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Regulatory Distance, Margins of Trade, and Regional Integration: The Case of the ASEAN+5

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Abstract: *This paper measures regulatory distance in non-tariff measures (NTMs) to examine the regulatory distance patterns and how the margins of trade respond to regulatory distance for the ASEAN+5 economies (the 10 Association of Southeast Asian Nations Member States plus Australia, China, India, Japan and New Zealand). It decomposes the margins of trade and regulatory distance by sector (agriculture and manufacturing) and NTM type (technical, non-technical, sanitary and phytosanitary (SPS), technical barriers to trade (TBTs), and pre-shipment inspections and other measures) for the 15 countries. At the country level, the results indicate a varying regulatory distance amongst the ASEAN+5 countries. Regulatory implementation also varies by sector and by the type of measure. Within sectors, SPS regulatory distance is higher in the agriculture sector, while for manufacturing, the regulatory distance in TBTs is higher. Notably, few countries recorded a higher regulatory distance for non-technical measures and pre-shipment inspections. Interestingly, for the ASEAN region, there seems to be no evidence supporting a reduction in regulatory distance from 2015 to 2018, despite efforts to harmonise NTMs since 2015. The results indicate that regulatory distance largely has a trade-reducing effect along the trade margins within ASEAN+5 bilateral trade. Technical measures have a greater trade-reducing effect than other measures along extensive and intensive trade margins – specifically SPS in the agriculture sector and TBTs in the manufacturing sector. Notably, there is also evidence of non-technical measures and pre-shipments and other formalities impacting trade along extensive margins, despite efforts to establish trade facilitation. The paper also describes some policy implications.*

Keywords: Intensive margin, extensive margin, regulatory distance, gravity model, ASEAN+5

JEL Classification: F14

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1. Introduction

The theoretical relationship between non-tariff measures (NTMs) and trade remains ambiguous. Stringent NTMs can impose additional costs on exporters, which in the context of models in the spirit of Melitz (2003) would raise the fixed costs of firms, leading to the exit of the least productive exporters from the market, and potentially impacting exports along both the extensive margins (number of firms) and intensive (average exports per firm) margins. NTMs may further raise the variable costs of exporting, which could again force firms to cease exporting, reducing exports along both margins. Conversely, the exit of the least productive firms from exporting may lead to a reallocation of resources towards more productive firms, which could then increase exports, especially if these firms are able to signal quality through meeting the standard-like measures[1] of NTMs.

However, NTMs affect margins of trade not only through their inherent stringency, but also through their non-harmonisation, implementation, and procedures (Cadot et al., 2015; Disdier, Fontagné, and Cadot, 2015; Reyes, 2012; Czubala, Shepherd, and Wilson, 2009; Chen and Mattoo, 2008). Following which, there has been an increasing demand for greater regulatory coherence in NTMs in the context of regional trade agreements. Based on international experience, regional trade agreements are estimated to have reduced regulatory distance (Cadot and Ing, 2015). There is, however, no clear prediction of the implications of regulatory distance for deepening regional integration through the two margins of trade. To provide meaningful contributions to the trade impacts of regulatory distance, the ongoing critical arrangement for regional integration in East Asia and the Pacific – the ASEAN+6 countries (the 10 Association of Southeast Asian Nations Member States plus Australia; China; India;[2] Japan; the Republic of Korea (henceforth, Korea); and New Zealand) or the Regional Comprehensive Economic Partnership – is considered most suitable, since it is a potential new frontier for regulatory coherence. Reportedly, there are significant qualitative differences in conformity assessment standards across the ASEAN+6, and some of the economies

[1] Standard-like measures include sanitary and phytosanitary (SPS) measures and technical barriers to trade (TBTs).

[2] At the time of writing, India was still part of the RCEP.

are found to have domestic conformity assessments that are less aligned with international standards (Nabeshima and Obashi, 2019; Mukherjee, 2019).

Basing the study on the extended ASEAN arrangement, this paper takes a different approach to understand the trade effects of distance and contributes to the literature in several ways. First, the paper constructs the regulatory distance measure (following the approach of Cadot et al., 2015) for the ASEAN+5 (excluding Korea)[3] countries at a finer level (sector-specific and NTM-specific) to ascertain the extent of regulatory variations in this grouping. Second, it extends the notion of distance to include regulatory effects in comparing the differential effects between geographical distance and regulatory distance on the intensive and extensive margins in a gravity model.

Previous empirical studies on the trade (exports, imports, and margins of trade) impacts of NTMs have largely employed the conventional approach to measure NTMs. These include a direct measure of (i) a specific NTM type (sanitary and phytosanitary (SPS) measures, technical barriers to trade (TBTs), or specific metric measures such as maximum residue limits on food) (Ghodsi et al., 2017; Fontagné et al., 2015; Fontagné, von Kirchbach, and Mimouni, 2005; Bao and Qiu, 2012; Essaji, 2008); or (ii) estimated ad valorem equivalents (AVEs) (Kee and Nicita, 2016; Cadot and Gourdon, 2016; Grübler, Ghodsi, and Stehrer, 2016) of NTMs. While most studies found a negative impact of NTMs on trade, some NTMs were found to facilitate trade (Ronen, 2017; Henson and Jaffee, 2007; Maertens and Swinnen, 2008; Xiong and Beghin, 2014). The positive impact of regulations is explained by their role as market-creating 'catalysts', especially in situations of asymmetric information. For this study, the distance in regulatory structure is considered most appropriate for the purpose of analysing the impact of differences in NTM regulations within a regional group. It is also useful for the purpose of identifying country pairs, sectors, and type of regulations where integration is lagging.

The remainder of the paper is organised as follows. Section 2 presents the theoretical links between regulatory distance and the margins of trade. Section 3 describes the gravity model specification and the data. Section 4 profiles the

[3] Korea is excluded from the analysis as no data on NTMs are available for this country.

margins of trade and regulatory distance between the ASEAN+5 economies to understand the regulatory distance patterns and to set the background of the study. Section 5 reports and discusses the empirical results. Section 6 concludes with some trade and policy implications through integration and regulatory coherence in ASEAN+5.

2. Theoretical Exposition: Distance and Margins of Trade

A core element of the gravity equation of international trade flows is geographical distance. The negative effects of distance on aggregate exports are strongly supported by empirical evidence, given the assumption of 'iceberg-type' variable costs in theoretical trade models. Recent research on the intensive and extensive margins has established equally robust results – a negative effect of geographical distance on both margins. While the Melitz (2003) model predicts that the extensive margin is negatively affected by both fixed and variable trade costs, there is no such clear prediction for the intensive margin for the following reasons. An increase in variable costs will reduce the sales of all firms but may also result in some of the lowest sales firms exiting the market, creating an ambiguous effect for average sales per firm. Further, the model predicts that sales per firm should be positively related to fixed trade costs.

Many empirical studies have supported the theoretical emphasis (and predictions) of distinguishing between the extensive and intensive margins in understanding the role of distance (or trade costs) in trade (Fernandes et al., 2019; Chaney, 2008, 2013; Lawless, 2010; Krautheim, 2012; Lin and Sim, 2012; Helpman, Melitz, and Rubinstein, 2008). For instance, Cheong, Kwak, and Tang (2016) found that the distance effect declines on the extensive margins and rises over time on the intensive margins, while Lawless (2010) and Bernard et al. (2007) demonstrated that distance has a strong negative effect on the number of products exported by United States (US) firms, but not on the amount they export. Chaney (2008) qualified that the extensive margin is more affected by distance when dealing with trade in differentiated goods (low elasticity of substitution).

Contrary to the 'death of distance' postulation, distance still matters for bilateral trade as there are indeed various costs associated with doing business at a distance. Generally, trade costs associated with distance are categorised into three components: transport/shipping costs, time-related costs, and costs of unfamiliarity. The costs of a lack of familiarity are less tangible and relate to laws, institutions, and culture (e.g. habits, language, religion, genetic). Likewise, recent scholarly research has shown that distance in terms of regulations between trade partners, otherwise known as regulatory distance (Ing, Peters, and Cadot, 2019; Nabeshima and Obashi, 2019; Cadot and Ing, 2015; Cadot et al., 2015), can have a trade slowing effect.

Interestingly, the arguments also lead one to the question of whether regulatory distance reflects a fixed or variable trade cost. In short, is regulatory distance considered a temporary or permanent barrier to trade? Cadot and Ing (2015) argued that the costs of doing business due to regulations are associated with the enforcement cost (fixed cost) and the sourcing cost (variable cost), both of which can affect firm selection. The enforcement and sourcing costs relate to the stringency effects of regulations, while fragmentation effects follow from different regulations across markets. Nonetheless, both effects can influence trade. Since this paper explores this new territory of regulatory distance to understand its impact on the dual margins of trade, any evidence that trade at the extensive margin is reduced would be interpreted as evidence of a fixed (enforcement) cost. Alternatively, the effect with respect to the total trade volume would reflect a variable trade cost.

3. Methodology and Data

3.1. Model Specification

This paper employs the gravity model to examine the relationship between regulatory distance and its impacts on aggregate exports, and the extensive margin and intensive margin. While the exact specification of the gravity equation varies, our equation includes the gross domestic product (GDP) of the importer and exporter, the distance (in terms of geographical distance and regulatory distance) between them, and other variables that may enhance or restrict trade (Foster,

Poeschl, and Stehrer, 2011). The starting point for our analysis is the following equation:

$$\ln X_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 Contig_{ij} + \beta_6 Comlang_{ij} + \beta_7 Landlock_{i,j} + \beta_8 \ln GD_{ij} + \beta_9 \ln RD_{ij} + \varepsilon_{ij} \quad (1)$$

where i and j denote the exporting and importing country, respectively; X is our dependent variable of interest (i.e. exports and the two margins of country i to country j); GD is the great circle distance between the capital cities of the two trade partners; RD is the regulatory distance of NTMs between the two trade partners (which will also be split up by sector and type of NTM in the analysis); GDP and POP refer to the level of GDP and population of either the importer or exporter, respectively; $Contig$ takes the value of one if the trading partners share a common border; $Comlang$ takes the value of one if the trading partners share a common language; $Lock$ is a dummy taking the value of one if either the importer or exporter is landlocked; and ε_{ij} is a normally distributed error term.

Since the incidence of NTMs does not express the regulatory structure between exporting and importing countries, in this paper, we measure regulatory distance to capture the differences in the NTM structure between both trading partners. Regulatory distance is measured as the difference between the patterns in which two countries impose NTMs, classified according to the UNCTAD (2013) nomenclature, across products at the Harmonized System (HS) 6-digit level. Following Cadot et al. (2015), if country *i* and *j* impose a specific NTM on a given product, then countries *i* and *j* are considered to have a 'similar' regulatory structure for that measure–product pair, and the regulatory distance is coded as zero. If, by contrast, country *j* imposes a different NTM to that of country *i* for a given product, or imposes no NTM while country *i* does, then *i* and *j* are taken as 'different' for that measure–product pair and the regulatory distance is coded as one. This comparison is repeated for all NTMs in the UNCTAD (n.d.) Trade Analysis and Information System (TRAINS) database applied to the specific HS 6-digit product by either *i* or *j,* and all the resulting ones and zeros are added up. The sum is then divided by the total number of NTMs applied to the specific HS 6-digit product by either of the two countries. Formally, let *i* and *j* index countries, *k* products, and *l* NTM types, and let:

$$NTM_{ilk} = \begin{cases} 1 \; if \; country \; i \; impose \; l \; to \; product \; k \\ 0 \qquad\qquad\qquad\qquad\qquad otherwise \end{cases} \qquad (2)$$

where, *i* is the trading partner (importer), *l* is the NTM type, and *k* is the product. Suppose that country A and B trade and impose A31 (labelling requirements for SPS reasons) on HS150510 (animal fats and oils, wool grease, crude; product *k).* In this case, both countries are imposing the same regulatory measures for HS150510 and therefore we code them as 0. If the regulatory measures differ between the trading partners, we then code it as 1. This is measured at the six-digit product level of the HS classification in each measure–product pair for each country *i* (importing country) and country *j* (exporting country). The regulatory distance is measured as $RD_{ik} = |NTM_{ilk} - NTM_{jlk}|$. We then aggregated the regulatory distance variable over all measures and all products at the HS 2-digit level to obtain the overall dissimilarity measure. As such, the aggregate regulatory distance is the total sum of absolute values of the differences in NTM application between countries *i* and *j* as follows:

$$RDs = \frac{1}{N}\sum_k \sum_l |NTM_{ilk} - NTM_{jlk}| \qquad (3)$$

The regulatory distance values lie between 0 and 1 since it is normalised by the total of product–NTM pairs. A higher value (a value closer to one) indicates a higher regulatory dissimilarity between two countries. The general idea is that if the regulation is the same in two countries, this is not regarded as a barrier to trade.[4] If they differ, then trade is impeded in one direction but not the other. In short, a more heavily regulated country should find it easier to export to a less regulated country, rather than the other way around.[5]

In terms of the indicators of exports, our approach is consistent with many

[4] It should be noted that the regulatory differences calculated for this study do not measure differences in the stringency of NTMs.

[5] Please note that regulatory distance measure by construction is symmetric. In other words, by country pairs, cases of over-regulation and cases of under-regulation are counted equally towards the 'distance'. For the descriptive analysis, over-regulation and under-regulation are still considered equally undesirable, albeit for different reasons – over-regulation because it is economically costly, and under-regulation because it may cause health risks to humans, animals, or plants. As for the interpretation of the impact of regulatory distance on trade, it should be interpreted with caution. However, in assessing the impact, we still observe significant variations due to sectoral dimensions (product level) in the pooled data set.

studies using the gravity equation, considering the (logged) value of total exports from each country in our sample to each ASEAN+5 importer as the dependent variable. We then decomposed the margins of trade to examine whether regulatory distance is impacting the volume of trade or the variety of products exported. To do this, we follow the approach of Kehoe and Ruhl (2003) in adapting the decomposition of Hummels and Klenow (2005) to apply to a single bilateral trade relationship. In particular, the extensive margin (EM) of exports is defined as:

$$EM_{ij} = \frac{\sum_{n \in N_{ij}} p_{kjn} x_{kjn}}{\sum_{n \in N} p_{kjn} x_{kjn}}, \qquad (4)$$

where N_{ij} is the set of observable categories in which exporting country i has positive exports to importing country j, p_{kjn} is the price of a unit of good n exported from reference country k to country j, and x_{kjn} is the quantity of good n exported from reference country k to country j. Reference country k has positive exports to j in all N categories. The reference country is defined as the world and is constructed such that the price and quantity of exports to country j from the world is time-varying. The extensive margin can be thought of as a weighted count of i's categories relative to k's categories, where the goods are weighted by their importance in world exports to importing country j. If all categories are of equal importance, then the extensive margin is simply the fraction of categories in which i exports to j. Hummels and Klenow (2005) highlighted a number of advantages and disadvantages of this measure of the extensive margin. In particular, they noted that by measuring the extensive margin without reference to i's exports, it prevents a category appearing important solely because i (and no other country) exports a lot of that product to j. They also noted that a disadvantage of the approach is that a country may appear to have a large extensive margin because it exports a small amount in categories in which k exports a lot, an outcome that could also arise if we were to use a simple count of the categories of goods exported.

The intensive margin (IM) of exports compares nominal exports for country i and k to country j in a common set of goods, and is given by:

$$IM_{ij} = \frac{\sum_{n \in N_{ij}} p_{ijn} x_{ijn}}{\sum_{n \in N_{ij}} p_{kjn} x_{kjn}} \qquad (5)$$

IM_{ij} equals the nominal exports of country i to country j relative to the nominal exports of k to j in those categories in which i exports to j, (N_{ij}). It can be shown that the ratio of country i's to country k's exports to country j is equal to the product of the two margins:

$$EXPRAT_{ij} = \frac{\sum_{n \in N_{ij}} p_{ijn} x_{ijn}}{\sum_{n \in N} p_{kjn} x_{kjn}} = IM_{ij} EM_{ij} \qquad (6)$$

This is an important result since, if we take logs of this equation, we observe that the log of the export ratio (*EXPRAT*) is equal to the sum of the logs of the two margins. Since ordinary least squares (OLS) is a linear operator, it will decompose the effects of the explanatory variables on the margins of trade, thus allowing us to quantify the importance of the extensive margin and intensive margin on the relationship between exports and regulatory distance.

The previous paragraph raises the important question of the level of aggregation. NTMs are instruments that are targeted at specific products or groups of products, and thus may be expected to have stronger and more visible effects at a sectoral level than at the aggregate level. In the ASEAN+5, about 53.44% (calculated from the UNCTAD TRAINS database) of total NTMs are in live animals and products, followed by vegetable products and prepared foodstuffs, beverages, spirits, vinegar, and tobacco. Similarly, the type of NTM matters, especially when SPS measures and TBTs[6] dominate the portfolio of NTMs in the ASEAN+5. We therefore undertake the analysis at both a fairly aggregated level (overall sectors and all NTM) as well as using more disaggregated data (specific sectors and types of NTMs) by considering (i) the regulatory distance of the overall NTMs for specific sectors (agriculture, HS01–HS24; and manufacturing, HS25–

[6] SPS measures and TBTs account for 41.42% and 43.29% of total NTMs in the ASEAN+5, respectively (calculated from the UNCTAD TRAINS database).

HS97); and (ii) the regulatory distance for technical NTMs (SPS measures, TBTs, and pre-shipment inspection and other measures) and non-technical NTMs, to examine their relative importance for the different margins of trade.

3.2. Robustness Checks

There has also been a great deal of debate in the literature on the appropriate specification of gravity models (Matyas, 1997; Egger, 2000; Baldwin and Taglioni, 2006). We adopt a number of specifications of the gravity model to test the robustness of our results. We consider a few issues that relate to the problem of estimating the trade effects of regulatory distance. We estimated the effect of aggregate regulatory distance level on margins, by recognising the sectoral differences as well as estimating it separately at a more disaggregated level (at sectoral level). As such, we used pooled data (at the 2-digit level) to include sectoral variations in estimating the trade policy effect. In particular, we include sector dummies to control for product heterogeneity. It may also be desirable to obtain sectoral effects because the effect could be heterogeneous across sectors, however. Given this, we estimated the effect of regulatory distance separately for two broad sectors: agriculture and manufacturing. In addition, we considered the importance of zero trade flows using methodologies recently developed in the literature – e.g. the Poisson pseudo-maximum likelihood (PPML) method of Santos Silva and Tenreyro, (2006).

As we move to estimate the gravity model at a disaggregated level, the presence of zero trade flows becomes more obvious. Further investigation points out that 28% of our sample consists of zero trade and ignoring zeros would bias our estimations. Countries such as Brunei, Myanmar, Cambodia, and the Lao People's Democratic Republic (Lao PDR) do not trade in certain product categories, resulting in zero trade. These four economies account for 61.7% of the zero bilateral trade – Brunei (16.9%), Myanmar (13.2%), Cambodia (14.4%), and the Lao PDR (17.2%). We, therefore, adopt the PPML technique to estimate the gravity model. Using proper estimation techniques is important to see the trade policy (regulatory distance) effect on trade margins. Although the OLS estimator has been the most commonly used technique to estimate gravity models, it may not be the most appropriate in the presence of zero trade flows, especially at the more disaggregated

level. One of the drawbacks of OLS is that it is not possible to include zero trade flows in the standard OLS estimation of the gravity model, in which trade flows are expressed in logarithms. As such, zero trade flows are excluded from the analysis, which can lead to biased results. A more appropriate approach in the presence of zero trade flows is to estimate the gravity model in multiplicative form using the PPML estimator (Santos Silva and Tenreyro, 2006). The PPML estimator, based on Monte Carlo simulations, has been shown to perform very well even with large numbers of zero trade flows. Moreover, the results when using PPML are robust to the presence of heteroscedasticity, a problem that has plagued trade data and provides not only biased but also inconsistent estimates in log-linear form with the OLS estimator.

3.3. Data Source

This paper uses the recent UNCTAD TRAINS global database on NTMs (researcher file version 12), which is publicly available. The data collection varies across countries, ranging from 2015 to 2018, with ASEAN Member States (AMS) having the latest year (2018).[7] The study uses those measures implemented (prior and afterward) up to the end of 2016 and later. The NTMs by country and product at the HS 6-digit level, based on the type of NTM (see UNCTAD (2013) for the classification of NTMs), are used to compute the regulatory distance (*RD*). Likewise, trade data at the HS 6-digit level are used for the construction of the margins of trade (*IM* and *EM*), and are compiled from the UN Comtrade database (United Nations, n.d.). Data for *GDP* and population (*POP*) are sourced from the World Development Indicators database (World Bank n.d.). Data for geographical distance (*GD*), and the information for country-pair contiguity (*Contig*), common language (*Comlang*), and landlocked economy (*Lock*), are extracted from the Centre d'Etudes Prospectives et d'Informations Internationales database (CEPII, n.d.). All values for exports (*X)* and *GDP* are expressed in 2010 constant prices. Given the differences in data collection year, we compiled a cross-section database for 2016 that is limited to the 15 countries or ASEAN+5, comprising two-way export flows for 210 (15 x 14) country pairs for 96 product groups at the HS 2-digit

[7] The years of data collection are 2017 for India; 2016 for China; and 2015–2016 for Australia, Japan, and New Zealand. For AMS, the data collection years are 2015 and 2018.

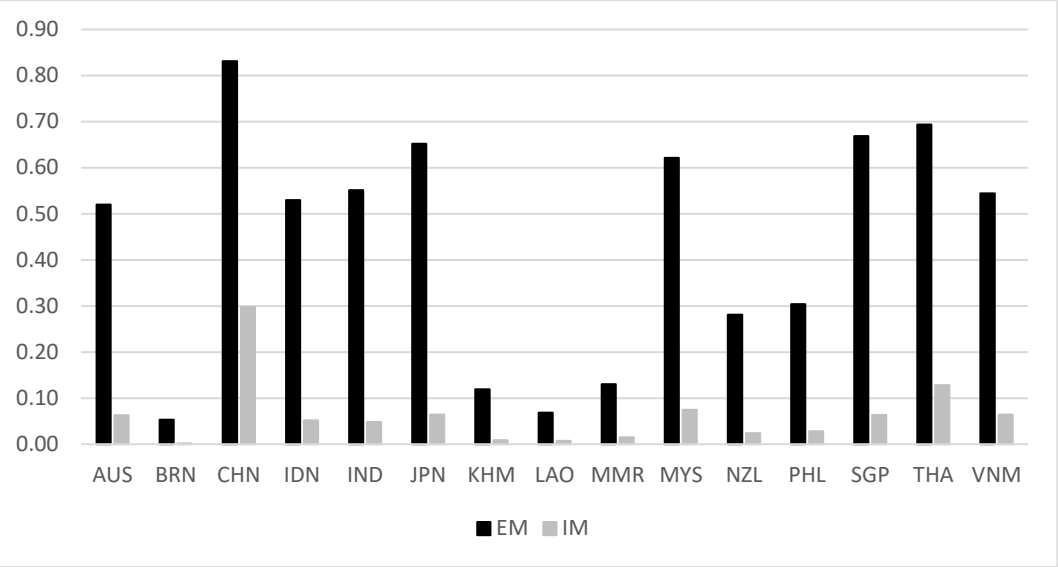
level. For ASEAN, we also analyse data up to 2018. Given that the UNCTAD TRAINS reports NTMs based on national tariff lines following HS4 (2012) or HS5 (2017), we used the concordance table to convert all the product codes to be consistent with our trade data to HS1 (1996).

4. Margins of Trade and Regulatory Distance in the ASEAN+5

Figure 1 displays the margins of trade for the ASEAN+5. The results provide an indication of the relative roles of the extensive margin (exports of a wider set of goods)[8] and the intensive margin (higher volume of exports of each good; intensity of existing trade flows) in exports. The extensive and intensive margins vary across countries and products (see Appendix Table 1 for the extensive and intensive margins for the ASEAN+5 countries at the HS 2-digit level). Typically, the extensive margin is found to play a dominant role in developing countries. Figure 1 shows that the extensive margin exceeds 0.6 for China, Japan, Malaysia, Singapore, and Thailand, while Appendix Table 1 indicates that the extensive margin is highest for a number of products in the manufacturing sector, exceeding 0.6. Amongst the products ranked based on the value of the extensive margin are HS42, HS94, HS64, HS33, HS85, HS34, HS49, HS62, HS39, HS61, HS65, and HS73. The HS85 category – electrical machinery and equipment and parts thereof; sound recorders and reproducers; television image and sound recorders and reproducers, parts and accessories of such articles – is also the most highly traded product within the ASEAN+5, contributing about 20% of total intra-regional exports.

[8] Also known as product diversification.

Figure 1: ASEAN+5 – Margins of Trade by Country, 2016



ASEAN = Association of Southeast Asian Nations; ASEAN+5 = ASEAN Member States plus Australia, China, India, Japan, and New Zealand; AUS = Australia; BRN = Brunei; CHN = China; EM = extensive margin; HS = Harmonized System; IDN = Indonesia; IM = intensive margin; IND = India; JPN = Japan; KHM = Cambodia; LAO = Lao People's Democratic Republic; MMR = Myanmar; MYS = Malaysia; NZL = New Zealand; PHL = Philippines; SGP = Singapore; THA = Thailand; VNM = Viet Nam.
Notes: Averaged across products at the HS 6-digit level.
Source: Calculated from the UN Comtrade Database (United Nations, n.d.).

Table 1 presents the proximity in regulation. The regulatory distance ranges from 0.087 to 0.346. China stands out from the rest of the economies, as the regulatory distance between China and each trading partner of the ASEAN+5 is consistently higher than that of all remaining bilateral pairs. To dig deeper into distances in the regulatory structure between the ASEAN+5, Figure 2 distinguishes the regulatory distance by the type of measure (technical measures (SPS, TBT, and pre-shipment inspection) and non-technical measures). On average, the regulatory distance between China and the ASEAN+5 is found to be the highest relative to the other remaining 14 countries in the region for all types of technical measures. In fact, the regulatory distance for SPS measures and TBTs between China and the rest of the economies in the region exceeded 0.3. In most cases, the regulatory distance for SPS measures and TBTs is higher than for other measures. Within countries, the regulatory distance for pre-shipment inspection is higher than the regulatory distance for SPS measures and TBTs for Indonesia, India, and the Lao PDR. The Philippines and the Lao PDR exhibit a higher regulatory distance for non-technical

measures. The differences in regulatory structure indicate the need to intensify the harmonisation efforts amongst the ASEAN+5.

Appendix Table 2 reports the regulatory distance by sector (agriculture and manufacturing) and by technical and non-technical measures for the country pairs within the region. By country pair, the results support the above aggregate analysis of a dissimilar regulatory structure between sectors and country pairs. The average SPS regulatory distance is greater for agriculture (0.303) than manufacturing sectors (0.157). Likewise, TBT distance seems to be equally important for both sectors, with an average regulatory distance of 0.234 for agriculture and 0.204 for manufacturing, respectively. China seems to be exceptional, where TBT distances are greater for the agriculture sector than SPS measures. Contrary to expectations, the regulatory distance for China and its trading partners exceeds 0.4 for TBTs in agriculture. Previous studies already suggest restrictive TBTs for agriculture in China (Bao and Qiu, 2012). However, the overall examination of the regulatory distance distribution for the full sample indicates that technical measure dissimilarity in the agriculture sector is largely higher than in manufacturing.[9] Specifically, the SPS regulatory distance is larger than that of TBTs. It is also observable that certain trade partners have a higher pre-shipment regulatory distance. Pre-shipment inspections are greater for the agriculture sector (0.213) than manufacturing (0.140). Appendix Table 3 provides a more detailed account of the regulatory distance at the 2-digit product level and by type of measure. Almost all the agricultural products are subjected to a greater regulatory distance (greater than the simple average of 0.2). Explicitly, pre-packaged food shows a higher regulatory distance within the agriculture sector. Within the manufacturing sector, chemical, rubber, wood, and electrical and electronics products recorded a higher average regulatory distance.

Given that ASEAN as a region has undertaken and committed to various initiatives for harmonisation efforts, we explore the regulatory distance variation further from 2015 to 2018. This is made possible since ASEAN has collected and updated its NTMs database up to 2018. Article 19 of the ASEAN Economic Community Blueprint indicated the need for AMS to harmonise their standards,

[9] The shaded areas provide more details where the score exceeds 0.30.

technical regulations, and conformity assessment procedures. Additionally, Chapter 7 of the ASEAN Trade in Goods Agreement requires AMS to remove unnecessary trade-reducing barriers. Table 2 shows the regulatory distance over time from 2014 to 2018 for AMS for both technical and non-technical measures.[10] Over time, there seems to be no significant reduction in regulatory distance (dissimilarity); instead, a positive change is recorded for all countries. This shows that AMS should take further proactive measures in their efforts towards regulatory harmonisation to significantly reduce the regulatory distance between countries. The average regulatory distance scores see a significant increase as a whole for ASEAN. Within the technical measures, some distinct patterns emerged. Thailand (0.335) and Cambodia (0.244) recorded a significantly higher regulatory distance in SPS measures compared with the ASEAN average of 0.178, with Malaysia (0.124) and Singapore (0.130) recording the lowest in 2018. As for TBTs, Viet Nam (0.298), the Philippines (0.255), and Cambodia (0.229) have the highest scores, while for pre-inspection measures, Indonesia (0.384) and the Lao PDR (0.259) recorded the highest distance dissimilarity.[11]

The non-technical regulatory distance for the Lao PDR (0.333), Myanmar (0.335), the Philippines (0.276), and Viet Nam (0.243) is greater than the ASEAN average. Nevertheless, in relative terms, the non-technical measures show a greater regulatory distance compared with technical measures. On a positive note, the increase (growth) in technical regulatory distance is much slower than the non-technical measure distance. This could be due to the harmonisation efforts that predominately focus on technical measures. As a whole, the varying size of the regulatory distance amongst AMS shows diversity in the structure of the NTMs implemented by AMS. This also allows us to identify the benchmark countries that could potentially be used for the harmonisation process, at least within ASEAN for a start. For instance, Singapore has the lowest score for pre-inspection regulatory distance. Lessons from Singapore would provide a viable option for the other members to pursue in reducing the regulatory distance.

[10] Overall, ASEAN records a 15% increase in NTMs, from 8,237 NTMs in 2015 to 9,502 in 2018.
[11] The average for TBTs and pre-inspections is 0.186 and 0.187, respectively.

Examining the distribution of regulatory distance provides some interesting observations. Figure 3 plots the kernel distribution of the regulatory distance by country pair and product over 2015 and 2018. AMS tend to lower the regulatory distance for the country-product combination where the regulatory distance has been already low for such combinations. Those country-product combinations that have regulatory dissimilarly scores lower than 0.25 in 2015 record a reduction in dissimilarity scores in 2018, while those above 0.25 show greater regulatory distance in 2018.[12] In other words, a reduction in regulatory dissimilarity only happens for products and country pairs where the scores are already low. This is true for all types of NTMs. Additionally, in the full sample (ASEAN+5), we observe a lower regulatory distance for countries that have bilateral preferential trade agreements (PTAs) specifically related to SPS measures and TBTs. Given the absence of specific PTAs related to SPS measures and TBTs for most of the AMS,[13] efforts towards regional harmonisation are crucial. This reinforces why ASEAN should accelerate its efforts in harmonising the regulatory differences.

[12] We also run the Spearman rank correlation on the regulatory distance between 2015 and 2018 (all measures and technical measures) by product and country pairs to assess this. For all measures, it shows a high positive correlation between 2015 and 2018, with an average correlation coefficient value above 0.85. Out of 96 products, only five products have a rank correlation coefficient lower than 0.55. For technical measures, the coefficient is even higher – above 0.89 – with all products having a correlation coefficient above 0.75.

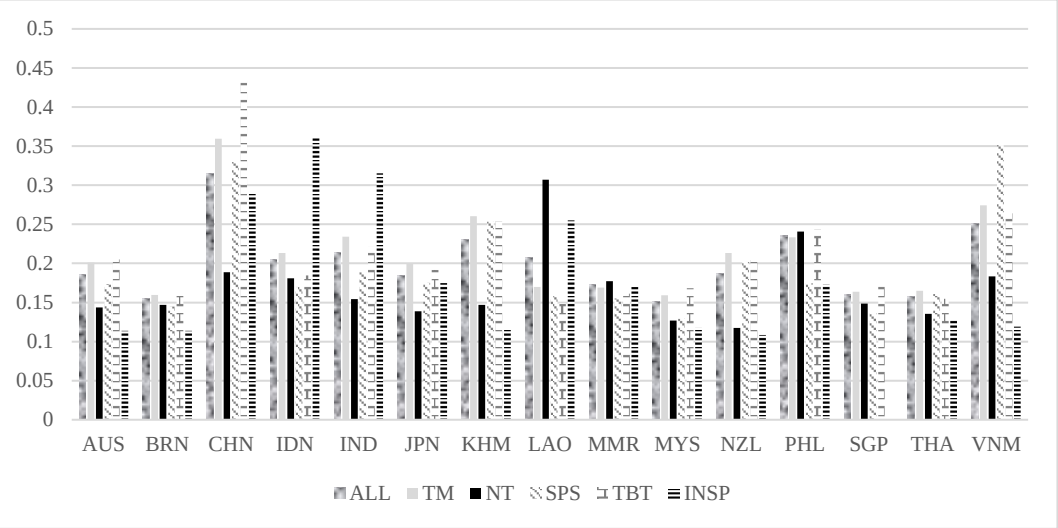
[13] The data on PTAs were based on the PTAs in force and with notifications to the World Trade Organization as of 2015. Only Brunei and Singapore have PTAs related to SPS measures and TBTs.

Table 1: ASEAN+5 – Regulatory Distance for NTMs by Country Pair, 2016

Reporter/ Partner	AUS	BRN	CHN	IDN	IND	JPN	KHM	LAO	MMR	MYS	NZL	PHL	SGP	THA
AUS		0.13718	**0.30984**	0.19760	0.18908	0.15982	0.23237	0.19190	0.16310	0.12870	0.16255	0.23085	0.14491	0.12952
BRN	0.13718		**0.27328**	0.15860	0.17477	0.14314	0.18939	0.15707	0.11155	0.09447	0.13733	0.18840	0.08996	0.10470
CHN	**0.30984**	**0.27328**		**0.31789**	**0.33449**	**0.32127**	**0.32720**	**0.33769**	**0.31197**	**0.28611**	**0.32083**	**0.33664**	**0.29743**	**0.29062**
IDN	0.19760	0.15860	**0.31789**		0.22476	0.18248	0.21704	0.20151	0.17820	0.15809	0.20057	0.23209	0.17158	0.16408
IND	0.18908	0.17477	**0.33449**	0.22476		0.19020	0.25874	0.22130	0.18174	0.16807	0.19054	0.24147	0.18175	0.15550
JPN	0.15982	0.14314	**0.32127**	0.18248	0.19020		0.21102	0.19531	0.15340	0.12637	0.15317	0.24251	0.12271	0.13169
KHM	0.23237	0.18939	**0.32720**	0.21704	0.25874	0.21102		0.24069	0.19944	0.18059	0.21253	0.27242	0.19047	0.19624
LAO	0.19190	0.15707	**0.33769**	0.20151	0.22130	0.19531	0.24069		0.16845	0.15665	0.21433	0.23398	0.16013	0.15689
MMR	0.16310	0.11155	**0.31197**	0.17820	0.18174	0.15340	0.19944	0.16845		0.10583	0.15562	0.21166	0.12243	0.12074
MYS	0.12870	0.09447	**0.28611**	0.15809	0.16807	0.12637	0.18059	0.15665	0.10583		0.13000	0.20180	0.08131	0.08780
NZL	0.16255	0.13733	**0.32083**	0.20057	0.19054	0.15317	0.21253	0.21433	0.15562	0.13000		0.23020	0.14218	0.13739
PHL	0.23085	0.18840	**0.33664**	0.23209	0.24147	0.24251	0.27242	0.23398	0.21166	0.20180	0.23020		0.20615	0.19557
SGP	0.14491	0.08996	**0.29743**	0.17158	0.18175	0.12271	0.19047	0.16013	0.12243	0.08131	0.14218	0.20615		0.11038
THA	0.12952	0.10470	**0.29062**	0.16408	0.15550	0.13169	0.19624	0.15689	0.12074	0.08780	0.13739	0.19557	0.11038	
VNM	0.22449	0.21752	**0.34689**	0.26142	0.27826	0.24405	0.29213	0.26540	0.23170	0.20962	0.23994	0.26716	0.21291	0.21845

ASEAN = Association of Southeast Asian Nations; ASEAN+5 = ASEAN Member States plus Australia, China, India, Japan, and New Zealand; AUS = Australia; BRN = Brunei; CHN = China; HS = Harmonized System; IDN = Indonesia; IND = India; JPN = Japan; KHM = Cambodia; LAO = Lao People's Democratic Republic; MMR = Myanmar; MYS = Malaysia; NTM = non-tariff measure; NZL = New Zealand; PHL = Philippines; SGP = Singapore; THA = Thailand; VNM = Viet Nam.
Note: Averaged across all HS 6-digit products.
Source: Calculated from the UNCTAD TRAINS database (UNCTAD, n.d.).

Figure 2: ASEAN+5 – Regulatory Distance for NTMs by Country and Type, 2016



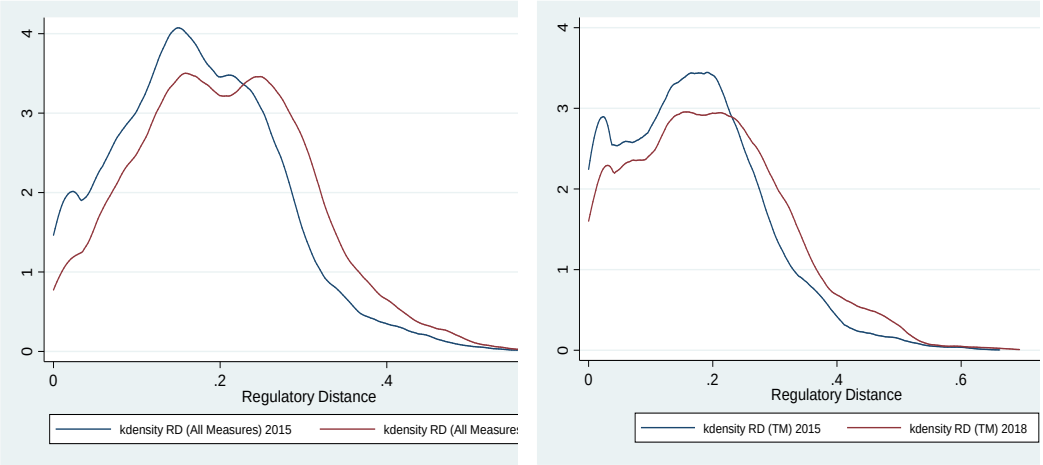
All = all NTMs; ASEAN = Association of Southeast Asian Nations; ASEAN+5 = ASEAN Member States plus Australia, China, India, Japan, and New Zealand; AUS = Australia; BRN = Brunei; CHN = China; HS = Harmonized System; IDN = Indonesia; IND = India; INSP = pre-shipment inspections and other formalities; JPN = Japan; KHM = Cambodia; LAO = Lao People's Democratic Republic; MMR = Myanmar; MYS = Malaysia; NT = non-technical measure (E, F, G, H, and I); NTM = non-tariff measure; NZL = New Zealand; PHL = Philippines; SGP = Singapore; SPS = sanitary and phytosanitary; TBT = technical barrier to trade; THA = Thailand; TM = SPS+TBT and INSP; VNM = Viet Nam.
Note: Averaged across all HS 6-digit products.
Source: Calculated from the UNCTAD TRAINS database (UNCTAD, n.d.).

Table 2: Regulatory Distance, ASEAN Member States, 2014–2018

Country	Mean (RD – Technical Measures)					Mean (RD – Non-Technical Measures)				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
BRN	0.123	0.133	0.141	0.147	0.151	0.131	0.161	0.162	0.177	0.180
IDN	0.134	0.172	0.193	0.205	0.209	0.114	0.184	0.196	0.224	0.229
KHM	0.222	0.233	0.242	0.257	0.261	0.127	0.158	0.161	0.180	0.187
LAO	0.132	0.141	0.149	0.163	0.166	0.134	0.311	0.314	0.330	0.333
MMR	0.129	0.139	0.150	0.156	0.161	0.102	0.177	0.186	0.300	0.335
MYS	0.124	0.135	0.142	0.146	0.150	0.103	0.136	0.139	0.167	0.173
PHL	0.194	0.202	0.213	0.219	0.221	0.209	0.251	0.253	0.270	0.276
SGP	0.128	0.139	0.146	0.152	0.156	0.127	0.157	0.159	0.176	0.182
THA	0.131	0.144	0.151	0.158	0.163	0.110	0.145	0.148	0.172	0.180
VNM	0.183	0.233	0.257	0.278	0.307	0.141	0.192	0.196	0.231	0.243
Average	0.150	0.167	0.179	0.188	0.194	0.130	0.187	0.191	0.223	0.232

ASEAN = Association of Southeast Asian Nations, AUS = Australia, BRN = Brunei, CHN = China, IDN = Indonesia, IND = India, JPN = Japan, KHM = Cambodia, LAO = Lao People's Democratic Republic, MMR = Myanmar, MYS = Malaysia, NZL = New Zealand, PHL = Philippines, RD = regulatory distance, SGP = Singapore, SPS = sanitary and phytosanitary, TBT = technical barrier to trade, THA = Thailand, VNM = Viet Nam.
Note: Technical measures include SPS measures (A), TBTs (B), and pre-shipment inspection and other formalities (C). Non-technical measures include measures for non-automatic licensing, quotas, prohibitions, and quantity-control measures other than for SPS or TBT reasons (E); price-control measures, including additional taxes and charges (F); finance measures (G); measures affecting competition (H); and trade-related investment measures (I). E and F are the most prominent measures used by ASEAN Member States. The distribution of the change in regulatory distance is shown in Appendix Figure 1.
Source: Authors.

Figure 3: Regulatory Distance Distribution, 2015 and 2018, ASEAN



ASEAN = Association of Southeast Asian Nations, TM = technical measure, RD = regulatory distance.
Source: Authors.

As a whole, some noteworthy observations are identified from the data on the margins of trade and regulatory distance. First, the extensive margin appears to be the primary avenue of export in the ASEAN+5. In addition, there is a significant dispersion between the ASEAN+5 in the extensive margin.[14] Second, China appears to have higher dissimilar regulatory structures, specifically for SPS measures and TBTs, with all countries. Third, there are differences in regulatory distance across sectors, with agriculture recording a higher distance than manufacturing, including within different types of measures.

5. Estimation Results

5.1. Margins of Trade Responses to Regulatory Distance

Tables 3–5 show the estimated results for various types of regulatory distance (all measures, technical, non-technical, SPS, TBT, and pre-shipment). The effect of regulatory distance on trade margins is also estimated by sector – agriculture (HS01–HS24) and manufacturing (HS25–HS97). The dependent variables of our estimation are the extensive margin and the intensive margin. We considered the log of the extensive and intensive margins because OLS is a linear operator and it

[14] Based on distribution plots and standard deviation.

allows us to decompose the effects of regulatory distance on the export ratio along both margins, and one can quantify the contribution of the two margins to the change in the ratio, as indicated in Equation 6.[15]

Consistent with trade theory, larger exporters tend to export more than smaller economies, and when differentiated along the margin, our results show that larger exporters export more along the intensive margin (0.641; Table 3 Column 2) and extensive margin (0.423; Table 3, Column 1).[16] However, examining the contribution of the two margins, we find that around 60.7% (0.646/(0.423+0.641)) of the larger exports of exporters with higher GDP is because of the intensive margin. This observation holds particularly for the manufacturing sector (where the GDP coefficient of the intensive margin is 0.724; Table 5, Column 2), while for the agriculture sector, the contribution of both margins seems to be equally important (Table 4, Columns 1 and 2). These observations imply very different consequences for the ASEAN+5. Richer countries may have only exported at higher quantities or higher prices, focusing less on expanding the variety of exports. In other words, the larger exporters of the ASEAN+5 remained relatively similar, concentrating on the same product structure as they trade amongst ASEAN+5 partners, particularly in the manufacturing sector.

In contrast, the decomposition of importers' GDP shows that a higher level of imports of importers with higher GDP is due to an increase in the extensive margin (the coefficient of the extensive margin is 0.219; Table 3, Column 1). Interestingly, the effect of the importers' size is negative on the intensive margin, indicating that higher income levels in importing countries tend to enhance the variety of trade to a greater extent than the intensity of existing imports. As for other variables, consistent with the literature, the estimation indicates that the population, geographical distance, and landlocked coefficients have a negative and significant relationship with trade margins. Similarly, common language and contiguity have a positive effect on trade margins.

[15] We did not report the results for the export ratio as the dependent variable to conserve space, but it can be easily calculated as in Equation 6. This is not applicable for PPML estimations since it is not a linear operator.

[16] The intensive margin reflects more export values, while the extensive margin reflects a wider variety of products.

Examining our variable of interest – that is, regulatory distance – indicates the following. When all the NTMs are considered, regulatory distance seems to have a trade-reducing effect on intensive margins (−0.771) and extensive margins (−0.209) (Table 3, Columns 1 and 2), but at a different degree. The evidence shows that regulatory distance has a greater effect on intensive margins. The negative effect along the extensive margins implies that regulatory distance hinders the number of firms exporting to destination countries due to the compliance cost of such dissimilarity. The negative effect at the extensive margin also suggests that having such regulatory distance between countries is a fixed cost that producers have to overcome before being able to export to the destination market. Similar results are obtained when considering technical measures only. Specifically, the regulatory distance coefficient of technical measures for intensive and extensive margins is −0.614 and −0.383, respectively (Table 1, Columns 3 and 4). Decomposing the regulatory distance for all sectors by type (SPS, TBTs, and pre-shipment measures) shows that SPS measures have a greater negative effect along intensive (−0.478) and extensive margins (−0.360) (Table 3, Columns 7 and 8) compared to TBTs and pre-shipment measures. The regulatory similarity of TBTs consistently shows a negative impact on the intensive margin (Table 3, Column 10). Pre-shipment inspections and other formalities have a negative effect; however, it is not significant for the full sample (Table 3, Column 11 and 12).

Given that regulatory distance may be subject to different implementation at the sectoral level, we examine its impact on two broad sectors: agriculture and manufacturing. Indeed, a significantly higher number of NTMs is found within the food sector (Devadason, Chandran, and Kaliappan, 2018). It is also important not to use the full sample, but instead to estimate separately by sector to eliminate the effect of a different production environment. Interestingly, the results become clearer that regulatory distance affects the agriculture sector much more than manufacturing along both margins. The effect is greater along the intensive margin (Tables 4 and 5, Columns 1 and 2). Specifically, by type of measure, technical measures have a larger trade-reducing effect than non-technical measures (Tables 4 and 5, Columns 3–6). Decomposing the technical measures indicates that the impact of SPS measures is greater in the agriculture sector than manufacturing.

Interestingly for the manufacturing sector, both SPS measures and TBTs seem to have a significant impact on the intensive and extensive margins (Table 5, Columns 7–10). As for pre-shipment and other formalities, they have a significant negative impact on the extensive margin of the agriculture sector (−0.305; Table 4, Column 11).

Given the presence of zero export values, we run the same equation using PPML. Tables 6–8 report the results.[17] The results are largely consistent with the results obtained by OLS for the full sample, with slight difference in terms of significant levels. For instance, for TBTs, it becomes clear that the trade-reducing impact is along both margins (Table 6, Columns 9 and 10), and pre-shipment inspections and other formalities become significant for the extensive margin (Table 6, Column 11). Likewise, by sector, TBTs become significant for the extensive margin in the agriculture sector and for the intensive margin in the manufacturing sector (Table 7, Column 9; Table 8, Column 10). Pre-shipment inspections and other formalities impact both margins in the agriculture sector (Table 7, Columns 11 and 12). As a whole, this suggests that the trade-reducing impact on margins is larger in agriculture than in manufacturing.

[17] Only results on the margins are reported.

Table 3: Regulatory Distance (by Measure Type) and Trade Margins, All Sectors

Variable	(1) In EM	(2) In IM	(3) In EM	(4) In IM	(5) In EM	(6) In IM	(7) In EM	(8) In IM	(9) In EM	(10) In IM	(11) In EM	(12) In IM
In GDPi	0.423***	0.641***	0.425***	0.640***	0.418***	0.635***	0.428***	0.643***	0.421***	0.635***	0.401***	0.606***
	(0.00990)	(0.0154)	(0.00990)	(0.0155)	(0.00986)	(0.0155)	(0.00992)	(0.0155)	(0.00987)	(0.0155)	(0.0111)	(0.0176)
In GDPj	0.219***	-0.00913	0.221***	-0.0105	0.213***	-0.0149	0.223***	-0.00810	0.217***	-0.0154	0.246***	0.0587***
	(0.00961)	(0.0147)	(0.00962)	(0.0147)	(0.00957)	(0.0147)	(0.00960)	(0.0147)	(0.00957)	(0.0146)	(0.0110)	(0.0168)
In PoPi	-0.0952***	-0.0176	-0.100***	-0.0157	-0.0842***	-0.00228	-0.100***	-0.0127	-0.0924***	-0.00708	-0.0506***	0.0407*
	(0.00834)	(0.0130)	(0.00834)	(0.0130)	(0.00802)	(0.0128)	(0.00809)	(0.0128)	(0.00820)	(0.0128)	(0.0101)	(0.0160)
In PoPj	-0.126***	-0.112***	-0.131***	-0.110***	-0.116***	-0.0986***	-0.130***	-0.108***	-0.124***	-0.103***	-0.145***	-0.171***
	(0.00808)	(0.0124)	(0.00809)	(0.0124)	(0.00788)	(0.0122)	(0.00791)	(0.0122)	(0.00800)	(0.0122)	(0.00959)	(0.0146)
Contigij	0.162***	0.464***	0.158***	0.457***	0.150***	0.469***	0.152***	0.450***	0.161***	0.459***	0.219***	0.478***
	(0.0326)	(0.0524)	(0.0325)	(0.0524)	(0.0326)	(0.0526)	(0.0324)	(0.0524)	(0.0326)	(0.0524)	(0.0354)	(0.0560)
Comlangij	0.177***	0.0788	0.176***	0.0820*	0.187***	0.0835*	0.188***	0.0983*	0.177***	0.0803	0.216***	0.185***
	(0.0244)	(0.0409)	(0.0244)	(0.0409)	(0.0243)	(0.0411)	(0.0244)	(0.0410)	(0.0245)	(0.0410)	(0.0316)	(0.0525)
Landlockij	-0.437***	-0.0507	-0.425***	-0.0170	-0.367***	-0.0509	-0.418***	-0.00887	-0.430***	-0.0230	-0.368***	0.0332
	(0.0607)	(0.0802)	(0.0604)	(0.0802)	(0.0627)	(0.0838)	(0.0605)	(0.0801)	(0.0605)	(0.0801)	(0.0622)	(0.0831)
In GDij	-0.411***	-0.711***	-0.418***	-0.714***	-0.412***	-0.698***	-0.418***	-0.713***	-0.410***	-0.705***	-0.413***	-0.761***
	(0.0169)	(0.0255)	(0.0169)	(0.0255)	(0.0169)	(0.0254)	(0.0168)	(0.0254)	(0.0169)	(0.0255)	(0.0221)	(0.0325)
RDij (All)	-0.209*	-0.771***										
	(0.100)	(0.158)										
RDij (TM)			-0.383***	-0.614***								
			(0.0839)	(0.134)								
RDij (NT)					-0.401***	0.160						
					(0.0971)	(0.149)						
RDij (SPS)							-0.360***	-0.478***				
							(0.0488)	(0.0802)				
RDij (TBT)									-0.0808	-0.291**		
									(0.0651)	(0.104)		
RDij (INSP)											-0.0827	-0.0243
											(0.0431)	(0.0715)

Constant	-12.27***	-13.01***	-12.20***	-12.96***	-12.23***	-13.17***	-12.35***	-13.19***	-12.26***	-12.96***	-12.55***	-13.26***
	(0.316)	(0.467)	(0.316)	(0.469)	(0.315)	(0.468)	(0.315)	(0.466)	(0.318)	(0.473)	(0.341)	(0.506)
Observations	14830	14830	14830	14830	14830	14830	14830	14830	14830	14830	12434	12434
Adjusted R^2	0.276	0.311	0.277	0.311	0.277	0.310	0.278	0.312	0.276	0.310	0.276	0.327

EM = extensive margin, IM = intensive margin.
Notes: Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All regressions include a full set of product dummies.
Source: Authors.

Table 4: Regulatory Distance (by Measure Type) and Trade Margins, Agriculture Sector

Variable	(1) In EM	(2) In IM	(3) In EM	(4) In IM	(5) In EM	(6) In IM	(7) In EM	(8) In IM	(9) In EM	(10) In IM	(11) In EM	(12) In IM
In GDPi	0.313***	0.373***	0.316***	0.371***	0.302***	0.356***	0.316***	0.375***	0.319***	0.359***	0.312***	0.346***
	(0.0205)	(0.0338)	(0.0205)	(0.0336)	(0.0204)	(0.0344)	(0.0205)	(0.0339)	(0.0204)	(0.0337)	(0.0236)	(0.0393)
In GDPj	0.167***	-0.0817**	0.171***	-0.0834**	0.159***	-0.0969**	0.171***	-0.0800**	0.173***	-0.0950**	0.202***	-0.0558
	(0.0191)	(0.0305)	(0.0190)	(0.0304)	(0.0191)	(0.0308)	(0.0189)	(0.0305)	(0.0188)	(0.0304)	(0.0216)	(0.0345)
In PoPi	-0.103***	-0.0425	-0.111***	-0.0474	-0.102***	-0.0000963	-0.117***	-0.0276	-0.120***	-0.0202	-0.101***	-0.00686
	(0.0180)	(0.0300)	(0.0181)	(0.0297)	(0.0162)	(0.0283)	(0.0164)	(0.0278)	(0.0171)	(0.0287)	(0.0217)	(0.0370)
In PoPj	-0.160***	-0.0594*	-0.166***	-0.0637*	-0.161***	-0.0263	-0.171***	-0.0486	-0.173***	-0.0416	-0.188***	-0.0524
	(0.0170)	(0.0266)	(0.0170)	(0.0265)	(0.0162)	(0.0257)	(0.0163)	(0.0258)	(0.0167)	(0.0258)	(0.0193)	(0.0308)
Contigij	0.223***	0.639***	0.222***	0.624***	0.191**	0.652***	0.216***	0.647***	0.216***	0.637***	0.218**	0.619***
	(0.0651)	(0.113)	(0.0651)	(0.113)	(0.0656)	(0.113)	(0.0652)	(0.112)	(0.0656)	(0.113)	(0.0702)	(0.120)
Comlangij	0.134**	0.141	0.117*	0.145	0.171***	0.222*	0.109*	0.172	0.105*	0.182*	0.189**	0.308**
	(0.0514)	(0.0901)	(0.0512)	(0.0893)	(0.0509)	(0.0915)	(0.0502)	(0.0890)	(0.0508)	(0.0889)	(0.0663)	(0.118)
Landlockij	-0.398***	-0.264	-0.408***	-0.249	-0.330**	-0.218	-0.416***	-0.211	-0.409***	-0.257	-0.311**	-0.253
	(0.114)	(0.176)	(0.114)	(0.175)	(0.114)	(0.178)	(0.113)	(0.175)	(0.113)	(0.176)	(0.111)	(0.182)
In GDij	-0.318***	-0.447***	-0.325***	-0.460***	-0.341***	-0.408***	-0.327***	-0.461***	-0.336***	-0.416***	-0.365***	-0.466***
	(0.0332)	(0.0530)	(0.0335)	(0.0536)	(0.0329)	(0.0509)	(0.0335)	(0.0543)	(0.0330)	(0.0512)	(0.0429)	(0.0669)

RDij (All)	-0.713*	-1.461**										
	(0.303)	(0.483)										
RDij (TM)			-0.371	-1.560***								
			(0.280)	(0.438)								
RDij (NT)					-0.954***	-0.230						
					(0.203)	(0.341)						
RDij (SPS)							-0.225	-1.211**				
							(0.232)	(0.379)				
RDij (TBT)									-0.0517	-0.430		
									(0.143)	(0.220)		
RDij (INSP)											-0.305**	-0.155
											(0.105)	(0.162)
Constant	-7.729***	-6.682***	-7.677***	-6.351***	-7.042***	-7.097***	-7.494***	-7.099***	-7.542***	-6.646***	-7.638***	-6.862***
	(0.566)	(0.905)	(0.574)	(0.924)	(0.566)	(0.912)	(0.561)	(0.890)	(0.584)	(0.947)	(0.598)	(0.941)
Observations	3644	3644	3644	3644	3644	3644	3644	3644	3644	3644	3061	3061
Adjusted R^2	0.214	0.148	0.213	0.149	0.217	0.146	0.213	0.149	0.212	0.147	0.201	0.153

EM = extensive margin, IM = intensive margin.
Notes: Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All regressions include a full set of product dummies.
Source: Authors.

Table 5: Regulatory Distance (by Measure Type) and Trade Margins, Manufacturing Sector

Variable	(1) In EM	(2) In IM	(3) In EM	(4) In IM	(5) In EM	(6) In IM	(7) In EM	(8) In IM	(9) In EM	(10) In IM	(11) In EM	(12) In IM
In GDPi	0.458***	0.724***	0.460***	0.723***	0.453***	0.718***	0.463***	0.726***	0.456***	0.719***	0.427***	0.685***
	(0.0112)	(0.0171)	(0.0112)	(0.0171)	(0.0112)	(0.0172)	(0.0113)	(0.0171)	(0.0112)	(0.0171)	(0.0127)	(0.0192)
In GDPj	0.237***	0.0186	0.239***	0.0174	0.231***	0.0128	0.241***	0.0198	0.235***	0.0139	0.260***	0.0992***
	(0.0111)	(0.0165)	(0.0111)	(0.0165)	(0.0111)	(0.0165)	(0.0111)	(0.0165)	(0.0111)	(0.0164)	(0.0128)	(0.0188)
In PoPi	-0.0919***	-0.0141	-0.0959***	-0.0121	-0.0783***	-0.000504	-0.0943***	-0.0109	-0.0884***	-0.00690	-0.0343**	0.0569**
	(0.00947)	(0.0144)	(0.00948)	(0.0144)	(0.00918)	(0.0142)	(0.00928)	(0.0142)	(0.00933)	(0.0142)	(0.0114)	(0.0175)
In PoPj	-0.115***	-0.134***	-0.118***	-0.132***	-0.102***	-0.122***	-0.116***	-0.131***	-0.111***	-0.128***	-0.130***	-0.211***
	(0.00916)	(0.0139)	(0.00917)	(0.0139)	(0.00894)	(0.0138)	(0.00898)	(0.0137)	(0.00905)	(0.0138)	(0.0109)	(0.0163)
Contigij	0.133***	0.373***	0.127***	0.366***	0.123**	0.375***	0.117**	0.355***	0.129***	0.367***	0.204***	0.393***
	(0.0372)	(0.0583)	(0.0371)	(0.0584)	(0.0373)	(0.0586)	(0.0371)	(0.0583)	(0.0372)	(0.0584)	(0.0405)	(0.0622)
Comlangij	0.200***	0.0434	0.201***	0.0443	0.200***	0.0426	0.216***	0.0608	0.196***	0.0382	0.223***	0.141*
	(0.0278)	(0.0455)	(0.0278)	(0.0455)	(0.0277)	(0.0456)	(0.0278)	(0.0456)	(0.0279)	(0.0456)	(0.0359)	(0.0573)
Landlockij	-0.452***	-0.0106	-0.426***	0.0266	-0.383***	-0.0128	-0.422***	0.0314	-0.429***	0.0266	-0.396***	0.0959
	(0.0706)	(0.0899)	(0.0702)	(0.0900)	(0.0740)	(0.0951)	(0.0704)	(0.0898)	(0.0703)	(0.0899)	(0.0732)	(0.0930)
In GDij	-0.442***	-0.816***	-0.449***	-0.820***	-0.440***	-0.806***	-0.446***	-0.817***	-0.443***	-0.817***	-0.434***	-0.878***
	(0.0196)	(0.0288)	(0.0196)	(0.0288)	(0.0195)	(0.0289)	(0.0195)	(0.0287)	(0.0196)	(0.0289)	(0.0256)	(0.0361)
RDij (All)	-0.420***	-0.707***										
	(0.106)	(0.166)										
RDij (TM)			-0.527***	-0.543***								
			(0.0879)	(0.139)								
RDij (NT)					-0.297**	-0.158						
					(0.111)	(0.166)						
RDij (SPS)							-0.398***	-0.428***				

							(0.0502)	(0.0819)				
RDij (TBT)									-0.271***	-0.397***		
									(0.0727)	(0.117)		
RDij (INSP)											-0.0138	-0.00913
											(0.0467)	(0.0784)
Constant	-13.09***	-14.52***	-13.00***	-14.49***	-13.15***	-14.67***	-13.19***	-14.68***	-13.04***	-14.47***	-13.72***	-14.74***
	(0.333)	(0.479)	(0.331)	(0.480)	(0.331)	(0.477)	(0.331)	(0.476)	(0.333)	(0.482)	(0.370)	(0.517)
Observations	11186	11186	11186	11186	11186	11186	11186	11186	11186	11186	9373	9373
Adjusted R^2	0.308	0.369	0.309	0.368	0.308	0.368	0.311	0.369	0.308	0.368	0.312	0.390

EM = extensive margin, IM = intensive margin.

Notes: Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. All regressions include a full set of product dummies.

Source: Authors.

Table 6: Regulatory Distance (by Measure Type) and Trade Margins, All Sectors, PPML

Variable	(1) EM	(2) IM	(3) EM	(4) IM	(5) EM	(6) IM	(7) EM	(8) IM	(9) EM	(10) IM	(11) EM	(12) IM
ln GDPi	0.330***	0.514***	0.330***	0.512***	0.328***	0.514***	0.331***	0.514***	0.331***	0.507***	0.318***	0.556***
	(0.00489)	(0.0129)	(0.00489)	(0.0129)	(0.00491)	(0.0129)	(0.00489)	(0.0129)	(0.00491)	(0.0130)	(0.00562)	(0.0146)
ln GDPj	0.151***	-0.0257	0.152***	-0.0264	0.149***	-0.0313*	0.153***	-0.0274*	0.152***	-0.0315*	0.174***	0.0428**
	(0.00471)	(0.0136)	(0.00471)	(0.0136)	(0.00471)	(0.0137)	(0.00472)	(0.0137)	(0.00470)	(0.0136)	(0.00552)	(0.0156)
ln PoPi	-0.0553***	-0.0245*	-0.0575***	-0.0246*	-0.0550***	-0.00784	-0.0616***	-0.0133	-0.0568***	-0.0189	-0.0199***	-0.0168
	(0.00411)	(0.0122)	(0.00411)	(0.0121)	(0.00406)	(0.0119)	(0.00404)	(0.0119)	(0.00407)	(0.0120)	(0.00489)	(0.0138)
ln PoPj	-0.0621***	-0.0498***	-0.0641***	-0.0495***	-0.0615***	-0.0373**	-0.0678***	-0.0423***	-0.0636***	-0.0436***	-0.0765***	-0.0879***
	(0.00415)	(0.0119)	(0.00415)	(0.0120)	(0.00409)	(0.0117)	(0.00410)	(0.0119)	(0.00411)	(0.0118)	(0.00496)	(0.0134)
Contigij	0.169***	0.577***	0.171***	0.572***	0.162***	0.580***	0.170***	0.569***	0.172***	0.568***	0.248***	0.595***
	(0.0162)	(0.0402)	(0.0161)	(0.0401)	(0.0162)	(0.0404)	(0.0161)	(0.0402)	(0.0161)	(0.0401)	(0.0173)	(0.0399)
Comlangij	0.181***	0.114**	0.180***	0.114**	0.182***	0.118**	0.181***	0.125**	0.182***	0.105*	0.234***	0.479***
	(0.0126)	(0.0416)	(0.0126)	(0.0416)	(0.0126)	(0.0416)	(0.0126)	(0.0417)	(0.0126)	(0.0417)	(0.0161)	(0.0467)

Landlockij	-0.686***	-0.171**	-0.694***	-0.136*	-0.644***	-0.182**	-0.691***	-0.133*	-0.694***	-0.143*	-0.603***	-0.0884
	(0.0363)	(0.0647)	(0.0362)	(0.0642)	(0.0371)	(0.0694)	(0.0362)	(0.0642)	(0.0362)	(0.0644)	(0.0366)	(0.0643)
In GDij	-0.301***	-0.539***	-0.302***	-0.542***	-0.306***	-0.528***	-0.305***	-0.534***	-0.302***	-0.537***	-0.314***	-0.712***
	(0.00866)	(0.0255)	(0.00868)	(0.0254)	(0.00866)	(0.0258)	(0.00867)	(0.0256)	(0.00865)	(0.0255)	(0.0121)	(0.0338)
RDij (All)	-0.191***	-0.778***										
	(0.0465)	(0.123)										
RDij (TM)			-0.0870*	-0.691***								
			(0.0410)	(0.106)								
RDij (NT)					-0.309***	-0.232						
					(0.0458)	(0.124)						
RDij (SPS)							-0.0751**	-0.314***				
							(0.0259)	(0.0629)				
RDij (TBT)									-0.114***	-0.464***		
									(0.0318)	(0.0807)		
RDij (INSP)											-0.195***	-0.0888
											(0.0240)	(0.0613)
Constant	-9.176***	-10.79***	-9.160***	-10.70***	-9.055***	-11.14***	-9.101***	-11.02***	-9.213***	-10.61***	-9.814***	-11.73***
	(0.126)	(0.345)	(0.127)	(0.343)	(0.124)	(0.344)	(0.125)	(0.344)	(0.128)	(0.346)	(0.137)	(0.352)
Observations	19950	19950	19950	19950	19950	19950	19950	19950	19950	19950	17277	17277
R^2	0.356	0.208	0.355	0.210	0.356	0.208	0.353	0.209	0.356	0.209	0.354	0.247

EM = extensive margin, IM = intensive margin, PPML = Poisson pseudo-maximum likelihood.

Notes: Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Authors.

Table 7: Regulatory Distance (by Measure Type) and Trade Margins, Agriculture Sector, PPML

Variable	(1) EM	(2) IM	(3) EM	(4) IM	(5) EM	(6) IM	(7) EM	(8) IM	(9) EM	(10) IM	(11) EM	(12) IM
ln GDPi	0.298***	0.320***	0.300***	0.319***	0.296***	0.309***	0.303***	0.324***	0.305***	0.311***	0.282***	0.368***
	(0.0103)	(0.0242)	(0.0102)	(0.0241)	(0.0105)	(0.0242)	(0.0103)	(0.0242)	(0.0102)	(0.0240)	(0.0118)	(0.0295)
ln GDPj	0.141***	-0.0647*	0.143***	-0.0652*	0.139***	-0.0736**	0.146***	-0.0616*	0.147***	-0.0704**	0.161***	-0.00904
	(0.0102)	(0.0271)	(0.0101)	(0.0270)	(0.0103)	(0.0270)	(0.0101)	(0.0270)	(0.0100)	(0.0269)	(0.0118)	(0.0311)
ln PoPi	-0.0627***	-0.0240	-0.0635***	-0.0282	-0.0709***	-0.00229	-0.0773***	-0.0209	-0.0689***	-0.0162	-0.0290**	-0.0300
	(0.00957)	(0.0242)	(0.00956)	(0.0245)	(0.00893)	(0.0223)	(0.00895)	(0.0229)	(0.00913)	(0.0232)	(0.0109)	(0.0286)
ln PoPj	-0.0893***	-0.00791	-0.0901***	-0.0105	-0.0953***	0.00638	-0.101***	-0.00820	-0.0951***	-0.00157	-0.0953***	-0.0209
	(0.00919)	(0.0230)	(0.00914)	(0.0230)	(0.00887)	(0.0220)	(0.00881)	(0.0223)	(0.00890)	(0.0223)	(0.0109)	(0.0257)
Contigij	0.299***	0.721***	0.303***	0.716***	0.289***	0.726***	0.300***	0.728***	0.305***	0.717***	0.388***	0.677***
	(0.0346)	(0.0800)	(0.0345)	(0.0801)	(0.0348)	(0.0805)	(0.0345)	(0.0807)	(0.0345)	(0.0799)	(0.0367)	(0.0794)
Comlangij	0.193***	0.271***	0.188***	0.271***	0.193***	0.299***	0.173***	0.283***	0.185***	0.276***	0.276***	0.659***
	(0.0273)	(0.0749)	(0.0272)	(0.0747)	(0.0274)	(0.0748)	(0.0268)	(0.0735)	(0.0270)	(0.0745)	(0.0328)	(0.0811)
Landlockij	-0.765***	-0.286*	-0.770***	-0.278*	-0.741***	-0.269*	-0.766***	-0.258*	-0.763***	-0.291*	-0.643***	-0.196
	(0.0761)	(0.126)	(0.0763)	(0.126)	(0.0763)	(0.129)	(0.0762)	(0.127)	(0.0761)	(0.127)	(0.0758)	(0.125)
ln GDij	-0.250***	-0.404***	-0.250***	-0.410***	-0.264***	-0.380***	-0.264***	-0.412***	-0.262***	-0.391***	-0.262***	-0.583***
	(0.0183)	(0.0500)	(0.0183)	(0.0504)	(0.0179)	(0.0480)	(0.0186)	(0.0510)	(0.0179)	(0.0481)	(0.0248)	(0.0639)
RDij (All)	-0.589***	-0.602										
	(0.142)	(0.391)										
RDij (TM)			-0.516***	-0.695								
			(0.130)	(0.367)								
RDij (NT)					-0.394***	-0.236						
					(0.114)	(0.270)						
RDij (SPS)							-0.0324	-0.665*				

							(0.112)	(0.327)				
RDij (TBT)									-0.236***	-0.221		
									(0.0681)	(0.180)		
RDij (INSP)											-0.511***	-0.362**
											(0.0604)	(0.137)
Constant	-7.811***	-6.198***	-7.898***	-6.030***	-7.420***	-6.286***	-7.651***	-6.429***	-7.932***	-6.072***	-8.407***	-6.960***
	(0.265)	(0.623)	(0.269)	(0.639)	(0.273)	(0.620)	(0.263)	(0.606)	(0.276)	(0.635)	(0.283)	(0.619)
Observations	5012	5012	5012	5012	5012	5012	5012	5012	5012	5012	4342	4342
R^2	0.288	0.134	0.289	0.134	0.287	0.132	0.287	0.135	0.289	0.133	0.284	0.179

EM = extensive margin, IM = intensive margin, PPML = Poisson pseudo-maximum likelihood.
Notes: Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Source: Authors.

Table 8: Regulatory Distance (by Measure Type) and Trade Margins, Manufacturing Sector, PPML

Variable	(1) EM	(2) IM	(3) EM	(4) IM	(5) EM	(6) IM	(7) EM	(8) IM	(9) EM	(10) IM	(11) EM	(12) IM
ln GDPi	0.339***	0.594***	0.339***	0.593***	0.337***	0.597***	0.340***	0.595***	0.339***	0.587***	0.326***	0.629***
	(0.00555)	(0.0155)	(0.00556)	(0.0154)	(0.00557)	(0.0155)	(0.00554)	(0.0155)	(0.00558)	(0.0155)	(0.00640)	(0.0170)
ln GDPj	0.154***	-0.0160	0.154***	-0.0165	0.152***	-0.0224	0.156***	-0.0196	0.154***	-0.0194	0.174***	0.0554**
	(0.00532)	(0.0155)	(0.00532)	(0.0156)	(0.00531)	(0.0156)	(0.00535)	(0.0157)	(0.00531)	(0.0154)	(0.00627)	(0.0175)
			Autho									
ln PoPi	-0.0535***	-0.0207	-0.0553***	-0.0202	-0.0503***	-0.00565	-0.0577***	-0.00917	-0.0538***	-0.0202	-0.0135*	0.00170
	(0.00458)	(0.0142)	(0.00457)	(0.0141)	(0.00453)	(0.0139)	(0.00452)	(0.0139)	(0.00453)	(0.0140)	(0.00544)	(0.0157)
ln PoPj	-0.0544***	-0.0617***	-0.0561***	-0.0609***	-0.0512***	-0.0490***	-0.0584***	-0.0522***	-0.0547***	-0.0602***	-0.0674***	-0.105***
	(0.00467)	(0.0139)	(0.00467)	(0.0140)	(0.00459)	(0.0135)	(0.00463)	(0.0139)	(0.00461)	(0.0137)	(0.00558)	(0.0153)
Contigij	0.131***	0.514***	0.132***	0.510***	0.123***	0.514***	0.129***	0.505***	0.131***	0.507***	0.205***	0.557***
	(0.0181)	(0.0453)	(0.0181)	(0.0452)	(0.0181)	(0.0454)	(0.0181)	(0.0453)	(0.0181)	(0.0449)	(0.0194)	(0.0451)
Comlangij	0.181***	0.0623	0.181***	0.0604	0.181***	0.0637	0.186***	0.0666	0.181***	0.0488	0.223***	0.413***
	(0.0142)	(0.0495)	(0.0142)	(0.0494)	(0.0141)	(0.0495)	(0.0142)	(0.0495)	(0.0142)	(0.0493)	(0.0185)	(0.0556)

Landlockij	-0.670***	-0.146	-0.670***	-0.106	-0.623***	-0.145	-0.667***	-0.109	-0.671***	-0.105	-0.597***	-0.0604
	(0.0410)	(0.0753)	(0.0409)	(0.0747)	(0.0423)	(0.0821)	(0.0408)	(0.0747)	(0.0409)	(0.0747)	(0.0415)	(0.0751)
In GDij	-0.315***	-0.601***	-0.316***	-0.604***	-0.318***	-0.595***	-0.317***	-0.597***	-0.315***	-0.606***	-0.326***	-0.764***
	(0.00990)	(0.0299)	(0.00993)	(0.0299)	(0.00991)	(0.0303)	(0.00992)	(0.0301)	(0.00992)	(0.0298)	(0.0138)	(0.0396)
RDij (All)	-0.0139	-0.702***										
	(0.0530)	(0.136)										
RDij (TM)			-0.0595	-0.595***								
			(0.0450)	(0.114)								
RDij (NT)					-0.252***	-0.153						
					(0.0522)	(0.145)						
RDij (SPS)							-0.139***	-0.180**				
							(0.0278)	(0.0672)				
RDij (TBT)									-0.00211	-0.649***		
									(0.0365)	(0.0920)		
RDij (INSP)											-0.109***	-0.100
											(0.0252)	(0.0677)
Constant	-9.576***	-12.64***	-9.542***	-12.58***	-9.551***	-12.99***	-9.534***	-12.89***	-9.573***	-12.36***	-10.20***	-13.75***
	(0.143)	(0.411)	(0.144)	(0.408)	(0.141)	(0.414)	(0.141)	(0.413)	(0.144)	(0.406)	(0.156)	(0.422)
Observations	14938	14938	14938	14938	14938	14938	14938	14938	14938	14938	12935	12935
R^2	0.384	0.259	0.383	0.259	0.385	0.257	0.382	0.257	0.384	0.262	0.385	0.297

EM = extensive margin, IM = intensive margin, PPML = Poisson pseudo-maximum likelihood.

Notes: Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Authors.

6. Conclusions

The study aims to assess the regulatory structure and examine the implications of regulatory distance on trade along the trade margins – extensive and intensive. In doing so, it assesses the impact of regulatory distance by type and sector on both margins. Conclusively, at the country level, there exists a varying regulatory structure amongst ASEAN+5 countries ranging from 0.087 to 0.346. NTM regulatory implementation also varies by sector and type of measure. Within sectors, SPS regulatory distance is higher in the agricultural sector, while for manufacturing, the TBT distance is higher. Notably, few countries recorded a higher regulatory distance for non-technical measures and pre-shipment inspections and other formalities. Interestingly, for the ASEAN region, there seems to be no evidence supporting a reduction in regulatory structure dissimilarity from 2015 to 2018, despite the efforts to harmonise NTMs since 2015, especially those related to technical measures. However, the increase in regulatory distance seems to be greater in non-technical measures than technical measures from 2015 to 2018. The results indicate that regulatory distance has a largely trade-reducing effect along the trade margins within ASEAN+5 bilateral trade, limiting the trade flows. Technical measures have a greater trade-reducing effect than other measures along both margins, specifically SPS measures in the agriculture sector and TBTs in the manufacturing sector. Notably, the evidence also indicates the impact of non-technical measures and pre-shipments and other formalities along extensive margins.

The results of this paper provides the following policy insights. First, although the extensive margin is greater than the intensive margin for most of the trading partners, the positive effect of the larger exporters exporting more along the intensive margin than the extensive margin could indicate the need to expand the extensive margins amongst the ASEAN+5 countries. Nevertheless, given that regulatory distance has a trade-reducing effect on extensive margins, it is important that the countries attempt to reduce the regulatory distance to increase the contribution of the larger exporters along the extensive margin. Additionally, the negative impact on extensive margins could also suggest that trade reduces along the extensive margin due to the fixed cost of such regulatory distance, limiting more

exporters from exporting wider range of products.

Second, understanding the regulatory distance patterns provides input for trade negotiators. First, international trade cooperation is inevitable as we find evidence that countries with bilateral PTAs related to SPS measures and TBTs have a lower regulatory distance. Given this, ASEAN as a region should embark more aggressively to harmonise regulatory incoherency since eliminating NTMs for legitimate reasons is no option. Second, technical measures, particularly SPS measures and TBTs, should be the focus of the harmonisation efforts as they have a greater impact on trade. In particular, countries with a higher technical regulatory distance, as shown by the decomposition of regulatory distance by measures and sectors, could learn and benchmark themselves in harmonising the regulatory structure.

Another easy policy target for harmonisation efforts could be non-technical measures and pre-shipment inspections and other formalities, where few countries have shown a higher distance. This is also important for ASEAN, since the overall growth in regulatory distance in non-technical measures from 2015 to 2018 seems to be significantly greater than in technical measures over the same period. The greater increase could be partly explained by the lack of current harmonisation efforts on non-technical measures. The best practices of other AMS could aid countries with higher non-technical regulatory distance to reduce the disparity and eventually converge with the rest. The ASEAN+5 could also be more targeted in their harmonisation efforts in some of the sectors where differences are greater. A more detailed account of the regulatory distance at the 2-digit product level and by type of measure indicates that all agricultural products are subject to greater regulatory distance (greater than simple averages of 0.2). However, pre-packaged food, specifically, records a higher regulatory distance within the agriculture sector. In the manufacturing sector, chemical including pharmaceutical, rubber, wood, and electrical and electronics products, recorded a higher average regulatory distance. Having better sectoral targets would help policymakers find common ground for the harmonisation efforts. ASEAN is already focusing on standard related measures in specific sectors and these efforts can be extended. A few sectors, such as pharmaceuticals, could have larger welfare effects on society if the trade-reducing

effect of regulatory distance can be lowered with the harmonisation efforts. Nevertheless, policymakers should work closely with stakeholders – specifically industries – to outline harmonisation strategies.

Nonetheless, our current measure of regulatory distance does not give enough information on stringency, and since implementation patterns are more complicated, it is therefore suggested that harmonisation efforts should take into consideration a more detailed assessment of such regulatory distance. Our results provide an avenue for identifying the types of regulations and sectors that experience the most trade-reducing effects on trade margins. As a starting point, policymakers can focus their harmonisation efforts on those measures and sectors. The study has also highlighted some of the variations in regulatory distance that can be useful for policymakers in an effort to achieve greater regional integration.

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Appendix Table 1: ASEAN+5 – Margins of Trade by Product Group, 2016

HS 2-digit	EM	IM
Agriculture (HS 01–HS 24)		
01 – Animals, live	0.16975	0.09303
02 – Meat and edible meat offal	0.23024	0.07631
03 – Fish and crustaceans, molluscs, and other aquatic invertebrates	0.46012	0.07492
04 – Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	0.36833	0.06294
05 – Animal originated products, not elsewhere specified or included	0.26454	0.08904
06 – Trees and other plants, live; bulbs, roots, and the like; cut flowers and ornamental foliage	0.40406	0.05345
07 – Vegetables and certain roots and tubers, edible	0.36791	0.08463
08 – Fruit and nuts, edible; peel of citrus fruits and melons	0.35121	0.07832
09 – Coffee, tea, mate, and spices	0.48085	0.06913
10 – Cereals	0.34497	0.07351
11 – Products of the milling industry; malt, starches, inulin, wheat gluten	0.34234	0.08228
12 – Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruits, industrial or medicinal plants; straw and fodder	0.32322	0.06615
13 – Lac; gums, resins, and other vegetable saps and extracts	0.44593	0.06241
14 – Vegetable plaiting materials; vegetable products not elsewhere specified or included	0.43179	0.07181
15 – Animal or vegetable fats and oils and their cleavage products; prepared animal fats; animal or vegetable waxes	0.33526	0.08087
16 – Meat, fish or crustaceans, molluscs or other invertebrates; preparations thereof	0.38818	0.07376
17 – Sugars and sugar confectionery	0.46276	0.06647
18 – Cocoa and cocoa preparations	0.45103	0.04910
19 – Preparations of cereal, flour, starch, or milk; pastrycooks' products	**0.63857**	**0.05407**
20 – Preparations of vegetables, fruits, nuts, or other parts of plants	0.46842	0.05866
21 – Miscellaneous edible preparations	**0.68893**	**0.04996**
22 – Beverages, spirits, and vinegar	0.53829	0.04355
23 – Food industries, residues and wastes thereof; prepared animal fodder	0.43550	0.04340
24 – Tobacco and manufactured tobacco substitutes	0.52136	0.05534
Manufacturing (HS 25–HS 97)		
25 – Salt; sulphur; earths; stones; plastering materials, lime, and cement	0.36310	0.08237
26 – Ores, slag, and ash	0.22852	0.11506
27 – Mineral fuels, mineral oils, and products of their distillation; bituminous substances; mineral waxes	0.57887	0.05572
28 – Inorganic chemicals; organic and inorganic chemical compounds of precious metals, of rare earth metals, of radioactive elements, and of isotopes	0.31914	0.07903
29 – Organic chemicals	0.33616	0.08005
30 – Pharmaceutical products	0.58490	0.02733
31 – Fertilisers	0.32710	0.04808
32 – Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments, and other colouring matter; paints, varnishes; putty, other mastics; inks	0.54707	0.04967
33 – Essential oils and resinoids; perfumery, cosmetic, or toilet preparations	**0.64679**	**0.04371**
34 – Soap, organic surface active agents; washing, lubricating, polishing, or scouring preparations; artificial or prepared waxes, candles and similar articles, modelling pastes, dental waxes and dental preparations	**0.63331**	**0.04809**

HS 2-digit	EM	IM
with a basis of plaster		
35 – Albuminoidal substances; modified starches; glues; enzymes	0.54349	0.05002
36 – Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations	0.24870	0.07421
37 – Photographic or cinematographic goods	0.36575	0.07252
38 – Chemical products not elsewhere specified	0.56591	0.04559
39 – Plastics and articles thereof	**0.61784**	**0.04651**
40 – Rubber and articles thereof	0.56983	0.05906
41 – Raw hides and skins (other than fur skins) and leather	0.45096	0.04560
42 – Articles of leather; saddlery and harness; travel goods, handbags, and similar containers; articles of animal gut (other than silkworm gut)	**0.67236**	**0.05720**
43 – Fur skins and artificial fur; manufactures thereof	0.21469	0.06496
44 – Wood and articles of food; wood charcoal	0.49094	0.06837
45 – Cork and articles of cork	0.24322	0.06575
46 – Manufactures of straw, esparto, or other plaiting materials; basket-ware and wickerwork	0.47159	0.08282
47 – Pulp of wood or other fibrous cellulosic material; waste and scrap of paper and paperboard	0.22951	0.07316
48 – Paper and paperboard; articles of paper pulp, paper, or paperboard	0.52193	0.05506
49 – Printed books, newspapers, pictures, and other products of the printing industry; manuscripts, typescripts, and plans	**0.63152**	**0.03704**
50 – Silk	0.32500	0.08745
51 – Wood, fine or coarse animal hair; horsehair yarn and woven fabric	0.21397	0.09709
52 – Cotton	0.39152	0.07374
53 – Vegetable textile fibres; paper yarn and woven fabrics of paper yarn	0.24973	0.07930
54 – Man-made filaments; strip and the like of man-made textile materials	0.43993	0.05739
55 – Man-made staple fibres	0.35637	0.07366
56 – Wadding, felt and nonwovens, special yarns; twine, cordage, ropes and cables, and articles thereof	0.46634	0.06205
57 – Carpets and other textile floor coverings	0.45432	0.06578
58 – Fabrics, special woven fabrics, tufted textile fabrics, lace, tapestries, trimmings, embroidery	0.45754	0.05019
59 – Textile fabrics; impregnated, coated, covered, or laminated; textile articles of a kind suitable for industrial use	0.50458	0.05957
60 – Fabrics; knitted or crocheted	0.54764	0.04838
61 – Apparel and clothes accessories; knitted or crocheted	**0.61059**	**0.06534**
62 – Apparel and clothes accessories; not knitted or crocheted	**0.62811**	**0.05543**
63 – Textiles, made-up articles; sets; worn clothing and worn textile articles; rags	0.52431	0.06118
64 – Footwear, gaiters, and the like; parts of such articles	**0.65067**	**0.06178**
65 – Headgear and parts thereof	**0.60983**	**0.05592**
66 – Umbrellas, sun umbrellas, walking sticks, seat sticks, whips, riding crops; and parts thereof	0.38447	0.07439
67 – Feathers and down prepared; and articles made of feather and of down; artificial flowers; articles of human hair	0.37400	0.08134
68 – Stone, plaster, cement, asbestos, mica, or similar materials; articles thereof	0.45877	0.06026
69 – Ceramic products	0.51077	0.06355
70 – Glass and glassware	0.47064	0.05867
71 – Natural, cultured pearls; precious, semi-precious stones; precious metals, metals clad with precious metal, and articles thereof; imitation	0.35755	0.06906

HS 2-digit	EM	IM
jewellery; coins		
72 – Iron and steel	0.36054	0.06204
73 – Iron or steel articles	**0.60893**	**0.05266**
74 – Copper and articles thereof	0.47845	0.05758
75 – Nickel and articles thereof	0.31383	0.06280
76 – Aluminium and articles thereof	0.56293	0.05638
78 – Lead and articles thereof	0.38972	0.05481
79 – Zinc and articles thereof	0.38500	0.06653
80 – Tin; articles thereof	0.43147	0.06423
81 – Other base metals, cermets, and articles thereof	0.22980	0.09748
82 – Tools, implements, cutlery, spoons, and forks of base metal; parts thereof, of base metal	0.51581	0.05402
83 – Metal; miscellaneous products of base metals	0.57216	0.05326
84 – Nuclear reactors, boilers, machinery, and mechanical appliances; parts thereof	0.59057	0.04961
85 – Electrical machinery and equipment and parts thereof; sound recorders and reproducers; television image and sound recorders and reproducers, parts and accessories of such articles	**0.64244**	**0.05092**
86 – Railway, tramway locomotives, rolling stock and parts thereof; railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signalling equipment of all kinds	0.27213	0.06843
87 – Vehicles; other than railway or tramway rolling stock, and parts and accessories thereof	0.55026	0.05011
88 – Aircraft, spacecraft, and parts thereof	0.27119	0.03972
89 – Ships, boats, and floating structures	0.21260	0.08437
90 – Optical, photographic, cinematographic, measuring, checking, medical, or surgical instruments and apparatus; parts and accessories	0.56202	0.04157
91 – Clocks and watches and parts thereof	0.34358	0.05337
92 – Musical instruments; parts and accessories of such articles	0.38564	0.07653
93 – Arms and ammunition; parts and accessories thereof	0.14046	0.06353
94 – Furniture; bedding mattresses, mattress supports, cushions, and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified; illuminated signs, illuminated name–plates and the like; prefabricated buildings	**0.65516**	**0.05920**
95 – Toys, games and sports requisites; parts and accessories thereof	0.57911	0.06211
96 – Miscellaneous manufactured articles	0.49010	0.06232
97 – Works of art; collectors' pieces and antiques	0.40942	0.04647

ASEAN = Association of Southeast Asian Nations; ASEAN+5 = ASEAN Member States plus Australia, China, India, Japan, and New Zealand; EM = extensive margin; HS = Harmonized System; IM = intensive margin.
Note: Averaged across products at the HS 6-digit level for all trading partners. Figures in bold refer to an extensive margin of more than 0.60.
Source: Calculated from the UN Comtrade Database (United Nations, n.d.).

Appendix Table 2: ASEAN+5 – Regulatory Distance for NTMs by Country Pair, by Sector, and by NTM Type, 2016

Country Pair	Agriculture						Manufacturing					
	ALL	TM	NT	SPS	TBT	INSP	ALL	TM	NT	SPS	TBT	INSP
AUS–BRN	0.238	0.236	0.247	0.308	0.145	0.050	0.104	0.113	0.083	0.054	0.151	0.008
AUS–CHN	0.362	0.413	0.148	0.345	0.566	0.172	0.293	0.342	0.166	0.312	0.404	0.267
AUS–IDN	0.277	0.307	0.159	0.382	0.163	0.451	0.171	0.185	0.138	0.094	0.186	0.293
AUS–IND	0.287	0.319	0.157	0.345	0.247	0.489	0.156	0.178	0.107	0.086	0.196	0.212
AUS–JPN	0.224	0.244	0.134	0.331	0.117	0.125	0.138	0.167	0.074	0.088	0.202	0.099
AUS–KHM	0.268	0.300	0.129	0.387	0.201	0.001	0.221	0.264	0.111	0.211	0.295	0.022
AUS–LAO	0.244	0.249	0.232	0.328	0.114	0.286	0.175	0.135	0.271	0.087	0.143	0.192
AUS–MMR	0.254	0.260	0.223	0.334	0.145	0.193	0.133	0.132	0.132	0.076	0.163	0.038
AUS–MYS	0.193	0.204	0.141	0.233	0.175	0.055	0.107	0.116	0.093	0.040	0.160	0.018
AUS–NZL	0.225	0.241	0.160	0.317	0.153	0.003	0.142	0.176	0.065	0.108	0.215	0.009
AUS–PHL	0.344	0.327	0.413	0.422	0.201	0.167	0.193	0.192	0.193	0.087	0.233	0.067
AUS–SGP	0.223	0.224	0.211	0.298	0.133	0.000	0.119	0.124	0.115	0.052	0.171	0.000
AUS–THA	0.213	0.217	0.197	0.261	0.170	0.042	0.102	0.116	0.073	0.066	0.145	0.039
AUS–VNM	0.251	0.269	0.180	0.305	0.255	0.009	0.216	0.241	0.154	0.346	0.238	0.027
BRN–CHN	0.347	0.388	0.186	0.332	0.513	0.157	0.249	0.299	0.118	0.294	0.338	0.259
BRN–IDN	0.233	0.236	0.229	0.278	0.139	0.401	0.134	0.128	0.151	0.074	0.105	0.285
BRN–IND	0.329	0.359	0.201	0.390	0.283	0.515	0.123	0.138	0.088	0.068	0.142	0.204
BRN–JPN	0.235	0.226	0.289	0.273	0.149	0.175	0.112	0.124	0.088	0.068	0.145	0.090
BRN–KHM	0.240	0.237	0.278	0.260	0.224	0.051	0.172	0.201	0.096	0.192	0.205	0.014
BRN–LAO	0.191	0.197	0.166	0.221	0.142	0.258	0.146	0.085	0.294	0.067	0.075	0.184
BRN–MMR	0.194	0.166	0.332	0.153	0.171	0.242	0.084	0.070	0.112	0.053	0.081	0.030
BRN–MYS	0.203	0.190	0.270	0.195	0.196	0.076	0.058	0.064	0.039	0.021	0.089	0.010
BRN–NZL	0.240	0.246	0.224	0.301	0.181	0.052	0.103	0.128	0.043	0.091	0.151	0.000
BRN–PHL	0.274	0.259	0.336	0.304	0.193	0.217	0.160	0.152	0.172	0.059	0.185	0.059
BRN–SGP	0.179	0.173	0.220	0.187	0.161	0.000	0.060	0.062	0.054	0.031	0.085	0.000
BRN–THA	0.222	0.218	0.249	0.245	0.189	0.090	0.066	0.061	0.080	0.048	0.070	0.030
BRN–VNM	0.284	0.273	0.349	0.326	0.220	0.058	0.195	0.217	0.136	0.328	0.207	0.019
CHN–IDN	0.352	0.393	0.185	0.279	0.582	0.362	0.307	0.353	0.197	0.293	0.386	0.438
CHN–IND	0.426	0.476	0.226	0.392	0.609	0.528	0.304	0.364	0.153	0.307	0.411	0.391
CHN–JPN	0.390	0.439	0.195	0.374	0.582	0.212	0.298	0.350	0.169	0.322	0.402	0.315
CHN–KHM	0.377	0.427	0.187	0.314	0.652	0.173	0.310	0.371	0.155	0.396	0.396	0.270
CHN–LAO	0.355	0.371	0.313	0.237	0.608	0.254	0.332	0.318	0.363	0.310	0.351	0.385
CHN–MMR	0.393	0.419	0.290	0.347	0.548	0.340	0.285	0.320	0.191	0.309	0.361	0.288
CHN–MYS	0.356	0.401	0.185	0.311	0.581	0.173	0.263	0.318	0.118	0.278	0.380	0.267
CHN–NZL	0.403	0.470	0.123	0.410	0.613	0.175	0.294	0.358	0.132	0.345	0.408	0.259
CHN–PHL	0.360	0.367	0.333	0.283	0.520	0.301	0.329	0.369	0.222	0.311	0.426	0.286
CHN–SGP	0.383	0.421	0.244	0.325	0.619	0.000	0.269	0.317	0.142	0.292	0.375	0.000
CHN–THA	0.366	0.391	0.280	0.329	0.525	0.185	0.266	0.308	0.164	0.300	0.351	0.269
CHN–VNM	0.352	0.386	0.222	0.305	0.555	0.181	0.345	0.405	0.193	0.552	0.412	0.248
IDN–IND	0.345	0.367	0.258	0.423	0.256	0.485	0.185	0.201	0.154	0.091	0.183	0.436
IDN–JPN	0.207	0.228	0.127	0.285	0.110	0.397	0.174	0.190	0.137	0.103	0.178	0.361

Country Pair	Agriculture						Manufacturing					
	ALL	TM	NT	SPS	TBT	INSP	ALL	TM	NT	SPS	TBT	INSP
IDN–KHM	0.215	0.234	0.151	0.252	0.169	0.452	0.218	0.249	0.144	0.151	0.245	0.293
IDN–LAO	0.185	0.171	0.274	0.217	0.089	0.195	0.207	0.156	0.337	0.092	0.123	0.430
IDN–MMR	0.242	0.246	0.227	0.272	0.138	0.641	0.157	0.145	0.184	0.083	0.127	0.314
IDN–MYS	0.216	0.232	0.152	0.275	0.135	0.396	0.139	0.138	0.144	0.061	0.128	0.293
IDN–NZL	0.270	0.310	0.106	0.390	0.154	0.453	0.177	0.199	0.128	0.124	0.187	0.285
IDN–PHL	0.281	0.264	0.355	0.274	0.204	0.540	0.216	0.211	0.231	0.086	0.212	0.339
IDN–SGP	0.209	0.222	0.162	0.251	0.137	0.000	0.159	0.153	0.178	0.071	0.151	0.000
IDN–THA	0.254	0.268	0.203	0.332	0.142	0.417	0.134	0.138	0.127	0.089	0.112	0.303
IDN–VNM	0.272	0.291	0.197	0.317	0.225	0.456	0.258	0.281	0.200	0.346	0.247	0.304
IND–JPN	0.322	0.346	0.226	0.411	0.224	0.427	0.146	0.165	0.104	0.098	0.163	0.242
IND–KHM	0.356	0.391	0.214	0.440	0.292	0.490	0.226	0.274	0.107	0.220	0.267	0.209
IND–LAO	0.307	0.331	0.204	0.389	0.230	0.366	0.193	0.145	0.313	0.080	0.133	0.322
IND–MMR	0.336	0.346	0.296	0.392	0.213	0.675	0.130	0.126	0.138	0.069	0.120	0.234
IND–MYS	0.292	0.311	0.213	0.323	0.270	0.442	0.127	0.140	0.096	0.054	0.149	0.211
IND–NZL	0.307	0.326	0.246	0.349	0.259	0.492	0.152	0.189	0.065	0.115	0.196	0.204
IND–PHL	0.358	0.367	0.322	0.395	0.304	0.479	0.203	0.222	0.152	0.072	0.258	0.250
IND–SGP	0.327	0.348	0.256	0.385	0.261	0.0000	0.133	0.142	0.112	0.066	0.153	0.000
IND–THA	0.273	0.309	0.127	0.329	0.248	0.478	0.116	0.131	0.082	0.069	0.127	0.210
IND–VNM	0.356	0.384	0.251	0.394	0.349	0.498	0.252	0.292	0.149	0.345	0.283	0.220
JPN–KHM	0.183	0.203	0.101	0.243	0.144	0.124	0.220	0.261	0.117	0.224	0.270	0.104
JPN–LAO	0.228	0.218	0.293	0.304	0.072	0.232	0.185	0.144	0.283	0.101	0.138	0.221
JPN–MMR	0.204	0.209	0.170	0.267	0.102	0.266	0.137	0.135	0.137	0.088	0.146	0.119
JPN–MYS	0.165	0.180	0.091	0.219	0.118	0.131	0.114	0.124	0.093	0.054	0.148	0.100
JPN–NZL	0.212	0.239	0.091	0.329	0.104	0.125	0.134	0.164	0.068	0.124	0.175	0.091
JPN–PHL	0.330	0.331	0.323	0.412	0.205	0.286	0.213	0.222	0.190	0.100	0.258	0.149
JPN–SGP	0.159	0.161	0.151	0.184	0.122	0.000	0.111	0.122	0.091	0.042	0.155	0.000
JPN–THA	0.215	0.232	0.134	0.311	0.117	0.124	0.104	0.119	0.071	0.078	0.128	0.112
JPN–VNM	0.243	0.270	0.125	0.327	0.200	0.131	0.244	0.280	0.154	0.354	0.279	0.109
KHM–LAO	0.212	0.201	0.289	0.252	0.100	0.287	0.250	0.225	0.312	0.222	0.204	0.188
KHM–MMR	0.217	0.228	0.168	0.268	0.167	0.191	0.194	0.212	0.138	0.177	0.224	0.044
KHM–MYS	0.185	0.207	0.097	0.237	0.176	0.057	0.179	0.213	0.091	0.180	0.229	0.022
KHM–NZL	0.228	0.258	0.109	0.343	0.155	0.001	0.207	0.264	0.069	0.237	0.276	0.014
KHM–PHL	0.308	0.305	0.331	0.364	0.235	0.166	0.261	0.291	0.181	0.218	0.309	0.058
KHM–SGP	0.178	0.186	0.155	0.211	0.169	0.000	0.195	0.222	0.123	0.190	0.243	0.000
KHM–THA	0.255	0.276	0.163	0.344	0.200	0.040	0.177	0.207	0.104	0.207	0.202	0.044
KHM–VNM	0.254	0.282	0.135	0.352	0.212	0.007	0.305	0.361	0.157	0.483	0.341	0.032
LAO–MMR	0.215	0.187	0.343	0.207	0.106	0.463	0.153	0.082	0.325	0.066	0.072	0.212
LAO–MYS	0.192	0.174	0.287	0.215	0.096	0.230	0.145	0.086	0.294	0.053	0.080	0.192
LAO–NZL	0.296	0.290	0.343	0.399	0.108	0.288	0.187	0.152	0.279	0.122	0.144	0.184
LAO–PHL	0.238	0.197	0.431	0.182	0.189	0.388	0.233	0.169	0.388	0.074	0.185	0.236
LAO–SGP	0.160	0.145	0.240	0.162	0.092	0.000	0.160	0.096	0.319	0.062	0.098	0.000
LAO–THA	0.219	0.218	0.237	0.268	0.128	0.250	0.136	0.084	0.267	0.081	0.060	0.210

Country Pair	Agriculture						Manufacturing					
	ALL	TM	NT	SPS	TBT	INSP	ALL	TM	NT	SPS	TBT	INSP
LAO–VNM	0.258	0.240	0.356	0.256	0.204	0.294	0.268	0.234	0.351	0.316	0.220	0.203
MMR–MYS	0.170	0.173	0.148	0.182	0.143	0.248	0.084	0.073	0.106	0.041	0.088	0.040
MMR–NZL	0.244	0.257	0.185	0.334	0.138	0.193	0.126	0.139	0.089	0.108	0.154	0.030
MMR–PHL	0.322	0.297	0.427	0.334	0.235	0.311	0.175	0.167	0.194	0.066	0.204	0.089
MMR–SGP	0.183	0.183	0.173	0.204	0.145	0.000	0.102	0.085	0.139	0.052	0.106	0.000
MMR–THA	0.233	0.231	0.235	0.298	0.122	0.231	0.083	0.072	0.110	0.070	0.068	0.060
MMR–VNM	0.271	0.282	0.214	0.320	0.233	0.199	0.219	0.233	0.171	0.335	0.229	0.049
MYS–NZL	0.200	0.220	0.104	0.275	0.154	0.058	0.107	0.131	0.051	0.077	0.156	0.010
MYS–PHL	0.303	0.294	0.340	0.324	0.257	0.223	0.168	0.162	0.179	0.053	0.200	0.062
MYS–SGP	0.134	0.138	0.116	0.136	0.148	0.000	0.064	0.065	0.060	0.017	0.092	0.000
MYS–THA	0.169	0.173	0.146	0.225	0.100	0.085	0.061	0.062	0.064	0.035	0.074	0.040
MYS–VNM	0.229	0.249	0.134	0.261	0.262	0.064	0.203	0.231	0.129	0.314	0.235	0.028
NZL–PHL	0.342	0.358	0.267	0.448	0.241	0.167	0.193	0.207	0.153	0.118	0.238	0.059
NZL–SGP	0.220	0.234	0.166	0.303	0.151	0.000	0.116	0.137	0.069	0.089	0.167	0.000
NZL–THA	0.235	0.250	0.165	0.328	0.154	0.042	0.105	0.128	0.055	0.105	0.136	0.031
NZL–VNM	0.256	0.283	0.144	0.340	0.234	0.009	0.235	0.281	0.115	0.379	0.279	0.019
PHL–SGP	0.288	0.266	0.394	0.292	0.239	0.000	0.179	0.169	0.200	0.061	0.212	0.000
PHL–THA	0.278	0.287	0.245	0.317	0.256	0.184	0.168	0.164	0.170	0.078	0.189	0.089
PHL–VNM	0.295	0.274	0.384	0.299	0.249	0.173	0.258	0.260	0.238	0.328	0.266	0.051
SGP–THA	0.200	0.202	0.193	0.244	0.156	0.000	0.080	0.075	0.100	0.046	0.095	0.000
SGP–VNM	0.228	0.245	0.169	0.267	0.246	0.000	0.208	0.237	0.125	0.322	0.245	0.000
THA–VNM	0.267	0.284	0.192	0.333	0.245	0.048	0.202	0.229	0.135	0.340	0.217	0.049
Average	0.263	0.275	0.220	0.303	0.234	0.213	0.180	0.191	0.152	0.157	0.204	0.140

ASEAN = Association of Southeast Asian Nations; ASEAN+5 = ASEAN Member States plus Australia, China, India, Japan, and New Zealand; AUS = Australia; BRN = Brunei; CHN = China; HS = Harmonized System; IDN = Indonesia; IND = India; INSP = pre-shipment inspection; JPN = Japan; KHM = Cambodia; LAO = Lao People's Democratic Republic; MMR = Myanmar; MYS = Malaysia; NT = non-technical measure; NTM = non-tariff measure; NZL = New Zealand; PHL = Philippines, SGP = Singapore, SPS = sanitary and phytosanitary measure; TBT = technical barrier to trade; THA = Thailand; TM = technical measure; VNM = Viet Nam.
Notes: Values above 0.3 are shaded. Averaged across all HS 6-digit products.
Source: Calculated from the UNCTAD TRAINS database (UNCTAD, n.d.).

Appendix Table 3: ASEAN+5 – Regulatory Distance for NTMs, by 2-Digit Products and by NTM Type, 2016

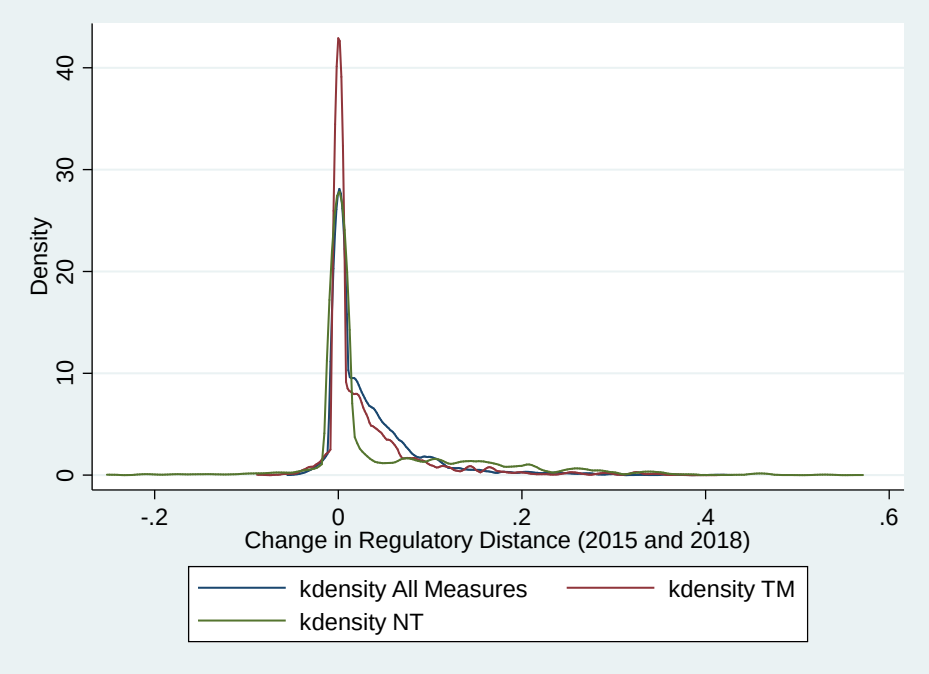
Product code	ALL	TM	NT	SPS	TBT	INSP
1	0.2428	0.2641	0.1874	0.2808	0.2245	0.3134
2	0.2871	0.2975	0.2404	0.3312	0.2490	0.2653
3	0.2996	0.3141	0.2401	0.3544	0.2421	0.3388
4	0.2886	0.3052	0.2233	0.3500	0.2460	0.2309
5	0.2241	0.2329	0.1928	0.2441	0.2153	0.2724
6	0.2363	0.2559	0.1858	0.2568	0.2408	0.3347
7	0.2722	0.2806	0.2304	0.3071	0.2369	0.2539
8	0.2646	0.2724	0.2263	0.2997	0.2287	0.2378
9	0.2788	0.2861	0.2371	0.3189	0.2402	0.2531
10	0.2552	0.2785	0.1853	0.3033	0.2332	0.3045
11	0.2713	0.2772	0.2390	0.3130	0.2268	0.2161
12	0.2510	0.2677	0.1925	0.2954	0.2235	0.2669
13	0.2851	0.2926	0.2452	0.3145	0.2742	0.2177
14	0.2227	0.2390	0.1556	0.2615	0.1790	0.3143
15	0.2749	0.2826	0.2329	0.3186	0.2336	0.2335
16	0.2858	0.2985	0.2317	0.3396	0.2353	0.2671
17	0.2742	0.2845	0.2285	0.3209	0.2447	0.1916
18	0.2708	0.2736	0.2544	0.3114	0.2299	0.1723
19	0.2713	0.2712	0.2709	0.3101	0.2296	0.1812
20	0.2692	0.2761	0.2347	0.3124	0.2331	0.1751
21	0.2762	0.2767	0.2733	0.3083	0.2362	0.2191
22	0.2676	0.2751	0.2417	0.3031	0.2567	0.1457
23	0.2369	0.2542	0.1598	0.2860	0.2002	0.2977
24	0.2100	0.2369	0.1743	0.2240	0.2574	0.1820
25	0.1552	0.1498	0.1640	0.1544	0.1514	0.1413
26	0.1822	0.1797	0.1851	0.1333	0.1966	0.2058
27	0.2116	0.2185	0.2000	0.1333	0.2391	0.1756
28	0.1838	0.1822	0.1906	0.1766	0.1973	0.0839
29	0.2138	0.2215	0.1911	0.1759	0.2502	0.1072
30	0.2605	0.2724	0.2224	0.1719	0.3403	0.1672
31	0.2178	0.2328	0.1851	0.1460	0.3238	0.1064
32	0.1751	0.1832	0.1370	0.1428	0.2073	0.0369
33	0.2257	0.2416	0.1740	0.1270	0.2909	0.2097
34	0.2139	0.2226	0.1833	0.0996	0.2547	0.1773
35	0.2796	0.2866	0.2380	0.3142	0.2572	0.2141
36	0.2071	0.2223	0.1822	0.1231	0.2460	0.1656
37	0.1284	0.1432	0.1063	0.1333	0.1455	0.1429
38	0.1702	0.1725	0.1639	0.1404	0.1921	0.1032
39	0.1631	0.1750	0.1119	0.1588	0.1849	0.1600
40	0.1659	0.1771	0.1303	0.1461	0.1995	0.1289

41	0.2028	0.2038	0.1988	0.2097	0.1961	0.2251
Product code	**ALL**	**TM**	**NT**	**SPS**	**TBT**	**INSP**
42	0.2032	0.2044	0.1993	0.1958	0.2168	0.1429
43	0.2044	0.2002	0.2216	0.2021	0.1966	0.2418
44	0.2102	0.2227	0.1754	0.2431	0.1957	0.2360
45	0.2012	0.2186	0.1261	0.2344	0.1975	0.2179
46	0.2154	0.2441	0.1254	0.2619	0.1681	0.2912
47	0.1645	0.1740	0.1462	0.1333	0.2018	0.1286
48	0.1379	0.1495	0.0998	0.1403	0.1531	0.1143
49	0.1411	0.1401	0.1418	0.1429	0.1400	0.1429
50	0.1505	0.1590	0.1223	0.1274	0.1772	0.1708
51	0.1997	0.1998	0.1996	0.1896	0.2181	0.1429
52	0.1369	0.1483	0.1031	0.1137	0.1629	0.1507
53	0.1850	0.1994	0.1131	0.2138	0.1881	0.1812
54	0.1427	0.1603	0.0940	0.1333	0.1691	0.1429
55	0.1417	0.1591	0.0997	0.1333	0.1678	0.1429
56	0.1678	0.1866	0.0936	0.2167	0.1666	0.2033
57	0.1762	0.1862	0.1503	0.1818	0.1993	0.1429
58	0.1445	0.1584	0.1032	0.1493	0.1663	0.1429
59	0.1340	0.1512	0.0862	0.1333	0.1566	0.1429
60	0.1627	0.1772	0.1256	0.1629	0.1910	0.1429
61	0.1793	0.1964	0.1383	0.1645	0.2190	0.1531
62	0.1829	0.1982	0.1453	0.1719	0.2193	0.1530
63	0.1685	0.1871	0.1168	0.1492	0.2073	0.1531
64	0.1902	0.1961	0.1711	0.1749	0.2212	0.1576
65	0.1740	0.1831	0.1429	0.1497	0.1985	0.1429
66	0.1844	0.1896	0.1689	0.1597	0.2119	0.1429
67	0.1791	0.1871	0.1570	0.1740	0.1976	0.1429
68	0.1488	0.1652	0.1168	0.1333	0.1696	0.1500
69	0.1488	0.1676	0.0984	0.1476	0.1752	0.1429
70	0.1655	0.1817	0.1142	0.1468	0.1904	0.1610
71	0.1835	0.1764	0.1892	0.1338	0.1848	0.1763
72	0.1318	0.1527	0.0896	0.1333	0.1720	0.0848
73	0.1143	0.1329	0.0862	0.1333	0.1620	0.0291
74	0.1299	0.1274	0.1369	0.1404	0.1216	0.1758
75	0.1438	0.1498	0.1319	0.1333	0.1493	0.2363
76	0.1325	0.1463	0.1014	0.1407	0.1471	0.1624
78	0.1722	0.1753	0.1635	0.1333	0.1735	0.2703
79	0.1572	0.1658	0.1390	0.1333	0.1711	0.2549
80	0.1717	0.1860	0.1456	0.1333	0.1885	0.2549
81	0.2116	0.2376	0.1727	0.1333	0.2440	0.2895
82	0.1767	0.1915	0.1398	0.1845	0.1949	0.1932
83	0.1357	0.1594	0.0914	0.1414	0.1665	0.1429
84	0.2276	0.2257	0.2307	0.1333	0.2639	0.1601

85	0.2321	0.2427	0.2128	0.1342	0.2809	0.1579
Product code	**ALL**	**TM**	**NT**	**SPS**	**TBT**	**INSP**
86	0.2209	0.2290	0.2071	0.1333	0.2463	0.1429
87	0.2175	0.2492	0.1725	0.1333	0.2667	0.2004
88	0.1702	0.1858	0.1406	0.1333	0.2146	0.1152
89	0.1909	0.2054	0.1673	0.1333	0.2339	0.1293
90	0.2298	0.2615	0.1802	0.1333	0.2930	0.1903
91	0.1976	0.2012	0.1893	0.1563	0.2330	0.1429
92	0.1993	0.1934	0.2180	0.1634	0.2241	0.1429
93	0.2161	0.2183	0.2108	0.1676	0.2396	0.1859
94	0.1693	0.1892	0.1269	0.1569	0.2065	0.0977
95	0.1613	0.1886	0.1193	0.1555	0.2043	0.1395
96	0.1706	0.1796	0.1487	0.1560	0.1916	0.1429
97	0.1855	0.1859	0.1849	0.1786	0.1958	0.1429

ASEAN = Association of Southeast Asian Nations; ASEAN+5 = ASEAN Member States plus Australia, China, India, Japan, and New Zealand; INSP = pre-shipment inspection; NT = non-technical measure; NTM = non-tariff measure; SPS = sanitary and phytosanitary measure; TBT = technical barrier to trade; TM = technical measure.
Note: The descriptions of the product codes are in Appendix Table 1. Shaded areas are values greater than 0.2.
Source: Authors.

Appendix Figure 1: Distribution of the Change in Regulatory Distance, 2015 and 2018, ASEAN



ASEAN = Association of Southeast Asian Nations, NT = non-technical measure, TM = technical measure.
Note: Negative value in change in regulatory distance indicates a reduction in distance while positive value means an increase (greater dissimilarity).
Source: Authors.

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