<i>Provision</i>	<i>Covered and...</i>	<i>Example(s)</i>
WTO <sup>+</sup>	Agriculture	Not enforceable	The parties share the long term objective of establishing a (...) agriculture trading system. They agree to work together towards the conclusion of the agriculture negotiations (...)
WTO <sup>+</sup>	AD and CVM	Enforceable Not enforceable	The common market shall extend to agriculture and trade in agricultural products (...) The provisions of this Article shall not be subject to the dispute settlement provisions of this Agreement
		Enforceable	Each Party retains its rights and obligations under Article VI of GATT 1994 and the WTO Agreement, and their successors, with regard to the application of antidumping and countervailing duties
WTO <sup>+</sup>	Customs administration	Not enforceable	The Member States recognise that the objectives of this Agreement may be promoted by harmonisation of customs policies and procedures in particular cases. Accordingly the Member States shall consult at the written request of either to determine any harmonisation that may be appropriate
		Enforceable	The Parties shall apply the provisions of Article VII of GATT 1994 and the WTO Agreement on the Implementation of Article VII of GATT 1994 for the purposes of determining the customs value of goods traded between the Parties
WTO <sup>+</sup>	IPR	Not enforceable	Each Party, recognising the importance of protecting intellectual property in further improving the business environment in the Party, shall: (a) endeavour to improve its intellectual property protection system; (b) comply with the obligations set out in the international agreements relating to intellectual property to which it is a party; (c) endeavour to become a party to international agreements relating to intellectual property to which it is not a party; (d) endeavour to ensure transparent and streamlined administrative procedures concerning intellectual property; (e) endeavor to ensure adequate and effective enforcement of IPR; and (f) endeavour to further promote public awareness of protection of intellectual property
		Enforceable	The Parties agree that the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights shall govern and apply to all intellectual property issues arising from this Agreement. Each Party affirms its rights and obligations with respect to each other Party under the TRIPS Agreement. Each Party shall accord to the nationals of each other Party treatment no less favourable than it accords to its own nationals with regard to the protection of intellectual property, subject to the exceptions provided in the TRIPS Agreement and in those multilateral agreements concluded under the auspices of WIPO. The Parties shall grant and ensure adequate and effective protection of IPR on a non-discriminatory basis, including effective measures for enforcing such rights against infringement, and particularly against counterfeiting and piracy

TABLE A3 *Continued*

<i>Type</i>	<i>Provision</i>	<i>Covered and...</i>	<i>Example(s)</i>
WTO <sup>+</sup>	Investment	Not enforceable	To promote investments, the Parties agree to enter into negotiations in order to progressively liberalise the investment regime. To promote investments and to create a liberal, facilitative, transparent and competitive investment regime, the Parties agree to enter into negotiations in order to progressively liberalise their investment regimes, strengthen cooperation in investment, facilitate investment and improve transparency of investment rules and regulations, and provide for the protection of investments. If a Party grants to a non-Party, after the entry into force of this Agreement, a more favourable investment framework than under this Agreement, it shall afford adequate opportunity to the other Parties to seek to obtain, including through possible negotiations, comparable conditions, on a mutually beneficial basis
		Enforceable	The Sides will not: impose local taxes or charges, directly or indirectly on goods, covered by the present agreement, of another Side, at the rate that exceeds the level of relevant taxes or charges imposed on analogous goods of the local production or those produced in third countries; introduce special restrictions or demands towards export and import of goods, covered by the present agreement, that in similar cases are not used towards analogous goods of the local production or those produced in third countries; use different rules towards warehousing, unloading, storage, shipment of goods, originated from another country to the agreement, as well as towards repayments and remittances, with the exception of rules that in similar cases are used towards domestic goods or those originated from third countries
WTO <sup>+</sup>	Public procurement	Not enforceable	The Parties will progressively develop their respective rules, conditions and practices on public procurement and shall grant suppliers of the other Party access to contract award procedures on their respective public procurement markets not less favourable than that accorded to companies of any third country. The Parties consider the liberalisation of their respective public procurement markets as an objective of this Agreement. The Parties aim at opening up of the award of public contracts on the basis of non-discrimination and reciprocity. The Parties shall, subject to their laws, regulations and policies, exchange information in respect of their government procurement policies and practices
		Enforceable	The Parties consider the opening up of the award of public contracts on the basis of non-discrimination and reciprocity, to be a desirable objective. 2. As of the entry into force of this Agreement, both Parties shall grant each other's companies access to contract award procedures a treatment no less favourable than that accorded to companies of any other country

TABLE A3 *Continued*

<i>Type</i>	<i>Provision</i>	<i>Covered and...</i>	<i>Example(s)</i>
WTO <sup>+</sup>	SPS	Not enforceable	The Parties shall aim to reduce differences in standardisation and conformity assessment. To this end the Parties shall conclude where appropriate agreements on mutual recognition in the field of conformity assessment
		Enforceable	Each party affirms its rights and obligations with respect to each other Party under the SPS Agreement. Each Party undertakes not to adopt or maintain any prohibition or quantitative restriction on the importation of any goods of the other Parties or on the exportation of any goods destined for the territory of the other Parties, except in accordance with its WTO rights and obligations or other provisions in this Agreement. The Parties reaffirm the rights and obligations relating to SPS measures under the SPS Agreement among those Parties that are parties to the said Agreement. The Parties shall apply their regulations in SPS matters in a non-discriminatory fashion and shall not introduce any measures that have the effect of unduly obstructing trade The Parties agree to enter into negotiations to progressively liberalise trade in services with substantial sectorial coverage.
WTO <sup>+</sup>	Services	Not enforceable	Each Party shall provide free transit over the territory of its country for goods originated within the customs territory of the other Party or having originated in third countries and destined for the customs territory of the other Party or any third country, and shall supply the exporters, importers, and shipping companies involved in such transit operations with all the available resources and services required for the execution of these transit operations on terms (including financial) that are not worse than the terms for providing the same resources and services to exporters, importers, and national shipping companies of any other third country. Contracting Parties shall conclude a special agreement on transit
		Enforceable	Each Party shall accord services and service suppliers of any other Party treatment no less favourable than that provided by those of the Party. There shall be free movement of services
WTO <sup>+</sup>	State aid	Not enforceable	The Parties shall review the issue of disciplines on subsidies related to trade in services in the light of any disciplines agreed under Article XV of General Agreement on Trade in Services (GATS) with a view to their incorporation into this Agreement
		Enforceable	Each Party agrees to eliminate and not reintroduce all forms of export subsidies for agricultural goods destined for the other Parties. The following are incompatible with the proper functioning of this Agreement in so far as it affects trade between the Contracting Parties: any state aid which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods.

TABLE A3 *Continued*

<i>Type</i>	<i>Provision</i>	<i>Covered and...</i>	<i>Example(s)</i>
WTO <sup>+</sup>	STE	Not enforceable	Contracting Parties shall not use state aid in the form of subsidies to enterprises or in any other form if the result of such state aid would be the distortion of normal economic conditions in the territory of the other Contracting Party. The Parties confirm their rights and obligations arising from the WTO Agreement on Subsidies and Countervailing Measures
		Not enforceable	The Contracting Parties shall adjust progressively any state monopoly of a commercial character so as to ensure that no discrimination regarding the conditions under which goods are procured and marketed exists between nationals of the Contracting Parties
		Enforceable	The Parties shall adjust progressively any state monopoly of a commercial character so as to ensure that by the date of entry into force of this Agreement, no discrimination regarding the conditions under which goods are procured and marketed exists between nationals of the Parties. Each Party shall ensure that any state monopoly supplier of a service in its Area does not, in the supply of the monopoly service in the relevant market, act in a manner inconsistent with the Party's commitments under this Chapter.
			The States Parties to this Agreement shall ensure that any state monopoly of a commercial character be adjusted, subject to the provisions laid down in Protocol D, so that no discrimination regarding the conditions under which goods are procured and marketed will exist between nationals of Party 1 and of Party 2
WTO <sup>+</sup>	TBT	Not enforceable	The parties agree to strengthen their co-operation in measures including technical barriers to trade/non-tariff measures.
			The Member States shall: (a) examine the scope for taking action to harmonise requirements relating to such matters as standards, technical specifications and testing procedures, domestic labelling and restrictive trade practices; and (b) where appropriate, encourage government bodies and other organisations and institutions to work towards the harmonisation of such requirements
		Enforceable	Member States shall eliminate other non-tariff barriers on a gradual basis within a period of five years after the enjoyment of concessions applicable to those products. Each Party undertakes not to adopt or maintain any prohibition or quantitative restriction on the importation of any goods of the other Parties or on the exportation of any goods destined for the territory of the other Parties, except in accordance with its WTO rights and obligations or other provisions in this Agreement. The Parties reaffirm the rights and obligations relating to standards, technical regulations and conformity assessment procedures under the TBT Agreement among those Parties that are parties to the said Agreement. The rights and obligations of the Parties, relating to technical barriers to trade (technical

TABLE A3 *Continued*

<i>Type</i>	<i>Provision</i>	<i>Covered and ...</i>	<i>Example(s)</i>
WTO <sup>x</sup>	Capital mobility	Not enforceable Enforceable	regulations, standards and conformity assessment procedures) and the respective measures, shall be governed by the WTO Agreement on Technical Barriers to Trade Not available Each Party shall permit all transfers relating to a covered investment to be made freely and without delay into and out of its territory. Such transfers include: (a) contributions to capital; (b) profits, dividends, interest, capital gains, royalty payments, management fees, and technical assistance and other fees; (c) proceeds from the sale of all or any part of the covered investment or from the partial or complete liquidation of the covered investment; (d) payments made under a contract entered into by the investor, or the covered investment, including payments made pursuant to a loan agreement; (e) payments made pursuant to paragraphs 1 and 2 of Article 10.6 and Article 10.11; and (f) payments arising under Section B. 2. Each Party shall permit returns in kind relating to a covered investment to be made as authorised or specified in a written agreement between the Party and a covered investment or an investor of the other Party. 3. Each Party shall permit transfers relating to a covered investment to be made in a freely usable currency at the market rate of exchange prevailing on the date of transfer
WTO <sup>x</sup>	Competition	Not enforceable	The Commission shall adopt, at the General Secretariat's proposal, the rules which are needed to guard against or correct practices which may distort competition within the Subregion, such as dumping, improper price manipulations, manoeuvres made to upset the normal supply of raw materials and others with a like effect. In this respect, the Commission shall consider the problems that could derive from the imposition of levies and other restrictions on exports Where a Party's monopoly supplier competes, either directly or through an affiliated company, in the supply of a service outside the scope of its monopoly rights and which is subject to that Party's specific commitments, the Party shall ensure that such a supplier does not abuse its monopoly position to act in its territory in a manner inconsistent with such commitments
WTO <sup>x</sup>	Environment	Not enforceable Enforceable	Member Countries shall undertake joint policies that enable a better use of their renewable and non-renewable natural resources and the preservation and improvement of the environment A Party shall not fail to effectively enforce its environmental laws, through a sustained or recurring course of action or inaction, in a manner affecting trade between the Parties, after the date of entry into force of this Agreement. Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between the Parties where the same conditions prevail, or a disguised restriction on international trade, nothing in this Chapter shall be construed to prevent the adoption or enforcement by a Party of measures: (a) necessary to protect public morals; (b) necessary to protect human, animal or plant life or health.

TABLE A3 *Continued*

<i>Type</i>	<i>Provision</i>	<i>Covered and...</i>	<i>Example(s)</i>
WTO <sup>x</sup>	Labour	Not enforceable	<p>Each Party recognises that it is inappropriate to encourage investments by investors of the other Party by relaxing its environmental measures. To this effect each Party should not waive or otherwise derogate from such environmental measures as an encouragement for establishment, acquisition or expansion of investments in its Area</p> <p>Cooperation between the Parties will complement the cooperation set out in other Chapters of this Agreement. Areas of cooperation may include but should not be limited to: science, agriculture including the wine industry, food production and processing, mining, energy, environment, small and medium enterprises, tourism, education, labour, human capital development and cultural collaboration. Cooperation on labour and employment matters of mutual interest and benefit will be based on the concept of decent work</p> <p>Neither Party shall require labour market testing, labour certification tests or other procedures of similar effect as a condition for temporary entry in respect of natural persons on whom the benefits of this Chapter are conferred.</p> <p>Each Party shall grant entry and temporary stay to nationals of the other Party in accordance with this Chapter including the provisions of Annex 13</p>

Source: Excerpts from various TAs obtained from World Bank (2011).



lated to give rise to an obligation is a matter of treaty interpretation. For example, dispute settlement rulings of the WTO Appellate Body have shown that obligations may arise from statements using the word 'should' instead of 'shall'. Second, provisions that are excluded from the agreements' dispute settlement system may still be subject to dispute settlement flowing from commitments that the Parties may have elsewhere. This argument applies not only to WTO<sup>+</sup> provisions related to other commitments at the WTO, but also to WTO<sup>X</sup> commitments arising from, for example, international treaties on labour standards and environmental protection. Third, the legal enforceability of a provision that allows the use of countermeasures to enforce rights or obligations may be limited by commitments stemming from other agreements. Finally, provisions not subject to dispute settlement may still be enforceable through political and diplomatic channels, but the reverse could also hold: it may not at all times be possible to enforce provisions which are subject to dispute settlement, due to political, non-legal and/or resource considerations. Indeed, it is important to acknowledge that there are limitations to the extent to which the legal enforceability of an undertaking can be determined with absolute certainty. However, it is still useful to differentiate, in one way or another, between those undertakings that instil in the reader some sense of concrete and imminent policy liberalisation and those that merely reflect a loosely defined agreement to explore possible avenues of future cooperation.

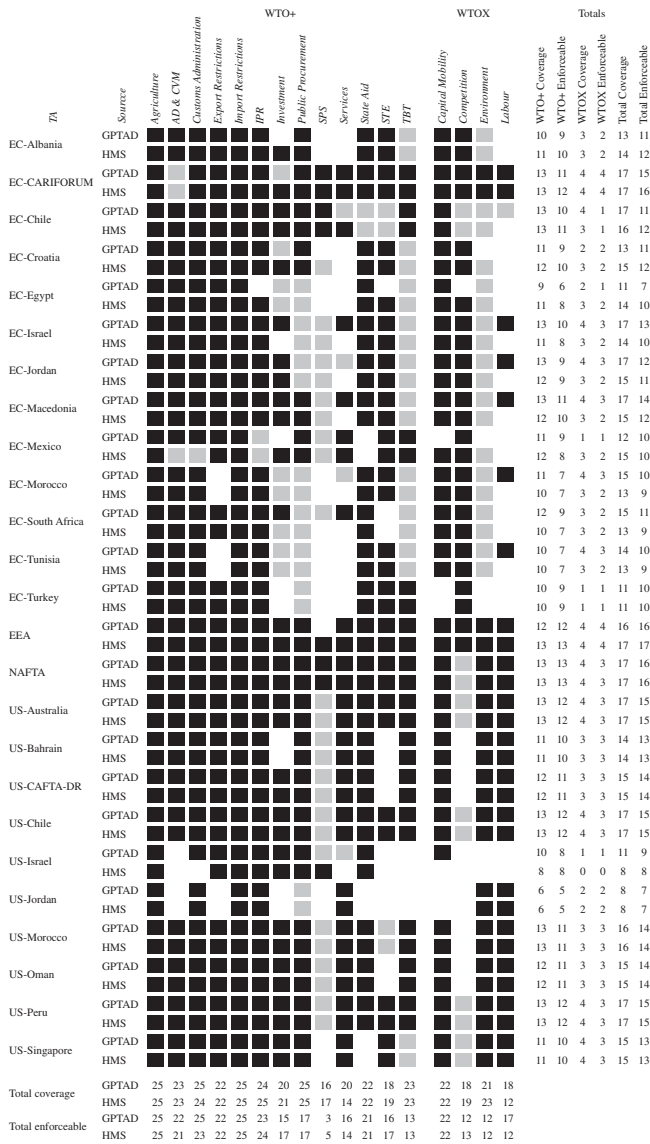
Figure A1 compares our strategy to that of HMS. Note that our coverage is much larger, but comparing the two data sets for the subsample of agreements that are part of both studies, HMS and ours, shows similarities and differences in the approach; the coding strategies can be compared. Figure A1 shows the 13 (4) WTO<sup>+</sup> (WTO<sup>X</sup>) policy domains on the top. Fourteen of the European Community (EC)'s 14 TAs and 11 agreements involving the United States are on the left. The information of rows marked 'GPTAD' is derived from World Bank (2011) and those marked 'HMS' refer to data in HMS. Individual cells are marked to indicate whether a provision listed in the column is covered by the agreement listed in the row. A black (grey) cell indicates undertakings that are (not) legally enforceable, while a blank cell indicates the absence of an agreement. For example, legally enforceable provisions on import restrictions are represented in all 25 TAs, regardless of the source used. Both sources also show that provisions on AD and CVM are not legally enforceable in the EC-CARIFORUM trade agreement.

Are the coding strategies compatible? By and large, the answer is affirmative, although there are some minor differences. Some differences are likely to be due to input errors. For instance, HMS indicate that services are legally enforceable in the USA-Israel agreement, but the treaty literally states that these 'the principles [on trade in services] (...) shall not be legally binding'. On the other hand, the commitments in the EC-Mexico agreement on AD and CVM and customs administration are elaborate and do not lack or rule out their legal enforceability.

Another difference involves provisions on investment and the WTO Agreement on TRIMS. HMS include 'TRIMS' as a WTO<sup>+</sup> provision and 'Investment' as a WTO<sup>X</sup> policy domain, but do not provide further information to sufficiently differentiate between these two concepts. Signatories of the TRIMS Agreement are committed to a basic, non-discriminatory system of cross-border investment.

However, the investment measures contained in the TAs investigated in this study usually start with the same principles, but do not necessarily refer to the TRIMS Agreement. So, although there may be a line between 'TRIMS' as a WTO<sup>+</sup> policy domain and the broader WTO<sup>X</sup> 'Investment' provisions, it is arguably an ambiguous one. Since scoring agreements

FIGURE A1  
 Benchmarks of EC and USA Agreements



Notes:

Black (grey) cells indicate undertakings that are (not) legally enforceable. Blank cells mean that there is no coverage.

Sources: Authors' calculations, HMS and World Bank (2011). An extended version of this figure for all 296 TAs is available in the online data set.

twice for the same type of provision is redundant, we include all TRIMS/investment-related provisions as one WTO+ policy domain called 'Investment'. Comparing this data with HMS's differentiated 'TRIMS/Investment' data shows that both methodologies are very similar.

Despite this small number of differences, the overall impression is that the methodologies are compatible. The column totals indicate that both methodologies provide a very similar number of agreements containing a specific provision, regardless of its legal enforceability. Both strategies find for both the EC and USA a strong support for WTO<sup>+</sup> and WTO<sup>x</sup> policies in their trade agreements. The EC tends to include more 'legally inflated' (i.e. legally unenforceable) undertakings than the USA, which focuses on a more limited range of legally enforceable commitments.

APPENDIX B  
DATA SET FOR GRAVITY MODEL

TABLE B1  
Countries in Data Set

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Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, British Indian Ocean Territory, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, China, Colombia, Comoros, Cook Islands, Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, D.R. Congo, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Faeroe Islands, Falkland Islands, Fiji, Finland, France, French Polynesia, French Southern Territories, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Greece, Greenland, Grenada, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Liechtenstein, Lithuania, Luxembourg, Macao, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mayotte, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Niue, North Korea, Norway, Oman, Pakistan, Palau, Palestinian Authority, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Pitcairn, Poland, Portugal, Qatar, Republic of Congo, Romania, Russia, Rwanda, Samoa, San Marino, São Tomé and Príncipe, Saudi Arabia, Senegal, Serbia, Serbia and Montenegro, Seychelles, Sierra Leone, Singapore, Slovak Republic, Slovenia, Solomon Islands, Somalia, South Africa, South Korea, Spain, Sri Lanka, St. Helena, St. Kitts and Nevis, St. Lucia, St. Pierre-Miquelon, St. Vincent and Grenadines, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Taiwan, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Virgin Islands, Wallis and Futuna, Yemen, Zambia, Zimbabwe

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TABLE B2  
Descriptive Statistics

<i>Variable</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Min.</i>	<i>Max.</i>
Real imports	1,012,073	$1.33e^{18}$	$1.54e^{20}$	0	$9.12e^{22}$
Real exports	1,004,441	$1.15e^{18}$	$1.54e^{20}$	0	$1.05e^{23}$
ln(real imports)	601,986	15.678	5.043	-10.857	52.867
ln(real exports)	569,881	15.888	5.016	-28.356	53.012
ln(distance)	2,850,380	8.812	0.775	2.349	9.901
ln(real GDP importer)	1,699,141	23.193	2.384	16.591	30.213
ln(real GDP exporter)	1,699,141	23.193	2.384	16.591	30.213
TA	3,127,266	0.033	0.177	0	1
TAI <sup>C</sup>	3,127,266	0.019	0.116	0	1
TAI <sup>E</sup>	3,127,266	0.017	0.109	0	0.962
TAI <sup>C*</sup>	3,127,266	0.019	0.113	0	1
TAI <sup>E*</sup>	3,127,266	0.017	0.104	0	0.941
IWTO <sup>+, C</sup>	3,127,266	0.019	0.112	0	1
IWTO <sup>+, E</sup>	3,127,266	0.017	0.102	0	1
IWTO <sup>X, C</sup>	3,127,266	0.019	0.126	0	1
IWTO <sup>X, E</sup>	3,127,266	0.018	0.120	0	1

Note:

\* refers to equation (4).