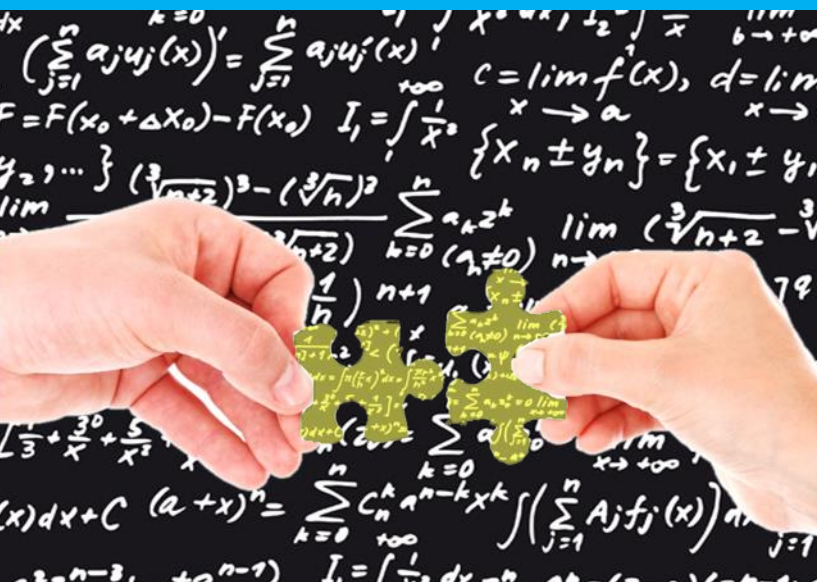




# Impact of implementation of digital trade facilitation on trade costs



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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

# WORKING PAPER

## Impact of implementation of digital trade facilitation on trade costs<sup>1</sup>

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## **Abstract**

This study estimates the effect of trade facilitation measures implementation on trade costs in Asia and the Pacific using data from the United Nations Global Survey on Trade Facilitation and Paperless Trade Implementation. Impact of different sets of measures are considered, from a basic set of measures to ensure compliance with the World Trade Organization Trade Facilitation Agreement (WTO TFA) commitments, to a full set of digital trade facilitation measures. The analysis shows that full implementation of both binding and non-binding measures in the WTO TFA is associated with an average 15% trade cost reduction in Asia-Pacific. On the other hand, full implementation of binding and non-binding WTO TFA measures together with other paperless and cross-border trade facilitation measures (digital trade facilitation) is projected to decrease trade costs by more than 26%, cutting international transaction costs in Asia and the Pacific by about \$1.2 trillion annually. The analysis also confirms that there are significant reductions in trade costs associated with trade partners' implementation of trade facilitation measures. This shows that economies which already have high rates of trade facilitation implementation have strong incentive to encourage and support their trading partners in implementing trade facilitation. Further facilitation of trade in these economies will involve developing legal and technical frameworks to support cross-border paperless trade, i.e., enabling the electronic exchange and legal recognition of trade data and documents between public and private actors located in different countries along the international supply chain, as envisaged in the recently adopted regional UN treaty on cross-border paperless trade facilitation, the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific (FA-PT).

**Key words:** Trade, Trade Models, International Trade Agreements, Liberalization, Trade Policy, Trade Simulations

**JEL codes:** F10, F12, F13, F17

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## Abbreviations

AEO	authorized economic operator
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
CA	Certification Authority
CII	World Bank Doing Business Credit Information Index
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
EU	European Union
FA-PT	Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific
ICT	information and communications technology
LSCI	Liner Shipping Connectivity Index
NTB	non-tariff barrier
NTFC	national trade facilitation committee
OECD	Organisation for Economic Co-operation and Development
RTA	regional trade agreement
SDGs	Sustainable Development Goals
TF	trade facilitation
TFA	Trade Facilitation Agreement
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNCTAD	United Nations Conference on Trade and Development
UNNEXt	United Nations Network of Experts for Paperless Trade and Transport for Asia and the Pacific
UNTF Survey	United Nations Global Survey on Trade Facilitation and Paperless Trade Implementation 2017
WTO	World Trade Organization

# 1. Introduction

Developing economies are particularly susceptible to high trade costs. Reduction of trade costs would encourage greater participation of developing economies in international trade, boost trade flows and contribute to their economic development. A wide consensus exists in the literature that future reductions in trade costs will come from addressing non-tariff barriers (NTBs) to trade, including through digital trade facilitation. Digital trade facilitation refers to the application of modern information and communication technologies (ICTs) to procedures involved in moving physical goods across borders. It includes in particular measures enabling the exchange of electronic (rather than paper-based) data and documents among public and private stakeholders involved in an international trade transaction, i.e. cross-border paperless trade. Asia-Pacific economies have long strived to make trade procedures as efficient as possible, including through implementation of automated customs systems, electronic single windows and other digital customs and trade facilitation initiatives. These paperless trade measures are rapidly becoming essential not only to maintain trade competitiveness, but also to address the trade control and logistics challenges associated with an increase in small shipments and cross-border e-commerce. As such, digital trade facilitation through cross-border paperless trade measures implementation holds promise to further bring down trade costs and enhance trade. To demonstrate the potential benefits of digital trade facilitation, this study seeks to quantify the impact of various levels of trade facilitation measures implementation on trade costs.

This study uses the detailed data from the United Nations Global Survey on Trade Facilitation and Paperless Trade Implementation (UNTF Survey). The effects of implementation of measures featured in the World Trade Organization Trade Facilitation Agreement (WTO TFA) as well as more advanced paperless trade measures outside the scope of the WTO TFA are examined. The findings suggest that digital trade facilitation implementation, such as through the Framework Agreement on Facilitation of Cross-



border Paperless Trade in Asia and the Pacific, can double the benefits of a narrower WTO TFA implementation.

The study further estimates the impact on trade costs of a country due to own trade facilitation measures implementation as well as due to their trade partners' implementation. The results suggest that implementation of trade facilitation measures by trade partners can also significantly reduce a country's own trade costs. As such, to reduce trade costs and boost trade the governments should actively collaborate, particularly on paperless cross-border trade facilitation initiatives, even if their own countries' trade facilitation measures implementation rates are already high.

This paper is organized as follows. First, an overview of the importance of trade costs is presented in section 2. Next, data and methodology for the study, including a summary of trade facilitation implementation levels in Asia and the Pacific, are presented in section 3. Results of the estimation of trade costs models follow in section 4. Counterfactual assessments of the trade cost reductions associated with a country' own trade facilitation reforms and/or those undertaken by its trade partners, are analysed in section 5. Section 6 concludes and presents the way forward for Asia and the Pacific.

## **2. Literature review**

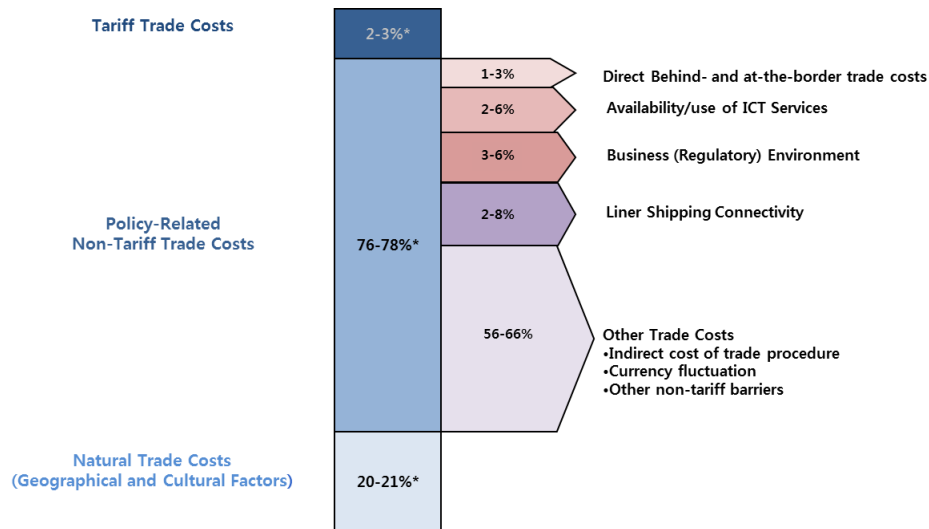
The importance of reducing trade costs to support sustained and sustainable development of the global economy has been widely acknowledged at the policy level, as evidenced by the focus of – and extensive discussions at – the Fifth Global Review on Aid for Trade held in July 2015. This is particularly important for developing economies, where trade costs typically remain high and have not fallen as fast as in more developed economies (Arvis et al., 2013).

A wide consensus exists in the literature that further reductions in trade costs will come from addressing NTBs, including through implementation of trade facilitation measures (Duval et al., 2015a and 2015b, among other sources). The importance of reducing not only tariff but also NTBs to trade is highlighted in a seminal study by

Anderson and Van Wincoop (2004), who found that ad-valorem trade costs between countries amounted to a staggering 170%, but that tariff costs only amounted to about 8%. However, measuring the importance and impact of individual non-tariff cost components has remained difficult.

Building on the inverse gravity approach pioneered by Novy (2013), several studies inferred aggregate trade costs from gross trade and output data, and set out to directly measure the contribution of tariffs and NTBs on such comprehensive trade costs. Regional analysis in Asia and the Pacific by ESCAP (2015a) found that while tariff costs accounted for 2-3% of trade costs across countries, natural trade costs such as geography (i.e., distance, landlockedness etc.), cultural distance and historical relationships (i.e., language, colonization etc.) between countries accounted for an additional 20%-21%% of trade costs (see figure 1). More importantly, policy-related NTBs accounted for the remaining 76%-78% of trade costs. The study found that international trade costs in that broad category were affected by liner shipping (maritime) connectivity, the domestic business environment of the trading partners, the availability and use of ICT services, the direct cost of trade procedures as well as by other policy related factors – the effect of which was difficult to disentangle, given the lack of data.

**Figure 1. What explains trade costs across countries in Asia and the Pacific?**



Note: figure 1 is a simplified representation of the results from ESCAP, 2015a

Arvis and others (2013) extended this type of analysis by developing the ESCAP-World Bank Trade Cost Database and conducting a comprehensive analysis of trade costs across 178 countries. Upon controlling for natural sources of trade costs (i.e., tariffs, transportation, language etc.) and other NTBs earlier identified in the literature, they confirmed the importance of liner shipping connectivity, including logistics performance in general, and the business environment in determining trade costs. Furthermore, the existence of a regional trade agreement (RTA) was shown to significantly reduce trade costs. That later result was corroborated by Novy (2013), who found that the existence of a free trade agreement between trading partners was associated with a 7%-12% decrease in trade costs.

While previous studies have demonstrated that trade facilitation (TF) can lead to higher trade flows and lower trade costs, very few studies have investigated the impact of the WTO TFA and/or paperless trade upon trade costs. With regards to the WTO TFA, Moïse and Sorescu (2013) collected data to construct 16 Organisation for Economic Co-operation and Development (OECD) TF Indicators corresponding to the main policy areas covered by the Agreement, and estimated the impact on trade costs across WTO member and observer States using the ESCAP-World Bank Trade Cost Database. Their analysis,

updated in OECD (2015) based on more recent TF Indicators and trade cost data, suggested that implementation of the TF measures featured in the WTO TFA would bring a 16.5%, 17.4% and 14.6% reduction in trade costs across low-income, lower-middle income and upper-middle income countries, respectively. Measures with the greatest potential for reducing trade costs include harmonizing and simplifying documents (up to 4.2% for the low-income group), streamlining border procedures (up to 3.9% for the lower-middle income group), and automating trade and customs procedures (up to 3.6% for the low-income group). These estimates unfortunately do not take into account the policy-related factors previously identified in the literature as highly significant, such as maritime connectivity and the business environment, possibly leading to overestimation of impact.

With regard to the implementation of paperless trade reforms, the literature is still emerging and evidence of benefits is typically based on case studies and ad hoc evidence. On the basis of an APEC survey on paper documents for trade in 1999, DTAC and FTEC (2001) found that removing the mandatory requirements for paper documents would result in savings amounting to 1.5% to 15% of the price of landed goods, depending on the specific product. A more recent study surveying firms in the Republic of Korea also found that businesses benefited to the tune of \$2.6 billion annually from the introduction of paperless trade, with savings accrued from reductions in labor costs, printing and delivery of documents (Hyundai Research Institute, 2006). In Singapore, the introduction of an electronic Single Window for trade documents reduced processing times from four days to 15 minutes and lowered the cost of submission per document by 71% (UNNExT, 2010). In the case of Japan, the introduction of an electronic Single Window and associated simplified procedures resulted in annual savings exceeding \$500 million for an initial investment of about \$90 million (UNNExT, 2011).

Shepherd and Duval (2014) recently reviewed studies related to paperless trade and found that cost reductions associated with implementation of paperless trade facilitation measures ranged from 20% to 87% per transaction across studies and countries. However, the differences in the scope of paperless trade considered as well as in the methodologies applied and data availability limited the comparability of the results across

studies. Using data from the ESCAP Survey on Trade Facilitation and Paperless Trade Implementation 2013, they found that full implementation of the paperless trade measures included in the survey would result in a 24% decline in exporting time and 17% reduction in direct export costs across the Asia-Pacific region, increasing the annual export potential of the region by \$257 billion.

### **3. Trade facilitation implementation and trade costs: data description and methodology**

To assess the effect of trade facilitation implementation on trade costs, this study first outlines the trade cost model and estimation methods used. Next, trade facilitation implementation indicators and data used in the estimation are introduced.

#### **3.1. Trade costs model estimation**

In line with previous studies (see Arvis et al., 2013), trade costs can be modelled as a function of natural geographic factors (i.e., distance, landlockedness and contiguity), cultural and historical distance (i.e. common official language, common unofficial language, former colonial relationships and formerly same country), the presence of regional trade agreements and liner shipping connectivity. The trade cost models estimated here also include trade facilitation implementation indicators, as well as an index of credit information capturing the impact on trade costs of domestic access to credit and cost of financial services – as such factor was identified as significant in earlier work (e.g., ESCAP, 2015b).

In order to better understand the impact on trade cost of a country's own implementation of trade facilitation reform, and that resulting from trade facilitation improvements in partner countries, two trade cost models are specified as follows:

Model I: Trade cost model with average TF implementation in own country and trading partner

$$\begin{aligned} \ln(\tau_{ij}) = & \beta_0 + \beta_1 \ln(\text{gtariff}_{ij}) + \beta_2 \ln(\text{dist}_{ij}) + \beta_3 (\text{contig}_{ij}) + \beta_4 (\text{comlang\_off}_{ij}) \\ & + \beta_5 (\text{comlang\_ethno}_{ij}) + \beta_6 (\text{colony}_{ij}) + \beta_7 (\text{comcol}_{ij}) + \beta_8 (\text{smctry}_{ij}) \\ & + \beta_9 (\text{rta}_{ij}) + \beta_{10} (\text{landlocked}_{ij}) + \beta_{11} \ln(\text{creditindex}_{ij}) + \beta_{12} \ln(\text{LSCI}_{ij}) \\ & + \beta_{13} \ln(\text{TF}_{ij}) + D_i + D_j + \varepsilon_{ij} \end{aligned}$$

Model II: Trade cost model with separate TF implementation in own country and trading partner

$$\begin{aligned} \ln(\tau_{ij}) = & \beta_0 + \beta_1 \ln(\text{gtariff}_{ij}) + \beta_2 \ln(\text{dist}_{ij}) + \beta_3 (\text{contig}_{ij}) + \beta_4 (\text{comlang\_off}_{ij}) \\ & + \beta_5 (\text{comlang\_ethno}_{ij}) + \beta_6 (\text{colony}_{ij}) + \beta_7 (\text{comcol}_{ij}) + \beta_8 (\text{smctry}_{ij}) \\ & + \beta_9 (\text{rta}_{ij}) + \beta_{10} (\text{landlocked}_{ij}) + \beta_{14} \ln(\text{creditindex}_i) + \beta_{15} \ln(\text{LSCI}_i) \\ & + \beta_{16} \ln(\text{TF}_i) + \beta_{17} \ln(\text{creditindex}_j) + \beta_{18} \ln(\text{LSCI}_j) + \beta_{19} \ln(\text{TF}_j) + D_i + D_j \\ & + \varepsilon_{ij} \end{aligned}$$

These two models extend the model featured in ESCAP (2015b), which only captured the impact of own country trade facilitation reform implementation. Variables, their definitions, treatment, sources and expected signs used in estimation are summarized in table 1. Fixed-effects dummy variables for income groups ( $D_i$  and  $D_j$ ) are included in order to account for cross-group heterogeneity as well as to increase estimation efficiency.<sup>5</sup> Robust standard errors are clustered by country pairs. The model is estimated using ordinary least square across a cross-section of 96 reporting countries. The list of reporting and partner countries included in the estimation is provided in table A1.1 in Annex 1.

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<sup>5</sup> The same set of fixed effects are used in model 1 and 2 to make the results across models more comparable. However, in line with the structural gravity literature, we also estimate model 1 using full country fixed effects, which yields similar and generally statistically significant results as well. See Annex of Duval et al.(2017) for details.

**Table 1. Variables, definitions, treatments, sources and expected signs**

Variable	Definition	Data Treatment	Source	Expected Sign
$\tau_{ij}$	Comprehensive trade costs.	Average of 2013-2015	World Bank-ESCAP Trade Cost Database	N/A
$gtariff_{ij}$	Geometric average tariff factor (1+rate) that each reporting country ( $i$ ) charges to its trade partner ( $j$ ) and vice versa, which can be expressed as $gtariff_{ij} = \sqrt{tariff_{ij} \times tariff_{ji}}$	Average of 2013-2015	World Integrated Trade Solution (WITS)	+
$dist_{ij}$	Geographical distance between country $i$ and $j$ .	N/A	CEPII	+
$contig_{ij}$	1 if country $i$ and $j$ share a common border and zero otherwise.	N/A	CEPII	-
$comlang\_off_{ij}$	1 if country $i$ and $j$ use the same common official language and zero otherwise.	N/A	CEPII	-
$comlang\_ethno$	1 if a language is spoken by at least 9% of the population in	N/A	CEPII	-

Variable	Definition	Data Treatment	Source	Expected Sign
	both countries and zero otherwise.			
$colony_{ij}$	1 if country $i$ and $j$ were ever in colonial relationship and zero otherwise.	N/A	CEPII	–
$comcol_{ij}$	1 if country $i$ and $j$ had a common colonizer after 1945 and zero otherwise.	N/A	CEPII	–
$smctry_{ij}$	1 if country $i$ and $j$ were or are the same country and zero otherwise.	N/A	CEPII	–
$rta_{ij}$	1 if country $i$ and $j$ are members of the same regional trade agreement and zero otherwise.	Latest definition in 2015	De Sousa, J. (2012)	–
$landlocked_{ij}$	1 if either country $i$ or $j$ is landlocked and zero otherwise.	N/A	CEPII	+
$creditindex_i /$ $creditindex_j /$ $creditindex_{ij}$	Average depth of credit information index of country $i$ , $j$ and geometric average of $i$ and $j$ <sup>6</sup>	0.0001 replacement/ average of DB2014-2016	Doing Business	–

<sup>6</sup> Data for credit information from the Doing Business Report is lagged one year, i.e., data from the Doing Business Report 2014 are from 2013. Geometric average of credit information index is defined as  $creditindex_{ij} = \sqrt{creditindex_i \times creditindex_j}$ . Geometric average formula also applies to LSCI<sub>ij</sub> and TF<sub>ij</sub>



<b>Variable</b>	<b>Definition</b>	<b>Data Treatment</b>	<b>Source</b>	<b>Expected Sign</b>
$LSCI_i /$ $LSCI_j /$ $LSCI_{ij}$	Average scores of liner shipping connectivity index of country $i, j$ and geometric average of $i$ and $j$	Data filling/ average of 2013-2015	UNCTAD	–
$TF_i /$ $TF_j /$ $TF_{ij}$	Percentage of TF implementation of country $i, j$ and geometric average of $i$ and $j$ modelled as: (a) overall TF and; (b) general TF and (paperless + cross-border paperless trade) <sup>7</sup>	0.0001 replacement data in 2015	UNTF Survey 2017	–

*Note:* Where available, the average of the most recent data in 2013-2015 is used in the estimation. Data filling for LSCI is required to ensure inclusion of landlocked economies. Port countries are used as proxies for landlocked countries' portal performance. For the TF components and credit information index, zeros are replaced by 0.0001 to prevent observations being omitted from the estimation. The list of countries included in the analysis are presented in Annex 1 table A1.1.

<sup>7</sup> For scoring of different stages of implementation see table A1.2 in Annex 1.

### 3.2. Overview of data on trade facilitation implementation

The impact of trade facilitation on trade costs is captured in the model by including trade facilitation implementation rates calculated on the basis of the United Nations Global Survey on Trade Facilitation and Paperless Trade Implementation (UNTF Survey).<sup>8</sup> This Survey provides data on the implementation of a range of TF measures related to the WTO TFA as well as more advanced digital trade facilitation measures.<sup>9</sup> The list of measures and the groupings considered in the calculation of aggregate implementation rates are shown in table 2.<sup>10</sup> General TF measures are all directly related to various WTO TFA provisions and may be further divided into three types of TF measures, i.e., institutional arrangement, transparency and formalities measures. In contrast, most paperless and cross-border paperless trade measures are not specifically included in the WTO TFA, and their implementation goes beyond the commitments made under the Agreement.

**Table 2. Grouping of trade facilitation measures included in the questionnaire**

Category		Trade facilitation measure (and question No.) in the questionnaire
General TF measures	Transparency	2. Publication of existing import-export regulations on the Internet 3. Stakeholder consultation on new draft regulations (prior to their finalization) 4. Advance publication/notification of new regulation before their implementation (e.g., 30 days prior) 5. Advance ruling (on tariff classification) 9. Independent appeal mechanism (for traders to appeal Customs and other relevant trade control agencies' rulings)
	Formalities	6. Risk management (as a basis for deciding whether a shipment will be or not physically inspected)

<sup>8</sup> UN TF Survey Dataset is updated as of August 2017.

<sup>9</sup> Implementation of each measure is rated as “fully”, “partially”, “on a pilot basis” or “not” implemented (see Table A1.2 in Annex 1 for more details). More information and survey methodology and data are available at <http://unnex.unescap.org/UNTFSurvey2017.asp>.

<sup>10</sup> For each country, the UN TF Survey features data on up to 38 trade facilitation measures. However, not all measures are applicable to all countries (e.g., transit facilitation measures), and data is missing for some of the more advanced measures in some countries. In order to ensure that the trade cost model estimation can be made on the basis of a sufficiently large number of countries, implementation rates are calculated on the basis of a common set of 31 trade facilitation measures in “General trade facilitation”, paperless trade and cross-border paperless trade measures only (excluding Question 20, 33, and 34).

<b>Category</b>		<b>Trade facilitation measure (and question No.) in the questionnaire</b>
		7. Pre-arrival processing 8. Post-clearance audit 10. Separation of Release from final determination of customs duties, taxes, fees and charges 11. Establishment and publication of average release times 12. Trade facilitation measures for authorized operators 13. Expedited shipments 14. Acceptance of paper or electronic copies of supporting documents required for import, export or transit formalities.
	<b>Institutional arrangement and cooperation</b>	1. Establishment of a national trade facilitation committee or similar body 31. Cooperation between agencies on the ground at the national level 32. Government agencies delegating controls to Customs authorities 33. Alignment of working days and hours with neighbouring countries at border crossings, and 34. Alignment of formalities and procedures with neighbouring countries at border crossings
	<b>Paperless trade</b>	15. Electronic/automated Customs System established (e.g., ASYCUDA) 16. Internet connection available to Customs and other trade control agencies at border-crossings 17. Electronic Single Window System 18. Electronic submission of Customs declarations 19. Electronic Application and Issuance of Trade Licenses 20. Electronic Submission of Sea Cargo Manifests 21. Electronic Submission of Air Cargo Manifests 22. Electronic Application and Issuance of Preferential Certificate of Origin 23. E-Payment of Customs Duties and Fees 24. Electronic Application for Customs Refunds
	<b>Cross-border paperless trade</b>	25. Laws and regulations for electronic transactions are in place (e.g. e-commerce law, e-transaction law) 26. Recognized certification authority (CA) issuing digital certificates to traders to conduct electronic transactions 27. Engagement of the country in trade-related cross-border electronic data exchange with other countries 28. Certificate of Origin electronically exchanged between your country and other countries 29. Sanitary & Phyto-Sanitary Certificate electronically exchanged between your country and other countries

<b>Category</b>	<b>Trade facilitation measure (and question No.) in the questionnaire</b>
	30. Banks and insurers in your country retrieving letters of credit electronically without lodging paper-based documents
<b>Transit facilitation</b>	35. Transit facilitation agreement(s) with neighbouring country(ies) 36. Customs Authorities limit the physical inspections of transit goods and use risk assessment 37. Supporting pre-arrival processing for transit facilitation 38. Cooperation between agencies of countries involved in transit
<b>Trade facilitation and SMEs</b>	39. Government has developed trade facilitation measures that ensure easy and affordable access for SMEs to trade related information 40. Government has developed specific measures that enable SMEs to more easily benefit from the authorized economic operator (AEO) scheme 41. Government has taken actions to make the single windows more easily accessible to SMEs (e.g., by providing technical consultation and training services to SMEs on registering and using the facility.) 42. Government has taken actions to ensure that SMEs are well represented and made key members of National Trade Facilitation Committees (NTFCs)
<b>Trade facilitation and agricultural trade</b>	43. Testing and laboratory facilities are equipped for compliance with sanitary and phytosanitary (SPS) standards in your country 44. National standards and accreditation bodies are established for the purpose of compliance with SPS standards in your country 45. Application, verification and issuance of SPS certificates is automated
<b>Women and trade facilitation</b>	46. The existing trade facilitation policy/strategy incorporates special consideration of women involved in trade 47. Government has introduced trade facilitation measures to benefit women involved in trade

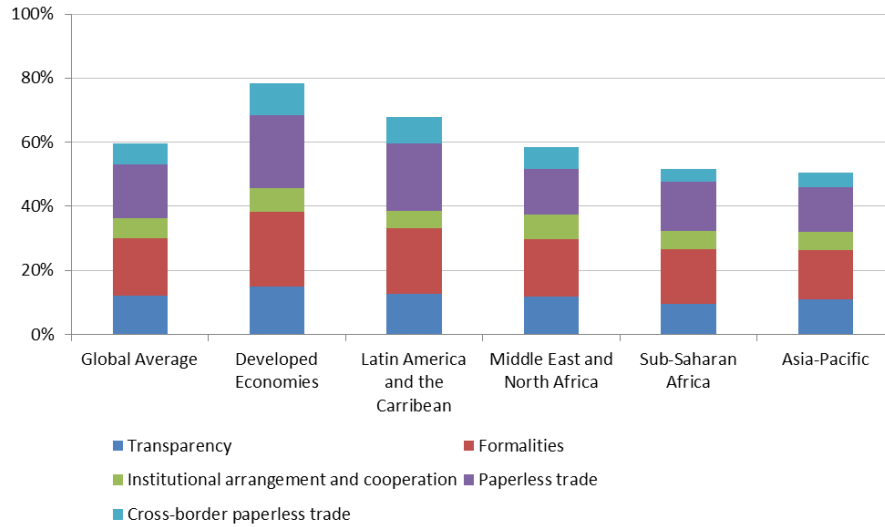
Source: UN Global Survey on Trade Facilitation and paperless Trade Implementation, 2017

Trade facilitation implementation rates for 2017 are shown in figure 2a. Global average rate of implementation is approximately 60%. There is significant cross-regional heterogeneity in the rates of implementation, which range from an average of 52% in Sub-Saharan Africa to almost 80% in the developed economies. In most cases, high income economies generally have higher trade facilitation implementation rates than other economies. Landlocked, least developed and small island developing economies tend to

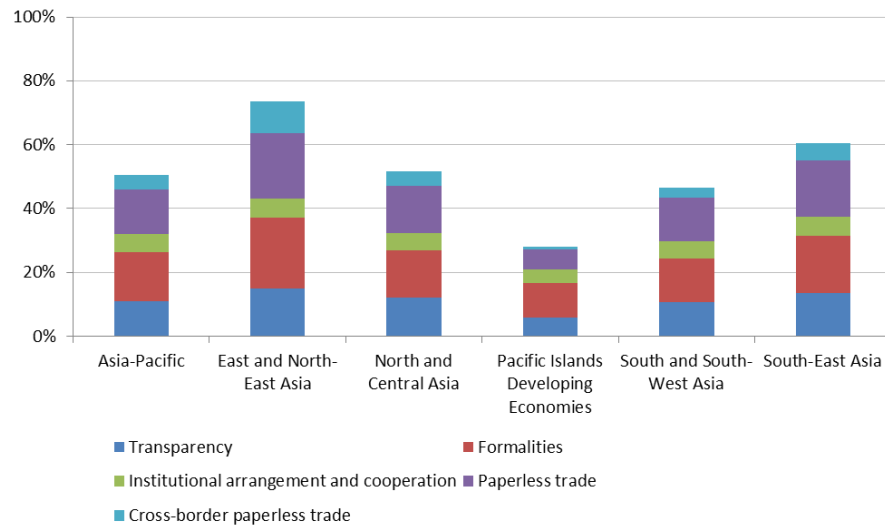
lag behind. This is highlighted by figure 2b, which shows the implementation rates across the Asia-Pacific subregions.

**Figure 1. Trade facilitation implementation rate**

**2a. Rates of implementation in major regions**



**2b. Subregional implementation rates in Asia and the Pacific**



Source: Authors' compilation, based on the UNTF Survey 2017.

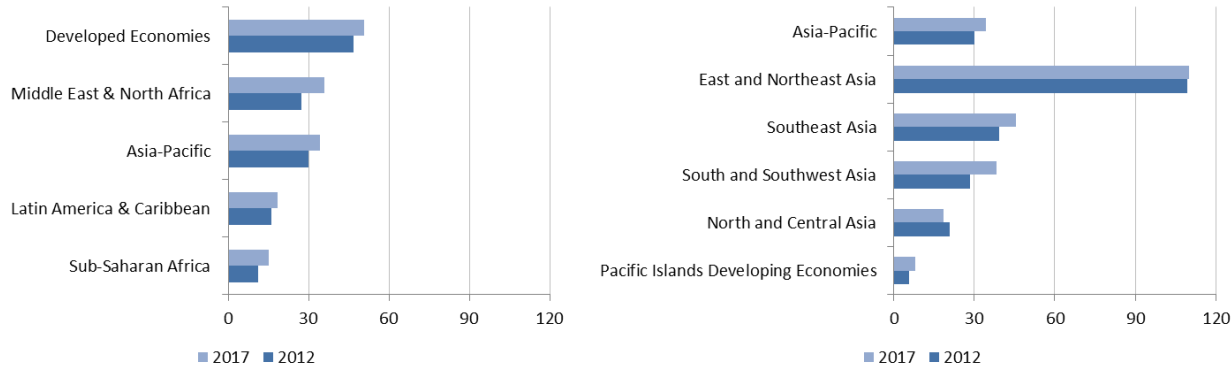
Note: \*Based on implementation rates of 31 of 38 main individual trade facilitation measures included in the UNTF Survey. Implementation of transit facilitation, trade facilitation and SMEs, trade facilitation and agricultural trade and women and trade facilitation are not included.

As efforts in reducing trade costs are not limited to the implementation of customs and information and data exchange facilitation measures as featured in the WTO TFA, streamlining other trade-related procedures (e.g., transport and payment procedures) and improvement of trade-related infrastructure for goods and services should also be considered when modelling trade costs. The United Nations Conference on Trade and Development (UNCTAD) Liner Shipping Connectivity Index (LSCI) and the World Bank Doing Business Credit Information Index (CII) are therefore included in the trade cost models featured in this study to capture broader aspects of trade facilitation.<sup>11</sup>

Figure 3 shows that the Asia-Pacific region performs moderately well in terms of both maritime connectivity (see figure 3a) and financing environment (see figure 3b). Asia-Pacific’s top performer is East and North-East Asia subregion, with Pacific Island Developing Economies consistently and significantly lagging behind other Asia-Pacific subregions, particularly in terms of liner shipping connectivity.

**Figure 2. Selected broad trade facilitation indicators**

**3a. Liner Shipping Connectivity Index (LSCI)**

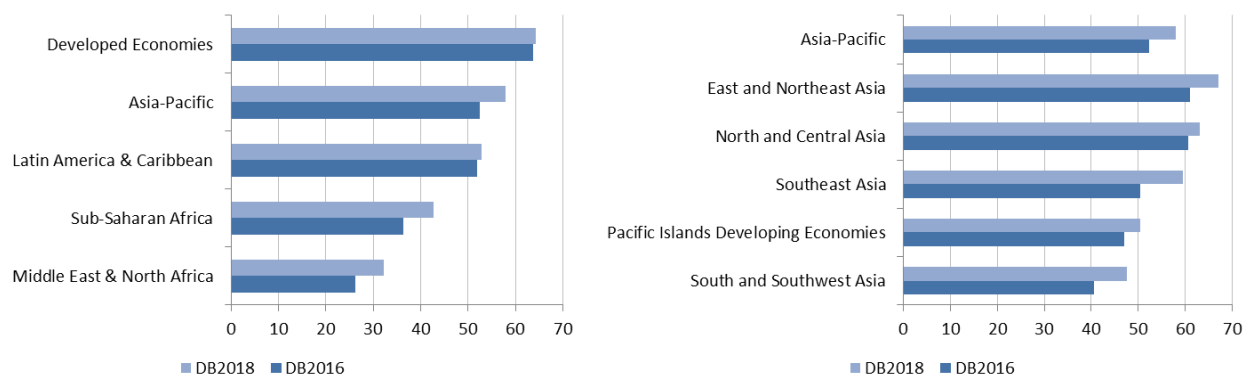


Source: UNCTAD, available at <http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=92>

Note: LSCI is an indicator of maritime infrastructure and services efficiency. A higher LSCI score implies a higher maritime connectivity.

<sup>11</sup> WTO 2015

### 3b. Credit Information Index (CII)



Source: World Bank Doing Business Report, available at [www.doingbusiness.org](http://www.doingbusiness.org).

Note: CII is one of the World Bank indicators of ease of financing in the World Bank Doing Business Report. CII scores range from 0 to 100. Higher scores indicate higher access and quality of credit information, contributing to a better environment for financing transactions.

## 4. Results

Outputs from cross-sectional fixed effects regressions are presented in table 3.<sup>12</sup> The trade cost models I and II introduced earlier are estimated using two different specifications of trade facilitation: Model (I.1) and (II.1) are estimated using overall trade facilitation implementation rate across all relevant trade facilitation and paperless trade measures in the UNTF Survey; Model (I.2) and (II.2) features disaggregated trade facilitation implementation rates, distinguishing between implementation of general trade facilitation measures (i.e., WTO TFA measures) and implementation of digital trade facilitation measures (paperless trade and cross-border paperless trade measures in the UNTF Survey).

<sup>12</sup> Refer back to table 1 for the definitions of variables.

**Table 3. Grouping of trade facilitation measures included in the questionnaire**

Dependent variable: $\tau_{ij}$	Beta coefficients				Standardized beta			
	MODEL I		MODEL II		MODEL I		MODEL II	
	(I.1)	(I.2)	(II.1)	(II.2)	(I.2)	(I.2)	(II.1)	(II.2)
Independent variables:	overall TFI	gen+dig TFI	overall TFI	gen+dig TFI	overall TFI	gen+dig TFI	overall TFI	gen+dig TFI
$\log(gtarif_{ij})$	0.290*	0.273*	0.336**	0.322**	0.0316*	0.0297*	0.0366**	0.0350**
	[1.766]	[1.656]	[2.068]	[1.996]	[1.766]	[1.656]	[2.068]	[1.996]
$\log(dist_{ij})$	0.174***	0.171***	0.172***	0.171***	0.342***	0.336***	0.340***	0.338***
	[22.59]	[22.12]	[22.58]	[22.29]	[22.59]	[22.12]	[22.58]	[22.29]
$contig_{ij}$	-0.165***	-0.169***	-0.167***	-0.168***	-0.0711***	-0.0728***	-0.0720***	-0.0723***
	[-5.034]	[-5.171]	[-5.188]	[-5.256]	[-5.034]	[-5.171]	[-5.188]	[-5.256]
$comlang\_off_{ij}$	-0.0757***	-0.0764***	-0.0797***	-0.0827***	-0.0660***	-0.0666***	-0.0695***	-0.0721***
	[-2.801]	[-2.801]	[-2.914]	[-3.027]	[-2.801]	[-2.801]	[-2.914]	[-3.027]
$comlang\_ethno_{ij}$	0.0265	0.0241	0.0297	0.0323	0.0241	0.0219	0.0270	0.0294
	[1.068]	[0.963]	[1.178]	[1.286]	[1.068]	[0.963]	[1.178]	[1.286]
$colony_{ij}$	-0.143***	-0.142***	-0.138***	-0.140***	-0.0464***	-0.0460***	-0.0448***	-0.0451***
	[-3.789]	[-3.763]	[-3.635]	[-3.687]	[-3.789]	[-3.763]	[-3.635]	[-3.687]
$comcol_{ij}$	-0.0399**	-0.0367*	-0.0404**	-0.0384**	-0.0297**	-0.0273*	-0.0301**	-0.0286**
	[-2.034]	[-1.866]	[-2.074]	[-1.963]	[-2.034]	[-1.866]	[-2.074]	[-1.963]
$smctry_{ij}$	-0.124***	-0.129***	-0.126***	-0.128***	-0.0353***	-0.0368***	-0.0359***	-0.0367***
	[-2.765]	[-2.890]	[-2.844]	[-2.921]	[-2.765]	[-2.890]	[-2.844]	[-2.921]
$landlocked_{ij}$	0.277***	0.277***	0.276***	0.278***	0.319***	0.319***	0.317***	0.320***
	[20.43]	[20.29]	[20.63]	[20.60]	[20.43]	[20.29]	[20.63]	[20.60]



Dependent variable: $\tau_{ij}$  Independent variables:	Beta coefficients				Standardized beta			
	MODEL I		MODEL II		MODEL I		MODEL II	
	(I.1) overall TFI	(I.2) gen+dig TFI	(II.1) overall TFI	(II.2) gen+dig TFI	(I.2) overall TFI	(I.2) gen+dig TFI	(II.1) overall TFI	(II.2) gen+dig TFI
$rta_{ij}$	-0.0882*** [-6.203]	-0.0907*** [-6.360]	-0.0871*** [-6.160]	-0.0881*** [-6.254]	-0.0912*** [-6.203]	-0.0938*** [-6.360]	-0.0901*** [-6.160]	-0.0911*** [-6.254]
$\log(creditindex_{ij})$	-0.0770*** [-5.260]	-0.0795*** [-5.421]			-0.0681*** [-5.260]	-0.0704*** [-5.421]		
$\log(creditindex_i)$			-0.0671*** [-7.594]	-0.0657*** [-7.417]			-0.0924*** [-7.594]	-0.0904*** [-7.417]
$\log(creditindex_j)$			0.00334 [0.263]	-0.00285 [-0.223]			0.00375 [0.263]	-0.00320 [-0.223]
$\log(LSCI_{ij})$	-0.228*** [-22.40]	-0.229*** [-22.32]			-0.344*** [-22.40]	-0.344*** [-22.32]		
$\log(LSCI_i)$			-0.0946*** [-13.90]	-0.0959*** [-14.02]			-0.212*** [-13.90]	-0.215*** [-14.02]
$\log(LSCI_j)$			-0.135*** [-19.28]	-0.135*** [-19.20]			-0.288*** [-19.28]	-0.287*** [-19.20]
$\log(Overall\ TFI_{ij})$	-0.464*** [-13.64]				-0.247*** [-13.64]			
$\log(Overall\ TFI_i)$			-0.222*** [-10.32]				-0.175*** [-10.32]	
$\log(Overall\ TFI_j)$			-0.234*** [-10.33]				-0.193*** [-10.33]	

Dependent variable: $\tau_{ij}$  Independent variables:	Beta coefficients				Standardized beta			
	MODEL I		MODEL II		MODEL I		MODEL II	
	(I.1) overall TFI	(I.2) gen+dig TFI	(II.1) overall TFI	(II.2) gen+dig TFI	(I.2) overall TFI	(I.2) gen+dig TFI	(II.1) overall TFI	(II.2) gen+dig TFI
$\log(\text{General } TF_{ij})$		-0.298*** [-8.203]				-0.147*** [-8.203]		
$\log(\text{General } TF_i)$				-0.106*** [-4.614]				-0.0796*** [-4.614]
$\log(\text{General } TF_j)$				-0.206*** [-7.322]				-0.149*** [-7.322]
$\log(\text{Paperless } TF_{ij})$		-0.143*** [-6.647]				-0.118*** [-6.647]		
$\log(\text{Paperless } TF_i)$				-0.0941*** [-6.215]				-0.110*** [-6.215]
$\log(\text{Paperless } TF_j)$				-0.0462*** [-3.289]				-0.0603*** [-3.289]
R-squared	0.527	0.525	0.533	0.532	0.527	0.525	0.533	0.532
Adjusted R-squared	0.525	0.522	0.530	0.528	0.525	0.522	0.530	0.528

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1; t-stat. in square brackets; reporter and partner income group fixed effects were used in all models and are jointly statistically significant; 3,151 observations were used in all models

All the estimated statistically significant coefficients have expected signs in every model. Distance ( $dist_{ij}$ ) and landlockedness ( $landlocked_{ij}$ ) all increase trade costs significantly. Having a common border ( $contig_{ij}$ ), a common official language ( $comlang\_off_{ij}$ ), being part of the same RTA ( $rta_{ij}$ ), having a former common colonizer ( $comcol_{ij}$ ) and/or a former colonial relationship ( $colony_{ij}$ ), and having formerly belonged to the same country ( $smctry_{ij}$ ) are all associated with statistically significant and lower bilateral trade costs. Having a common unofficial ( $comlang\_ethno_{ij}$ ) language is not found to be statistically significant.

In terms of policy and infrastructure factors related to trade facilitation, maritime connectivity ( $LSCI_{ij}$ ), and ease of financing and trade facilitation implementation ( $creditindex_{ij}$ ) indicators both have the expected and statistically significant negative impact on trade costs. Although efforts on tariff reductions have been encouraged during the past two decades, further reducing them globally remains an effective way to reduce trade costs. Results across all four models suggest that a 10%<sup>13</sup> change in tariffs ( $gtariff_{ij}$ ) may be expected to reduce overall trade costs by approximately 3%, on average.

The main variables of interest in this study are trade facilitation implementation variables ( $TF$ ). The results emphasize the importance of trade facilitation implementation, with a 10% increase in the overall implementation of trade facilitation measures ( $Overall\ TF_{ij}$ ) associated with a 4.6% reduction in trade costs – see Model (I.1).

As noted previously, the overall TF implementation variable ( $Overall\ TF_{ij}$ )<sup>14</sup> used in Model (I.1) is the average of TF implementations rates of countries  $i$  and  $j$ . To isolate the impact of countries' own TF implementation from trade partners' TF implementation, Model (II.1) includes country's own overall implementation rate ( $Overall\ TF_i$ ) as well as trade partner's implementation rate ( $Overall\ TF_j$ ) as explanatory variables. The results show that approximately a 2% reduction of trade costs is expected when there is a 10%

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<sup>13</sup> All percentage signs (%) mean a percentage changes, unless stated otherwise.

<sup>14</sup> WTO TFA measures and other selected trade facilitation measures beyond the WTO TFA

improvement in a country's own TF implementation and a further 2% reduction when trade partners improve their TF implementation by 10%. The latter finding is particularly important for developed countries since they already have high TF implementation rates, with little scope for TF implementation improvements to achieve further trade costs reductions. However, by cooperating on trade facilitation plurilaterally and multilaterally with trade partners, such as through the WTO TFA and the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific, significant gains in trade costs reduction can still be achieved by the developed countries.

Next, this study disaggregates the impact of overall trade facilitation (*Overall TF*), which is the combined effect of the WTO TFA and other TF measures. Models (I.2) and (II.2) replace Overall trade facilitation (*Overall TF*) variable with General implementation (combination of transparency, formalities, and institutional arrangements and cooperation measures under the WTO TFA, *General TF*), and Paperless and cross-border paperless TF implementation (other measures that go beyond the commitment under the WTO TFA, *Paperless TF*). Results suggest that implementation of general trade facilitation measures and paperless trade and cross-border paperless trade measures are both highly significant determinants of trade costs.

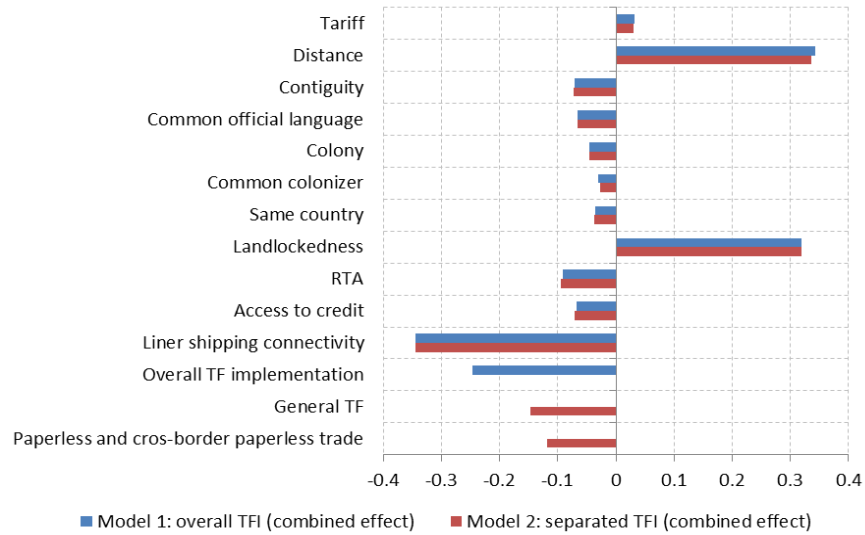
Model (I.2) shows a 10% improvement in general trade facilitation (*General TF<sub>ij</sub>*) results in a 3.0% reduction in trade costs, while improvement in paperless and cross-border paperless TF measures implementation (*Paperless TF<sub>ij</sub>*) by 10% is associated with a 1.4% reduction in trade costs. The effects of improvements of countries' own implementation and those of trading partners are mixed. Model (II.2) shows while a country's 10% own improvement of general trade facilitation (*General TF<sub>i</sub>*) is associated with a 1.1% decline in trade costs, a similar improvement in a country's own paperless and cross-border paperless trade measures (*General TF<sub>i</sub>*) results in a 0.9% reduction in trade costs. At the same time, a 10% improvement in trade partner's implementation of general trade facilitation measures (*General TF<sub>j</sub>*) is associated with approximately a 2.1% reduction in trade costs, while an improvement by 10% in trade partner's paperless and cross-border paperless trade measures (*Paperless TF<sub>j</sub>*) reduces trade costs by 0.5%.

The findings strongly support two important conclusions in implementing trade facilitation measures. First, general trade facilitation measures, which are often less complex and less costly to implement than other measures, can assist towards reducing trade costs. Once countries have reached the basic obligations associated with the WTO TFA, they should proactively adopt modern ICTs to trade procedures as well as implement electronic Single Window systems and other paperless trade measures. Second, there are synergic effects of trade facilitation implementation in reducing trade costs. Effects of trade costs reduction are from both own implementation as well as trade partners' implementation of trade facilitation measures. As such, by cooperating on trade facilitation plurilaterally and multilaterally with trade partners through agreements such as the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific, significant gains in trade costs reduction can still be achieved by the developed countries, who already have high levels of trade facilitation implementation.

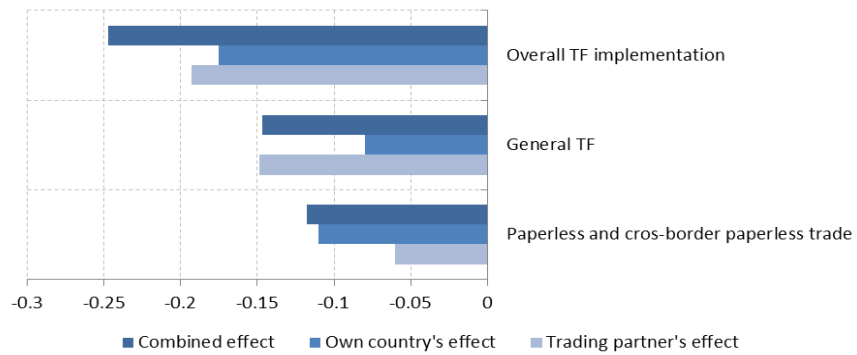
The scope for making a 10% improvement varies significantly across factors and it is therefore useful in calculating standardized coefficients, which take into account the underlying data distribution of explanatory factors across the sample of countries considered. As shown in figure 4a, doing this highlights the importance of maritime connectivity as a dominant factor of trade cost variations across countries. It also confirms the importance of trade facilitation implementation in reducing trade costs. However, it also reveals that trade costs are not very sensitive to tariff reductions – essentially because tariffs have already been reduced drastically over the past two decades. It also confirms that distance and landlockedness remain key natural barriers to international trade. Examining trade facilitation implementation into details (see figure 4b), leading factors are those of general trade facilitation category. However, there is a mixed result on magnitudes of impact in trade costs reductions from the category of trade facilitation when considering the effects from own country and trading partner improvements.

## Figure 1. Sensitivity of trade costs to natural and policy factors

### 4a. Sensitivity of trade costs to natural and policy factors (combined effect)



### 4b. Sensitivity of trade costs to trade facilitation implementation



Source: Authors' calculations.

Note: The figure shows standardized regression coefficients of all models in this study.

## 5. Impact of trade facilitation implementation on trade costs in Asia-Pacific: A “what if” analysis

Based on the trade costs model estimated earlier, the potential of trade facilitation measures in reducing trade costs across countries is further investigated using counterfactual simulations (“what if” analyses). The following two scenarios are considered:

**Scenario 1: Partial TF implementation scenario:** All countries that have either not implemented, or have implemented on a pilot basis the TF measures considered, take action and achieve at least partial implementation of all measures in each group;

**Scenario 2: Full TF implementation scenario:** All countries that have not achieved full implementation of the TF measures considered take action and achieve full implementation.

Under each scenario, three alternative sets of TF measures are considered for implementation:<sup>15</sup>

(a) **WTO TFA (binding only):** All measures that are binding under the WTO TFA; These measures include no paperless trade measures

(b) **WTO TFA (binding+non-binding):** all measures that are binding under the WTO TFA as well as those included in the WTO TFA but are non-binding; These measures include a few paperless trade measures

(c) **Digital TF:** a more ambitious set of measures, which includes binding and non-binding WTO TFA measures as well as all paperless trade measures included in the UNTF Survey.

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<sup>15</sup> Details regarding to scoring of different stage of implementation and allocation of the 31 trade facilitation measures included in this study to each of the three groups are provided in table A1.2 and table A1.3 in Annex 1

Results of the simulations are presented in tables 4a-4c. Table 4a shows trade costs reductions from simultaneous trade facilitation improvements by a country and its trading partners. Based on Model I.1, partial implementation of measures limited to those binding under the WTO TFA results in trade costs reductions of 4.1%, whereas full implementation of these measures reduces trade costs by 9.0%. In contrast, implementation of binding and non-binding WTO TFA measures results in a reduction of 7.2% in trade costs under a partial implementation scenario, and a 15% reduction under the more ambitious full implementation scenario. When the Digital TF set of measures are implemented, the average trade costs reduction across countries increases to more than 16% when partially implemented, and more than 26% when fully implemented. The difference between full implementation of just the binding WTO TFA measures and the Digital TF measures is a nearly threefold reduction in trade costs, highlighting the need for countries to be as ambitious as possible in their trade facilitation reform efforts.

The simulation results based on Model (I.2) allow us to differentiate between the impact of general TF measures specified in the WTO TFA and paperless trade measures, many of which are not readily specified in the WTO TFA. Achieving at least partial implementation of all general TF measures in the region (scenario 1) results in a nearly 7% average reduction in trade costs in Asia and the Pacific, while full implementation of these measures leads to a 13.4% reduction. Trade costs reductions associated with implementation of paperless trade and cross-border paperless trade measures are of a similar magnitude (8.8% and 12.5% for partial and full implementation, respectively).

Tables 4b and 4c show results based on Model II.1 and II.2, distinguishing between trade costs reductions from a country's own implementation of trade facilitation reform and those resulting from reform in trading partner countries. For example, own implementation of binding and non-binding WTO TFA measures reduces trade costs by 9.2% under the full implementation scenario (Model II.1 in table 4b), while implementation of these measures by trade partners reduces trade costs of that country by up to 6.2% (Model II.1 in table 4c). Similar results are obtained in the case of the Digital TF implementation, where own implementation reduces trade costs by 15.9% (Model II.1 in



table 4b), while implementation by trade partners reduces trade costs by 11.8% (Model II.1 in table 4c).

These results show that, while reduction in trade costs will come essentially from own implementation, significant additional trade costs reductions may be achieved by encouraging trade partners to implement trade facilitation measures. The results provide a good rationale for the strong support of developed economies and other countries with very high trade facilitation implementation rates for the WTO TFA, which encourages developing economies in accelerating trade facilitation reforms. It further shows that leading trade facilitating economies have a strong incentive to support regional and multilateral cooperation on trade facilitation. This is particularly true in the case of cross-border paperless trade, which cannot be achieved without simultaneous implementation in own and partner countries.

**Table 1. Changes in international trade costs of Asia-Pacific as a result of trade facilitation improvements<sup>16</sup>**

4a Trade costs changes from trade facilitation in

Trade costs reduction from TFI improvement : Asia-Pacific	WTO TFA (binding)		WTO TFA (binding + non-binding)		Digital TF (binding + non-binding WTO TFA + other paperless and cross-border paperless)	
	Partially implemented	Fully implemented	Partially implemented	Fully implemented	Partially implemented	Fully implemented
<b>Model I.1</b>						
Overall TF	-4.07%	-8.98%	-7.20%	-14.98%	-16.47%	-26.17%
<b>Model I.2</b>						
General TF measures	-3.84%	-8.38%	-5.61%	-12.22%	-6.67%	-13.40%
Paperless and cross-border paperless trade	-	-	-1.65%	-2.78%	-8.81%	-12.47%

<sup>16</sup> See Annex 2 for individual country results.

#### 4b. Change on own country's trade facilitation implementation

Trade costs reduction from improvement on reporter side	WTO TFA (binding)		WTO TFA (binding + non-binding)		Digital TF (binding + non-binding WTO TFA + other paperless and cross-border paperless)	
	Partially implemented	Fully implemented	Partially implemented	Fully implemented	Partially implemented	Fully implemented
<b>Model II.1</b>						
Overall TF	-2.65%	-5.60%	-4.51%	-9.16%	-10.05%	-15.91%
<b>Model II.2</b>						
General TF measures	-1.77%	-3.69%	-2.46%	-5.28%	-2.92%	-5.80%
Paperless and cross-border paperless trade	-	-	-1.43%	-2.32%	-6.98%	-9.65%

#### 4c. Change on trading partners' trade facilitation implementation

Trade costs reduction from improvement on partner side	WTO TFA (binding)		WTO TFA (binding + non-binding)		Digital TF (binding + non-binding WTO TFA + other paperless and cross-border paperless)	
	Partially implemented	Fully implemented	Partially implemented	Fully implemented	Partially implemented	Fully implemented
<b>Model II.1</b>						
Overall TF	-1.41%	-3.48%	-2.72%	-6.20%	-6.90%	-11.83%
<b>Model II.2</b>						
General TF measures	-1.94%	-4.68%	-3.07%	-7.17%	-3.70%	-7.90%
Paperless and cross-border paperless trade	-	-	-0.37%	-0.67%	-2.38%	-3.56%

Source: Authors' calculations.

At the individual country level, trade cost reductions associated with the various scenarios vary from zero to more than 40% (see figures 5a for partial implementation and 5b for full implementation, and Appendix 2 for country-level results of the rest of simulated improvements scenarios). The overall effects largely depend on each country’s existing level of trade facilitation implementation. As figure 5b shows, most of the least developed countries and landlocked developing countries in Asia and the Pacific can expect trade cost reductions of 5% (in the case of the Lao People’s Democratic Republic) to 24% (in the case of Afghanistan) from full simultaneous implementation of the WTO TFA binding measures alone. Trade costs reductions in most least developed countries and landlocked developing countries increase further to between 11% (the Lao People’s Democratic Republic) and 32% (Afghanistan) with full implementation of binding and non-binding WTO TFA commitments. Achieving full digital trade facilitation in turn generates trade costs reductions of more than 22% in most least developed countries and landlocked developing countries.

**Figure 1. Trade cost reductions from simultaneous improvements in trade facilitation in Asia-Pacific**

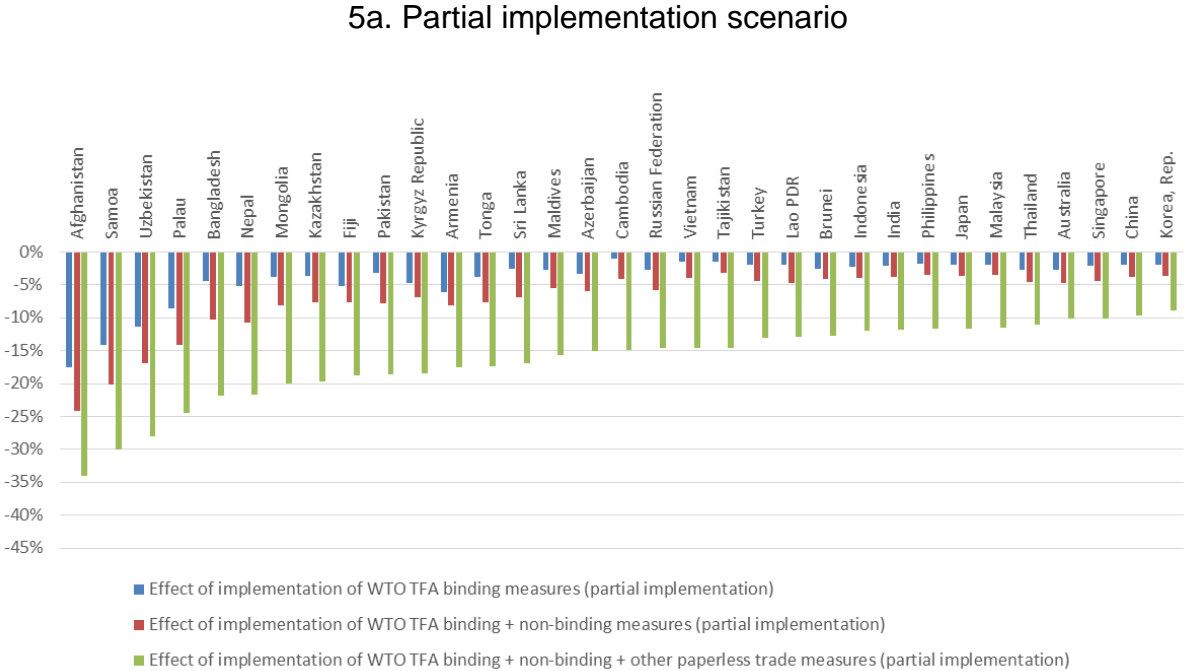
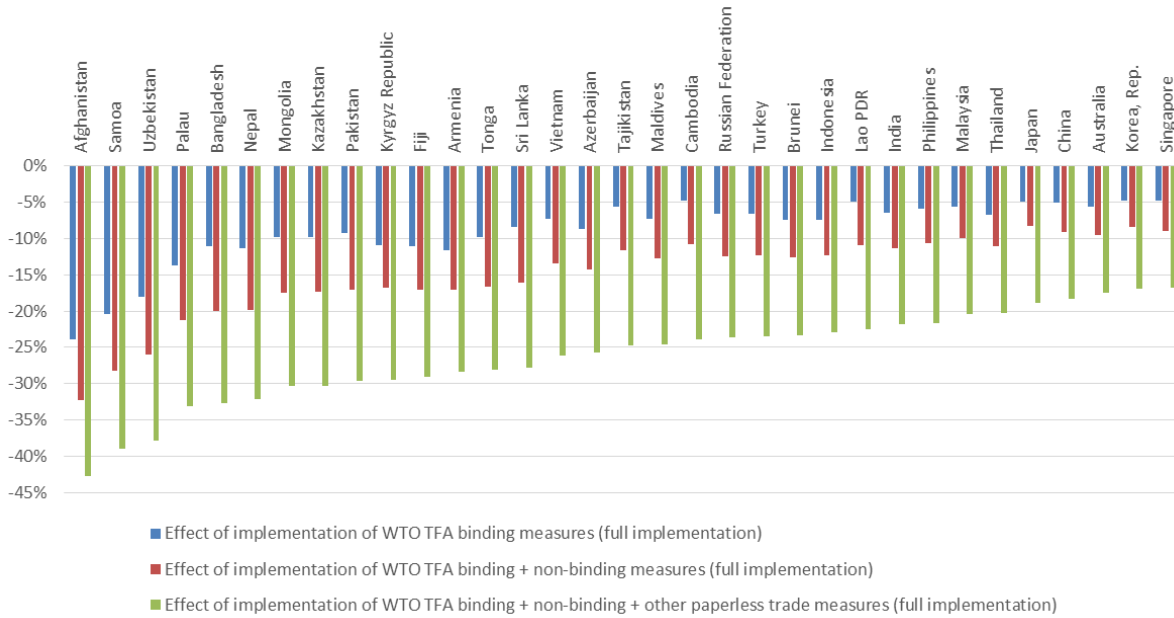


Figure 5b. Full implementation scenario

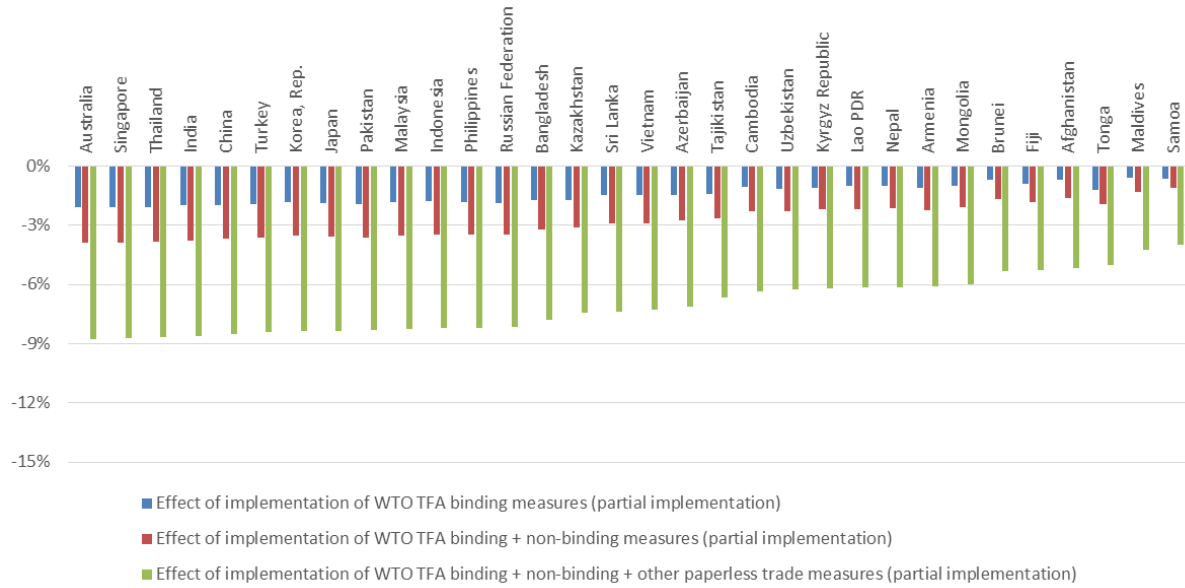


Source: Authors' calculations.

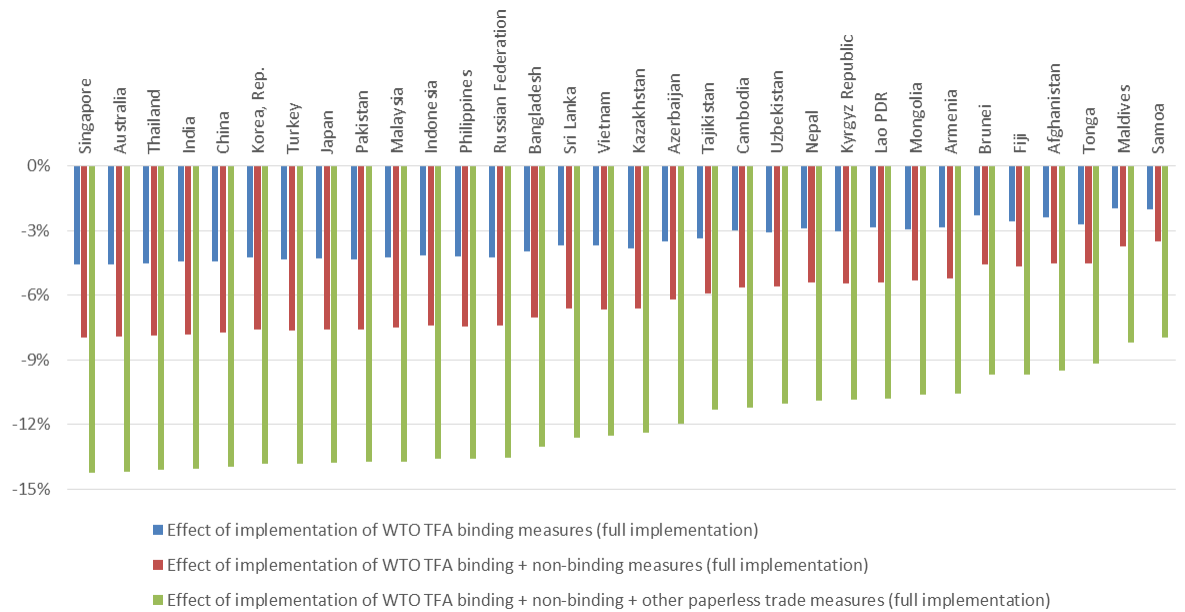
As emphasized earlier, economies with high rates of TF implementation can significantly benefit from trade partners' implementation. For example, Association of Southeast Asian Nations (ASEAN) member States, such as Malaysia, Singapore and Thailand, and East Asian countries, such as China, Japan and Republic of Korea, whose implementation of the WTO TFA is already in place still benefit from trading partners' improvement in WTO TFA implementation (see figures 6a and 6b). Trade costs reductions as a result of trading partners' improvement under the WTO TFA+ Digital TF scenario ranges from 8% to 9% under partial implementation scenario and from 13% to 15% under full implementation scenario. Such cost reductions are significant and important in terms of improving the overall efficiency of the multilateral trading system, contributing to making it more inclusive and sustainable and facilitating development of global production networks. However, they should be clearly differentiated from trade cost reductions achieved through self-implementation of trade facilitation reform since they do not inherently affect a country's relative trade competitiveness.

**Figure 2. Trade cost reductions from trading partners' improvements in trade facilitation in Asia-Pacific**

**6a. Partial implementation scenario**



**6b. Full implementation scenario**



Source: Authors' calculations.

While the trade costs reductions from trade facilitation reform in general, and digital trade facilitation reform in particular, are impressive, it is worth emphasizing that it may be difficult to achieve full implementation in the short to medium term. Furthermore, several least developed countries and landlocked developing countries including, for example, Uzbekistan, Palau, Azerbaijan, are not WTO member. As such, these countries may not have access to the technical assistance committed by development partners under the WTO TFA.

At the same time, an interesting finding from the counterfactual simulations of trade facilitation implementation on trade costs is that many developing economies in Asia and the Pacific can expect only limited trade cost reductions from their own WTO TFA implementation, essentially because they have already implemented most of the measures featured in the agreement. This is particularly true for ASEAN and East Asian economies, where implementation of some of the most advanced measures featured in the WTO TFA – such as Single Windows – had been initiated well before the WTO TFA was concluded. Regional and multilateral initiatives and technical assistance that encourage less advanced countries to implement trade facilitation measures will provide more opportunities for the more advanced countries to further reduce trade costs. However, for these countries, making significant progress in reducing trade costs through trade facilitation necessarily implies focusing on digital trade facilitation and cross-border paperless trade measures.

To put these results into perspective, it is useful to contrast them with the trade costs reductions that may be associated with broader trade facilitation reforms, which often encompass measures aimed at improving trade-related infrastructure and services, and the overall business environment. In that context, the following additional counterfactual simulations were carried as part of this study using the results of Model I.1 in table 2.2:

**Scenario 3:** *Improvement in maritime connectivity:* (a) all countries with LSCI scores below the developing countries' average improve their LSCI scores up to the

average of developing countries, and (b) countries with the LSCI scores below the OECD average bring up their LSCI scores up to the OECD average;

**Scenario 4: *Improvement in access to financing:*** (a) all countries with CII scores below the developing countries' average improve their CII scores up to the average of developing countries, and (b) countries with the CII scores below the OECD average bring their CII scores up to the OECD average.

As shown in table 5, the results suggest that improvement in maritime connectivity, as described in Scenario 3, would reduce trade costs in Asia and the Pacific by approximately 8% to 9%. Improved access to finance through improvement in credit information availability and quality (Scenario 4) could reduce trade costs by at best 1%. As expected, the effect on trade costs reduction is greater when the improvement is pushed up to the OECD averages. Effect on countries' own improvement is somewhat similar to the magnitude of spillover effects from trading partners' improvement in maritime connectivity and access to trade finance.

**Table 2. Changes in trade costs of Asia-Pacific as a result of port connectivity and trade finance improvement**

	LSCI improvement up to		Credit Index improvement up to	
	Developing countries' average	OECD average	Developing countries' average	OECD average
Simultaneous improvement	-8% / -9%	-13% / -14%	0% / -1%	-1% / -2%
Own improvement	4% / -6%	-6% / -8%	0% / -1%	0% / -2%
Trade partner improvement	-3% / -5%	-6% / -8%	0% / -1%	0% / -1%

Source: Authors' calculation.

Note: Counterfactual estimates based on Models I and II, assuming port connectivity and credit information levels are brought up to the developing economies average and the OECD average.

Taken together, the size of the trade costs reductions associated with these broader trade facilitation measures appears to be significant, although they cannot be

readily compared to those associated with implementation of the WTO TFA and paperless and cross-border paperless trade measures. It is noteworthy, however, that infrastructure improvement, as implied by improvements in LSCI scores, hold less promise to reduce trade costs than the arguably significantly less costly options of implementing WTO TFA and digital TF measures.

## **6. Conclusions**

Using the data from the UNTF Survey, together with the latest available data from the World Bank-ESCAP Trade Cost Database, this study investigated the impact of implementing trade facilitation measures on trade costs. Impact of different sets of measures were considered, from a basic set of measures to ensure compliance with the WTO TFA commitment to a full set of digital trade facilitation measures. The study also disaggregated the effects of countries' own TF implementation from their trade partners' implementation. Important results may be summarized as follows.

First, full implementation of binding and non-binding measures included in the WTO TFA is associated with an average 15% trade cost reduction in Asia-Pacific, while implementation of binding measures only result in 9% trade costs reduction. This result clearly highlights the need for countries to fully implement the WTO TFA to reap significant benefits.

Second, implementation of digital trade facilitation can generate very significant trade costs reductions for most economies, reaching up to 40% for the least advanced economies. The magnitude of trade costs reductions from implementation of paperless trade and cross-border paperless trade measure is similar to that of implementing measures in the WTO TFA. The estimated impact of a full implementation of Digital TF is associated with a 26.2% decrease in international trade costs in the Asian and the Pacific region, or savings in international transaction costs of about \$1.2 trillion. Overall, an ambitious digital trade facilitation strategy could nearly double the trade costs reductions expected from the WTO TFA compliance alone.



Third, the analysis confirmed that there are significant reductions in trade costs associated with trade partners' implementation of trade facilitation measures. This shows that economies which already have high rates of trade facilitation implementation have strong incentive to encourage and support their trading partners in implementing trade facilitation. Further facilitation of trade in these economies will involve developing legal and technical frameworks to support cross-border paperless trade, i.e., enabling the electronic exchange and legal recognition of trade data and documents between public and private actors located in different countries along the international supply chain, as envisaged in the recently adopted Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific.<sup>17</sup> At the national level, such efforts should best take place within the context of broader trade facilitation programmes and strategies encompassing trade-related infrastructure and services, particularly those related to maritime connectivity and access to finance.

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<sup>17</sup> ESCAP (2017). *Framework Agreement on Facilitation of Cross-Border Paperless Trade in Asia and the Pacific*. Available from <http://www.unescap.org/resources/framework-agreement-facilitation-cross-border-paperless-trade-asia-and-pacific>

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## Appendix

### Annex 1: Data description for estimating models

**Table A1.1: Reporting countries and trading partners used in this study**

Reporting country/Trading partner				
Afghanistan	Comoros	Ireland	Nepal	Sweden
Armenia	Congo, Rep.	Italy	Nicaragua	Switzerland
Australia	Costa Rica	Japan	Niger	Tajikistan
Austria	Cote d'Ivoire	Jordan	Nigeria	Tanzania
Azerbaijan	Croatia	Kazakhstan	Pakistan	Thailand
Bahrain	Dominican Republic	Kenya	Palau	Togo
Bangladesh	Ecuador	Korea, Rep.	Panama	Tonga
Barbados	Egypt, Arab Rep.	Kyrgyz Republic	Paraguay	Turkey
Belgium	El Salvador	Lao PDR	Peru	Uganda
Benin	Fiji	Lebanon	Philippines	Ukraine
Bolivia	Finland	Madagascar	Portugal	United Arab Emirates
Botswana	France	Malawi	Qatar	Uruguay
Brazil	Gambia, The	Malaysia	Russian Federation	Uzbekistan
Brunei	Germany	Maldives	Samoa	Viet Nam
Burkina Faso	Ghana	Mauritius	Senegal	Yemen
Cambodia	Greece	Mexico	Singapore	Zimbabwe
Cameroon	Guatemala	Mongolia	Spain	
Chile	Honduras	Morocco	Sri Lanka	
China	India	Mozambique	Sudan	
Colombia	Indonesia	Namibia	Suriname	

**Table A1.2: Coding and scoring of different stage of implementation**

<b>Definition of stage of implementation</b>	<b>Coding/ Scoring</b>
<p><b>Full implementation:</b> The trade facilitation measure implemented is in full compliance with commonly accepted international standards, recommendations and conventions (such as the Revised Kyoto Convention, UN/CEFACT Recommendations, or the WTO Trade Facilitation Agreement). It is implemented in law and in practice. It is available to essentially all relevant stakeholders nationwide, supported by an adequate legal and institutional framework as well as adequate infrastructure, and financial and human resources.</p>	3
<p><b>Partial implementation:</b> A measure is considered to be partially implemented if at least one of the following is true: (a) the trade facilitation measure is not in full compliance with commonly accepted international standards, recommendations and conventions; (b) the country is still in the process of rolling out the implementation of measure; (c) the measure is practiced on an unsustainable, short-term or ad-hoc basis; (d) the measure is not implemented in all targeted locations (such as key border crossing stations); or (e) not all targeted stakeholders are fully involved.</p>	2
<p><b>Pilot stage of implementation:</b> A measure is considered to be at the pilot stage of implementation if, in addition to meeting the general attributes of partial implementation, it is available only to (or at) a very small portion of the intended stakeholder group (location) and/or is being implemented on a trial basis. When a new trade facilitation measure is under pilot stage of implementation, the old measure is often continuously used in parallel to ensure the service is provided in case of disruption of new measure. This stage of implementation also includes relevant rehearsals and preparation for the fully-fledged implementation.</p>	1
<p><b>Not implemented:</b> This simply means a trade facilitation measure has not been implemented. However, this stage does not rule out initiatives or efforts towards implementation of the measure. For example, under this stage, (pre)feasibility or planning of implementation can be carried out, and consultation with stakeholders on the implementation may be arranged.</p>	0

*Note:* Table A1.2 presents coding and scoring of trade facilitation measures in four categories.

**Table A1.3 Nature and relationships between selected trade facilitation measures considered and the WTO TFA provisions\***

Trade facilitation measure	Corresponding WTO TFA Article	Binding or non-binding nature of the WTO TFA Article
<b>General Trade Facilitation</b>		
1. Establishment of a national trade facilitation committee or similar body	Section 3, Article 23: Institutional Arrangements	Binding
2. Publication of existing import-export regulations on the Internet	Section 1, Article 1.2: Information Available Through Internet	Non-binding (Phrasing: shall, to the extent practicable and in a manner consistent with its domestic law and legal system)
3. Stakeholders' consultation on new draft regulations (prior to their finalization)	Section 1, Article 2: Opportunity to Comment, Information Before Entry into Force, and Consultations	Non-binding (Phrasing: shall, to the extent practicable and in a manner consistent with its domestic law and legal system)
4. Advance publication/notification of new regulations before their implementation (e.g., 30 days prior)	Section 1, Article 2.1: Opportunity to Comment and Information Before Entry into Force	Non-binding (Phrasing: shall, to the extent practicable and in a manner consistent with its domestic law and legal system)
5. Advance ruling (on tariff classification)	Section 1, Article 3 : Advance Rulings	Binding
6. Risk management (as a basis for deciding whether a shipment will be or not physically inspected)	Section 1, Article 7.4 : Risk Management	Non-binding (Phrasing: shall, to the extent possible)
7. Pre-arrival processing	Section 1, Article 7.1: Pre-arrival Processing	Binding
8. Post-clearance audit	Section 1, Article 7.5: Post-Clearance Audit	Binding
9. Independent appeal mechanism (for traders to appeal Customs and other relevant trade control agencies' rulings)	Section 1, Article 4: Procedures for Appeal and Review	Binding

Trade facilitation measure	Corresponding WTO TFA Article	Binding or non-binding nature of the WTO TFA Article
10. Separation of Release from final determination of customs duties, taxes, fees and charges	Section 1, Article 7.3: Separation of Release from Final Determination of Customs Duties, Taxes, Fees and Charges	Binding
11. Establishment and publication of average release times	Section 1, Article 7.6: Establishment and Publication of Average Release Times	Non-binding (Phrasing: members are encouraged)
12. Trade facilitation measures for authorized operators	Section 1, Article 7.7: Trade Facilitation Measures for Authorized Operators	Binding
13. Expedited shipments	Section 1, Article 7.7: Expedited Shipments	Binding
14. Acceptance of paper or electronic copies of supporting documents required for import, export or transit formalities.	Section 1, Article 10.2: Acceptance of Copies	Non-binding (Phrasing: shall endeavor to accept)
<b>Paperless Trade Facilitation</b>		
15. Electronic/automated Customs System (e.g., ASYCUDA)	n/a	
16. Internet connection available to Customs and other trade control agencies at border-crossings	n/a	
17. Electronic Single Window System	Section 1, Article 10.4: Single Window	Non-binding (Phrasing: shall endeavour to establish)
18. Electronic submission of Customs declarations	n/a	
19. Electronic Application and Issuance of import and export permit, if such permit is required	n/a	
20. Electronic Submission of Sea Cargo Manifests	n/a	

Trade facilitation measure	Corresponding WTO TFA Article	Binding or non-binding nature of the WTO TFA Article
21. Electronic Submission of Air Cargo Manifests	n/a	
22. Electronic Application and Issuance of Preferential Certificate of Origin	n/a	
23. E-Payment of Customs Duties and Fees	Section 1, Article 7.2: Electronic Payment	Non-binding (Phrasing: shall, to the extent practicable)
24. Electronic Application for Customs Refunds	n/a	
<b>Towards Cross-Border Paperless Trade</b>		
25. Laws and regulations for electronic transactions are in place (e.g. e-commerce law, e-transaction law)	n/a	
26. Recognised certification authority issuing digital certificates to traders to conduct electronic transactions	n/a	
27. Engagement of your country in trade-related cross-border electronic data exchange with other countries	n/a	
28. Certificate of Origin electronically exchanged between your country and other countries	n/a	
29. Sanitary & Phyto-Sanitary Certificate electronically exchanged between your country and other countries	n/a	
30. Traders in your country apply for letters of credit electronically from banks or insurers without lodging paper-based documents	n/a	



Trade facilitation measure	Corresponding WTO TFA Article	Binding or non-binding nature of the WTO TFA Article
<b>Border Agency Cooperation</b>		
31. Cooperation between agencies on the ground at the national level	Section 1, Article 8: Border Agency Cooperation	Binding
32. Government agencies delegating controls to Customs authorities	n/a	
33. Alignment of working days and hours with neighbouring countries at border crossings	Section 1, Article 8: Border Agency Cooperation	Non-binding (Phrasing: shall, to the extent possible and practicable)
34. Alignment of formalities and procedures with neighbouring countries at border crossings	Section 1, Article 8: Border Agency Cooperation	Non-binding (Phrasing: shall, to the extent possible and practicable)

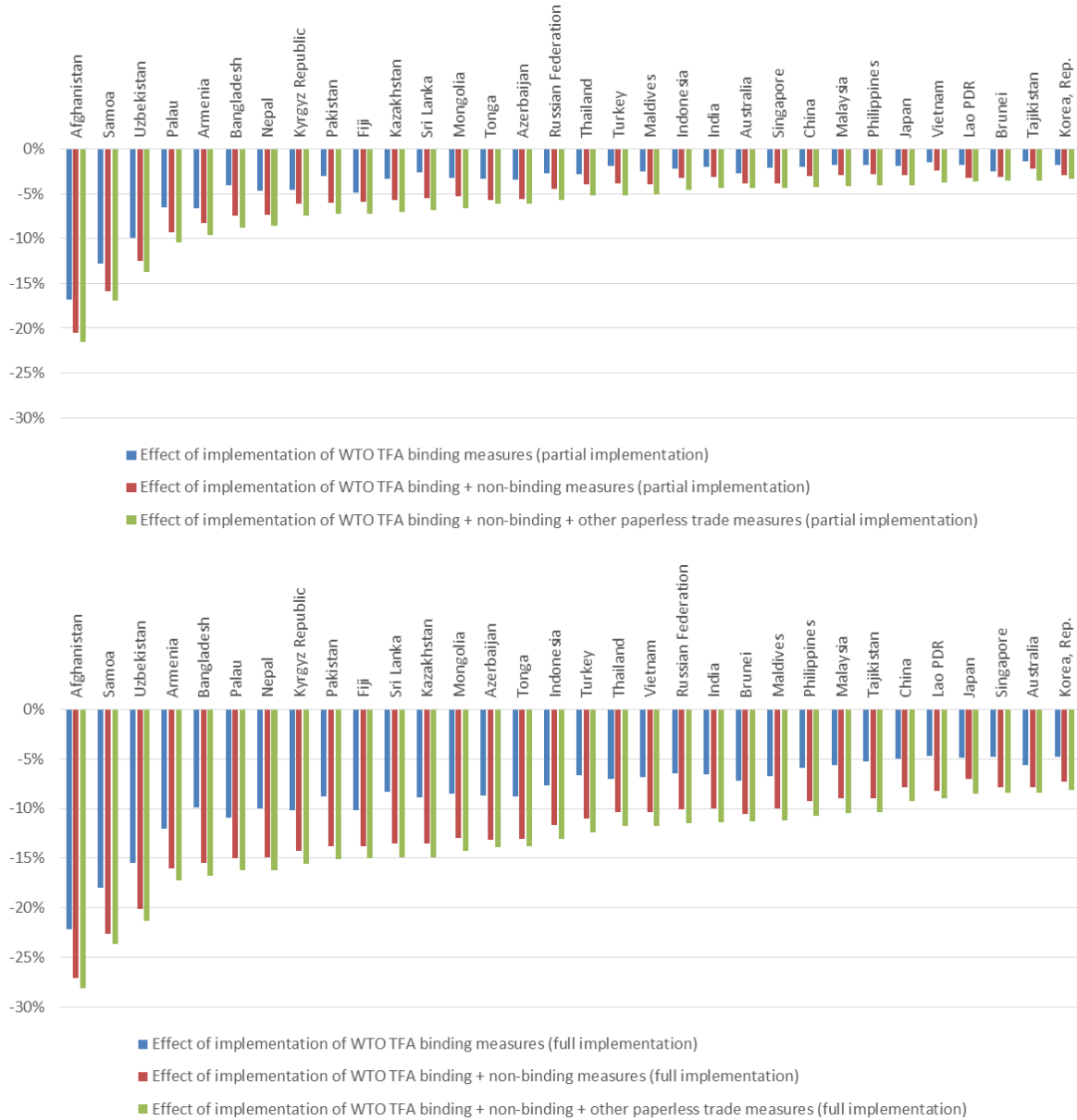
Note: Table A1.3 presents justifications for classing WTO TFA measures as binding or non-binding.

\*Measures which are binding under the WTO TFA correspond to group one (1) of TF measures in the counterfactual analysis presented in the chapter. Group 2 consists of the measures in group one (1) as well as non-binding WTO TFA measures. All measures, including paperless and cross-border paperless trade measures, identified as N/A constitute group 3.

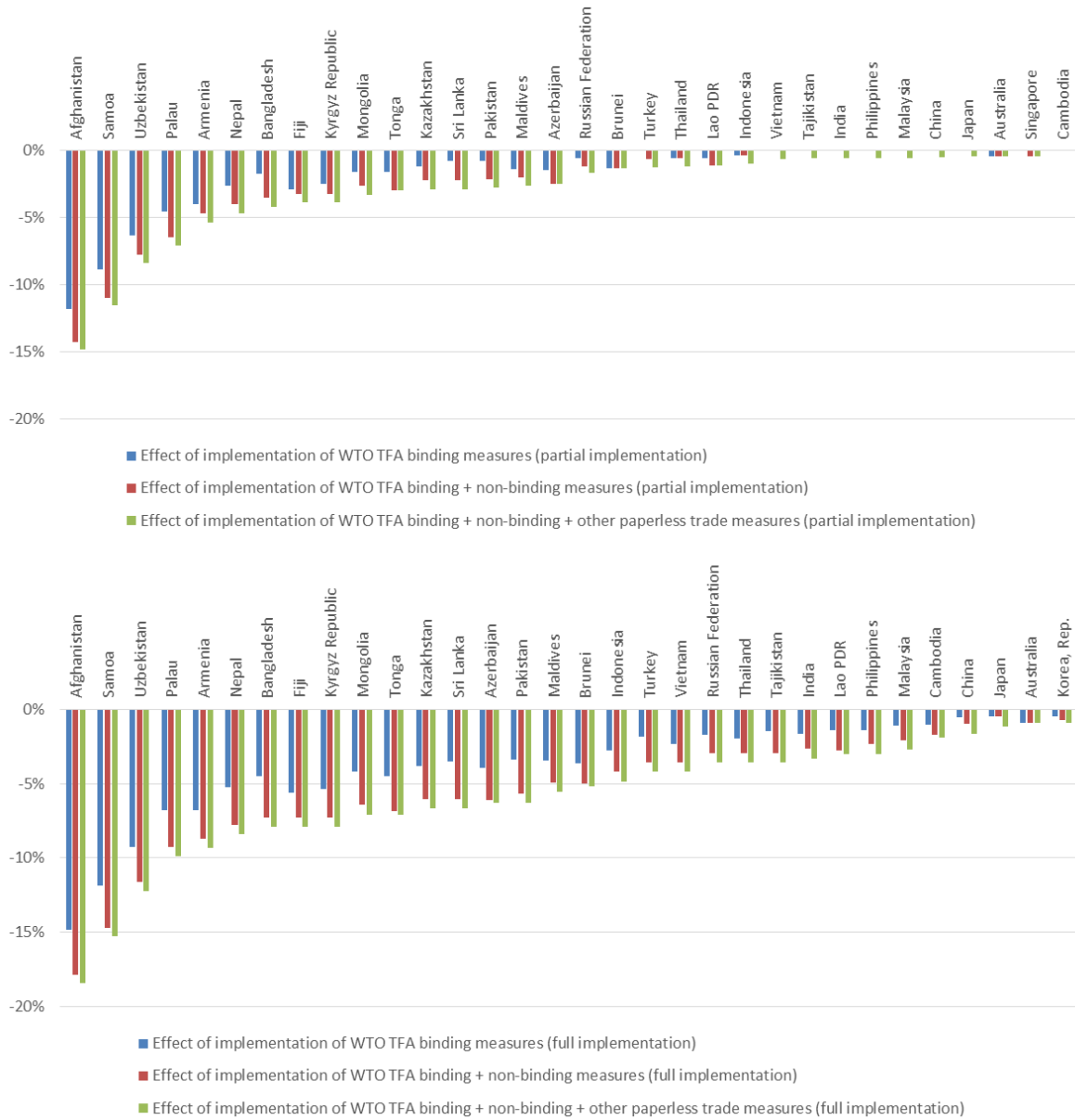
## Annex 2: Individual country results in trade cost reductions from general trade facilitation and paperless and cross-border paperless trade facilitation in Asia-Pacific countries

### Figure A2.1: General trade facilitation implementation

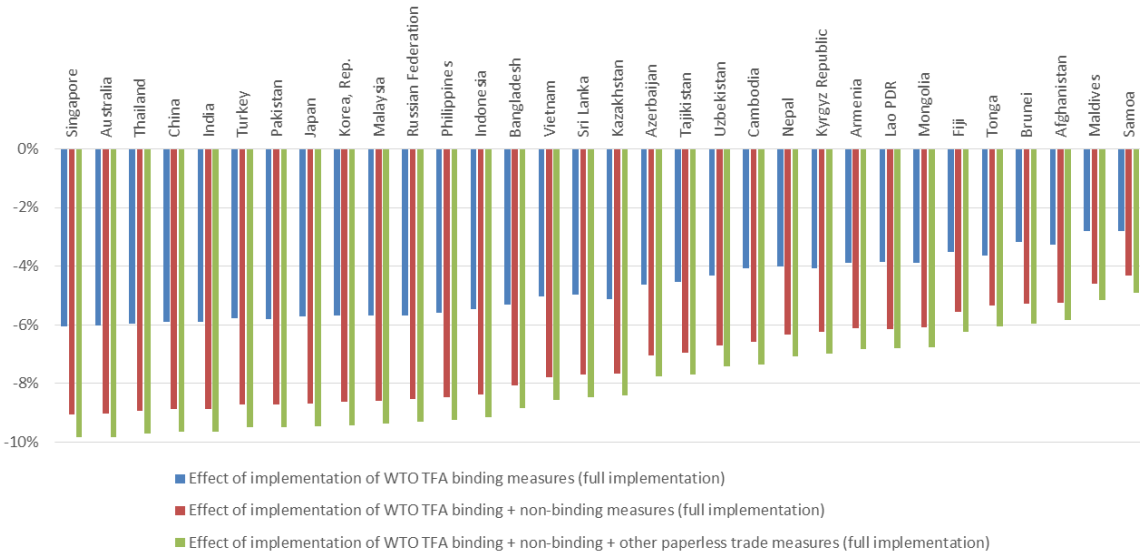
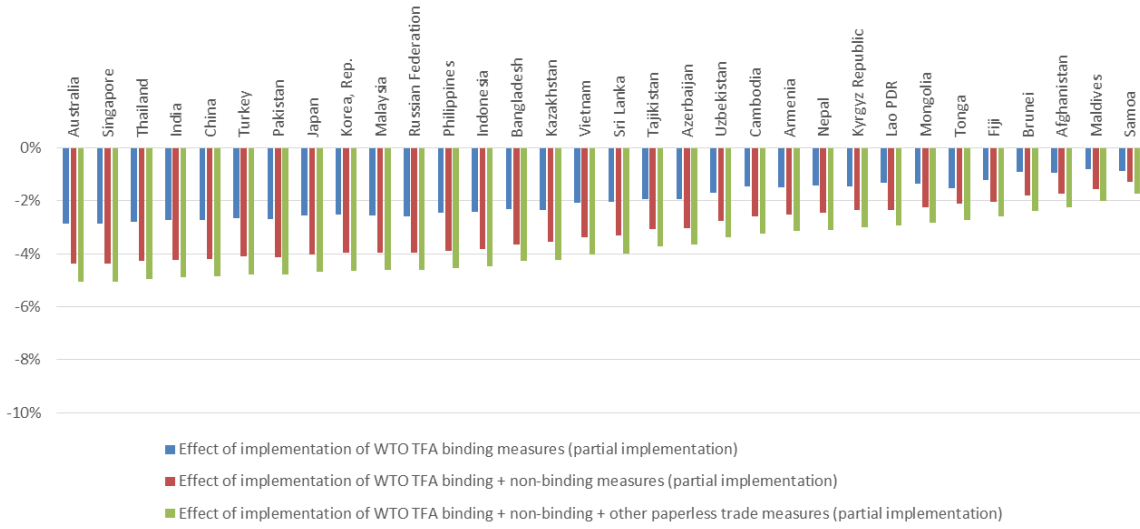
(a). Simultaneous improvement



(b). Own improvement

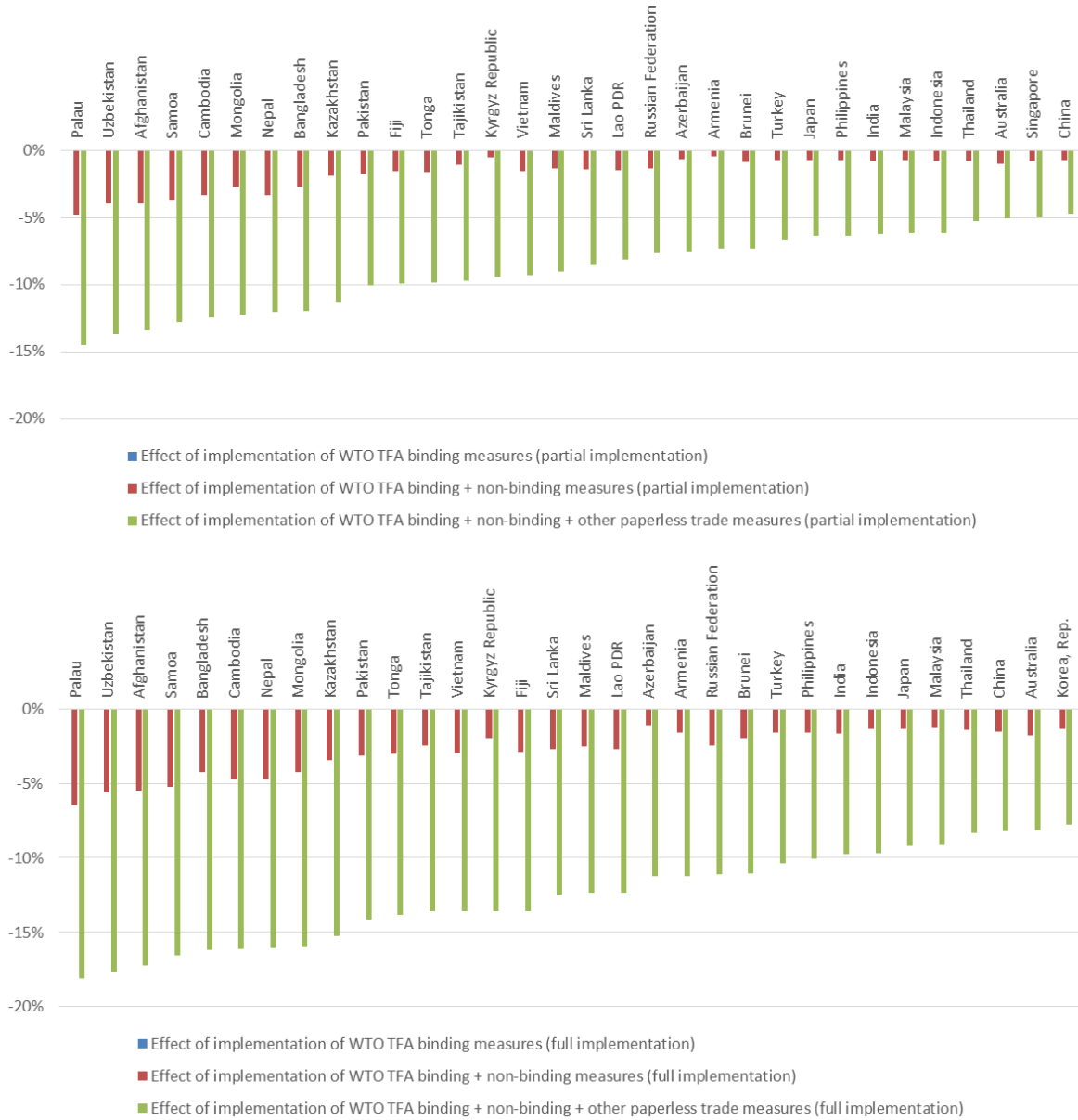


### (c). Trade partner improvement

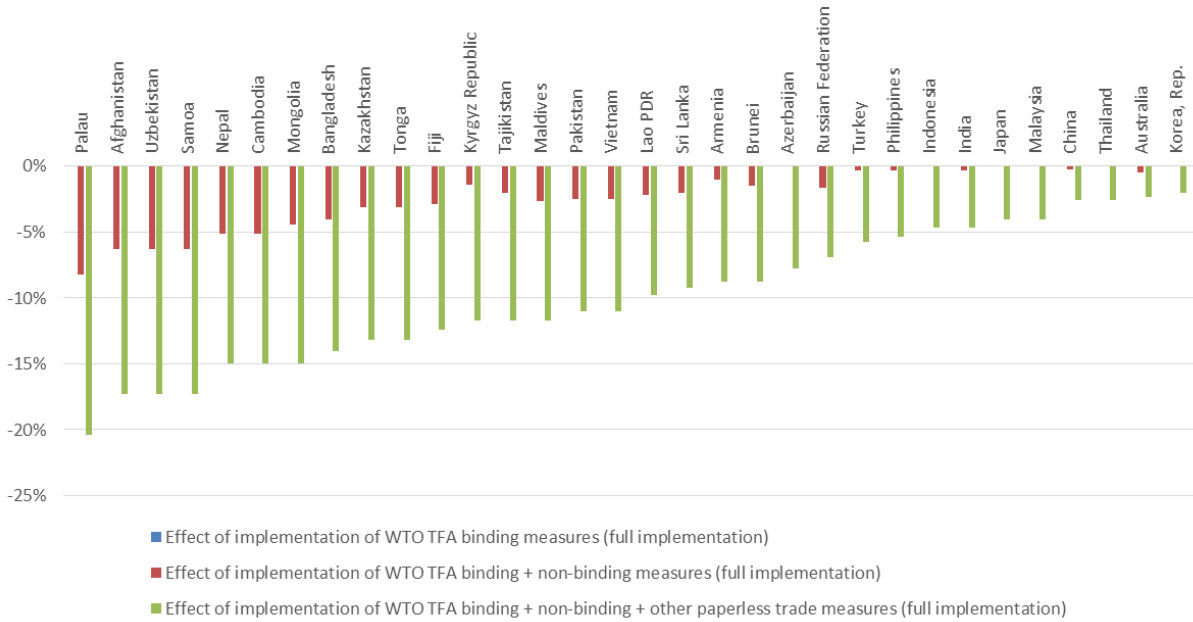
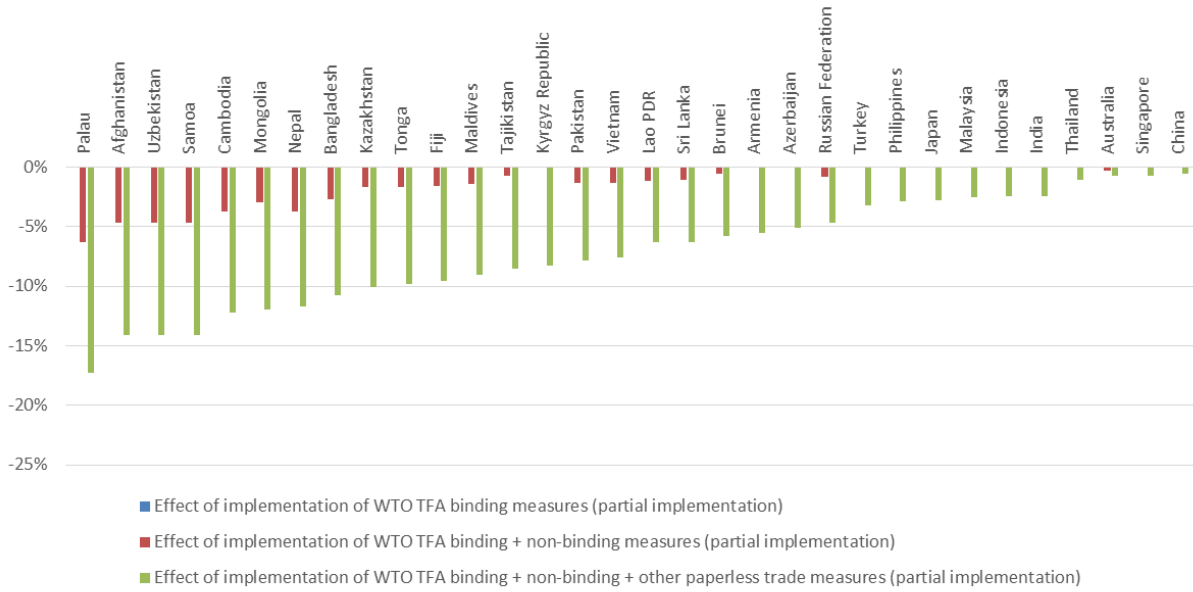


## Figure A2.2: paperless and cross border paperless trade facilitation implementation

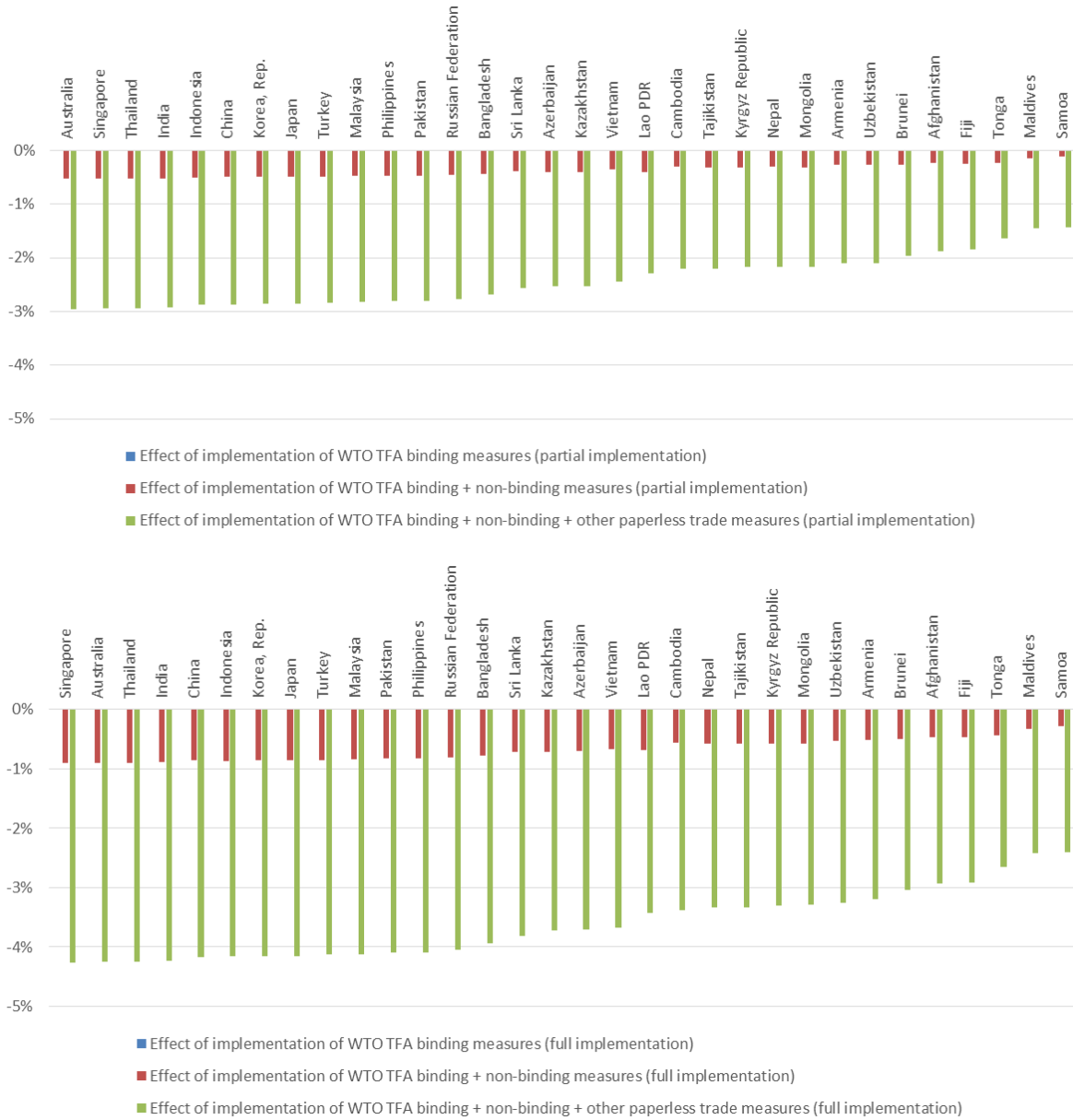
### (a). Simultaneous improvement



(b). Own improvement

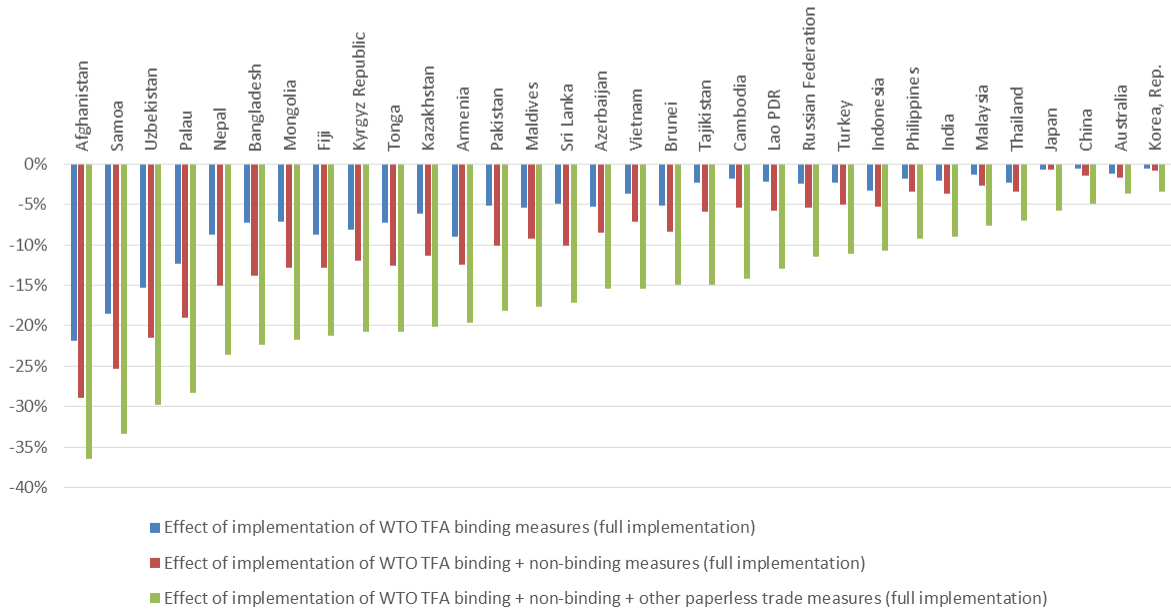
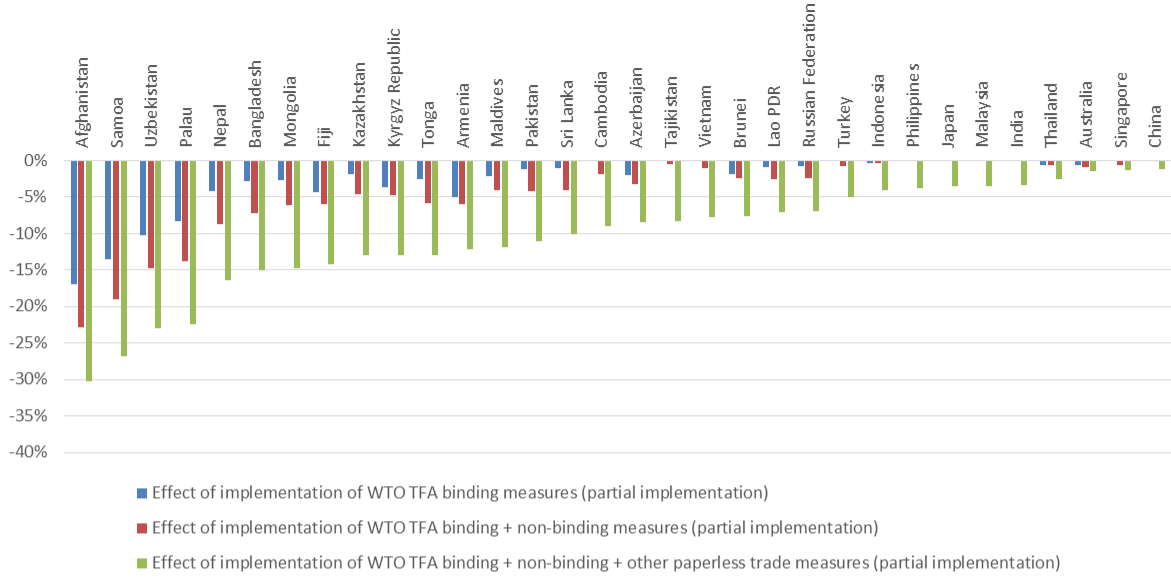


### (c). Trade partner improvement



**Figure A2.3: overall trade facilitation**

(a). Own improvement



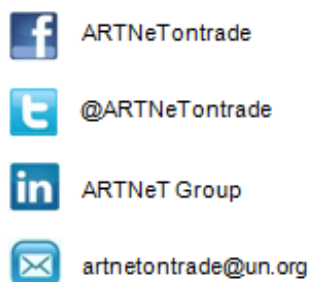




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