A Cross-country Assessment of Commitment Behavior in the Trade Facilitation Agreement*

Russell Hillberry
Purdue University

Carlos Zurita
Purdue University

April 13, 2021

Abstract

We use a new database of commitments made during the process of ratifying the Trade Facilitation Agreement (TFA) to study variation in countries' commitment behavior. The TFA is a novel World Trade Organization agreement because it allows developing countries to select commitments from a menu of best practices in trade facilitation, rather than to consent, or not, to a comprehensive package of negotiated commitments. The operation of this *à la carte* approach to concluding trade agreements is worthy of study in its own right, but the commitment data also offer a high-level description of progress in an international effort to improve border management procedures around the globe. Our study uses data on TFA commitments to describe progress across subcomponents of the agreement. A regression model shows that the number of Type A trade facilitation commitments that a country made in the TFA ratification process depends on its level of development, its population size, and its past receipts of foreign aid to support trade facilitation. We use multi-dimensional scaling techniques to study differences in the content of national commitment bundles. This approach demonstrates that variation in the content of countries' commitments is closely tied to the number of commitments made.

Keywords: Trade Facilitation, Trade Facilitation Agreement, World Trade Organization, Special and Differential Treatment, Single Undertaking, Multidimensional Scaling

JEL codes: F02, F13, F53.

---

1 Introduction

The World Trade Organization's (WTO) "Doha" round of trade negotiations is now in its nineteenth year. The lack of progress toward a comprehensive agreement highlights the challenges associated with the traditional approach to negotiating multilateral agreements. In earlier rounds, negotiators achieved consensus among the members, and a comprehensive package of negotiated provisions was approved *en masse* in what is known formally as a *single undertaking*. The slow progress in the Doha Round is likely due to longer term developments at the WTO that have made it difficult to achieve an agreement that would allow consensus support for a single undertaking.[1]

One notable exception to the lack of progress in the Doha Round has been the successful negotiation and ratification of the *Agreement on Trade Facilitation* (TFA), a stand-alone agreement that entered into force in 2017. The TFA aims to make the logistics of international trade simpler and less costly via the spread of best practices in managing the flow of goods across national borders. The TFA provides countries with a lengthy list of practices and procedures that countries should, eventually, implement. Some of these practices are currently well beyond the capacity of many WTO member governments. An important novelty of the TFA is that it allows each developing country government to choose a subset of the total package of commitments for which it is prepared to be held responsible, deferring commitments on other trade facilitation measures until the government deems itself capable of successful implementation. This á la carte approach represents an alternative framework to agreements concluded with a single-undertaking, and is therefore worthy of further study.[2]

This paper studies cross-country variation in the lists of so-called *Type A* commitments countries made in the process of ratifying the TFA. Type A commitments are those which countries agreed to have in place within one year of the entry-into-force of the TFA.[3] Variation across Type A commitments in the number of countries committing is informative about the global "state of play" of trade facilitation around the time that the agreement entered into force.[4] Variation across commitments can also provide information about the perceived relative difficulty of implementing the 238 commitments in the agreement. Cross-country regressions relate the number of countries' type A commitments to various country characteristics such as level of per capita income, population, landlocked status,

---

[1]Among the long-term developments that have made achieving consensus more difficult are a) sustained growth in the number of member countries and thus the number of members necessary for consensus, b) concomitant growth in the diversity of member interests, and c) the growing importance of "beyond-the-border" trade policy issues that may be less amenable to agreement through normal modes of negotiation. Hoekman and Nelson (2018) review these broad challenges in historical perspective. Henn and Le Hen (2011) discusses specific challenges that hindered conclusion of the Doha Round, including the Global Financial Crisis.

[2]Neufeld (2014a) offers a useful history of the TFA negotiations, and highlights this important innovation in the approach to special and differential treatment for developing countries in WTO agreements. Hoekman (2016) discusses the departure of the TFA's negotiating modalities from those of standard WTO agreements, and highlights both risks and opportunities of the new approach.

[3]Commitments for which a country is not prepared may be listed as Type B or Type C commitments. We provide more information about these commitments in Section II.

[4]In this paper we study commitment behavior, rather than the status of implementation. It is very unlikely that all of the Type A commitments had been translated into operational capabilities at the time of ratification. Operational capabilities are very difficult to quantify on a global and measure-by-measure basis. In our view commitment behavior is likely to be indicative of countries' expected progress over the short-run, and is also worthy of study in its own right.

etc. An appropriate factor analysis model - multidimensional scaling - determines whether there is important cross-country variation in the *kinds* of commitments made, a question that is potentially distinct from the question of *how many* commitments countries made.

Much of the world's existing knowledge about the practicalities of trade facilitation lies outside the formal academic literature on international trade.[5] Multinational organizations such as the United Nations, the World Customs Organization, the WTO, the World Bank and regional development banks such as the Inter-American Development Bank employ skilled professionals who - together with specialized consultants - advise governments on the implementation and operation of best practices in trade facilitation.[6] Member governments themselves staff their agencies with logistics professionals tasked with managing their own border agencies. This paper provides a formal, statistical treatment of countries' commitment behavior. Formalization of this kind may be useful for readers who are less familiar with the complexities of trade facilitation implementation in developing country settings.

Ours is the first study of which we are aware that uses data from the Trade Facilitation Agreement Database (TFAD), a database that reports WTO member countries' commitments under the TFA. A number of other academic studies have used data from the Organization for Economic Cooperation and Development (OECD) database known as the Trade Facilitation Indicators (TFI).[7] In this paper we focus not on the breadth or quality of implementation of trade facilitation measures but instead on commitments, which are - at least - more easily observed and quantified. Since trade facilitation reforms are still in process in many countries, it is too soon to attempt the linking of TFA commitments to other outcomes.

A small but growing literature has used program evaluation tools to study specific reforms in particular countries or to describe the operation of particular trade facilitation practices.[8] Other studies illustrate the benefits of data analysis for improving the operation of trade facilitation reforms such as risk-management.[9] We do not provide evidence on the effectiveness of trade facilitation reforms or propose methods for operational improvements. Our objective is to study cross-country variation in commitment behavior.

A quite different contribution of the paper is that it offers insight into the structure of countries' preferences over the set of possible trade facilitation commitments. Analyses of agreements concluded under the single undertaking approach largely rely on theoretical concepts such as *cross-issue linkages*

---

[5]A useful introduction to these practicalities, and one that focuses on the challenges and opportunities of trade facilitation reform in developing countries, is McLinden et al. (2011).

[6]One example of this is the work of Neufeld (2014b), who analyzes the trends of Trade Facilitation provisions in Regional Agreements.

[7]Moïsé et al. (2011) and Moïsé et al. (2013) describe the OECD data collection effort. Applications using these data include Moïsé et al. (2013), Beverelli et al. (2015), Fontagné et al. (2020), and Hillberry and Zhang (2018). Trade facilitation measures can be defined broadly or narrowly, so the number of trade facilitation measures being reported varies across the data sets. The TFI documents cross-country variation in 78 trade facilitation practices or procedures, while the TFAD tracks 238 distinct commitments. A key difference between the databases is that the OECD attempts the (very difficult) task of quantifying on-the-ground practices, while the TFAD tracks commitments, but does not verify implementation.

[8]See, for example, Carballo et al. (2014), Carballo et al. (2016b,a), Carballo et al. (2016c,d), Fernandes et al. (2016), and Fernandes et al. (2021).

[9]See Chalendard et al. (2019) and Cariolle et al. (2019).

and *reciprocity*.[10] While the superstructure of the TFA could be understood in these terms - developed countries provide financial and technical assistance to support developing country trade facilitation reforms - the flexibility that individual developing countries have to choose their commitments under the TFA means that item-by-item variation in these commitments is informative about their preferences and/or capacities with respect the range of possible commitments. We use multidimensional scaling (MDS) techniques to measure the degree to which countries differ in the kinds of commitments made, a question that is distinct from an examination of the number of commitments made.[11] The MDS analysis illustrates how countries' preferences/capacities differ in this setting, and may therefore provide insight into how á la carte agreements are achieved. These lessons may be informative for negotiations of global agreements outside the context of international trade.[12]

In the paper we find considerable variation across measures in the number of countries making a Type A commitment to particular trade facilitation measures. The functional areas with the largest proportion of Type A commitments are *movement under customs control* and *pre-shipment inspection*. These areas of regulation appear to be the easiest in which to make commitments. Measures associated with *single windows* and *authorized operator* programs have the smallest shares of Type A commitments. These appear to be the most difficult areas in which to make progress.

Cross-country regression analysis indicates that the number of Type A commitments a country makes rises sharply with per capita income. Each log point change in per capita income increases the number of Type A commitments made by 36.[13] Countries with larger populations made more commitments as well. Countries that received more aid to support trade facilitation, on a per capita basis, also made more commitments.

The MDS analysis collapses the data from 238 dimensions to nine, with the first dimension explaining 72% of the variation in the data. This first dimension is almost perfectly correlated with the number of commitments made, which indicates that developing countries' commitment behavior varies primarily in the number of commitments made, rather than in the type of commitments made.[14] One interpretation of the almost perfect correlation of the first dimension with the number of commitments made would be that countries differ primarily in their capacity for implementing commitments generally, rather than in the kinds of commitments they expect to implement. This structure of trade policy preferences is highly unlikely in more complex settings that require countries

---

[10]We refer here to a largely theoretical literature on bargaining in WTO negotiations, as in Hoekman (1989), Leidy and Hoekman (1994), Winham and Black (1986). Hoekman and Kostecki (2001, p. 114-118) briefly review and integrate this literature.

[11]For example, island countries might face different logistical challenges than landlocked countries, and make different types of commitments as a result. In practice we find that the variation in kinds of commitments made is dwarfed by simple variation in the *number* of commitments made.

[12]The Paris Climate Accords, for example, have a choose-your-own commitment structure that is somewhat similar to the á la carte structure used in the TFA. See United Nations (2015).

[13]We also find that, after controlling for per capita income, countries with larger populations make more commitments. Strong links to slow-moving variables such as per capita income and population may suggest that full implementation of the agreement lies far in the future. That said, we also find that countries with large per capita recipients of foreign aid dedicated to trade facilitation make more commitments, which may offer some hope that policies can matter.

[14]A second dimension reveals some deviation in the form of commitments, after controlling for the number of commitments. The second dimension explains approximately 12 percent of the variation in commitment behavior.

to agree to different kinds of commitments across multiple issues.

The organization of the paper is as follows. Section II reviews the TFA and provides a short discussion of the history of negotiations. Section III describes the data and reports summary statistics. This section also contains a discussion of the apparent relative difficulty of implementing various reforms. In section IV we propose a cross-country regression model linking the total number of commitments to various country characteristics, and report the results. Section V explains multidimensional scaling analysis and applies it to countries' commitments on the 238 measures. Section VI concludes.

2 Background

The WTO defines trade facilitation as the "simplification, modernization and harmonization of export and import processes."[15] The goal of trade facilitation is to improve the efficiency and efficacy of a wide variety of procedures undertaken by governments (primarily) in the process of overseeing the movement of traded goods through border posts or other ports of entry.[16] Specific trade facilitation measures are designed to produce outcomes such as increased transparency of government procedures, reductions in the time that traded goods are under the control of government agencies, improvements in the security and speed by which private sector firms can make the required payments, faster and better communication between different government agencies that are tasked with inspections, and more.[17]

Neufeld (2014a) offers a history of the TFA negotiations, and argues that broadly speaking, trade facilitation is a fundamental purpose of the GATT/WTO and has been for most of its history.[18] The specific negotiation history of the TFA began with its inclusion in the WTO negotiating agenda at the Singapore Ministerial of the WTO in 1996.[19] Negotiations around the issue of trade facilitation were part of the broad agenda of the Doha development round of negotiations that began in 2001. Trade facilitation is seen as a development issue because most developing country governments lagged behind their developed-country counterparts in their capacity to implement best practices. Developing country members - already feeling burdened with implementation of Uruguay Round commitments - were wary of accepting additional binding commitments in the Doha Round. But these governments also recognized that improvements in the area of trade facilitation were potentially beneficial to their own economies.

Negotiations around the topic of trade facilitation took an unusual path in the Doha Round. In

---

[15]This definition as well as a complete WTO summary of the topic is available here: `https://www.wto.org/english/tratop_e/tradfa_e/tradfa_e.htm`

[16]Trade facilitation measures can require integration of the activities of multiple government agencies along with those of multiple sets of private sector actors, which can include ports, financial institutions, customs brokers, hauliers and more. It is important to recognize that a country's capacity to implement certain measures may be constrained by the capacities of its private sector as well as by the capacities of its government.

[17]We offer a description of functional areas in Appendix A, and link them to their position in the text of the agreement.

[18]The following discussion of the TFA negotiations draws heavily on Neufeld (2014a).

[19]Trade facilitation is one of the four topics collectively known as the "Singapore issues," which also include trade and competition, trade and investment, and government procurement. These issues move beyond traditional market access concerns, and the bundling of these issues in early stages of the Doha negotiations contributed to the round's rocky start.

contrast to the infamous 'Green room' approach that limits negotiations to a small number of influential member governments, negotiations around trade facilitation typically involved meetings that were open to all members. Developing country members' need for technical and financial assistance was recognized from the beginning, and these issues were negotiated along with questions such as what topics would be included in the negotiations, and whether developing countries would be expected to make binding commitments. A key innovation that the negotiations brought forth was a novel approach to special and differential treatment issues. Implementation of trade facilitation measures was to be linked to developing countries' capacities, and assessment of these capacities were to take place on a "country-by-country and measure-by-measure level."[20]

What emerged in the agreed text was a broad but detailed representation of best practices in trade facilitation, and a structure for making binding commitments to these measures. The structure of the special and differential treatment provisions in the agreement was novel in that it allowed developing countries to make commitments on a measure-by-measure basis, and to do so conditionally. Specifically, the commitment structure allows developing countries the flexibility to make three types of commitments. Type A commitments are binding commitments, and ratifying governments expected them to be operational within one year of the agreement's entry-into-force (which eventually occurred in February 2017). Type B commitments allow countries to delay their implementation until such time that they have the capacity to implement. Type C commitments are those that the country believes will require both additional time as well as substantial financial and/or technical assistance before they can be implemented. As part of the process of ratifying the agreement, member country governments were to assign each commitment a type; only Type A commitments are binding in the immediate future.

3   Data

This section describes the data used in our analysis. Our main outcome measures are the set of type A commitments made by each developing country WTO member in their ratification process. Appendix A offers a detailed mapping of the agreements' text into functional areas and numbers of commitments. In our regression analysis we aggregate commitments on the 238 specific provisions up to counts of countries' commitments. We also describe the country characteristic variables we use in the analysis.

3.1   TFA Type A Commitments

The data used to document countries' type A commitments are taken from the TFA Database (TFAD), which is published by WTO (2019a). The TFAD provides a full breakdown of each member country's commitments at a given point in time. Our draw - in January 2019 - was meant to include countries whose ratification process had lagged the agreements' entry-into-force. This is a useful time to conduct

---

[20]See Neufeld (2014a).

a study of commitments, as the data from this time represent countries' choices at the time they implemented the agreement.[21] Commitments are made at the level of a subsection of an article of the agreements; a subsection is typically a paragraph of text. This process generates data for 238 commitments across the 12 articles of Section II of the Agreement. The TFAD indicates, for each subsection/paragraph, whether a type A, type B or type C commitment has been made by the member country. In our work we are only interested in type A commitments, since type B and type C commitments are merely conditional promises of future action. We refer interchangeably to "type-A commitments" or "commitments."

Our draw of the TFAD data contains observations on the commitments of 113 developing country WTO Members. The Members missing in the TFAD at the time of data collection are those that (1) had not ratified the TFA agreement, (2) had not made any type of commitments, or (3) were developed countries assumed to have implemented the TFA during negotiations.[22]

The commitments can be organized according to their position in the legal text or to their inclusion in a functional area of trade facilitation policy. For example, Article 1 of of Section I is a transparency provision that relates to the publication and availability of relevant information that trading firms need to engage in cross-border trade. Article 1 contains 22 provisions that are part of four functional areas of trade facilitation - publication, making information available through the internet, points of enquiry, and protocols for notification. In total there are 12 articles of text, 36 functional areas of trade facilitation and 238 provisions/commitments.

3.2 Country characteristics

We use a number of broad country characteristic variables in the analysis. Our primary use of these data are as independent variables that help us to explain cross-country variation in the number of Type A commitments that a country makes. We also investigate correlations of these data with the most important dimensions uncovered by the multi-dimensional scaling exercise.

One main source of country characteristic data is The World Factbook, published by Central Intelligence Agency (2019).[23] From this source we take variables that measure countries' GDP per capita and population. The GDP per capita variable is used to link trade facilitation commitments to the average income in a country. Our GDP per capita variable is measured at market exchange rates, because trade facilitation capacities may require the importation of technology and expertise.

From Central Intelligence Agency (2019) we also draw information on the value of countries'

---

[21]The formal language for these commitments are "implementation commitments," which reflects the idea that these commitments were made at the time that countries implemented the agreement. In what follows we avoid using the term implementation as it relates to the agreement, because we wish to use the word implementation to reflect the successful completion of a trade facilitation measure.

[22]The developed countries are the countries belonging to the European Union and the Schengen area, plus other countries such as Australia, Canada, Japan, New Zealand, Russia and the United States of America.

[23]The CIA data are useful because they are comprehensive, and use common definitions across countries. Some variables that are measured poorly or infrequently in some developing countries are estimated by the CIA, which means that we have a comprehensive set of data with uniform definitions across all countries. The CIA also provides data for Taiwan, which is absent from some other international data sets. We use the most recent full year of data for each country in Central Intelligence Agency (2019), which is most typically 2017.

imports and exports. We sum these two variables together and divide by GDP to create the standard measure of openness. Both the trade variables and GDP are measured at market exchange rates. Because past trade facilitation efforts might have affected current commitment behavior, as well as current levels of openness, the openness variable is potentially endogenous in our regression model. We thus treat openness as a control variable and include it only as a robustness check on our other findings.

We also construct variables that quantify countries' geographic characteristics. Landlocked and island countries both offer different sets of challenges for trade logistics. These challenges may affect the number and type of Type A commitments such countries make. We create *landlocked* and *island* binary variables using information from Central Intelligence Agency (2019).[24]

In the years since trade facilitation emerged as a negotiating issue at the WTO, both the European Union and the United States have engaged in numerous preferential trade agreements with countries that we study. Both of these entities typically require trade facilitation commitments in the preferential agreements they sign. We construct dummy variables to indicate whether or not a country has a preferential trade agreement with either the European Union or the United States.[25] Our hypothesis is that countries with agreements with either or both of these entities will have a larger number of Type A commitments. This would occur if a) countries with more advanced trade facilitation capacities are more likely to enter into agreements with the two entities, or b) that preferential agreements with the two entities induced further development of trade facilitation in their partner countries.

In the context of the negotiations around the TFA, two groups of developing countries formed.[26] The "Core group" was made up of countries that were concerned about developing countries' capacity to implement new measures.[27] The Core group emphasized that very different levels of trade facilitation capacity existed across countries, and it therefore opposed binding commitments and supported a mandate for technical and financial assistance in the agreement. The "Colorado group" of countries supported a more robust TFA, and argued specifically for bindings in the agreement.[28] We construct dummy variables to indicate membership in each of these negotiating groups, and include these as control variables in the cross-country regressions.

Finally, from OECD (2020) we obtain the amount of international aid each country received for the

---

[24]To determine if a country is landlocked we use the *coastline* indicator from the Central Intelligence Agency (2019), which shows the number of coastline in kilometers each country has. Therefore, we create the variable *landlocked* which takes the value of 1 when a country has 0 km of coastline, and zero otherwise. To determine if a country is an island we use the *land boundaries* indicator from the Central Intelligence Agency (2019), which shows the total length of all land boundaries for a specific country. As a result, we create the variable *island* which takes the value of 1 when a country has 0 km of land boundaries, and zero otherwise. Cuba is an exception to this last rule. Although it legally has a 28.5 km boundary with Guantanamo, we treat Cuba as an island.

[25]The Office of the United States Trade Representative (2019) lists all countries that have signed a Free Trade Agreements with the US. Similarly, the European Commission (2019) lists all countries that have signed a Free Trade Agreements with the European Union.

[26]See Neufeld (2014a).

[27]This Group members were, primarily, Bangladesh, Botswana, Cuba, Egypt, India, Indonesia, Jamaica, Kenya, Malaysia, Mauritius, Namibia, Nepal, Nigeria, the Phillipines, Rwanda, Tanzania, Trinidad and Tobago, Uganda, Venezuela, Zambia and Zimbabwe.

[28]The countries in this group were, primarily, Chile, Colombia, Costa Rica, South Korea, Paraguay and Singapore.

specific purpose of trade facilitation.[29] We sum these particular aid flows over the years 1995-2013, and divide by countries' populations to create a measure of per capita aid for trade.[30] It may be that low trade facilitation capacity generates aid dollars, so this variable may be endogenous. We nonetheless include it in the regressions because it is likely that aid tied specifically to trade facilitation generated an ability to make commitments in the area.

3.3 Descriptive Statistics

Table 1 shows the descriptive statistics of the dependent and independent variables used in our analysis. The data contain 113 country observations. We report the mean, standard deviation, minimum and maximum for each variable. The mean number of Type A commitments per country is 124.64, the minimum is 2, the maximum is 238 and the standard deviation is 76.68.[31] These figures indicate that there is a high degree of variability across countries in the number of commitments made.

Table 1: Descriptive Statistics Number of Type A Commitments

Variable	No. of Obs.	Mean	Std. Dev.	Min	Max
Number of Type A Comms.	113	124.64	76.68	2.00	238.00
GDPpc (thousands)	113	9.34	14.50	0.30	83.66
logGDPpc	113	8.33	1.30	5.69	11.33
landlocked	113	0.22	0.42	0.00	1.00
island	113	0.20	0.40	0.00	1.00
population (millions)	113	49.82	178.81	0.05	1379.30
logpop	113	15.84	2.08	10.87	21.04
US FTA	113	0.16	0.37	0.00	1.00
EU FTA	113	0.17	0.38	0.00	1.00
Core	113	0.18	0.38	0.00	1.00
Colorado	113	0.07	0.26	0.00	1.00
AFTpc	113	3.84	6.56	0.00	29.75
openness	112	0.61	0.42	0.09	3.32

US FTA and *EU FTA* are binary variables that indicate if a country has a signed TFA with the US or the EU respectively. *Core* and *Colorado* are binary variables that indicate a country's membership in one of two TFA negotiating groups. *AFTpc* is the total aid per capita received for the purpose of trade facilitation in the years 1995-2013. We exclude the openness variable for Samoa (WSM) because an idiosyncratically large value of imports reported for 2018 caused an implausibly large value of openness (106.2), and because the inclusion of WSM in subsequent regressions substantially affected the estimated magnitude and level of statistical significance of the openness variable.

---

[29]For this statistic we use the trade facilitation aid figure (line 33120) from the OECD international development statistics database (2020).

[30]The trade facilitation aid data first become available in 1995. We have data from years after 2013, but do not include these because they post date the conclusion of the TFA negotiations.

[31]Sierra Leone is the country that made only two Type A commitments. The countries in the data making 238 Type A commitments were Chile, Hong Kong, Israel, South Korea, Mexico, Saudi Arabia, Singapore, Turkey and Taiwan.

3.4 Commitments across types of trade facilitation measure

The text of the TFA contains a wide array of trade facilitation measures. The 238 measures included in the data set vary substantially in their form and purpose. Some require simple regulatory changes, others require the adoption of sophisticated information technology and/or the coordination of a large number of government agencies. It can be difficult for those outside the field of trade logistics to understand how implementation difficulties vary across different areas of trade facilitation.

We use the cross-country distribution of commitments to cast some light on this question. We calculate the percentage of all commitments that were designated as Type A commitments. Since Type A commitments are those that were to be operational one year after the agreements' entry into force, variation across commitments in the number of countries making a Type A commitment is informative about its relative difficulty. The percentage of all commitments that are Type A is also informative about overall progress in the process of developing countries' full implementation of the TFA.

We organize the data in two ways: by Articles of the agreement's text, and by functional areas of trade facilitation. There are a total of 12 Articles and 36 areas of regulation. We first report the percentage of commitments in each Article of text that are Type A commitments. We then report the percentage of commitments that are Type A for each functional area. The denominator of the reported percentages is the number of countries (113) multiplied by the number of commitments within each article of the agreement or within each functional area of trade facilitation. The numerator is the total number of commitments - across countries and articles/functional areas - that were designated as Type A commitments.

Table 2 reports the percentage of commitments that were type A commitments for each Article in section I of the agreement. The highest percentage is for *Article 9: Movement under Customs Control (Movement of Goods)* with an implementation level of more than 80%. We infer that Article 9 is the easiest article in which to make progress. *Article 3: Advance Rulings* and *Article 8: Border Agency Cooperation* have the lowest percentage of Type A commitments (both with less than 40%). It appears to be more difficult to make commitments related to these Articles.

One can also group commitments by area of regulation. Table 3 reports the variation in type A commitments when the data are organized this way. More than 80% of the commitments in the areas of *Movement Under Customs Control* (Art. 9) and *Pre-Shipment Inspection* (Art. 10.5) are Type A commitments.[32] Commitments related to *Single Windows* (Art 10.4) have an implementation level of just above 20%, while only 30% of measures related to *Authorized Operator* programs (Art. 7.7) are of Type A.[33]

---

[32]The single provision in the *Movement Under Customs Control* area of regulation relates to the ability of trading firms to move goods from the port of arrival to an inland customs office. The two provisions related to *Pre-shipment inspection* allow for some customs procedures/inspections to be accomplished by private sector firms in the country of origin rather than by customs officials in the destination country.

[33]The four provisions related to *Single Window* area of regulation relate to the simplification of trading firms' interaction with the importing government. A single window allows the trading firm to interact with all government agencies through a single electronic portal. See Chapter 8 in McLinden et al. (2011) for a discussion of *Single Windows*. *Authorized Operator* programs offer firms that are trusted by the oversight agency considerable leeway in their operations as

Table 2: Type A commitments by article number.

Article	Number of Comm. by Article	Number of Comm. Possible	Number of Type A Comm.	Type A percentage
Article 9 - Movement under Customs Control	1	113	95	84.1
Article 4 - Procedures for Appeal or Review	9	1017	654	64.3
Article 10 - Import, Export and Transit Formalities	30	3390	2147	63.3
Article 11 - Freedom of Transit	21	2373	1493	62.9
Article 6 - Disciplines on Fees and Charges	14	1582	956	60.4
Article 12 - Customs Cooperation	49	5537	3063	55.3
Article 2 - Comment and Consultation	4	452	238	52.7
Article 5 - Impartiality, Non-discrim. & Transparency	8	904	442	48.9
Article 7 - Release and Clearance of Goods	55	6215	2827	45.5
Article 1 - Publication and Availability of Information	22	2486	1101	44.3
Article 8 - Border Agency Cooperation	6	678	263	38.8
Article 3 - Advance Rulings	19	2147	805	37.5

(i) The Number of Commitments by Article is calculated as the number of paragraphs in each article.

(ii) The Number of Commitments Possible is calculated as the Number of Commitments by Article multiplied by the total number of countries analyzed (113 in this research).

(iii) Number of Type A Commitments is the sum of all paragraphs belonging to the article that member countries designated as Type A.

(iv) The Type A percentage is the share of total commitments that are Type A, multiplied by 100.

Table 3: Type A commitments by area of regulation.

	Area	Number of Comm. By Area	Number of Comm. Possible	Number of Type A Comm.	Type A percentage
1.-	Movement Under Customs Control	1	113	95	84.1
2.-	Pre-Shipment Inspection	2	226	187	82.7
3.-	Detention	1	113	89	78.8
4.-	Use of Customs Brokers	3	339	267	78.8
5.-	Temporary Admission of Goods and Inward and Outward Processing	4	452	355	78.5
6.-	Common Border Procedures and Uniform Documentation Requirements	6	678	526	77.6
7.-	Rejected Goods	2	226	174	77.0
8.-	Penalty Disciplines	8	904	597	66.0
9.-	Separation of Release from Final Determination of Customs Duties, Taxes, Fees and Charges	7	791	512	64.7
10.-	Procedures for Appeal or Review	9	1017	654	64.3
11.-	Freedom of Transit	21	2373	1493	62.9
12.-	Use of International Standards	2	226	134	59.3
13.-	Specific Disciplines on Fees and Charges for Customs Processing	2	226	134	59.3
14.-	Customs Cooperation	49	5537	3063	55.3
15.-	Perishable Goods	5	565	312	55.2
16.-	Opportunity to Comment and Information Before Entry into Force	3	339	180	53.1
17.-	Post-Clearance Audit	4	452	235	52.0
18.-	Notification	3	339	176	51.9
19.-	Acceptance of Copies	3	339	175	51.6
20.-	Consultations	1	113	58	51.3
21.-	Pre-Arrival Processing	2	226	116	51.3
22.-	Formalities and Documentation Requirements	4	452	231	51.1
23.-	Expedited Shipments	13	1469	748	50.9
24.-	Notifications for Enhanced Controls or Inspections	4	452	227	50.2
25.-	General Disciplines on Fees and Charges	4	452	225	49.8
26.-	Electronic Payment	1	113	55	48.7
27.-	Publication	10	1130	510	45.1
28.-	Information Available Through Internet	5	565	239	42.3
29.-	Risk Management	4	452	187	41.4
30.-	Enquiry Points	4	452	176	38.9
31.-	Border Agency Cooperation	6	678	263	38.8
32.-	Establishment and Publication of Average Release Times	2	226	86	38.1
33.-	Advance Rulings	19	2147	805	37.5
34.-	Test Procedures	3	339	126	37.2
35.-	Trade Facilitation Measures for Authorized Operators	17	1921	576	30.0
36.-	Single Window	4	452	98	21.7

(i) The Number of Commitments by Area is calculated as the number of paragraphs in each Area.
(ii) The Number of Commitments Possible is calculated as the Number of Commitments by Area multiplied by the total number of countries analyzed (113 in this research).
(iii) Number of Commitments Made is the sum of all paragraphs belonging the article implemented by WTO Member countries.
(iv) The Type A percentage is the share of total commitments that are Type A, multiplied by 100.

3.5 GDP per capita vs. Number of type A commitments

As a first step in our analysis of the relationship between the level of GDP per capita and the number of commitments made, we show Figure 1. Each point represents a member country, and the labels refer to each country's three digit ISO-code. The figure shows a positive relationship between the number of type A commitments and logged per capita income. While a positive relationship is not surprising - higher income countries are likely to have greater capacities to implement trade facilitation measures - the implications are hardly trivial. If implementation only requires more financial resources, then the transfer of resources that is embodied in the TFA can lead the way to full implementation. But if implementation requires other outcomes that are linked with per capita income (e.g. an educated workforce, effective rule of law, widespread use of information technology) then the positive relationship in Figure 1 would suggest full implementation of the TFA lies in the distant future.
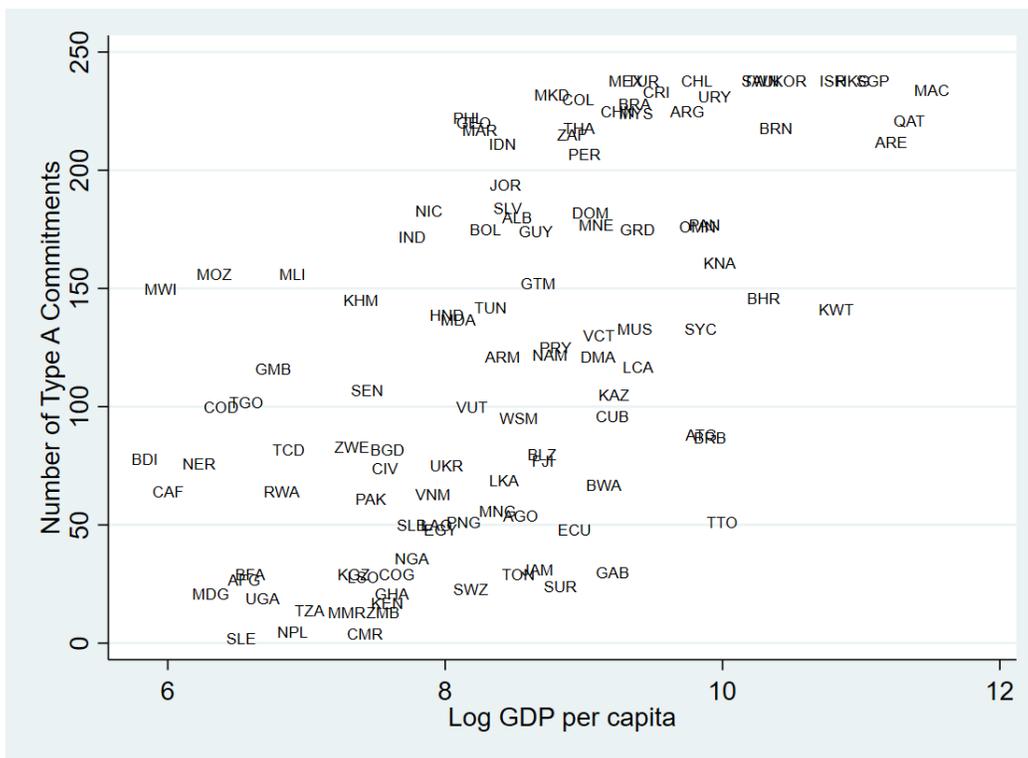

Figure 1: Number of type A commitments vs. log GDP per capita.

Another striking feature of Figure 1 is the enormous heterogeneity of commitment behavior that exists, even among countries with similar levels of development. Despite a very low average income, Malawi (MWI) made 150 commitments. Trinidad and Tobago (TTO) has a much average level of income, but made only 51 commitments.

---

4   Variation in the number of commitments made

To better understand cross-country variation in the number of Type A commitments made, we turn to a simple linear regression model. As with any cross-country regression, causal interpretation is risky. Some of the most econometrically and economically significant variables we study are very plausibly exogenous. Other conceptually important variables are endogeneity risks. The number of potential causal variables is also plausibly large, and we only have 113 data points to study. In this setting misspecification is a real risk. We therefore view our exercises as primarily descriptive. The primary goal is to understand which kinds of countries make more or fewer Type A commitments.

4.1   OLS Regression specification

We assume the following regression model:

$$A_i = \beta_0 + \beta_1 logGDPpc_i + \beta_2 landlocked_i + \beta_3 island_i + \beta_4 logPop + \beta_5 USFTA_i +$$
$$+ \beta_5 EUFTA_i + \beta_6 Core_i + \beta_7 Colorado_i + \beta_8 AFTpc_i + \beta_9 openness_i + \epsilon_i \tag{1}$$

where A_i is the number of Type A commitments made by country i, *log* represents the natural logarithm, *GDPpc* is the level of GDP per capita (at market exchange rates), *landlocked* is a dummy variable taking the value of 1 whenever a country is landlocked, and zero otherwise, *island* is a dummy variable taking the value of 1 whenever a country is an island, and zero otherwise, $logPop_i$ is the log of the population size of i, $USFTA_i$ is a dummy variable indicating that country i has a preferential trade agreement with the US, $EUFTA_i$ a dummy indicating that country i has signed a free trade agreement with the European Union, $Core_i$ an indicator that the country i belonged to the "Core Group" during TFA negotiations, $Colorado_i$ an indicator that country i belonged to the "Colorado Group" during TFA negotiations, $AFTpc_i$ is a measure of country i's per capita aid received to support trade facilitation, $openness_i$ takes its standard form, and ϵ_i represents a normally distributed error term.[34]

4.2   Results

Table 4 reports the results of the series of OLS regressions based on the specification in (1). We successively add variables in order to explore patterns of conditional variation. Some of the independent variables are potentially endogenous to the capacity to undertake trade facilitation measures, and we order the regression specifications to include these variables last.

Our initial specification includes only the *GDP per capita (logGDPpc)* variable, a quantitative representation of the data pattern seen in Figure 1. The results of this regression indicate that each log point in income raises the number of type A commitments by nearly 36. The *min* and *max* values of *logGDPpc* in Table 1 reveal a range of 5.5 log points in these data. An application of the coefficient

---

[34]OLS estimation assumes a continuous left hand side variable and a normal error term. One might argue that count models are more appropriate here, but we view the transparency of the OLS estimator as a significant advantage.

Table 4: OLS Regression. Dependent Variable: Number of Type A commitments

	(1) A	(2) A	(3) A	(4) A	(5) A	(6) A	(7) A
logGDPpc	35.59***	36.44***	40.21***	36.81***	36.46***	36.59***	36.81***
	(3.91)	(4.41)	(4.47)	(4.66)	(4.55)	(4.58)	(4.78)
landlocked		-21.29	-11.81	-3.501	-1.608	-5.986	-5.742
		(15.54)	(16.14)	(16.03)	(15.99)	(15.63)	(15.77)
island		-49.13***	-27.02	-16.62	-8.844	-11.29	-12.16
		(13.07)	(16.79)	(17.54)	(18.03)	(18.07)	(18.30)
logPop			8.279**	7.608**	10.02***	11.18***	11.31***
			(3.17)	(3.31)	(3.48)	(3.51)	(3.55)
USA FTA				33.43*	24.26	32.13*	32.54*
				(19.67)	(19.77)	(17.83)	(18.11)
EU FTA				19.69	14.79	-6.255	-6.800
				(22.11)	(22.89)	(21.81)	(22.33)
Core					-34.70**	-34.94**	-34.86**
					(14.55)	(14.38)	(14.69)
Colorado					15.46	20.24	20.14
					(12.38)	(13.54)	(13.65)
AFTpc						1.948**	1.976**
						(0.76)	(0.76)
openness							-0.592
							(10.70)
Constant	-171.9***	-164.2***	-333.5***	-307.1***	-337.0***	-360.5***	-364.3***
	(33.41)	(39.92)	(73.88)	(77.40)	(78.59)	(80.15)	(81.40)
Observations	113	113	113	113	113	113	112†
R^2	0.361	0.425	0.458	0.507	0.534	0.555	0.556
Adjusted R^2	0.355	0.410	0.438	0.479	0.498	0.517	0.512

Robust standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
LogGDPpc refers to the natural logarithm of the GDP per capita at the Official Exchange Rate.
The 'Core Group' is a group of nearly 20 countries that initially opposed the TFA.
The 'Colorado Group' is composed of nine countries considered the Trade Facilitation proponents.
US FTA is a dummy variable that indicates if a country has a FTA with the United States.
EU FTA is a dummy variable that indicates if a country has a FTA with the European Union,
we have not considered other types of agreements.
AFTpc is the total aid per capita given to developing countries between 1995-2013 for Trade
Facilitation.
Openness refers to (Imports + Exports)/GDP.
In the last column we excluded Samoa (WSM) from the regressions because its openness measure
is a large outlier.

estimate to this range of variation implies that a difference of 200 commitments (out of a total of 238) can be explained by variation in the per capita income variable.[35] The R^2 measure in column 1 indicates that log per capita income variation explains 36 percent of the overall cross-country variation in the number of Type A commitments made.

We next include two dummy variables that are also quite plausibly exogenous to countries' trade facilitation commitments - dummy variables that indicate countries that are either landlocked or islands. Both landlocked countries and islands face logistical hurdles that other countries may not face, and it is useful to understand how these geographic characteristics affect commitment behavior. The results in column 2 of Table 4 show that both landlocked and island countries make substantially fewer commitments than countries that are able to trade over both land and sea.[36] The coefficient on the landlocked dummy is economically large but not statistically significant. The coefficient on the island dummy is even larger and statistically significant, though these effects disappear when other covariates are subsequently added to the regression. The marginal contribution of the landlocked and island dummy variables to R^2 is modest, even though these sets of countries jointly represent 42 percent of the sample.

In column 3 we include countries' (log) population size as a control variable. It seems likely that large-population countries would have relatively higher capacities - when it comes to implementing trade facilitation initiatives - than smaller countries with similar levels of income. It may be, for example, that poor countries with large populations can exploit scale economies in the implementation of trade facilitation measures.[37] Indeed we find a statistically and economically significant coefficient on the population variable. Each log point of population is associated with 8.3 additional type A commitments. A 10.1 log point range of the data (seen in Table 1) implies that population explains a change of 84 commitments from the *min* to the *max*. The contribution of the log population to R^2 is modest. The main effect of including the population variable seems to be to reduce the implied effects of the landlocked and island dummy variables.

Column 4 adds to the specification dummy variables that capture membership in free trade agreements with the United States and with the European Union, respectively. As expected, the coefficients on these variables are positive (and large), but they are measured with considerable noise. Several countries in the data have trade agreements with both partners (e.g. Mexico). The FTA variables are also potentially endogenous to trade facilitation capacities, since advanced economies like the US and EU likely prefer to conclude trade agreements with countries who have the capacity to implement advanced trade facilitation measures. One indirect way to see this is that the inclusion of these

---

[35]While we refrain from attaching causal interpretations to the entire set of right hand side variables in 1, it seems justifiable in the case of the per capita income variable. We note that the coefficient estimate on this variable remains quite stable as we add other covariates.

[36]It may seem that one of the two types of countries must be in a position that is at least as good as a country that is neither landlocked nor an island. But landlocked countries are less exposed to global trade, while island countries lack a land border over which to trade large volumes with their immediate neighbor.

[37]For example, large countries may be better able to incorporate sophisticated forms of information technology into border management because they can identify and train sufficiently large numbers of highly-skilled specialized professionals.

two dummy variables reduced the magnitude of the coefficients associated with all of the other four variables in the regression.

In column 5 we add two further dummy variables that capture membership, respectively, in the Core and Colorado groups of countries that played prominent roles in the TFA negotiations. Core group countries argued that developing countries' capacity to implement trade facilitation measures was too low to require binding commitments. These countries' *ex post* commitment behavior was consistent with this point of view. Core group countries made an average of nearly 35 fewer commitments than otherwise equivalent countries that were not in the group. This difference is statistically significant at the 5 percent level of confidence. A small group of countries known as the Colorado group pushed for binding commitments in the negotiations. Their *ex post* commitment behavior is consistent with greater willingness to make Type A commitments than otherwise equivalent peers.[38] This effect is not, however, statistically significant.

Column 6 adds to the regression *AFTpc*, per capita international aid received to support trade facilitation. The estimated relationship is positive and statistically significant. Each dollar per capita in dedicated aid received raises the number of commitments a country makes by 1.9. The 29.75 range of this variable (as seen in Table 1) suggests that a country receiving the maximum per capita foreign aid flow made approximately 58 more commitments than otherwise equivalent countries that received no such aid. This estimate is likely to suffer from an endogeneity bias; countries with low trade facilitation capacity should be expected to receive more aid and to make fewer commitments. If anything, foreign aid flows may have had larger effects on commitments than what we estimate here.

The inclusion of our aid measure in the regression leaves the effect of GDP per capita on commitments unchanged. The estimated effect of population on commitments rises somewhat; the largest recipients of aid on a *per capita* basis are likely to be quite small. Perhaps the most interesting changes in this column are the changes in the estimated coefficients on the US and EU FTA dummies. The sign on the estimated EU dummy switches sign, from positive to negative, while the coefficient on the US dummy rises. It seems that EU agreements have tended to be concluded with countries receiving large per capita aid flows in the trade facilitation area.[39] The change in the US coefficient from columns 5 to 6 suggests that US has tended to conclude trade agreements with countries that received lower-than-average per capita aid to support trade facilitation.

In column 7 we add the openness variable. We might expect countries that are more open to trade to make more commitments. But the potential for endogeneity is a concern (countries with more trade facilitation capacity may be more open to trade and make more commitments). The effect we estimate is negative and not statistically significant. The developing countries we study may have high levels of openness because their informal sectors are large (reducing measured GDP), and because many of them are quite small (and thus dependent on imports for many products). It is nonetheless useful to note that the inclusion of this variable does little to affect the other coefficients in the regression.

---

[38]Three of the six Colorado group countries made Type A commitments on all 238 measures.

[39]The EU itself is a major supplier of foreign aid in the area, and often pairs aid to support trade facilitation with trade agreements.

An important lesson of the regression analysis is that the revealed capacity of countries to make binding trade facilitation commitments appears to be closely tied to their per capita income and - to a lesser degree - their population size. Both these variables are statistically and economically significant across a range of specifications. The quantitative importance of these two slow-moving variables in explaining commitment behavior may imply that the road to full implementation of the TFA will be a long one.

Evidence from a third variable suggests some grounds for hope that policy can be effective in this area. Countries which receive more per capita aid to support trade facilitation tend to make more Type A commitments. Note however, that the aid flows are measured on a per capita basis, and that commitments are not overly responsive to per capita aid flows. Full implementation of the TFA by developing countries may require very large flows of funds if progress is to rely on this particular mechanism.

5   Multidimensional scaling analysis (MDS)

In the previous section we simply studied the number of commitments, implicitly collapsing any distinctions between the commitments in terms of their content. But the content of the commitments themselves varies substantially across measures. Some require particular bureaucratic structures, others prescribe protocols for selecting shipments for inspection, while others involve informational technology investments and/or coordination across multiple government agencies. The variety of trade facilitation measures listed in the agreement may mean that different kinds of countries differ in their ability to implement different kinds of measures. In this section we ask how the content of Type A commitments differs across countries, a question that can be distinct from asking what explains the number of Type A commitments made.

Conceptually, we can treat commitments on each measure as a binary outcome. Of the 238 trade facilitation measures in the database, countries are ready or nearly ready to implement (a type A commitment), or they are not (type B or Type C commitments). In the regression analysis above we collapse all of this information to a single vector, the number of Type A commitments made by each of 113 countries in the sample. But we can also represent the commitment data as a 113x238 dimension matrix of outcomes. We represent the commitment outcomes as ones and zeroes, with type A commitments taking the value of one, and other types of commitments taking the value of zero. We then apply multi-dimensional scaling (MDS) techniques to reduce the dimensionality of this large matrix.[40]

Perhaps the most well-known application of MDS techniques in the social sciences is its use in the study of voting behavior in the United States Congress.[41] This literature applies MDS to binary data on roll-call votes within each two-year session of U.S. Congress, and positions individual legislators

---

[40]MDS is a tool for dimension reduction when the outcome data are binary. It functions in a manner that is similar to principal components analysis, a dimension-reduction technique applied to continuous data.

[41]See Poole and Rosenthal (1985), Poole and Rosenthal (1991)and Poole and Rosenthal (2000).

within a revealed ideological space. In the modern context, dimension reduction through MDS generates a one-dimensional space that represents Members of Congress' voting behavior in a manner that qualitative analysts would consider to be a faithful representation of the left-right political spectrum. The TFAD data have many fewer observations, but they have a similar structure to roll-call votes in Congress, and we can apply similar techniques to them.

Our question is whether or not we can observe systematic differences in the substance of countries' trade facilitation commitments. It may be, for example, that countries differ only in the number of commitments made. Countries with more capacity make more commitments, but the content of countries' choices only differ because countries with more capacity do more difficult things. If so, an MDS analysis applied to our data should produce a one-dimensional space. On the other hand, it may be that some kinds of trade facilitation measures are relatively easier for some countries to implement, while other countries find different bundles of commitments easier to implement. Island countries, for example, might make substantively different commitment bundles than landlocked countries because the trade facilitation challenges are different in each setting. In principle there might be any number of such cross-country differences, which would mean that the MDS analysis would leave us with a multi-dimensional space.

The outputs of MDS analysis are similar to that of principal components analysis: a series of eigen vectors and associated eigen values provide a compact representation of the multidimensional space. As in principal components analysis, MDS produces a measure of each dimension's explained variation, in this case known the coefficient of determination (R^2). After completing the MDS analysis, we correlate countries' position along the most important dimensions with the the number of Type A commitments and with other country characteristic data. This post-estimation analysis aids the interpretation of the output from the MDS exercise.

5.1   MDS Results

To implememnt multidimensional scaling we apply the MDS command in STATA, using the 'classical' option and specifying binary data. Following Kaiser (1974), we keep the nine dimensions with eigen values greater than 1. We find that the 238 dimensional space that is represented by data on each of the individual commitments can be faithfully represented by just nine dimensions. And most of these nine dimensions are not important, quantitatively.

Panel A of Table 5 reports information on the coefficient of determination, the conceptual equivalent of an R^2 measure in that it provides the share of variation in the data that is explained by each dimension.[42] The figures in the top row are cumulative measures of explained variation; the second row reports the marginal contribution of each dimension to the explained variation. As the table shows, the first dimension explains 72 percent of the variation in the data, the second only 12 percent, and subsequent dimensions far less.

The first dimension is clearly quite important, but what does it measure? To answers this question

---

[42]The use of this measure is proposed by Bartholomew et al. (2008).

Table 5: Goodness of fit of MDS and Pearson correlation coefficients.

	dim1	dim2	dim3	dim4	dim5	dim6	dim7	dim8	dim9
Panel A									
R^2	0.717	0.836	0.876	0.905	0.915	0.929	0.939	0.953	0.959
ΔR^2	0.717	0.120	0.040	0.029	0.010	0.014	0.010	0.014	0.006
Panel B									
(A) No. of Comm.	-0.998	0.052	0.012	0.010	-0.008	0.005	-0.009	-0.013	0.004
logGDPpc	-0.586	0.227	0.150	-0.003	-0.121	-0.043	-0.052	-0.055	0.088
landlocked	0.304	-0.154	-0.182	0.034	0.041	-0.073	0.072	-0.047	-0.095
island	0.082	0.014	0.308	0.151	-0.069	0.090	-0.030	0.018	0.114
logpop	-0.086	0.145	-0.288	-0.156	0.287	-0.156	0.045	0.007	-0.025
EU FTA	-0.342	0.159	-0.090	-0.102	0.092	0.041	0.099	-0.087	0.206
US FTA	-0.427	0.136	-0.033	-0.118	0.040	0.053	-0.005	-0.049	0.141
Core	0.241	0.056	-0.096	0.101	0.149	-0.069	-0.107	0.084	-0.045
Colorado	-0.344	0.051	-0.158	-0.082	0.145	0.095	0.112	-0.025	0.039
AFTpc	-0.133	0.042	-0.133	0.096	-0.010	-0.010	0.112	0.050	0.128
openness	-0.193	0.004	0.042	-0.079	-0.069	-0.166	-0.081	-0.077	0.054

Following the Kaiser (1974) criteria, from MDS results we kept the nine dimensions with eigenvalues greater than 1. Thus, we label our configurations settings from 1-dimension (dim1) to 9-dimensions (dim9)
Panel A shows the value of the coefficient of determination, R^2, for the observed distances in the initial 238-dimension configuration versus the fitted distances in the different configuration settings. Furthermore, ΔR^2 records the marginal increase in R^2 for adding another dimension to the configuration.
Panel B shows the Pearson correlation coefficients between the score of each country in the MDS dimensions and their values in the control variables. These control variables are the same as those used in the OLS cross-country regressions

we correlate a score variable that positions each country along each dimension, and correlated the dimension scores with the data from the regression model.[43] The results of this correlation are reported in Panel B of Table 5.

Column 1 shows that the first dimension of the MDS analysis is almost perfectly correlated with the number of commitments made ($\rho = -0.998$). This means that the primary explanation for cross-country variation in the content of countries' Type A commitments is very simple: countries vary in the number of commitments made. This means that in large part, the measures in the agreement can be understood as a heirarchy. Countries with the lowest levels of capacity implement only the most widely adopted measures; countries with higher levels of capacity adopt commitments that are apparently more challenging to implement.

Correlation of the second dimension with the observable variables provides some explanation of less important country differences in commitment behavior. The second dimension is, by construction, completely orthogonal to the first dimension. Interpreting the first dimension as variation that arises because of the number of commitments made, the second dimension tells us about variation in the kinds of commitments, after controlling for the number of commitments. Taking the country characteristic variables with the strongest correlations in column 2, and interpreting their signs, we can say that the second dimension tells us that countries that have high average incomes, have large populations, are

---

[43]The score variable is calculated by taking the inner product of the binary data representing a country's commitments and the eigen vector linked to that dimension, with the inner product then multiplied by the associated eigen value. The score variable positions each country along a line in the same manner that studies of Congressional votes would locate a Congressperson along the first dimension in that data, which is commonly understood as a left-right political spectrum.

not landlocked, and are members of trade agreements with EU and/or the US tend to make somewhat different commitment bundles than otherwise equivalent countries with opposite characteristics. We should not over-interpret these results, however, as the second dimension explains only 12 percent of the variation in the data, and the correlation with these country characteristics is not overly strong.[44]

In summary, while it is not the entire story, the importance of the first dimension - and the nearly perfect correlation with the number of commitments made - offer a central lesson. Most of the variation in commitment behavior is not in the content of commitments, but in the number of commitments made. Had there been a requirement of a single undertaking, these data suggest that there was little hope that a negotiating modality focused on cross-issue linkages and reciprocity would have achieved a successful conclusion of negotiations, even on this narrow topic. The central difference in commitments relates to differences in capacities, rather than to differences in the preferred content of the agreement. This is probably not news to the negotiating parties or to trade logistics professionals. The purpose of our analysis is to describe these realities empirically for a wider audience.

6   Conclusion

In this paper we provide a descriptive analysis of WTO member countries' initial 'Type A' commitments under the TFA. Type A commitments were binding within a year of the agreements' ratification, and are therefore a useful representation of the number and kinds of commitments that developing countries themselves saw as feasibly implemented in the immediate future. Our analysis thus provides a high-level description of developing countries' progress towards full implementation of the agreement at the time of ratification. We provide three kinds of analysis that offer different kinds of information and exploit variation across the kinds and numbers of commitments that countries made at the time of ratification.

First, we document variation across areas of trade facilitation policy in the percentage of commitments made in each area. This analysis is informative about developing countries' comfort, in aggregate, with the status of their ability to successfully implement each trade facilitation measure within a short period of time. We conduct the analysis by grouping commitments according to their position in the legal text, and by their inclusion in functional areas of trade facilitation policy. Commitments related to *movement under customs control* and *pre-shipment inspection* appear to be the easiest for developing countries to implement. *Single windows* and *authorized operator* programs appear to be the most difficult.

Our second exercise attempts to explain cross-country variation in the number of Type A commitments made during initial ratification. A simple linear regression model shows that variation in per capita income alone explains 36% of the variation in the number of commitments that countries made. Each additional log point of per capita income is associated with 36 more type A commitments

---

[44]The third dimension explains only four percent of the variation in the commitment data; its correlation pattern suggests that it captures some residual variation in the content of the agreement that is linked to islands with small populations. Subsequent dimensions do not explain a meaningful share of the variation in the commitment behavior, and we refrain from interpreting them.

made during the ratification process. After controlling for per capita income, countries with larger populations also make more commitments. We also find that countries receiving more dedicated aid to support trade facilitation make more commitments. In our richest specification of the regression model, we find that eight independent variables jointly explain 56 percent of the variation in the number of type A commitments.

Our third and final exercise considers the content of countries' commitment bundles, rather than simply measuring the number of commitments made. A key question is whether there are important differences across countries in the kinds of commitments made. We employ a multidimensional scaling analysis to look for common commitment patterns in the data. The first latent dimension explains 72 percent of the variation in the data, and is almost perfectly correlated with the number of commitments made. The second dimension explains only 12 percent more of the variation in the data, and subsequent dimensions make far smaller marginal contributions. The relatively large role of the first dimension - and its near perfect correlation with the number of commitments made - indicates that there is only modest variation across countries in the preferred *content* of their commitments, after controlling for the number of commitments made.

Although our evidence relates only to the narrow topic of trade facilitation, we believe an analysis of the structure of commitment behavior in this agreement potentially informs much larger questions regarding the structure of trade negotiations, and international negotiations more broadly. The TFA is notably different from other GATT/WTO agreements because it allowed developing countries to choose their commitments in an á la carte fashion, rather than requiring a single undertaking based on a common set of commitments. The á la carte structure produced a successful conclusion of negotiations at the WTO, even as broader WTO negotiations based on traditional modalities that exploit cross-issue linkages to achieve a single undertaking have stalled. One reason for the TFA's success may be that the structure of preferences over commitments does not appear to be very different across countries; countries differ primarily in the number of trade facilitation commitments they feel ready to make. The TFA's á la carte structure may be appropriate for other negotiations, whether they be about trade or about other international issues.

References

Bartholomew, David J., Fiona Steele, Irini Moustaki, and Jane I. Galbraith, *Analysis of Multivariate Social Science Data*, 2 ed., Chapman and Hall/CRC, Boca Raton, FL., ISBN: 978-1-58488-961-8, 2008.

Beverelli, Cosimo, Simon Neumueller, and Robert Teh, "Export Diversification Effects of the WTO Trade Facilitation Agreement," *World Development*, 2015, *76*, 293–310.

Carballo, Jerónimo, Alejandro Graziano, Georg Schaur, and Christian Volpe Martincus, "The Heterogeneous Cost of Port-of-Entry Delays," *Inter-American Development Bank Discussion Paper IDB-DP-351, Inter-American Development Bank, Washington, DC*, 2014.

_ , **Georg Schaur, Alejandro Graziano, and Christian Volpe Martincus**, "The Border Labyrinth: Information Technologies in the Presence of Multiple Agencies," *Inter-American Development Bank Working Paper IDB-WB-706, Inter-American Development Bank, Washington, DC*, 2016.

_ , _ , _ , **and** _ , "Transit Trade," *Inter-American Development Bank Working Paper IDB-WB-70, Inter-American Development Bank, Washington, DC*, 2016.

_ , _ , **and Christian Volpe Martincus**, "Posts as Trade Facilitators," *Inter-American Development Bank Working Paper IDB-WB-701, Inter-American Development Bank, Washington, DC*, 2016.

_ , _ , **and** _ , "Trust No One? Security and International Trade," *Inter-American Development Bank Working Paper IDB-WB-703, Inter-American Development Bank, Washington, DC*, 2016.

Cariolle, Joël, Cyril Chalendard, Anne-Marie Geourjon, and Bertrand Laporte, "Measuring and Improving the Performance of Customs Valuation Controls: An Illustration with Gabon," *The World Economy*, 2019, *42* (6), 1850–1872.

Central Intelligence Agency, "The World Factbook," *Central Intelligence Agency, Washington, DC, 2019, URL:* `https://www.cia.gov/library/publications/resources/the-world-factbook/index.html`*, Access Date: 2019-04-03*, 2019.

Chalendard, Cyril, Gaël Raballand, and Antsa Rakotoarisoa, "The Use of Detailed Statistical Data in Customs Reforms: The Case of Madagascar," *Development Policy Review*, 2019, *37* (4), 546–563.

European Commission, "Trade Negotiations and Agreements," *European Commission, Brussels, Belgium, URL:* `https://ec.europa.eu/trade/policy/countries-and-regions/negotiations-and-agreements/` *Access Date: 2018-03-28*, 2019.

Fernandes, Ana M, Russell Hillberry, and Alejandra Mendoza, "Trade Effects of Customs Reform: Evidence from Albania," *The World Bank Economic Review*, 2021, *35* (1), 34–57.

_ , _ , **and Claudia Berg**, "Expediting Trade: Impact Evaluation of an In-House Clearance Program," *The World Bank Policy Research Working Paper 7708*, 2016.

Fontagné, Lionel, Gianluca Orefice, and Roberta Piermartini, "Making (Small) Firms Happy? The Heterogeneous Effect of Trade Facilitation Measures," *Review of International Economics*, 2020, *28*.

Henn, C and JB Le Hen, "The WTO Doha Trade Round—Unlocking the Negotiations and Beyond," *International Monetary Fund, Policy Paper Series*, 11 2011.

Hillberry, Russell and Xiaohui Zhang, "Policy and Performance in Customs: Evaluating the Trade Facilitation Agreement," *Review of International Economics*, 2018, *26* (2), 438–480.

Hoekman, Bernard, "Determining the Need for Issue Linkages in Multilateral Trade Negotiations," *International Organization*, 1989, *43* (4), 693–714.

_ , "The Bali Trade Facilitation Agreement and Rulemaking in the WTO: Milestone, Mistake or Mirage?," *The World Trade System: Trends and Challenges*, 2016, pp. 149–92.

_ **and Douglas Nelson**, "Twenty-First-Century Trade Agreements and the Owl of Minerva," *Annual Review of Resource Economics*, 2018, *10*, 161–183.

_ **and Michel M Kostecki**, *The Political Economy of the World Trade System: The WTO and Beyond*, 2 ed., ISBN: 9780198294313, New York, Oxford University Press, 2001.

Kaiser, Henry F, "An Index of Factorial Simplicity," *Psychometrika*, 1974, *39* (1), 31–36.

Leidy, Michael P. and Bernard M. Hoekman, ""Cleaning Up" While Cleaning Up? Pollution Abatement, Interest Groups and Contingent," *Public Choice*, 1994, *78*, 241–258.

McLinden, G., E. Fanta, D. Widdowson, and T. Doyle, *Border Management Modernization*, ISBN:978-0-8213-8596-8, The World Bank, Washington DC., Report number 58845, 2011.

Moïsé, E., T. Orliac, and P. Minor, "Trade Facilitation Indicators: The Impact on Trade Costs'," *OECD Trade Policy Papers*, 2011, (118).

Moïsé, Evdokia, Silvia Sorescu et al., "Trade Facilitation Indicators: The Potential Impact of Trade Facilitation on Developing Countries' Trade," 2013, (144).

Neufeld, Nora, "The Long and Winding Road: How WTO Members Finally Reached a Trade Facilitation Agreement," WTO Staff Working Papers ERSD-2014-06, World Trade Organization (WTO), Economic Research and Statistics Division 2014.

_ , "Trade Facilitation Provisions in Regional Trade Agreements: Traits and Trends," *Journal of International Commerce, Economics and Policy*, 2014, *5* (02), 1450005.

Office of the United States Trade Representative, "Free Trade Agreements," *Office of the United States Trade Representative, Excecutive Office of the President, Washington D.C., URL: https://ustr.gov/trade-agreements, Access Date: 2018-12-23*, 2019.

Organisation for Economic Co-operation and Development, "Query Wizard for International Development Statistics (QWIDS)," *Organisation for Economic Co-operation and Development, Paris, 2020, URL: https://stats.oecd.org/qwids/, Access Date: 2020-12-25*, 2020.

Poole, Keith T and Howard Rosenthal, "A Spatial Model for Legislative Roll Call Analysis," *American Journal of Political Science*, 1985, *29* (2), 357–384.

_ **and** _ , "Patterns of Congressional Voting," *American Journal of Political Science*, 1991, *35* (1), 228–278.

_ **and** _ , *Congress: A Political-Economic History of Roll Call Voting*, 1 ed., ISBN: 9780195142426, Oxford University Press, 2000.

United Nations, "Paris Agreement," *United Nations Treaty Collection, Chapter XXVII 7. d, URL: https://treaties.un.org/pages*, 2015.

Winham, Gilbert R and David Black, *Canada-US Sectoral Trade Study: The Impact of Free Trade: a Background Paper*, Halifax, NS: Centre for Foreign Policy Studies, Dalhousie University, 1986.

World Trade Organization, "Trade Facilitation Agreement Database," *URL:https://www.tfadatabase.org/, Access date: 2019-01-30*, 2019.

_ , "Trade Facilitation Agreement Facility," *URL:https://www.tfafacility.org/, Access date: 2019-03-20*, 2019.

A   Structure of Section I of the Trade Facilitation Agreement

In this appendix we provide more details about the 36 areas of regulation in the TFA. Table A.1 is reproduced from WTO (2019b), except that we also calculate and report the number of paragraphs of text (i.e. commitments) for each area of regulation. The table reports the relevant article and section, a working title, a description of the regulation and the number of paragraphs of text related to the topic.

One area of regulation that is worthy of note is *Customs Cooperation*, Article 12 in the agreement. This area of regulation has 49 paragraphs, which means that this area accounts for over 20% of the total paragraphs in the TFA. Countries' progress on Article 12 is thus an important factor in their apparent progress towards full ratification. Generally speaking *Customs Cooperation* refers to compliance and information sharing between each member's Customs Agencies. It also includes guidelines as to how to request, protect, refuse and provide Customs information between Members. Table 3 shows that only 55% of the commitments made in this area are Type A commitments.

Table A.1: Brief Descriptions of Article regulations

Art. section	Area of regulation	What it regulates	No. par.
Art. 1.1	Publication	The types of information that governments publish, and the manner of publication.	10
Art. 1.2	Information available through internet	The information a government provides to the public regarding import, export and transit procedures, and the manner by which it is provided.	5
Art. 1.3	Enquiry points	The means by which an individual trader, a government, or any other interested person can obtain specific information from a Member about import, export or transit requirements.	4
Art. 1.4	Notification	Communications to/from the WTO Committee on Trade Facilitation.	3
Art. 2.1	Comments and information before entry into force	The process by which national trade legislation is made. This includes the process for enacting laws on trade-related matters by the national legislative body (congress, parliament, legislature, etc.) as well as secondary legal acts (regulations, rules, orders, etc.) issued by executive or administrative bodies.	3
Art. 2.2	Consultations	The process by which border agencies obtain the views of traders and other stakeholders on matters affecting them.	1
Art. 3	Advance rulings	The means by which a trader can obtain reliable "binding" information about the tariff classification, origin, or other customs treatment of his goods before he imports them.	19
Art. 4	Procedures for appeal or review	The rights of traders to obtain review and correction of decisions made by Customs officials or officials of other border agencies.	9
Art. 5.1	Notifications for enhanced controls or inspections	Disciplines on any system of issuing notifications or guidance to concerned authorities to enhance controls and inspections on imported goods, particularly food products, beverages and feedstuffs.	4
Art. 5.2	Detention	The "detention" of goods declared for importation by Customs or other border authority (e.g., health, safety, agriculture, etc.) for purposes of conducting an inspection.	1
Art. 5.3	Test procedures	Laboratory testing of goods for customs, food safety, agriculture or other regulatory purposes.	3
Art. 6.1	General disciplines on fees and charges	The "fees and charges" that governmental authorities assess on, or in connection with, imports or exports.	4
Art. 6.2	Specific disciplines on fees and charges	The "fees and charges" that customs authorities assess on, or in connection with, imports or exports for services provided to the importer or exporter.	2
Art. 6.3	Penalty Disciplines	The assessment of civil or administrative penalties for violations of the customs laws.	8
Art. 7.1	Prearrival processing	Submission of the documents required for the release of imported goods to customs and other border agencies.	2
Art. 7.2	Electronic payment	The means by which a trader can pay his duties, taxes, fees and charges.	1
Art. 7.3	Separation of release	Release of imported goods from Customs.	7
Art. 7.4	Risk management	The methodology or practices that Customs uses to determine which import, export or transit transactions or operators should be subject to control and the type and degree of control to be applied.	4
Art. 7.5	Postclearance audit	Customs verification of compliance with customs and related laws and regulations through examination of the trader's books and records at his premises following release of the goods.	4

Art. section	Area of regulation	What it regulates	No. par.
Art. 7.6	Average release times	Measuring the performance of customs and other border agencies with respect to the release of goods.	2
Art. 7.7	Authorized operators	Special or preferential customs treatment provided to reliable traders.	17
Art. 7.8	Expedited shipments	Documents and goods imported by air express-delivery operators and other expedited shippers.	13
Art. 7.9	Perishable goods	Customs clearance and release of imported "perishable goods".	5
Art. 8	Border Agency Cooperation	(1) The activities of the different national border agencies in connection with an import, export or transit transaction. (2) The activities of the border agencies of two Members in connection with trade across a shared border.	6
Art. 9	Movement of goods	Imported goods arrive at one customs office (for example, an international airport or a seaport) for delivery to an inland destination within the same country, where the importer will declare and clear the goods. The goods may be offloaded from the international carrier at the point of entry and loaded on another means of transport (truck or rail, for example) for carriage to the final destination. The measure is intended to allow the goods to be moved under a simplified procedure to the inland customs office, and permit the importer to clear them at the destination rather than at the port of arrival.	1
Art. 10.1	Formalities	Import, export and transit formalities and documentation requirements.	4
Art. 10.2	Acceptance of copies	Presentation of supporting documents for import, export or transit formalities.	3
Art. 10.3	Use of international standards	Import, export and transit formalities and procedures.	2
Art. 10.4	Single window	Traders' submission of documents/data to multiple government agencies to allow import, export or transit of a goods shipment.	4
Art. 10.5	Preshipment inspection	Use of pre-shipment inspection firms to carry out customs-related controls on imported goods.	2
Art. 10.6	Use of customs brokers	The use of customs brokers in import, export or transit operations.	3
Art. 10.7	Common border procedures	The import/export procedures applied by Customs, and documentation requirements, at the different entry and exit offices within the customs territory.	6
Art. 10.8	Rejected Goods	The re-export or return of imported goods that have been rejected by government authorities.	2
Art. 10.9	Temporary admission of goods & inward and outward processing	Customs procedures to allow the importation of goods without payment of import duties and taxes, or eligible for duty drawback, subject to conditions on the use to which the goods have been, or will be, put.	4
Art. 11	Transit	(1) The regulations and formalities that a Member applies to traffic in transit. (2) Goods in transit and the vessels and transport means of other Members (strengthened non-discrimination). (3) Customs transit procedures and controls. (4) The use and discharge of guarantees that may be required by Customs in connection with transit operations. (5) Promotion of agreements and coordination on transit matters at a regional and bilateral level.	21
Art. 12	Customs cooperation	Customs-to-Customs exchange of information for purposes of verifying goods declarations.	49
		Total of Paragraphs	238