ERIA Discussion Paper Series

Transparency in Non-tariff Measures: An International Comparison*

Lili Yan ING*
Economic Research Institute for ASEAN and East Asia (ERIA) and University of Indonesia

Olivier CADOT†
University of Laussane, Centre for Economic Policy Research (CEPR) and Foundation for International Development Study and Research FERDI

Janine WALZ‡
The World Bank

August 2016

Abstract: : We construct an index of transparency in non-tariff measures based on notifications to the World Trade Organization under the agreements on sanitary and phytosanitary measures and on technical barriers to trade, the existence of a trade portal giving ready access to trade-relevant regulations, the existence of NTM data collected under the Multi-Agency Support Team classification, and the results of an experiment conducted between 2015 and 2016 where we asked for specific regulations concerning the import of a particular product on behalf of a private company. The resulting country ranking shows that the Organisation for Economic Co-operation and Development countries are, by and large, the most transparent, but also shows that the Association of Southeast Asian Nations member states score well compared to other developing countries.

Keywords: International trade, non-tariff measures, transparency, governance, index, ranking
JEL Classification: F12, F13, F14, F15, F6

* This paper is part of an ERIA research project on regional integration in ASEAN. The authors are grateful to the ASEAN Secretariat and to MCC-TEC AG for its valuable collaboration. Without implicating them, the authors would also like to thank Michael Jensen and Fabio Artuso for useful discussions. All remaining errors are the authors' only. The opinions expressed in this study are those of the authors and do not necessarily represent the view of the ERIA and World Bank, its Board of Directors, or the governments that it represents.
* Corresponding author: liliyan.ing@eria.org.
† Faculty of Business & Economics, Université de Lausanne, CH 1015 Dorigny, Switzerland.
‡ 1818, H St NW, Washington, DC 2043 USA.

1. Introduction

Transparency is fundamental to modern administrative law in many industrial countries and is key to preventing arbitrariness and capture by special interests. Transparency in administrative rules and processes is also crucial for transactions that involve lengthy and complex procedures like international shipments, and is thus particularly relevant as a trade facilitator; as non-tariff measures (NTMs) are often complex legal instruments, transparency is particularly important in their case.

Indeed, a growing literature has shown that improved transparency can generate substantial gains in trade and investment flows (see e.g. Francois, 2001; Wolfe, 2003; Kerr, 2008; Helble, Shepherd, and Wilson, 2009; Lejárraga and Shepherd, 2013). In these papers, the determinants of trade volumes typically follow the gravity equation, while the causal effects of transparency on trade are identified using variation either in perception-based transparency indices across countries or in transparency provisions across regional trade agreements.

In spite of growing interest in measuring transparency in trade policy, most of the proxies used in the literature are broad in scope, relating to general perceptions of government transparency or to 'WTO+' provisions in regional trade agreements. We propose in this paper a more direct approach drawing on what governments actually do in the area of NTM transparency. We draw on various sources, including 'off-the-shelf' data, on country-level compliance with World Trade Organization (WTO) requirements, such as the notification of potentially trade-restricting measures (a general requirement for all WTO members), the creation of a trade portal (a requirement under the recent Trade Facilitation Agreement (TFA), or the availability of NTM inventories under the Multi-Agency Support Team (MAST) classification in the new United Nations Conference on Trade and Development (UNCTAD) database. In order to get closer to what really happens on the ground, we combine those with the results of an original experiment, in which a Swiss producer of food containers and logistics solutions sent a standardized request on relevant import regulations to trade agencies and sanitary and phytosanitary (SPS) or technical barriers to trade (TBT) enquiry points to 182 countries in the world. The information requests were in French to French-speaking countries, in Spanish to Spanish-speaking countries, and in English to all other ones. They were sent in repeated waves in order to smooth out cases of non-response due to temporary unavailability of particular staff members or other non-persistent factors.

When responses were received, we rated them by their quality; for instance, some agencies simply acknowledged receipt, while, at the other extreme, Slovenia sent a highly detailed technical explanation that was translated into German (the Swiss company's home language) by the Embassy of the Republic of Slovenia in Bern, Switzerland. We then aggregated the experimental scores with those under the other criteria, using as weights the variable loadings from principal factor analysis, and then ranked countries by decreasing order of the index value. As our scores have a limited range of integer values, there are multiple countries with the same index. Among the tied countries, rankings are arbitrary; in order to remove the indeterminacy, based on the observation that transparency, by and large, correlates with income levels, we rank countries by decreasing order of gross domestic product (GDP) per capita.

Our index largely correlates with the government transparency score of the World Economic Forum's Global Competitiveness Index (GCI). It also reveals plausible but nevertheless interesting variation across income and regional groups. Unsurprisingly, the Organisation for Economic Co-operation and Development (OECD) countries typically have the highest scores; non-OECD high-income countries – which include a number of oil producers – have low ones. The lowest scores are observed in low-income and lower-middle-income countries. Among developing countries, the Association of Southeast Asian Nations (ASEAN) has the highest average scores, followed (albeit with much more heterogeneity) by European and Central Asian countries. The lowest scores are observed in countries in the Middle East and North Africa and sub-Saharan Africa.

The rest of the paper is organized as follows. Section 2 briefly reviews the literature on transparency and trade. Section 3 details the construction of the index. Section 4 analyses the properties of the resulting ranking. Section 5 concludes.

2. Transparency as a Trade Facilitator: What Do We Know?

Be it because of the delays involved in the transactions, different jurisdictions involved, or lack of familiarity between sellers and buyers, international trade is particularly vulnerable to business risk. A number of papers (e.g. Anderson and Marcouiller, 2002; de Groot et al., 2004; Levchenko, 2007; Nunn, 2007; Francois and Manchin, 2013) have shown that institutional quality improvements reducing the uncertainty faced by traders have substantial trade-enhancing effects. Typically, the literature focuses on variables that correlate with contract enforcement, such as the protection of property rights or the 'rule of law', political stability, lack of corruption, or government effectiveness components of the World Bank's Worldwide Governance Indicators. The mechanism, implicit or explicit depending on the modelling approaches, that translates institutional improvements into higher trade volumes is essentially the reduction of sunk and fixed costs (see e.g. van Tongeren 2009; Handley and Limão 2015).

Beyond general institutional quality, a number of papers have shown that transparency has positive effects on trade and investment (Francois, 2001; Wolfe, 2003; Kerr, 2008; Helble, Shepherd, and Wilson, 2009). Helble, Shepherd, and Wilson (2009), for instance, use perception-based indicators from the World Economic Forum's Global Competitiveness Report and from the World Bank's Logistics Performance Index, which provide indicators of customs efficiency, corruption, favouritism, policy uncertainty, and the prevalence of non-tariff barriers (NTBs). Using factor analysis to aggregate these components into a comprehensive index of transparency in import regulations,[1] they find the five highest scores among Asia-Pacific Economic Cooperation (APEC) countries for Singapore, New Zealand, Australia, Hong Kong, and the United States, and the five lowest scores for Peru, Thailand, the Philippines, Viet Nam, and Russia.

Including their transparency index as one of the determinants of trade volume in a gravity equation,[2] they find substantial and statistically significant effects on trade between APEC countries, in particular for heterogeneous products. Simulating the effect of transparency improvements on trade, they estimate that if all the APEC countries with below-average

[1] They also derive an index of transparency in export regulation.

[2] As transparency in trade regulation can be endogenous to trade volume (either through reverse causation or through omitted variables), the authors use colonial history as an instrumental variable for the transparency index in order to identify a one-way causal mechanism from transparency to trade volume.

transparency scores were to improve to the region's average, intra-APEC trade, excluding commodities, would rise by US$148 billion, or 7.5 percent of its current value. Interestingly, the induced trade increase is eight times larger than if all APEC countries with above-average tariffs were to reduce their tariffs to the region's average, highlighting the importance of transparency (see also APEC and World Bank, 2007).

Transparency has been promoted in various ways in the multilateral trading system, encouraging smaller countries, which are rarely if ever challenged under the WTO's dispute resolution system, to live up to their commitments (Bown and Hoekman, 2007). In a thorough analysis, Wolfe (2013) distinguishes between three generations of transparency requirements: basic 'right-to-know' requirements, monitoring and surveillance mechanisms, and accessibility (reporting and engagement).

Right-to-know requirements for trade in goods are included in articles II and X of the General Agreement on Tariffs and Trade (GATT), which states:

> *Laws, regulations, judicial decisions and administrative rulings of general application, made effective by any contracting party, pertaining to the classification or the valuation of products for customs purposes, or to rates of duty, taxes or other charges, or to requirements, restrictions or prohibitions on imports or exports or on the transfer of payments therefor, or affecting their sale, distribution, transportation, insurance, warehousing inspection, exhibition, processing, mixing or other use, shall be published promptly in such a manner as to enable governments and traders to become acquainted with them. (GATT Article X, para. 1)*

The right-to-know principle is also enshrined in the WTO's notification system. However, in the absence of an enforcement mechanism, the system has only had limited success (see Bacchetta, Richtering, and Santana, 2012).

The WTO's primary monitoring and surveillance mechanism is based on periodic Trade Policy Reviews, which provide detailed assessments of member countries' trade policies over a wide range of issues. For regulatory issues, another important monitoring and surveillance mechanism is provided by the 'specific trade concerns' (STC) clauses of the SPS and TBT agreements, which are based on a 'reverse' notification procedure (the notification is made not by the country issuing the regulation, but by partners aggrieved by it). [3]

[3] Article 2.5 of the TBT Agreement states that '[a] Member preparing, adopting or applying a technical regulation which may have a significant effect on trade of other Members shall, upon the request of another Member, explain the justification of that technical regulation. The TBT committee is the place where such justification shall be provided.' See Fontagné and Orefice (2016). Many WTO agreements

Reporting and engagement requirements have developed over time, starting with the obligation to create enquiry points for SPS and TBT measures, the development of databases (the WTO's Integrated Trade Intelligence Portal (I-TIP) and the recent development of a universal NTM database by UNCTAD), and the obligation to set up trade portals in the WTO's TFA.

Transparency provisions are also prevalent in regional trade agreements (for an overview, see Lejárraga, 2013), where they have the appealing feature of being 'non-excludable' and therefore having only trade creation effects, without any potential for trade diversion (see Chauffour and Maur, 2011; Lejárraga and Shepherd, 2013). Using an OECD database of free trade agreements (FTAs) with WTO+ provisions, Lejárraga and Shepherd (2013) find that countries with high democracy and governance indices are more likely to include transparency provisions in bilateral FTAs, which are also more prevalent in FTAs between countries at different levels of income. Based on a raw count of transparency provisions in agreements, they also find that each provision correlates with a 1 percent rise in bilateral trade.

We now turn to the construction of an index of transparency in NTMs, using a combination of off-the-shelf data such as WTO notifications with the results of an original experiment.

3. A Synthetic Measure of NTM Transparency

Our index combines two broad sources of information: (i) publicly available data, and (ii) the results of an experiment consisting of addressing a specific request for regulatory information, on behalf of a private company, to various national agencies including SPS/TBT enquiry points, and rating the quality of the response, when a response was received (more details below).

3.1. Data sources

Cross-country variation in the availability of publicly available statistical data on NTMs is a source of difficulties for the statistical analysis of their trade effects. Missing data make

have independent reverse notification procedures, but those have progressively lost importance (see Wolfe, 2013).

estimates vulnerable to selection effects, as countries that do not report many measures may do so because they do not want to publicize highly restrictive or arbitrarily administered regulations. By contrast, if one is interested in measuring transparency, cross-country variation in the level or quality of the information provided is itself the focus of analysis. In this section, we describe the data we have used to construct our index.

Compliance with WTO transparency requirements

We collected data on three dimensions of compliance with WTO transparency requirements: TBT notifications, SPS notifications, and the creation of a functional trade portal mandated by the WTO's TFA.

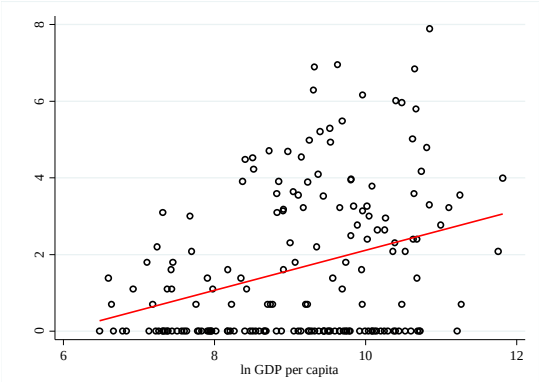
WTO members are under as many as 157 different notification obligations. According to the WTO Glossary, a notification is 'a transparency obligation requiring member governments to report trade measures to the relevant WTO body if the measures might have an effect on other Members.' Thus, trade restrictiveness is at the heart of the notification process. Under the WTO's TBT and SPS agreements, members must notify to the WTO all new regulations with potentially trade-restrictive effects, except those based on international standards. Thus, a sanitary regulation based on the Codex Alimentarius needs not be notified. Similarly, a regulation that liberalises trade, such as Myanmar's recent elimination of import licenses for a wide range of products, need not be notified. By contrast, a technical regulation based on a regional or national standard must be notified. While these criteria seem relatively straightforward, in practice, whether a measure is likely to restrict trade or not is a judgment call on which the country imposing the measure and its trade partners may disagree.

Even though notifications are mandatory, in practice few countries other than the United States duly report all regulations. Most low-income countries notify very few measures, and even among high-income countries, there is considerable variation in the number of notifications (Figure 1).

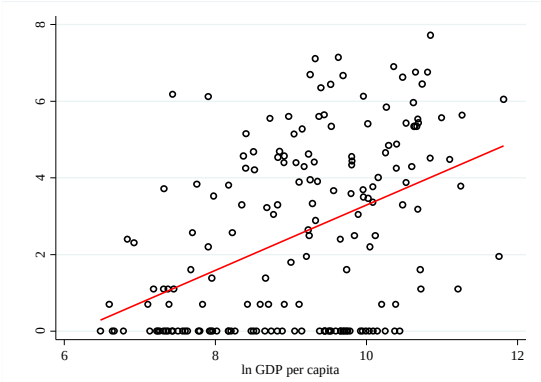
The quality of notifications also varies, some notifications being vague and uninformative. WTO staff filter out obvious errors, such as regulations on car seats notified under the SPS Agreement, but many of them nevertheless remain approximate. We will not attempt here to assess the quality of country notifications but only their cumulative count since 1995.

Figure 1: Notification count and income

Sanitary and phytosanitary



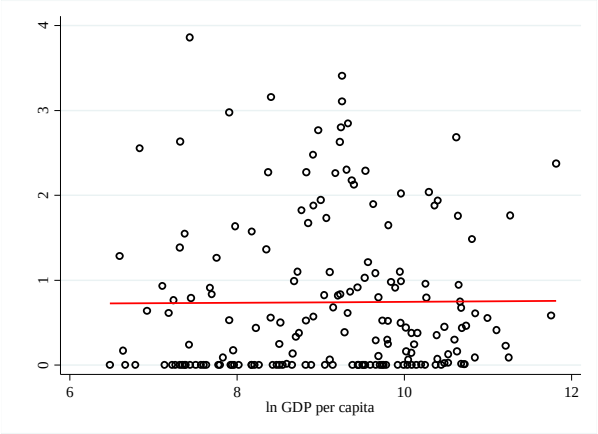
Technical barriers to trade



Note: Both the number of notifications (on the vertical axis) and the value of gross domestic product (GDP) per capita (on the horizontal axis) are in logs. Notifications are cumulated over 1995–2013.
Source: Authors' calculations using the World Trade Organization's Integrated Trade Intelligence Portal (I-TIP) database for notifications and World Bank's World Development Indicators (WDI) for GDP per capita (2013).

In order to make the notification count comparable across countries in spite of differences in economic size, we adopt two alternative approaches. In one (our preferred specification), we take advantage of the pattern shown in Figure 1 and divide countries into two groups: those that never notify (clustered along the horizontal axis) and those that notify at least sometimes. In this form, our notification data become binary and thus scale independent. In another specification, we scale the total number of notifications since 1995 by the average value of imports over 1995–2013 as a proxy for the complexity of the notifying country's economy. This eliminates the heavy dependence on income levels appearing in Figure 1, with the resulting number bearing no clear relationship with the country's level of income (Figure 2).

Figure 2: Normalised notification count (TBT and SPS combined) and income



Note: SPS = sanitary and phytosanitary, TBT = technical barriers to trade.

Source: Authors' calculations using the World Trade Organization's Integrated Trade Intelligence Portal (I-TIP) database for notifications and World Bank's World Development Indicators (WDI) for GDP per capita (2013).

As an alternative measure of transparency in NTMs, we score countries on whether they set up a 'trade portal' (i.e. a website) to provide information on regulations applicable to imported products. The WTO's TFA, adopted at the Bali Ministerial Conference in December 2013, mandates that countries set up trade portals aimed at facilitating traders' access to relevant information. Such websites, which some countries (e.g. European Union members) already had prior to the Bali agreement, can take different names (trade portal, trade repository, etc.); we searched for them using a number of keywords. In addition to coding the existence of a portal in binary form, we also rated its quality on a 1–3 scale, with a score of 3 for the highest quality. Our criterion was for the site to give either direct access to regulations (in the form of PDF files or summary tables) or to email addresses, telephone numbers, or names of contact persons. Empty shells and sites giving merely tariff rates were not considered as containing 'meaningful information' on NTMs and were given a score of 1. Sites giving limited information, e.g. notifications to the WTO in vague form, were given a score of 2. Although both notifications and the creation of trade portals are WTO obligations, the groups of non-compliers under both agreements are only weakly correlated, as shown in Table 1.

Table 1: Compliance with TFA and notification requirements (percent)

	No portal	Portal	Total
Never notified	32.5	4.5	37.0
Notified	44.5	18.5	63.0
Total	77.0	23.0	100.0

Note:TFA = Trade Facilitation Agreement.
Source: World Trade Organization's Integrated Trade Intelligence Portal (I-TIP), web search for portals.

While 63 percent of all countries have notified SPS or TBT measures at least once and have created a meaningful trade portal, only 23 percent have a working portal, possibly reflecting the fact that the TFA is a recent agreement.

NTM data

Over the last two decades, data have been collected on NTMs in various waves and forms. One of the earliest datasets was published on UNCTAD's Trade Analysis Information System (TRAINS) database, accessible from the World Bank's World Integrated Trade Solution (WITS) portal. The first wave of data was collected in the early 2000s and was used in the paper by Kee, Nicita and Olarreaga (2009) to calculate trade restrictiveness indices. Since then, the TRAINS database has been replenished as part of a joint effort by UNCTAD and the World Bank, while regional entities such as the Latin American Integration Association (ALADI) Secretariat for Latin American countries, the African Development Bank for the African continent, and the Economic Research Institute for ASEAN and East Asia (ERIA) for ASEAN countries have contributed regional data collection efforts. The new data are classified in a consistent way by type of measure using MAST, a common classification proposed by UNCTAD in collaboration (in its 2012 version) with the WTO. Data collection is, in most cases, carried out by outside consultants and financed by development partners rather than by countries themselves, so their availability does not necessarily reflect a proactive transparency effort by government. However, data collection requires the collaboration of various government agencies and cannot proceed without, at the minimum, tacit government approval. In that sense, it is also a sign of transparency, albeit a weak one. Accordingly, we grade countries in binary form (0 or 1) on whether NTM data were collected as part of this multilateral or regional effort. Table 2 illustrates the correlation between the two waves of data collection. The coefficient of correlation is 0.41; however,

differences in coverage between the two waves are not random. As the 2001 wave did not cover a number of industrial countries (particularly ones in the European Union), we did not use it in the index construction.[4]

Table 2: Correlation in the availability of TRAINS data between the two waves (%)

TRAINS 2001	TRAINS data, MAST classif.		
	No data	Data	Total
No data	51.9	22.8	74.6
Data	5.8	19.6	25.4
Total	57.7	42.3	100.0

Note: MAST = Multi-Agency Support Team, TRAINS = Trade Analysis Information System.
Source: World Bank's World Integrated Trade Solution (WITS) portal.

Experimental data

Finally, we completed off-the-shelf data with a simple experiment consisting of emailing a request for information about regulations applicable to the import of a certain product to relevant agencies including ministries of trade, health, or agriculture and SPS inquiry points in 182 countries, and scoring the information received in return (if any). For this, we secured the collaboration of a Swiss company, MCC-TEC AG, producing and exporting containers and integrated logistics solutions for food and pharmaceutical products. The information requests were sent from a company email account and answers were received on that account. The text of the information request was as follows:

> *Dear Sir or Madam,*
>
> *I am writing you regarding import procedures and requirements in [country name].*
>
> *MCC-TEC AG is a company based in Bätterkinden, Switzerland. Our core product is MCC-BOX, a container for the transportation of pharmaceutical and food products (www.mcc-tec.ch/anwendungen/pharmalogistik and www.mcc-tec.ch/anwendungen/ foodlogistik). We are establishing business contacts with potential clients in [country capital's name] but are currently in exploratory mode.*

[4] Kee et al. (2009) completed the TRAINS NTM data with data compiled by Shepherd (2004) and from WTO Trade Policy Reviews.

In order to enable us to proceed with the planning of our export strategy and be able to respond to customer queries, could you please send us useful documentation or weblinks regarding technical regulations as they apply to pharmaceutical and food logistics as well as any import license procedures and required documentation for the import of Swiss-made products in [country name]?

We thank you in advance for your help.

With best regards,

For Latin American countries, it was sent in Spanish, and for francophone countries, it was sent in French. In all other countries, it was sent in English. For European Union member states, queries went to national authorities and not to the European Commission. For federal countries, they went to federal authorities and not to subnational entities. The first wave of emails was sent on 1 July 2015; when no response was received (107 cases), a second mail was sent a month later in order to ensure that non-response was not due to temporary factors like unavailability of the contact person or IT failure. In some cases, we received personalised answers; for instance, Slovenia responded with a letter detailing all relevant regulations that was translated into German (which they guessed was the company's operating language, even though the letter was in English) by the Slovenian embassy in Switzerland. In a number of cases, our information requests were redirected to specific government agencies; we then followed up until we got a final answer (informative or not). An additional wave of emails was sent to SPS and TBT inquiry points in the fall of 2015.

Table 3 shows that our various transparency data have weak correlation coefficients with each other, suggesting that they are not collinear. The lowest correlation coefficients are for the availability of NTM data in the 2001 TRAINS database, reflecting the fact that industrial countries were not in that database.

Table 3: Correlation between NTM transparency variables

	TRAINS 2001	TRAINS MAST	Normalized notifications	Portal quality	Experiment score
TRAINS 2001	1.00				
TRAINS data, MAST class.	0.41	1.00			
Normalized notifications	-0.01	-0.13	1.00		
Portal quality	-0.17	0.42	-0.06	1.00	
Experiment score*	-0.08	0.26	0.03	0.31	1.00

MAST = Multi-Agency Support Team, NTM = non-tariff measure, TRAINS = Trade Analysis Information System.
Note: * Best score of the two survey waves.
Source: Authors' calculations.

Transparency data vary substantially across regions, as shown in Table 4, although the extent of variation differs between variables. For instance, while the proportion of countries notifying anything to the WTO varies from a low of 50 percent (East Asia and the Pacific, and South Asia) to a high of 71 percent (Latin America and the Caribbean), the number of notifications, when normalised by import value, varies more, with sub-Saharan Africa having a high score not so much because countries in the region provide a lot of notifications but because of their low average import values. The proportion of trade portals already set up also varies substantially, from a low of 7 percent in Latin America to a high of 47 percent in Europe and Central Asia (the European Union has had a working trade portal since before the TFA).

Table 4: Average NTM transparency across regions

	EAP	ECA	LAC	MENA	SA	SSA
WTO SPS/TBT notifications						
Proportion of notifiers	0.64	0.72	0.85	0.55	0.50	0.57
Average normalized notifications*	1.01	1.41	8.21	4.23	1.12	4.44
TFA trade portal						
Proportion of existing portals	0.11	0.55	0.06	0.10	0.25	0.19
Average portal quality	2.33	3.00	2.00	3.00	1.00	2.22
TRAINS NTM data						
2001 version	0.14	0.04	0.41	0.20	0.63	0.40
MAST version	0.54	0.64	0.44	0.20	0.63	0.21
Experiment						
Average score (0-3)	0.57	1.17	0.88	0.25	0.13	0.28
Observations	*28*	*47*	*34*	*20*	*8*	*47*

EAP = East Asia and the Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, NTM = non-tariff measure, SA = South Asia, SPS = sanitary and phytosanitary, SSA = sub-Saharan Africa, TBT = technical barriers to trade, TFA = Trade Facilitation Agreement, TRAINS = Trade Analysis Information System, WTO = World Trade Organization.
Note: Regions are defined according to World Bank classification except that ECA includes high-income, non-World Bank client European countries.
* Number of notifications per million dollar of imports, on average, over 1995–2013.
Source: Authors' calculations.

Scores also vary substantially across income groups, as shown in Table 5 with typically higher scores at higher income levels (except for high-income, non-OECD countries), likely reflecting stronger administrative capabilities. This effect is probably subdued in the data due to donor assistance in the case of low-income countries. For instance, a number of low-income countries in sub-Saharan Africa have trade portals set up and financed by donors but no regulatory data uploaded, sometimes possibly reflecting low appropriation of the initiatives as much as low capabilities. The results of our experiment also vary substantially,

with the highest score going to the Europe and Central Asia region because it includes the European Union countries, many of which provided very precise responses.

Table 5: Average NTM transparency by income group

	HI (OECD)	HI (non-OECD)	UMI	LMI	LI
WTO SPS/TBT notifications					
Proportion of notifiers	0.93	0.67	0.69	0.60	0.54
Average normalized notifications	0.89	3.43	5.07	3.57	5.99
TFA trade portal					
Proportion of existing portals	0.81	0.14	0.15	0.15	0.11
Average portal quality	3.00	3.00	2.50	2.38	1.50
TRAINS NTM data					
2001 version	0.04	0.04	0.35	0.27	0.40
MAST version	0.89	0.89	0.52	0.27	0.26
Experiment					
Average 1-3 score	1.81	1.81	0.79	0.37	0.09
Observations	*27*	*38*	*52*	*52*	*35*

HI = high income, LI = low income, LMI = lower middle-income, NTM = non-tariff measure, OECD = Organisation for Economic Co-operation and Development, SPS = sanitary and phytosanitary, TBT = technical barriers to trade, TFA = Trade Facilitation Agreement, TRAINS = Trade Analysis Information System, UMI = upper middle-income, WTO = World Trade Organization.

Note: Income groups are defined according to World Bank classification.

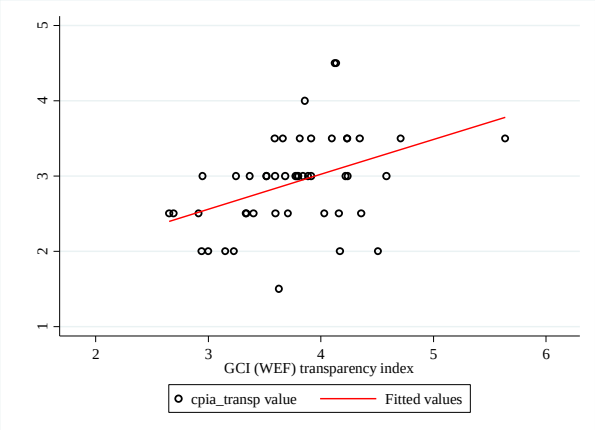
* Number of notifications per million dollar of imports, on average, over 1995–2013.

Source: Authors' calculations.

Beyond NTMs, overall government transparency is regularly rated through executive surveys by the World Economic Forum as part of the Global Competitiveness Index (GCI). It is also scored by the World Bank as part of the Country Policy and Institutional Assessment (CPIA). The two measures, which are collected only for a limited number of countries, are only weakly correlated, with a correlation coefficient of 0.41 (Figure 3).

Similarly, a simple regression of survey-based indices on our specific NTM transparency measures produces weak correlation (Table 6),with our transparency data explaining, together with income levels, a bit less than a third of the cross-country variation in the CPIA and GCI indices. Correlations are stronger with the GCI transparency index (part of the GCI) than with the CPIA. Variables with a statistically significant correlation with the GCI include the binary measure of whether a country notifies anything to the WTO and, interestingly, the score on our experiment.

Figure 3: Correlation between GCI and CPIA government transparency indices



CPIA = Country Policy and Institutional Assessment, GCI = Global Competitiveness Index, WEF = World Economic Forum.
Source: Authors' calculations.

Table 6: Regression of overall transparency indices on NTM transparency variables

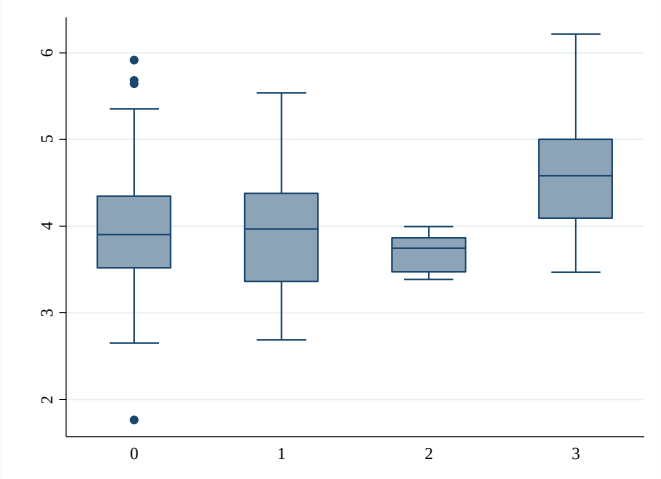
Dependent variable	GCI government transparency sub-index		World Bank CPIA transparency score	
Estimator : OLS	(a)	(b)	(c)	(d)
ln GDP per capita	0.248	0.273	0.468	0.462
	(3.81)***	(4.17)***	(4.80)***	(5.11)***
WTO SPS/TBT notifications				
At least one notification	0.405		0.103	
	(3.03)***		(0.68)	
Normalized notifications		0.015		0.014
		(1.52)		(1.23)
TFA trade portal				
Country has a trade portal	0.179		-0.207	
	(1.24)		(1.01)	
Portal quality		0.070		-0.159
		(1.24)		(1.24)
TRAINS NTM data				
2001 version	0.072	0.123	0.482	0.558
	(0.51)	(0.85)	(2.65)**	(2.88)***
MAST version	-0.131	-0.080	-0.307	-0.291
	(0.95)	(0.53)	(1.67)*	(1.63)
Experiment score	0.094	0.091	0.012	0.026
	(1.79)*	(1.67)*	(0.15)	(0.35)
Constant	1.392	1.407	-0.959	-0.923
	(2.51)**	(2.54)**	(1.27)	(1.29)
R^2	0.31	0.28	0.28	0.30
N	130	130	75	75

CPIA = Country Policy and Institutional Assessment, GCI = Global Competitiveness Index, GDP = gross domestic product, MAST = Multi-Agency Support Team, NTM = non-tariff measure, OLS = ordinary least squares, SPS = sanitary and phytosanitary, TBT = technical barriers to trade, TFA = Trade Facilitation Agreement, TRAINS = Trade Analysis Information System.
Source: Authors' calculations.

The lack of correlation between objective measures of NTM transparency such as compliance with WTO requirements and survey-based perceptions is noteworthy. Several factors may contribute to this lack of correlation. First, it may be the case that trade-related agencies like SPS enquiry points are 'enclaves' of transparency in governments that are otherwise non-transparent. Second, perceptions tend to be self-fuelling, circulating among circles of executives and expatriates who mutually reinforce group opinions generated out of a few salient anecdotes. However, the partial correlation between the experiment's score and survey-based perception indices is statistically significant, albeit at the 10-percent-level, suggesting that perceptions are not entirely self-fuelling.

Indeed, Figure 4 illustrates this with a box plot showing the conditional distribution of GCI scores for each level of the experimental score. A slight upward shift in the conditional distribution is discernible in the GCI score at the highest level of the experimental score and conversely at the lowest level.

Figure 4: Distribution of GCI scores, by experimental score level



GCI = Global Competitiveness Index.
Note: Each box marks the interval between the 25th and 75th percentiles of the conditional distribution of GCI transparency scores for each value of the experiment's score; the 'whiskers' mark the upper and lower limits of the conditional distribution without outliers, and the outliers, when there are any, appear as dots above or below the whiskers. The horizontal bar is the median.
Source: Authors' calculations using the World Economic Forum's GCI index values for 'transparency in government policy'.

Our data paint a varied picture of NTM transparency across countries and provide a good basis for building up an overall index, to which we now turn.

3.2. Aggregation

After cleaning, we are left with 187 countries with all dimensions of the data. We aggregate our transparency variables using weights derived from factor analysis. Factor analysis, a widely used technique in many disciplines, highlights patterns in data with high dimensionality (many variables) and high degrees of correlation between variables. The objective is to identify a small number of orthogonal factors, not directly observed, that account for most of the variation in the dataset. The contribution of each variable to a given factor's variation is called a 'loading'. Here, as the data's dimensionality is low, and so is the degree of correlation between variables (see Table 3), we use the technique essentially to derive weights to construct an overall NTM transparency index. We used factor analysis on two alternative versions of the notifications and portal data. The first version is in binary form, where the notification variable is 1 when the country notified at least one measure to the WTO and 0 otherwise, and the portal variable is 1 when the country has a trade portal and 0 otherwise. The second, alternative version is in continuous form, where the notification variable is the cumulated number of notifications since the creation of the WTO, normalised by the value of imports, and the portal variable ranges from 1 to 3 based on a subjective assessment of the information displayed on it. Factor analysis using the latter (continuous) version shows negative loadings for normalised notifications, which is not a desirable feature, and performs no better than using the former (binary) version, while the two alternative indices have a correlation coefficient of 0.9325. Hereon, we use the binary version of the index, for which factor analysis results are shown in Table 7 after standardisation of the variables to a common scale.

Table 7: Factor analysis results

(a) Unrotated factor analysis

	Eigenvalue	Diff.	Prop.	Cumul.
Factor1	1.079	1.089	1.458	1.458
Factor2	-0.010	0.075	-0.013	1.444
Factor3	-0.064	0.160	-0.114	1.330
Factor4	-0.245		-0.330	1.000

Notes: Likelihood ratio (LR) test: independent vs. saturated: $\chi^2(6) = 85.37$; Prob> $\chi^2 = 0.0000$

(b) Factor loadings, no rotation

	Factor 1	Uniqueness
Country has at least one notification	0.479	0.771
Country has a trade portal	0.525	0.725
NTM data available in MAST classification	0.617	0.619
Experiment score	0.441	0.806

MAST = Multi-Agency Support Team, NTM = non-tariff measure.
Source: Authors' calculations.

Part (a) of Table 7 provides the eigenvalue of each of the factors identified and their contribution to the data's overall variance. Part (b) gives the loading of each variable and its uniqueness, which is the proportion of its variance that is not associated with the factors (the residual variance).

Part (a) of Table 7 shows that the first factor alone over-explains the data's overall variation, so in part (b) we discard the other ones. We use the variable loadings in Factor 1 as weights in the aggregate NTM transparency index.

The next issue is what functional form to use to aggregate data into a single index. Usual forms include a Cobb–Douglas function, constant elasticity of substitution (CES) function, or a simple weighted sum. A Cobb–Douglas form would assign an overall index value of 0 to all countries with a 0 in one of the index's components; this would create an oversized and uninformative cluster at 0 values, which is not desirable. A CES function would be preferable but gives results that are broadly similar to a weighted average while relying on an arbitrary choice of elasticity of substitution. As there is no obvious benchmark to rely on for the elasticity of substitution and substitutability between components does not play a crucial role in our analysis, we go for the simplest solution, i.e. a weighted sum using factor loadings from Table 7 as weights. In the index's construction, experiment scores, which are not binary,

are normalized to lie between 0 and 1 using the following formula (letting x be the index score):

$$x_n = \frac{x - x_{\min}}{x_{\max} - x_{\min}} \ .$$

We now turn to the resulting ranking of countries.

4. Results

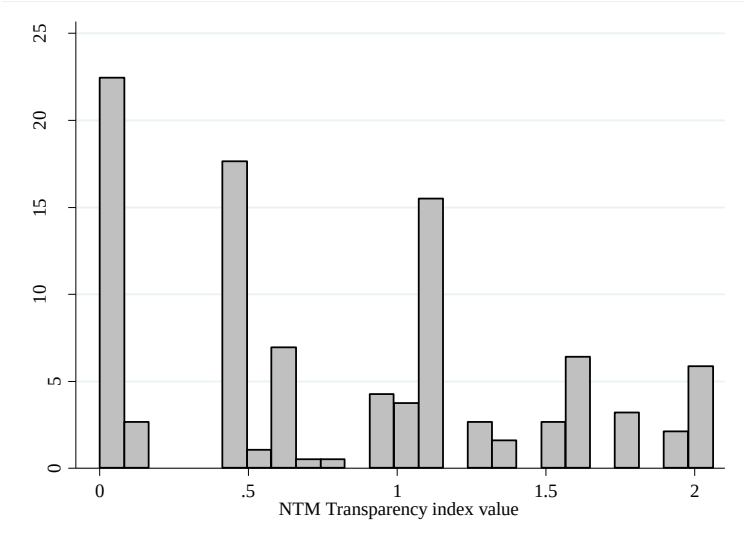
Two rankings can be constructed, depending on the type of notification data. In the first version, notifications are taken in binary form, distinguishing only between countries that notified and countries that do not. In the second, the notification variable is the normalised count. The second version gives results that are, by and large, close to those of the first, but less plausible, with some low-income countries pushed to high index values by their low import values (which mechanically raise the normalised value). For brevity, we report only results according to version 1; results according to version 2 are available upon request.

4.1. Rankings

Country rankings and index values are presented in Appendix Table A1. The index takes on 25 discrete values between 0 and 2.061, with a median at 0.62. Within each value of the index, there are several countries whose ranking within that index category is arbitrary. The frequency of index values is shown in Figure 5.

The front-runners category includes Northern European countries; next come most of the European countries, together with Australia. The first ASEAN country is Singapore, which is in the second category, together with the United States and New Zealand.

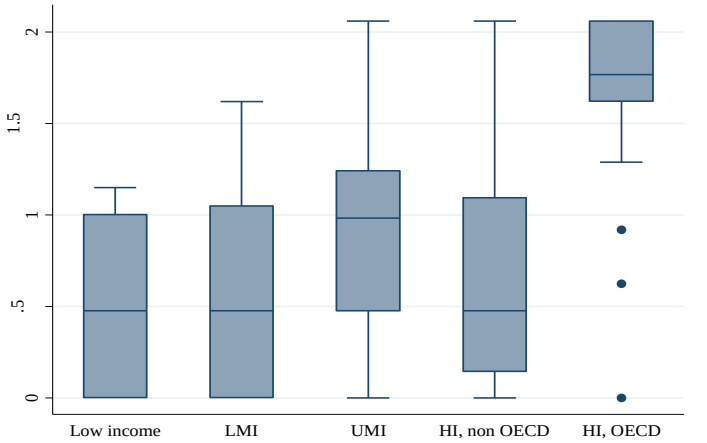
Figure 5: Distribution of index values



NTM = non-tariff measure.
Source: Authors' calculations.

The index values go up with the level of income, except for non-OECD high-income countries (which include, for instance, oil producers) which have low transparency index values (Figure 6).

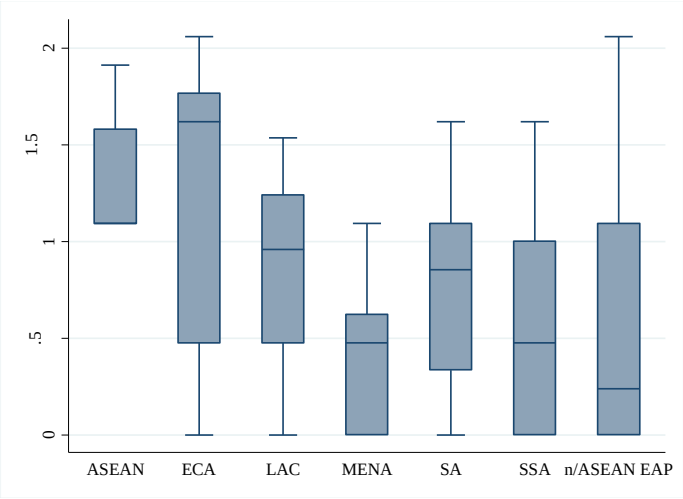
Figure 6: Distribution of index values by income category



HI = high income, LMI = lower middle-income, OECD = Organisation for Economic Co-operation and Development.
Note: Income groups are defined according to World Bank classification. Each box marks the interval between the 25th and 75th percentiles of the conditional distribution of Global Competitiveness Index (GCI) transparency scores for each value of the experiment's score; the 'whiskers' mark the upper and lower limit of the conditional distribution without outliers, and the outliers, when there are any, appear as dots above or below the whiskers. The horizontal bar is the median.
Source: Authors' calculations.

Index values also vary by region, with high index values for ASEAN countries and low ones for countries in sub-Saharan Africa and the Middle East and North Africa (Figure 7). ASEAN index values are boosted by the comprehensive data collection effort undertaken by ERIA in collaboration with UNCTAD in 2015, whose results are taken into account in this paper.

Figure 7: Distribution of index values by region



ASEAN = Association of Southeast Asian Nations, EAP = East Asia and the Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, SA = South Asia, SSA = sub-Saharan Africa.
Source: Authors' calculations.

The high performance of ASEAN countries in the NTM transparency index is confirmed by regression analysis which makes it possible to control for different income levels (Table 8). The approach taken here consists of regressing various transparency indices on income levels, regional dummies, and an additional dummy variable for ASEAN countries. The EAP dummy is then dropped because of collinearity, as it includes too few non-ASEAN countries. Non-ASEAN EAP countries then become the omitted category, and coefficient estimates are to be interpreted as relative to that omitted category.

Table 8: ASEAN's relative performance under various NTM transparency indices

Dependent variable :	NTM transparency index	GCI transp. sub-index	WB CPIA transp. score
Estimator : OLS	(a)	(b)	(c)
GDP per capita	0.000	0.000	0.000
	(2.77)***	(5.48)***	(3.38)***
ASEAN	0.716	-0.279	-0.830
	(3.48)***	(0.70)	(3.57)***
ECA	0.632	-0.384	-0.512
	(3.23)***	(1.06)	(2.21)**
LAC	0.400	-0.598	-0.277
	(2.23)**	(1.57)	(1.20)
MENA	-0.163	-0.756	-0.986
	(0.80)	(1.97)*	(3.84)***
SA	0.365	-0.497	-0.494
	(1.46)	(1.32)	(1.79)*
SSA	0.158	-0.363	-0.406
	(0.90)	(0.99)	(2.10)**
Constant	0.351	4.140	2.879
	(2.16)**	(11.65)***	(15.62)***
R^2	0.30	0.33	0.30
N	175	128	75

ASEAN = Association of Southeast Asian Nations, CPIA = Country Policy and Institutional Assessment, ECA = Europe and Central Asia, GCI = Global Competitiveness Index, GDP = gross domestic product, LAC = Latin America and the Caribbean, MENA = Middle East and North Africa, NTM = non-tariff measure, OLS = ordinary least squares, SA = South Asia, SSA = sub-Saharan Africa, WB = World Bank.
Notes: Robust t-statistics in parentheses. * $p<0.1$; ** $p<0.05$; *** $p<0.01$.
Source: Authors' calculations.

Interestingly, regression results are sharply different depending on whether one uses as the dependent variable our transparency index or survey-based measures. With our indicator, ASEAN countries fare very well with a positive and significant coefficient. By contrast, with the GCI or the CPIA, the point estimate is either negative or insignificant. This largely reflects the particular effort targeted at NTM transparency through the 2015 data collection. As experimental results were also positive for ASEAN countries, our scores may also reflect particular attention given to NTMs as part of regional integration efforts which have no counterpart in domestic regulatory environments.

4.2. Robustness

As a first robustness test, we explore whether one single criterion overwhelming drives the rankings. This is unlikely given our reliance on factor analysis, but we nevertheless check explicitly if taking out one of the criteria in the index affects drastically the rankings it generates. We take out each criterion, one by one, recalculate the index values and ranking, and then calculate the correlation between the resulting partial indices. If rankings suddenly became very different when one criterion was taken out, that criterion could be considered as having a disproportionate influence. As Table 9 shows, correlations are very high, suggesting that no single criterion drives the rankings.

Table 9: Correlation between partial indices

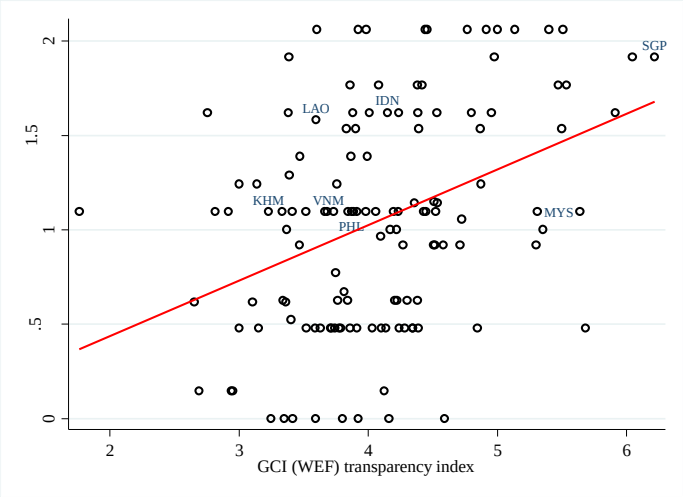
		(a)	(b)	(c)	(d)	(e)
Complete index	(a)	1.000				
Without notifications	(b)	0.946	1.000			
Without portal	(c)	0.946	0.847	1.000		
Without TRAINS MAST data	(d)	0.912	0.814	0.812	1.000	
Without experiment	(e)	0.973	0.903	0.909	0.849	1.000

MAST = Multi-Agency Support Team, TRAINS = Trade Analysis and Information System.
Notes: (a)-(e) columns correspond to the same variables as (a)-(e) lines; that is, (a) is the complete index, (b) the index without the experiment etc. Weights are held constant throughout.

We also compare our index with the government transparency component of the GCI.[5] There is large overlap between the two databases, with 134 countries common to the two databases. The correlation is clearly positive (Figure 8), and it is significant at the 1 percent level.

[5] The GCI's 'transparency of government policy' component scores countries on the basis of the following question: In your country, how easy is it for businesses to obtain information about changes in government policies and regulations affecting their activities?.

Figure 8: Correlation between the NTM transparency index and the GCI's government transparency sub-index



GCI = Global Competitiveness Index, NTM = non=tariff measures, WEF = World Economic Forum.
Source: Authors' calculations using World Economic Forum database (http://reports.weforum.org/global-competitiveness-report-2015-2016/).

The correlation with the World Bank's CPIA is much weaker, and the data overlap is also substantially smaller, with only 79 data points in common out of 21 countries.

Thus, all in all, our robustness exercise suggests that our NTM transparency index is not overly driven by one single criterion and that it correlates fairly well with overall government transparency as measured by the GCI.

5. Concluding Remarks

The index of NTM transparency that we propose in this paper is based on a mixture of statistical data availability, compliance with WTO transparency requirements, and the results of an original experiment. The resulting index is robust in the sense that it is not overly sensitive to one single criterion. It is also broadly correlated with the government transparency component of the World Economic Forum's GCI. Finally, it makes it possible to rank countries by their degree of transparency in NTMs.

Two main results emerge from our country ranking. First, industrial countries generally lead the pack, which is not overly surprising. Second, ASEAN efforts towards NTM transparency seem to have produced results, as ASEAN countries score arguably higher in

data collection and experimental results than in compliance with WTO transparency requirements. However, those efforts are largely unnoticed by the business community, as survey-based measures of government transparency still produce poor ratings for ASEAN member states.

Transparency alone may not be enough to encourage the spread of best practices (a similar argument was made about disclosure requirements by Stiglitz, 2010; see the discussion in Wolfe, 2013); coercion mechanisms may be necessary as well. Such coercion mechanisms, however, do not exist currently in ASEAN. The contrasted ratings of ASEAN member states suggest that improved NTM transparency should be better communicated and should be used as an entry point to broader regulatory transparency and simplification. This could be achieved by giving NTM committees (in countries that have set up such committees) a broader mandate for regulatory supervision and simplification, including for domestic regulations.

References

Anderson, J., and D. Marcouiller (2002), 'Insecurity and the Pattern of Trade: An Empirical Investigation', *Review of Economics and Statistics*, 84(2), pp. 342–352.

Asia-Pacific Economic Cooperation (APEC) and World Bank (2007), *Transparency and Trade Facilitation in the Asia-Pacific: Estimating the Gains from Reform*. Washington, DC: The World Bank.

Bacchetta, M., J. Richtering, and R. Santana (2012), 'How Much Light Do WTO Notifications Shed on NTMs?', in O. Cadot and M. Malouche (eds.), *Non-tariff Measures: A Fresh Look at Trade Policy's New Frontier*. London, UK/Washington, DC: Centre for Economic Policy Research and The World Bank, pp. 23–55.

Baldwin, R. (2006), 'Multilateralising Regionalism: Spaghetti Bowls as Building Blocs on the Path to Global Free Trade', *NBER Working Paper Series* No. 12545, Boston, MA: National Bureau of Economic Research.

Bown, C., and B. Hoekman (2007), 'Developing Countries and Enforcement of Trade Agreements: Why Dispute Settlement Is Not Enough', *World Bank Policy Research Working Paper Series* No. 4450, Washington, DC: The World Bank.

Chauffour, J.-P., and J.-C. Maur (2011), *Preferential Trade Agreement Policies for Development: A Handbook*. Washington, DC: The World Bank.

De Groot, H., G.-J- Linders, P. Rietveld, and U. Subramanian (2004), 'The Institutional Determinants of Bilateral Trade Patterns', *Kyklos*, 57(1), pp. 103–123.

Djankov, S., C. Freund, and C.S. Pham (2010), 'Trading on Time', *Review of Economics and Statistics*, 92(1), pp. 166–173.

Fontagné, L., and G. Orefice (2016), 'Let's Try Next Door: Technical Barriers to Trade and Multi-Destination Firms', mimeo, CEPII.

Francois, J. (2001), 'Trade Policy Transparency and Investor Confidence: Some Implications for an Effective Trade Policy Review Mechanism', *Review of International Economics*, 9(2), pp. 303–316.

Francois, J., and M. Manchin (2013), 'Institutions, Infrastructure, and Trade', *World Development*, 46(C), pp. 165–175.

Handley, K., and N. Limão (2015), 'Trade and Investment under Policy Uncertainty: Theory and Firm Evidence', *American Economic Journal: Economic Policy*, 7, pp. 189–222.

Helble, M., B. Shepherd, and J. Wilson (2009), 'Transparency and Regional Integration in the Asia Pacific', *World Economy*, 32(3), pp. 479–508.

Kee, H.L., A. Nicita, and M. Olarreaga (2009), 'Estimating Trade Restrictiveness Indices', *Economic Journal*, 119(January), pp. 172–199.

Kerr, W. (2008), 'Trade Agreements: The Important Role of Transparency'; *Estey Centre Journal of International Law and Trade Policy*, 9(1), pp. 1–11.

Lejárraga, I. (2013), 'Multilateralizing Regionalism: Strengthening Transparency Disciplines in Trade', *OECD Trade Policy Paper Series* No. 152, Paris: Organisation for Economic Co-operation and Development.

Lejárraga, I., and B. Shepherd (2013), 'Quantitative Evidence on Transparency in Regional Trade Agreements', *OECD Trade Policy Paper Series* No. 153, Paris: Organisation for Economic Co-operation and Development.

Lesser, C. (2007), 'Do Bilateral and Regional Approaches for Reducing Technical Barriers to Trade Converge Towards the Multilateral Trading System?', *OECD Trade Policy Paper Series* No. 111, Paris: Organisation for Economic Co-operation and Development.

Levchenko, A. (2007), 'Institutional Quality and International Trade', *Review of Economic Studies*, 74(3), pp. 791–819.

Moïsé, E. (2010), 'Transparency Mechanism and Non-tariff Measures: Case Studies', *OECD Trade Policy Paper Series* No. 58, Paris: Organisation for Economic Co-operation and Development.

Nunn, N. (2007), 'Relationship Specificity, Incomplete Contracts, and the Pattern of Trade', *Quarterly Journal of Economics*, 122(2), pp. 569–600.

Shepherd, B. (2004), *E.U. Standards Database*. Paris: Institut d'Études Politiques.

Stiglitz, J. (2010), 'Government Failure vs. Market Failure: Principles of Regulation'; in E.J. Balleisen and D. A, Moss (eds.), *Governments and Markets: Toward a New Theory of Regulation*. Cambridge, UK: Cambridge University Press, pp. 13–51.

van Tongeren, F. (2009), 'Transparency in the Design of Non-Tariff Measures and the Cost of Market Entry: Conceptual Framework', OECD Working Party of the Trade Committee TAD/TC/WP(2009)33, Paris: Organisation for Economic Co-operation and Development.

Wolfe, R. (2003), 'Regulatory Transparency, Developing Countries, and the WTO', *World Trade Review*, 2(2), pp. 157–182.

Wolfe, R. (2013), 'Let the Sun Shine at the WTO: How Transparency Bring the Trading System into Life', *WTO Staff Working Paper* ERSD 2013-03, Geneva: World Trade Organization.

Appendix

Country ranking

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
IRL	Ireland	0	1	2.06	1	0.000	1	3	0	1	3	45,242	5.5
AUT	Austria	0	2	2.06	1	0.000	1	3	0	1	3	44,873	5.0
SWE	Sweden	0	3	2.06	1	0.012	1	3	0	1	3	43,869	5.4
DNK	Denmark	0	4	2.06	1	0.021	1	3	0	1	3	43,560	4.8
DEU	Germany	0	5	2.06	1	0.000	1	3	0	1	3	43,522	5.1
AUS	Australia	0	6	2.06	1	0.024	1	3	0	1	3	43,011	4.9
ESP	Spain	0	7	2.06	1	0.002	1	3	0	1	3	32,770	4.0
CYP	Cyprus	0	8	2.06	1	0.009	1	3	0	1	3	32,554	4.4
SVK	Slovak Republic	0	9	2.06	1	0.010	1	3	0	1	3	25,718	3.9
POL	Poland	0	10	2.06	1	0.001	1	3	0	1	3	23,152	3.6
LVA	Latvia	0	11	2.06	1	0.036	1	3	0	1	3	21,176	4.5
SGP	Singapore	1	12	1.91	1	0.002	1	3	0	1	2	76,988	6.2
USA	United States	0	13	1.91	1	0.018	1	3	0	1	2	51,457	5.0
NZL	New Zealand	0	14	1.91	1	0.128	1	3	0	1	2	32,990	6.0
HUN	Hungary	0	15	1.91	1	0.004	1	3	0	1	2	22,494	3.4
NLD	Netherlands	0	16	1.77	1	0.013	1	3	0	1	1	46,054	5.5
BEL	Belgium	0	17	1.77	1	0.004	1	3	0	1	1	41,397	4.4
GBR	United Kingdom	0	18	1.77	1	0.001	1	3	0	1	1	37,386	5.5

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
FRA	France	0	19	1.77	1	0.003	1	3	0	1	1	37,256	4.4
CZE	Czech Republic	0	20	1.77	1	0.026	1	3	0	1	1	28,674	3.9
SVN	Slovenia	0	21	1.77	1	0.034	1	3	0	1	1	28,450	4.1
FIN	Finland	0	22	1.62	1	0.007	1	3	0	1	0	40,209	5.9
ITA	Italy	0	23	1.62	1	0.000	1	3	0	1	0	35,525	2.8
PRT	Portugal	0	24	1.62	1	0.000	1	3	0	1	0	27,000	4.0
EST	Estonia	0	25	1.62	1	0.006	1	3	0	1	0	24,736	5.0
LTU	Lithuania	0	26	1.62	1	0.010	1	3	0	1	0	24,084	4.5
ROM	Romania	0	27	1.62	1	0.015	1	3	0	1	0	18,137	3.9
MUS	Mauritius	0	28	1.62	1	0.015	1	3	1	1	0	16,950	4.8
BGR	Bulgaria	0	29	1.62	1	0.007	1	3	0	1	0	15,672	3.4
IDN	Indonesia	1	30	1.62	1	0.021	1	1	0	1	0	9,449	4.1
NAM	Namibia	0	31	1.62	1	0.001	1	2	1	1	0	9,028	4.4
IND	India	0	32	1.62	1	0.006	1	1	1	1	0	4,948	4.2
LAO	Lao PDR	1	33	1.58	0	0.000	1	3	1	1	3	4,579	3.6
JPN	Japan	0	34	1.54	1	0.012	0	0	1	1	3	35,598	5.5
CHL	Chile	0	35	1.54	1	0.141	0	0	1	1	3	21,183	4.9
CRI	Costa Rica	0	36	1.54	1	0.191	0	0	1	1	3	13,833	4.4
PER	Peru	0	37	1.54	1	0.193	0	0	1	1	3	11,045	3.9
JAM	Jamaica	0	38	1.54	1	0.100	0	0	0	1	3	8,674	3.8
HRV	Croatia	0	39	1.39	1	0.014	0	0	0	1	2	21,114	3.5
COL	Colombia	0	40	1.39	1	0.158	0	0	1	1	2	12,053	3.9
PRY	Paraguay	0	41	1.39	1	0.119	0	0	1	1	2	7,444	4.0

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
GRC	Greece	0	42	1.29	0	0.000	1	3	0	1	1	25,462	3.4
URY	Uruguay	0	43	1.24	1	0.035	0	0	1	1	1	18,770	4.9
BRA	Brazil	0	44	1.24	1	0.121	0	0	1	1	1	15,220	3.1
THA	Thailand	1	45	1.24	1	0.038	0	0	0	1	1	13,752	3.8
ARG	Argentina	0	46	1.24	1	0.106	0	0	1	1	1		3.0
GMB	Gambia, The	0	47	1.15	1	0.079	1	1	1	0	1	1,598	4.5
MLT	Malta	0	48	1.14	0	0.000	1	3	0	1	0	28,276	4.5
CIV	Cote d'Ivoire	0	49	1.14	0	0.000	1	2	1	1	0	2,802	4.4
BRN	Brunei Darussalam	1	50	1.10	1	0.005	0	0	0	1	0	74,161	
HKG	Hong Kong SAR,	0	51	1.10	1	0.002	0	0	1	1	0	51,250	
RUS	Russian Federation	0	52	1.10	1	0.003	0	0	1	1	0	24,063	4.0
MYS	Malaysia	1	53	1.10	1	0.012	0	0	0	1	0	22,481	5.3
CUB	Cuba	0	54	1.10	1	0.032	0	0	1	1	0	19,812	
TUR	Turkey	0	55	1.10	1	0.006	0	0	0	1	0	18,196	4.4
VEN	Venezuela	0	56	1.10	1	0.007	0	0	1	1	0	18,020	1.8
MEX	Mexico	0	57	1.10	1	0.026	0	0	1	1	0	16,146	4.1
CHN	China	0	58	1.10	1	0.018	0	0	1	1	0	11,215	4.5
TUN	Tunisia	0	59	1.10	1	0.010	0	0	1	1	0	10,800	3.7
ECU	Ecuador	0	60	1.10	1	0.457	0	0	1	1	0	10,466	3.4
LKA	Sri Lanka	0	61	1.10	1	0.043	0	0	1	1	0	9,014	3.9
GTM	Guatemala	0	62	1.10	1	0.093	0	0	1	1	0	6,978	4.2
MAR	Morocco	0	63	1.10	1	0.015	0	0	1	1	0	6,805	4.4

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
PHL	Philippines	1	64	1.10	1	0.043	0	0	0	1	0	6,157	3.9
BOL	Bolivia	0	65	1.10	1	0.036	0	0	1	1	0	5,897	3.7
VNM	Vietnam	1	66	1.10	1	0.014	0	0	0	1	0	5,001	3.8
PAK	Pakistan	0	67	1.10	1	0.016	0	0	1	1	0	4,459	3.3
KHM	Cambodia	1	68	1.10	1	0.004	0	0	0	1	0	2,847	3.2
TZA	Tanzania	0	69	1.10	1	0.054	0	0	1	1	0	2,330	3.9
SEN	Senegal	0	70	1.10	1	0.028	0	0	1	1	0	2,204	4.2
NPL	Nepal	0	71	1.10	1	0.032	0	0	1	1	0	2,154	3.5
RWA	Rwanda	0	72	1.10	1	0.277	0	0	1	1	0	1,510	5.6
MDG	Madagascar	0	73	1.10	1	0.025	0	0	1	1	0	1,399	2.9
MWI	Malawi	0	74	1.10	1	0.004	0	0	1	1	0	763	3.7
MMR	Myanmar	1	75	1.10	1	0.003	0	0	0	1	0		2.8
KAZ	Kazakhstan	0	76	1.06	0	0.000	0	0	1	1	3	21,892	4.7
ARE	United Arab Emira	0	77	1.00	1	0.016	1	3	0	0	0	59,693	5.4
GRD	Grenada	0	78	1.00	1	0.348	1	1	0	0	0	11,245	
BLZ	Belize	0	79	1.00	1	0.129	1	3	0	0	0	8,119	
NGA	Nigeria	0	80	1.00	1	0.000	1	3	1	0	0	5,405	3.4
KEN	Kenya	0	81	1.00	1	0.401	1	1	0	0	0	2,718	4.2
UGA	Uganda	0	82	1.00	1	1.000	1	3	0	0	0	1,696	4.2
SYC	Seychelles	0	83	0.97	0	0.000	1	2	0	0	3	24,110	4.1
SAU	Saudi Arabia	0	84	0.92	1	0.073	0	0	0	0	3	49,707	4.5
CAN	Canada	0	85	0.92	1	0.034	0	0	0	0	3	42,281	5.3

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
AZE	Azerbaijan	0	86	0.92	1	0.002	0	0	0	0	3	16,173	4.3
ZAF	South Africa	0	87	0.92	1	0.032	0	0	0	0	3	12,597	4.5
SLV	El Salvador	0	88	0.92	1	0.320	0	0	0	0	3	7,856	3.5
GEO	Georgia	0	89	0.92	1	0.187	0	0	0	0	3	6,823	4.7
ZMB	Zambia	0	90	0.92	1	0.082	0	0	0	0	3	3,564	4.6
UKR	Ukraine	0	91	0.77	1	0.027	0	0	0	0	2	8,468	3.7
LSO	Lesotho	0	92	0.67	0	0.000	1	3	0	0	1	2,426	3.8
KWT	Kuwait	0	93	0.63	1	0.104	0	0	0	0	1	78,454	3.8
ISR	Israel	0	94	0.63	1	0.119	0	0	0	0	1	31,628	4.2
TTO	Trinidad and Toba	0	95	0.63	1	0.144	0	0	0	0	1	29,517	3.8
BWA	Botswana	0	96	0.63	1	0.051	0	0	0	0	1	14,255	4.4
DOM	Dominican Republ	0	97	0.63	1	0.168	0	0	0	0	1	11,735	4.2
LCA	St. Lucia	0	98	0.63	1	0.626	0	0	0	0	1	10,458	
ALB	Albania	0	99	0.63	1	0.185	0	0	0	0	1	9,667	4.3
NIC	Nicaragua	0	100	0.63	1	0.484	0	0	0	0	1	4,467	3.3
LBN	Lebanon	0	101	0.62	0	0.000	0	0	1	1	0	16,871	3.1
DZA	Algeria	0	102	0.62	0	0.000	0	0	0	1	0	13,370	3.4
MRT	Mauritania	0	103	0.62	0	0.000	0	0	0	1	0	3,550	2.7
AFG	Afghanistan	0	104	0.62	0	0.000	0	0	1	1	0	1,933	
BFA	Burkina Faso	0	105	0.62	0	0.000	0	0	1	1	0	1,547	
IRQ	Iraq	0	106	0.52	0	0.000	1	3	0	0	0	14,714	
BGD	Bangladesh	0	107	0.52	0	0.000	1	1	0	0	0	2,764	3.4

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
QAT	Qatar	0	108	0.48	1	0.209	0	0	0	0	0	135,649	5.7
MAC	Macao SAR, Chin	0	109	0.48	1	0.017	0	0	0	0	0	127,544	
OMN	Oman	0	110	0.48	1	0.103	0	0	0	0	0	41,926	4.3
BHR	Bahrain	0	111	0.48	1	0.293	0	0	0	0	0	40,974	4.8
ATG	Antigua and Barbu	0	112	0.48	1	0.043	0	0	0	0	0	20,947	
PAN	Panama	0	113	0.48	1	0.090	0	0	0	0	0	18,224	4.4
BRB	Barbados	0	114	0.48	1	0.042	0	0	0	0	0	15,625	
JOR	Jordan	0	115	0.48	1	0.029	0	0	0	0	0	11,544	4.3
DMA	Dominica	0	116	0.48	1	0.331	0	0	0	0	0	10,331	
EGY	Egypt	0	117	0.48	1	0.028	0	0	1	0	0	10,248	3.7
VCT	St. Vincent and the	0	118	0.48	1	0.277	0	0	0	0	0	10,180	
MNG	Mongolia	0	119	0.48	1	0.027	0	0	0	0	0	9,985	4.1
FJI	Fiji	0	120	0.48	1	0.017	0	0	0	0	0	7,439	
ARM	Armenia	0	121	0.48	1	0.234	0	0	0	0	0	7,398	4.3
GUY	Guyana	0	122	0.48	1	0.112	0	0	0	0	0	6,463	3.7
CPV	Cape Verde	0	123	0.48	1	0.010	0	0	1	0	0	6,254	4.1
SWZ	Swaziland	0	124	0.48	1	0.008	0	0	0	0	0	6,013	3.7
COG	Congo, Rep.	0	125	0.48	1	0.003	0	0	0	0	0	5,800	
HND	Honduras	0	126	0.48	1	0.187	0	0	0	0	0	4,314	4.2
MDA	Moldova	0	127	0.48	1	0.063	0	0	0	0	0	4,225	3.9
GHA	Ghana	0	128	0.48	1	0.012	0	0	1	0	0	3,725	3.9
KGZ	Kyrgyz Republic	0	129	0.48	1	0.089	0	0	0	0	0	2,921	3.8

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
CMR	Cameroon	0	130	0.48	1	0.015	0	0	0	0	0	2,714	4.0
PNG	Papua New Guine	0	131	0.48	1	0.002	0	0	0	0	0	2,525	
BEN	Benin	0	132	0.48	1	0.026	0	0	1	0	0	1,716	3.6
ZWE	Zimbabwe	0	133	0.48	1	0.006	0	0	0	0	0	1,678	3.6
MLI	Mali	0	134	0.48	1	0.064	0	0	1	0	0	1,504	3.8
TGO	Togo	0	135	0.48	1	0.018	0	0	1	0	0	1,317	
GIN	Guinea	0	136	0.48	1	0.033	0	0	1	0	0	1,219	3.0
MOZ	Mozambique	0	137	0.48	1	0.019	0	0	0	0	0	1,014	3.5
CAF	Central African Re	0	138	0.48	1	0.255	0	0	0	0	0	929	
BDI	Burundi	0	139	0.48	1	0.056	0	0	0	0	0	730	3.2
SUR	Suriname	0	140	0.44	0	0.000	0	0	0	0	3	15,705	
BIH	Bosnia and Herzeg	0	141	0.15	0	0.000	0	0	0	0	1	9,370	2.9
BTN	Bhutan	0	142	0.15	0	0.000	0	0	0	0	1	7,248	4.1
TCD	Chad	0	143	0.15	0	0.000	0	0	0	0	1	1,996	2.9
HTI	Haiti	0	144	0.15	0	0.000	0	0	0	0	1	1,613	2.7
FRO	Faeroe Islands	0	145	0.15	0	0.000	0	0	0	0	1		
GNQ	Equatorial Guinea	0	146	0.00	0	0.000	0	0	0	0	0	34,178	
KOR	Korea, Rep.	0	147	0.00	0	0.000	0	0	0	0	0	32,022	3.3
LBY	Libya	0	148	0.00	0	0.000	0	0	0	0	0	22,965	
KNA	St. Kitts and Nevis	0	149	0.00	0	0.000	0	0	0	0	0	20,433	
GAB	Gabon	0	150	0.00	0	0.000	0	0	0	0	0	17,769	3.9
BLR	Belarus	0	151	0.00	0	0.000	0	0	0	0	0	17,210	

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
IRN	Iran, Islamic Rep.	0	152	0.00	0	0.000	0	0	0	0	0	16,414	3.4
PLW	Palau	0	153	0.00	0	0.000	0	0	0	0	0	13,774	
MNE	Montenegro	0	154	0.00	0	0.000	0	0	0	0	0	13,589	
SRB	Serbia	0	155	0.00	0	0.000	0	0	0	0	0	12,806	
TKM	Turkmenistan	0	156	0.00	0	0.000	0	0	0	0	0	12,684	
MDV	Maldives	0	157	0.00	0	0.000	0	0	0	0	0	12,626	
MKD	Macedonia, FYR	0	158	0.00	0	0.000	0	0	0	0	0	11,874	4.6
KSV	Kosovo		159	0.00	0	0.000	0	0	0	0	0	8,537	
AGO	Angola	0	160	0.00	0	0.000	0	0	0	0	0	6,755	
WSM	Samoa	0	161	0.00	0	0.000	0	0	0	0	0	5,755	
TON	Tonga	0	162	0.00	0	0.000	0	0	0	0	0	5,130	
WBG	West Bank and Gaza		163	0.00	0	0.000	0	0	0	0	0	4,929	
UZB	Uzbekistan	0	164	0.00	0	0.000	0	0	0	0	0	4,789	
SDN	Sudan	0	165	0.00	0	0.000	0	0	0	0	0	3,872	
YEM	Yemen, Rep.	0	166	0.00	0	0.000	0	0	0	0	0	3,674	
TUV	Tuvalu	0	167	0.00	0	0.000	0	0	0	0	0	3,551	
STP	São Tomé and Pri	0	168	0.00	0	0.000	0	0	0	0	0	3,044	
DJI	Djibouti	0	169	0.00	0	0.000	0	0	0	0	0	2,879	
TJK	Tajikistan	0	170	0.00	0	0.000	0	0	0	0	0	2,385	4.2
SLB	Solomon Islands	0	171	0.00	0	0.000	0	0	0	0	0	2,062	
KIR	Kiribati	0	172	0.00	0	0.000	0	0	0	0	0	1,705	
SLE	Sierra Leone	0	173	0.00	0	0.000	0	0	0	0	0	1,593	3.6

					WTO notifications		TFA trade portal		TRAINS data				
Country	ISO3	ASEAN	Rank	Index value	At least one notif.	Normalized notif.	Has a trade portal	Portal quality	2001 version	MAST version	Experim. score	GDP per capita 2014	WEF transp. index
ERI	Eritrea	0	174	0.00	0	0.000	0	0	0	0	0	1,505	
COM	Comoros	0	175	0.00	0	0.000	0	0	0	0	0	1,428	
GNB	Guinea-Bissau	0	176	0.00	0	0.000	0	0	0	0	0	1,373	
ETH	Ethiopia	0	177	0.00	0	0.000	0	0	0	0	0	1,256	3.2
NER	Niger	0	178	0.00	0	0.000	0	0	1	0	0	883	
LBR	Liberia	0	179	0.00	0	0.000	0	0	1	0	0	784	3.8
ZAR	Congo, Dem. Rep.		180	0.00	0	0.000	0	0	0	0	0	652	
CYM	Cayman Islands	0	181	0.00	0	0.000	0	0	0	0	0		
GUM	Guam		182	0.00	0	0.000	0	0	0	0	0		
ABW	Aruba		183	0.00	0	0.000	0	0	0	0	0		
PRK	Korea, Dem. Rep.	0	184	0.00	0	0.000	0	0	0	0	0		
SYR	Syrian Arab Repul	0	185	0.00	0	0.000	0	0	0	0	0		
SOM	Somalia	0	186	0.00	0	0.000	0	0	0	0	0		
GRL	Greenland	0	187	0.00	0	0.000	0	0	0	0	0		

ASEAN = Association of Southeast Asian Nations, GDP = gross domestic product, ISO = International Organization for Standardization, MAST = Multi-Agency Support Team, TFA = Trade Facilitation Agreement, TRAINS = Trade Analysis and Information System, WEF = World Economic Forum, WTO = World Trade Organization.

Note: Country rankings within categories with equal index values are arbitrary; by default, countries are ranked by decreasing order of GDP per capita.

ERIA Discussion Paper Series

No.	Author(s)	Title	Year
2016-23	Lili Yan ING, Olivier CADOT and Janine WALZ	Transparency in Non-tariff Meausres: An International Comparison	Aug 2016
2016-22	VO Tri Thanh and Cuong Van NGUYEN	Towards Responsive Regulatory Management Systems: Country Report for Viet Nam	July 2016
2016-21	Gilberto M. LLANTO	Towards a Requisite Regulatory Management System: Philippines	June 2016
2016-20	Lili Yan ING and Olivier CADOT	Facilitating ASEAN Trade in Goods	June 2016
2016-19	Doan Thi Thanh HA, Kozo KIYOTA, and Kenta YAMANOUCHI	Misallocation and Productivity: The Case of Vietnamese Manufacturing	May 2016
2016-18	Vangimalla R. REDDY, Shardendu K. SINGH and Venkatachalam ANBUMOZHI	Food Supply Chain Disruption due to Natural Disasters: Entities, Risks, and Strategies for Resilience	May 2016
2016-17	Arindam DAS-GUPTA, Gemma B. ESTRADA, Donghyun PARK	Measuring Tax Administration Effectiveness and its Impact on Tax Revenue	Apr 2016
2016-16	Naohiro YASHIRO	Regulatory Coherence: The Case of Japan	Mar 2016
2016-15	Song June KIM and Dae Yong CHOI	Regulatory Coherence: The Case of the Republic of Korea	Mar 2016
2016-14	Peter CARROLL, Gregory BOUNDS and Rex DEIGHTON-SMITH	Towards Responsive Regulations and Regulatory Coherence in ASEAN and East Asia: The Case of Australia	Mar 2016

No.	Author(s)	Title	Year
2016-13	Derek GILL	Defining Regulatory Management System	Mar 2016
2016-12	Derek GILL	Regulatory Coherence: The Case of New Zealand	Mar 2016
2016-11	Sang-Hyop LEE, Jungsuk KIM and Donghyun PARK	Demographic Change and Fiscal Sustainability in Asia	Mar 2016
2016-10	Ayako OBASHI and Fukunari KIMURA	The Role of China, Japan, and Korea in Machinery Production Networks	Mar 2016
2016-09	Ayako OBASHI and Fukunari KIMURA	Deepening and Widening Production Networks in ASEAN	Mar 2016
2016-08	Willem THORBECKE	Increasing the Resilience of Asian Supply Chains to Natural Disasters: The Role of the Financial Sector	Feb 2016
2016-07	Hiroyuki NAKATA, Yasuyuki SAWADA and Kunio SEKIGUCHI	Market Concentration and Risk-Prevention Incentives: The Case of the Hard Disk Drive Industry	Feb 2016
2016-06	Meinhard BREILING	Tourism Supply Chains and Natural Disasters: The Vulnerability Challenge and Business Continuity Models for ASEAN Countries	Feb 2016
2016-05	Masaru TANAKA and Shigeatsu HATAKEYAMA	Towards Reframing the Spirit of ASEAN Environmentalism: Insights from Japan's COHHO Experience and Studies	Feb 2016
2016-04	Manaek SM PASARIBU	Challenges of Indonesian Competition Law and Some Suggestions for Improvement	Jan 2016
2016-03	VO Tri Thanh and NGUYEN Anh Duong	Promoting Rural Development, Employment, and Inclusive Growth in ASEAN	Jan 2016

No.	Author(s)	Title	Year
2016-02	Venkatachalam ANBUMOZHI	Convergence of Opportunities: Resilience and the ASEAN Community	Jan 2016
2016-01	Lili Yan ING, Shujiro URATA and Yoshifumi FUKUNAGA	How Do Exports and Imports Affect the Use of Free Trade Agreements? Firm-level Survey Evidence from Southeast Asia	Jan 2016

Previous year of ERIA Discussion Paper, can be downloaded at:

http://www.eria.org/publications/discussion_papers/FY2015/

http://www.eria.org/publications/discussion_papers/FY2014/

http://www.eria.org/publications/discussion_papers/FY2013/

http://www.eria.org/publications/discussion_papers/FY2012/

http://www.eria.org/publications/discussion_papers/FY2011/

http://www.eria.org/publications/discussion_papers/FY2010/

http://www.eria.org/publications/discussion_papers/FY2009/

http://www.eria.org/publications/discussion papers/FY2008/