Article

Estimating the Impacts of Non-Tariff Measures in the Indian Ocean Rim Association

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Abstract: In recent years, the Indian Ocean Rim Association has witnessed an increasing trend in the use of non-tariff measures (NTMs). This study evaluated the impact of NTMs in the Indian Ocean Rim Association through estimations of their ad valorem equivalents at the HS chapter and country levels. A gravity model using NTM count data (intensity) was specified and estimated to derive the importer-specific ad valorem equivalents for the four (4) most used NTMs in the region. The results showed the presence of both import-impeding and import-promoting effects of NTMs; however, the import-impeding effects dominated in the region. The quantitative restriction and safeguard measures were more restrictive compared to the sanitary and phytosanitary measures and technical barriers to trade. This was expected since quantitative restrictions are trade-distorting by design. This calls for reforming trade policy in the region toward NTMs that are more transparent and trade enhancing for successful subsequent trade negotiations in the Indian Ocean Rim Association, which would support the sustainable economic development of the region.

Keywords: ad valorem equivalent; non-tariff measures; gravity model; IORA

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1. Introduction

In the last three decades, the world has witnessed a dramatic increase in international trade, with many countries trading unilaterally and multilaterally. International trade has grown twice as much as global production [1], with total merchandise trade reaching USD 34.9 trillion in 2017 [2]. This growth was partly linked to the rapid technological development across the globe, the process of trade liberalization under the multilateral trading system (WTO), and the proliferation of regional trade integration arrangements (RTAs). The process of multilateral trade liberalization has been successful in significantly reducing import tariffs, which currently stand at an average below 5% globally [3]. However, non-tariff measures (NTMs) are on the rise and can hinder trade-driven sustainable economic development. NTMs can directly or indirectly impact sustainable development. Direct impact involves policies with a direct effect on sustainability, such as protecting health and the environment, while indirect impact involves policies that affect trade and their effects spill over to sustainable development [4,5]. There is a growing literature that matches NTMs to the goals of sustainable development [5–8]. For example, the removal of burdensome NTMs in agrifood trade is expected to enhance sustainable world food security [9].

Non-tariff measures comprise a vast array of technical and non-technical government measures that can alter the volume, direction and composition of trade in a distortionary or promoting manner [10]. For example, some technical NTMs, such as sanitary and phytosanitary agreements (SPS) or technical barriers to trade (TBT), are targeted at protecting plant

and human health and the environment, as well as mitigating information asymmetries and ensuring better import quality [11–14]. Furthermore, some countries make use of NTMs as political instruments (retaliatory) to restrict trade from countries that engage in trade wars with them [15,16]. The use of NTMs is regulated at the multilateral level by three agreements: TBT, SPS and, more recently, the trade facilitation agreement (TFA). The latter agreement is expected to significantly boost global trade as it directly addresses trade inefficiencies that are generated at the border by non-tariff barriers, such as customs red tape and poorer trade logistics.

The incidence of NTMs is on the rise in the Indian Ocean Rim Association (IORA) [17]. The trade structures and geographical and economic diversity of IORA countries vary their capacities to manage the economic implications of the protective measures of NTMs. The strategic address of the protective and distortionary measures of NTMs is expected to foster intra-regional trade (IRT) and promote further regional integration in the IORA [18,19]. The present framework of open regionalism (open regionalism is a form of regional economic integration that does not discriminate against economies outside the region, where countries are free to embark on an individual trade agreement with non-members) and the overlap of various trade agreements might undermine the process of tariff reduction and harmonization in the region. Nevertheless, much can be gained if the focus is on the reduction of NTMs [10] and strengthening the soft component of open regionalism, which involves trade facilitation and economic and technical cooperation [20,21].

In the past, studies about the NTMs of the IORA were addressed qualitatively without quantitative estimation, suggesting that there is still a knowledge gap that needs to be filled concerning the impact of NTMs on trade within the region. To the best of our knowledge, there has not been any study that estimated the ad valorem equivalent (AVE) of NTMs in the IORA. We expect that the estimation of importer-specific AVEs of NTMs in the IORA would contribute to a better understanding of the trade cost in the region and provide research-based information to the ongoing negotiation process of reducing trade costs.

The next section presents a brief background about the IORA and the prevalence of NTMs in the region. Section 3 describes the model, the underlying estimation issues and the data that was used in the analysis. Section 4 discusses the results and their implications, while Section 5 concludes the paper.

2. IORA and NTMs Incidence

The Indian Ocean is one of the fast-growing regions in the world and has always been a conduit for trade within Asia, the Middle East and Africa. Half of the world's container ships transit in this region, with strong future growth prospects [22]. The IORA is a regional economic association that operates on the principle of open regionalism to promote economic and sustainable growth through open trade and investment facilitation. The IORA includes countries from various geographical regions and continents (GCC, Africa and South and East Asia) with varying incomes, development levels, populations and factor endowments (Appendix A, Table A1).

Intra-regional trade has been quite robust in the IORA, despite the non existence of a legally binding regulating trade agreement in the region. However, the intra-regional trade level is relatively low compared to other trade blocs, such as the European Union (EU), North America Free Trade Agreement (NAFTA) and the Asia–Pacific Economic Cooperation (APEC) (APEC also operates based on open regionalism principles) [23]. Commitments by member countries to harmonize trade policy concerning tariffs, non-tariff barriers (NTBs), customs and other trade measures would potentially enhance regional integration and reduce the intra-regional trade performance gap [24]. It is expected that a deeper economic integration by the IORA members would increase the total and agricultural trade by 55 and 90%, respectively, and is equivalent to cutting ad valorem tariffs by 10.3 and 14.9% for both types of trade, respectively [23].

The incidence of NTMs within the Indian Ocean is relatively high based on the notification of NTMs reported to WTO. WTO requires member countries to notify their NTM cases to ensure transparency and improve global trade. About 18% of the global notifications of NTMs were reported by IORA countries (Table 1).

Table 1. Comparison of NTM notifications.

Percentage of IORA Notifications Compared to World Notifications										
Measures	SPS	TBT	ADP	CV	SG	SSG	QR	TRQ	XS	Total
IORA	1822	3607	538	29	3		557	98	45	7227
World	15,145	19,256	1980	234	12	1379	1821	1279	379	41,289
Percent	12.03	18.73	27.17	12.39	25.00	0.00	30.59	7.66	11.87	17.50
Notification of Agricultural Products as a Percentage of Total Products in the IORA										
	SPS	TBT	ADP	CV	SG	SSG	QR	TRQ	XS	Total
Agricultural Products	1656	1414	25	6			175	94	38	3291
Total Products	1822	3607	538	29	3		557	98	45	7227
Percent	90.89	39.20	4.65	20.69	0.00	0.00	31.42	95.92	84.44	45.54

ADP—anti-dumping, CV—countervailing, QR—quantitative restrictions, SG—safeguards, SPS—sanitary and phytosanitary, SSG—special safeguards, TBT—technical barriers to trade, TRQ—tariff-rate quotas, XS—export subsidies. Source: Authors' calculation based on the WTO Integrated Trade Intelligence Portal (I-TIP) as of 2020.

In the IORA, TBT is the most applied form of NTM, followed by SPS measures (Figure 1). However, the agricultural sector had more incidences of SPS than TBT measures. The agricultural sector accounted for 39% of the total incidence of NTMs in the region, following the global trend of the intensive use of NTMs on agri-foods products (Figure 2) compared to manufacturing products [25].

Figure 1. Number of NTM notifications in the IORA as of 2020. Source: Authors' calculations based on the WTO Integrated Trade Intelligence Portal.

Figure 2. World tariffs and AVEs of NTMs by economic sector. Source: UNCTAD 2017 report of NTMs.

3. Model

There are two approaches, direct and indirect, that can be taken when estimating the AVEs of NTMs [26]. The direct method makes use of the handicraft approach and a combination of handicraft and econometric approaches. The handicraft approach involves removing all factors other than NTMs that impact domestic prices and would result in an accurate estimation of the NTM ad valorem equivalent. Breaux et al. [27] are among the few that applied this approach.

The indirect approach involves a two-stage computation for obtaining AVE. The first stage derives the impact on the quantity of trade with and without an NTM, while the second stage converts the impact on the quantity of trade into AVE using the import demand elasticities. This method was developed by Kee et al. [28] but it constrains NTMs to non-negative values, which portray only the trade-impeding effect of NTMs. The effect of an NTM on trade is ambiguous, as it can be trade-facilitating (increase demand) in the presence of positive externalities or trade hindering when it is used as a protective measure. As a result, subsequent studies, such as Beghin et al. [11] and Ghodsi et al. [29], employed unconstrained estimation, which allowed for both positive and negative AVEs, where trade-promoting and trade-restricting effects of NTMs are captured.

A large strand of empirical research has relied on the gravity model when estimating the AVEs of NTMs, despite the increasing prevalence of NTMs and data limitations [30]. This research followed suit and built on the work of Kee et al. [31] and Ghodsi et al. [29] to estimate the AVEs by employing an intensity measure (count number) when capturing the NTMs that were notified to WTO.

The ad valorem equivalent estimation followed a two-stage approach. First, the effect of NTMs on the import demand was estimated using an augmented structural gravity model, followed by transforming the estimates into AVEs. The Poisson pseudo maximum likelihood (PPML) estimator was used for gravity estimation as it resolves issues arising from the presence of zero trade and produces consistent estimates that are easy to interpret [32–34]. As most NTMs are not bilateral, we employed the importer-specific augmented structural gravity model in the logarithmic form as follows:

$$Inc_{ijk} = \beta_{oh} + \beta_{1k} \ln(1 + \tau_{ijk-1}) + \sum_{n=1}^{N-1} \beta_{2k}^n M_{jkt-1}^T + \sum_{i=1}^n \beta_{3jk}^n (\omega_1 M_{jkt-1}^T) + \beta_{4k}^n x_{jkt-1} + \delta_i + \delta_j + \delta_t + u_{ijk-1} \quad (1)$$

Inc_{ijk} is the import value, where i and j indicate the origin and destination of product k (chapter level HS-2 digit) at time t . M_{jkt-1}^T captures the count of an NTM type during the period $t-1$, while τ_{ijkt-1} denotes the bilateral ad valorem tariff imposed by j on imports of k from i . $\omega_1 M_{jkt-1}^T$ is an integer variable that captures the interaction of NTM counts and factor endowments, x_{jkt-1} is a vector of time-varying country-pair characteristics, factor endowment and WTO membership. δ_i , δ_j and δ_t reflect the exporter, importer and time dimensionality, respectively, and help to take care of the multilateral resistance effect [35–37]. Furthermore, the explanatory variables were lagged by a year in order to minimize the endogeneity bias that might result from including policy variables as regressors that often take time before the effects are noticed on demand [29]. The regression equation was carried out at the chapter level of the harmonized system (HS-2 96 chapters) and country-level (the country-pair time effect was used in the country gravity estimation). β_{2k}^n and β_{3k}^n capture the direct and interaction effects of NTMs on import values. The trade impact coefficients (β_{2k}^n , β_{3k}^n) were later inputted into Equation (2) below to estimate the AVEs of NTMs for the IORA importing country ($AVE_{country}$) and chapter ($AVE_{chapter}$). The import demand elasticity, de , was taken from Ghodsi et al. [38].

$$AVE_{Chapter} = \frac{\left[\exp(\beta_{2k}^n + \beta_{3jk}^n) - 1 \right]}{de} \times 100 \quad (2)$$

Data

The analysis was limited to eleven IORA countries due to data availability. The data that were retrieved from the wiiw database provided NTMs information for only 11 out of the 22 IORA countries. The harmonized system (HS) revision 2002 was used to ensure consistency of the trade import data and the NTMs (Appendix A, Table A2) data ranging from 2009 to 2015. Trade import value data and ad valorem tariffs were retrieved from World Bank's World Integrated Trade Solution (WITS). Information on NTMs was pooled from the wiiw database based on an extensive compilation done by Ghodsi et al. [39]. This NTM database was favoured because it is a compilation of NTMs from the World Trade Organization (WTO) and the Integrated Trade Intelligence Portal (I-TIP), which allows for variation in NTM types and NTMs in a continuous form. Only measures of SPS, TBT, QR and SG were considered. The NTMs provided by wiiw were in HS-6 digit and we aggregated them to HS-2 digit using R software to suit the objective of the study. Data on factor endowment (labour and capital stock) were retrieved from the Penn World Tables (PWT 9.1) compiled by Feenstra et al. [40], while the relevant gravity variables (GDP and population) and agricultural land were retrieved from the CEPII and World Bank Indicator database (WDI), respectively.

4. Results and Discussion

Four main NTMs (SPS, TBT, QR and SG) were considered in the analysis based on their prevalence in the IORA region. Our results included both positive and negative AVE estimates, allowing for the evaluation of whether NTMs had import-promoting or import-reducing effects at the country and chapter levels [7,8,21]. Of the total expected AVE estimates, we were only able to retrieve around 36.5% that were binding and significant at the 10% level. Positive AVEs indicate the price-raising effect of NTMS, signalling strong import quality and consumer satisfaction when SPS and TBT measures are considered [14]. It should also be noted that the NTM effect depends on the commodity and the country been analysed [41].

4.1. Country-Level AVE

Only 11 countries were considered in the estimation of the country-level AVEs. The impact of NTMs varies by country depending on prevailing trade and economic structure and the intended purpose of the NTM in place [29]. The results indicated that the imposed SPS measures were mostly import-restricting effects, while the TBT measures had an

import-facilitating effect across all countries (Table 2). The TBT AVEs varied from -0.09 in South Africa to -87 in UAE. The import-facilitating impact of TBT might suggest that IORA countries impose such technical measures to increase the quality of imports and information that is available to consumers. As most of the SPS measures were applied to the agricultural sector, their import-restricting effect may suggest that SPS in the IORA were used as a protective substitute for the declining use of tariffs in the sector. In addition, the restrictive effect of SPS seemed to be higher overall in the high-income countries of the region (Singapore, Oman and Malaysia) than in middle- and low-income countries.

Table 2. AVEs of the IORA countries.

Importer	SPS	TBT	QR	SG	Tariff
UAE	0.026	-87.007	.	-4.396	4.5
Australia	0.055	-0.164	-0.007	.	2
Indonesia	0.009	-0.046	.	-0.702	5
India	-0.028	-0.012	.	-0.881	12.8
Kenya	0.005	-0.009	.	.	9.2
Mauritius	-0.142	.	.	.	0.6
Malaysia	0.487	-0.444	.	.	4.5
Oman	0.400	-1.618	.	37.885	4.6
Singapore	95.771	.	.	.	0
Tanzania	.	-0.698	.	.	9.7
South Africa	-0.010	-0.019	.	-8.250	6.3

PPML estimations were significant at least $p < 0.10$ level. Note: The country-pair time effects and tariffs were computed.

4.2. Chapter-Level AVE in the IORA

The trade impacts of NTMs depend on the type of product and level of aggregation used in the analysis (chapter level in our case). The results are reported based on the HS-2 chapter (Appendix A, Table A3), HS economic sector (Table 3) and sector level (Appendix A, Table A4). In general, there were twice as many positive AVEs indicating import-restriction effects than negative ones (Table 3). These results were in line with those obtained by Ghodsi et al., where the AVEs varied in both positive and negative directions.

Table 3. AVEs of the IORA NTMs by HS economic sector.

Description	SPS	TBT	QR	SG
I: (01–05) Live animals and products	0.011	-0.020	0.658	.
II: (06–14) Vegetable products	-0.004	0.082	0.141	-0.071
III: (15–15) Animal and vegetable fats, oils and waxes	.	.	-0.019	.
IV: (16–24) Prepared foodstuffs, beverages, spirits, vinegar and tobacco	-0.232	-0.033	6.114	4.490
V: (25–27) Mineral products	0.057	0.020	0.054	.
VI: (28–38) Products of chemical and allied industries	21.817	-0.012	1.878	-4.494
VII: (39–40) Resins, plastics and articles and rubber and articles	.	-0.021	0.199	1.922
VIII: (41–43) Hides, skins and articles, saddlery and travel goods	-1.771	0.071	1.251	.
IX: (44–46) Wood, cork and articles and basket wares	.	0.240	.	-0.923
X: (47–49) Paper, paperboard and articles	0.232	0.259	1.687	12.546
XI: (50–63) Textiles and articles	0.976	0.032	-0.525	-3.260
XII: (64–67) Footwear, headgear, feathers, artificial flowers and fans	-0.107	0.001	4.171	.
XIII: (68–70) Articles of stones, plaster, ceramic products and glass	.	-0.005	.	.
XIV: (71–71) Pearls, precious stones and metals and coins	.	.	.	.
XV: (72–83) Base metals and articles	0.263	-0.062	0.640	-0.415
XVI: (84–85) Machinery and electrical equipment	.	-0.004	.	.
XVII: (86–89) Vehicles, aircraft and vessels	-3.594	-3.496	-0.745	-1.050
XVIII: (90–92) Instruments, clocks, recorders and reproducers	.	-0.004	0.785	-2.034
XIX: (93–93) Arms and ammunition	.	0.278	.	.
XX: (94–96) Miscellaneous manufactured articles	-46.767	-0.015	0.593	.
XXI: (97–97) Works of art and antiques	.	.	.	.

Note: Calculated based on simple averages.

Considering the overall binding AVE (Appendix A, Table A3), the SPS measure had the highest and lowest binding AVEs. For the SPS measure, the highest AVE was for albuminoidal substances (HS 35: AVE of 67), followed by cotton (HS 52: AVE of 3) and the lowest was furniture (HS 94: AVE of −47). Regarding the TBT measure, nickel and articles thereof (HS 75: AVE of 0.77) had the highest AVE, closely followed by wood pulp (HS 47: AVE of 0.76), while the lowest was railway or tramway locomotives (HS 86: AVE of −6.9). The QR measure had the highest AVE for tobacco (HS 24: AVE of 36) and the lowest for residues and waste from food industries (HS 23: AVE of −12.5). The results for the SG measures indicated that paper and paperboard (HS 48: AVE of 12.6) obtained the highest AVE and “Other made-up textile articles” (HS 63: AVE of −7) had the lowest AVE.

At the HS economic sector level (Table 3), we observed the import-restricting effect for paper, paperboard and articles (X: (HS 47–49)) and prepared foodstuffs, beverages, spirits, vinegar and tobacco (IV: (HS 16–24)). This might indicate the existence of strong trade barriers. As for vehicles, aircraft and vessels (XVII: (HS 86–89)), we observed an import-promoting effect with negative AVEs.

The results for the sectoral level for agriculture (Appendix A, Table A4) showed, on average, a high AVE for QR and SG measures as opposed to SPS and TBT, despite their high incidence on agricultural products in the IORA. High numbers of specific NTMs might be imposed but do not necessarily translate to strong restrictions, i.e., high AVEs of such NTMs. This might suggest that import quota and contingent trade protection measures were still rampant in the region, probably as a way of protecting the domestic agricultural industries. High AVEs of concern in the agricultural sector, based on the QR and SG measures, were discovered for tobacco, preparation of vegetables, dairy produce and cereals. For the manufacturing product, we found more positive AVEs than negative ones, with albuminoidal substances, headgear, and cotton having high import-restricting effects on them. The manufacturing sector also showed a high AVE on average for QR, which could be linked to its high incidence, as shown in Table 1.

Overall, the observed differences in the AVE estimates might have been due to the product aggregation, the small number of years covered and the small number of countries included in the analysis (due to data paucity).

5. Conclusions

This study aimed to contribute to the empirical literature on the quantification of NTMs in the IORA region by estimating the AVEs of four specific NTMs (SPS, TBT, QR and SG) at the country, product and sector levels. The research method that was used in the analysis followed recent studies, employing an intensity measure of NTMs rather than the conventional dummy variable method. The method allowed for distinguishing the import-promoting and import-restricting effects of specific NTMs.

Overall, the results indicated that NTMs in the IORA were more trade-restricting than trade-promoting, which could have an impact on sustainable economic development through trade. The quantitative and contingent measures were found to be more restrictive than SPS and TBT. At the product level, the results showed that trade in agricultural and food products were negatively affected by NTMs, mostly in the form of quantitative restriction and safeguard measures, despite the prevalence of the SPS measures in agriculture. This area requires more investigation and calls for attention, as contingent measures are more trade-distorting, and understanding their impacts is crucial to future trade agreements in the region. At the country level, we observed high restrictiveness of SPS measures for high-income countries as compared to middle- and low-income countries.

The results that were obtained in this research needed to be interpreted with some precaution due to the limited number of countries covered in the study. Further research is needed to understand the trade effect of NTMs by increasing the countries and years covered. Since this study was carried at a highly aggregated level (HS-2 digit), future studies can be conducted at a more disaggregated level (HS-6 digit) to fully understand the

impact of various NTMs on various products. In addition, it would be useful to thoroughly empirically consider the impact of NTMs on sustainability within the IORA.

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Appendix A

Table A1. IORA countries income and regional classifications.

Region	Countries	Income Level
Australasia	Australia	High
Southeast Asia	Indonesia	Upper Middle
	Malaysia	Upper Middle
	Singapore	High
	Thailand	Upper Middle
South Asia	Bangladesh	Lower Middle
	India	Lower Middle
	Maldives	Upper Middle
	Sri Lanka	Lower Middle
West Asia	Iran	Upper Middle
	Oman	High
	UAE	High
	Yemen	Low
Eastern Africa	Comoros	Low
	Kenya	Lower Middle
	Madagascar	Low
	Mauritius	High
	Seychelles	High
	Somalia	Low
Southern Africa	Tanzania	Lower Middle
	Mozambique	Low
	South Africa	Upper Middle
	France (Reunion Island)	

Table A2. Non-tariff measures classifications.

Imports		
Technical Measures	A	Sanitary and Phytosanitary Measures
	B	Technical Barriers to Trade
	C	Pre-Shipment Inspection and Other Formalities
	D	Contingent Trade-Protective Measures
	E	Non-Automatic Licensing, Quotas, Prohibitions and Quantity-Control Measures Other Than for SPS or TBT Reasons
Non-Technical Measures	F	Price-Control Measures, Including Additional Taxes and Charges
	G	Finance Measures
	H	Measures Affecting Competition Procurement Restrictions, Intellectual Property and Rules of Origin
	I	Trade-Related Investment Measures
	J	Distribution Restrictions
	K	Restrictions on Post-Sales Services
	L	Subsidies (Excluding Export Subsidies Under P7)
	M	Government Procurement Restrictions
	N	Intellectual Property
	O	Rules of Origin
Exports		
	P	Export-Related Measures

Source: UNCTAD 2015.

Table A3. AVEs of NTMs at the HS chapter level.

HS 2	Description	SPS	TBT	QR	SG
1	Live animals and products	0.020	−0.087	.	.
2	Meat and edible meat offal	.	−0.003	−1.338	.
3	Fish and crustaceans, molluscs, ...	.	−0.002	.	.
4	Dairy produce, birds' eggs, ...	0.002	−0.008	3.164	.
5	Products of animal origin, ...	.	0.000	0.147	.
6	Live trees and other plants, ...	.	.	.	.
7	Edible vegetables and certain ...	−0.004	0.003	.	.
8	Edible fruit and nuts, ...	.	−0.002	.	.
9	Coffee, tea, ...	.	.	.	.
10	Cereals	.	−0.045	1.582	.
11	Products of the milling industry, ...	−0.005	0.004	.	−0.071
12	Oilseeds and oleaginous fruits, ...	.	.	−0.291	.
13	Lac, gums, resins, ...	.	.	−0.867	.
14	Vegetable plaiting materials, ...	.	0.449	.	.
15	Animal or vegetable fats and oils, ...	.	.	−0.019	.
16	Preparations of meat, of fish, ...	−0.016	−0.010	−5.161	.
17	Sugars and sugar confectionery	.	−0.021	.	.
18	Cocoa and cocoa preparations	−0.043	.	.	.
19	Preparations of cereals, flour, ...	0.006	0.000	.	.
20	Preparations of vegetables, ...	.	−0.005	.	4.490
21	Miscellaneous edible preparations	0.029	−0.015	.	.
22	Beverages, spirits and vinegar	.	−0.006	.	.
23	Residues and waste from ...	0.005	−0.007	−12.529	.
24	Tobacco and manufactured ...	−1.376	−0.196	36.032	.
25	Salt, sulfur, earth and stone, ...	0.057	−0.002	0.054	.
26	Ores, slag and ash	.	.	.	.
27	Mineral fuels, mineral oils, ...	.	0.041	.	.
28	Inorganic chemicals, organic ...	.	.	0.064	.

Table A3. Cont.

HS 2	Description	SPS	TBT	QR	SG
29	Organic chemicals	.	.	−0.007	−0.333
30	Pharmaceutical products	.	−0.026	−0.035	.
31	Fertilizers	.	.	0.703	.
32	Tanning or dyeing extracts, ...	−1.838	.	.	.
33	Essential oils and resinoids, ...	.	−0.001	.	.
34	Soap, organic surface-active ...	.	−0.024	0.637	.
35	Albuminoidal substances, ...	67.224	.	11.209	−8.655
36	Explosives, pyrotechnics, ...	.	0.028	0.572	.
37	Photographic or cinematographic ...	.	.	.	.
38	Miscellaneous chemical products	0.065	−0.036	.	.
39	Plastics and articles thereof	.	.	0.169	.
40	Rubber and articles thereof	.	−0.021	0.230	1.922
41	Raw hides and skins ...	.	0.004	1.918	.
42	Articles of leather, saddlery, ...	.	0.138	.	.
43	Furskins and artificial fur, ...	−1.771	.	0.584	.
44	Wood and articles of wood, ...	.	0.062	.	−0.923
45	Cork and articles of cork	.	.	.	.
46	Manufactures of straw, ...	.	0.418	.	.
47	Pulp of wood or other fibrous ...	.	0.762	.	.
48	Paper and paperboard, ...	0.232	0.017	0.141	12.546
49	Printed books, newspapers, ...	.	0.000	3.233	.
50	Silk	.	0.040	.	.
51	Wool, fine or coarse ...	.	.	1.729	.
52	Cotton	3.000	.	0.339	−0.232
53	Other vegetable textile fibres, ...	.	.	−4.476	.
54	Man-made filaments	.	−0.032	−0.545	.
55	Man-made staple fibers	.	0.000	.	.
56	Wadding, felt and nonwovens, ...	.	.	.	.
57	Carpets and other textile floor ...	.	0.043	.	.
58	Special woven fabrics, ...	.	.	.	.
59	Impregnated, coated, covered ...	.	.	.	−2.344
60	Knitted or crocheted fabrics	.	0.095	.	.
61	Articles of apparel and clothing ...	−0.046	.	−0.013	.
62	Articles of apparel and clothing ...	−0.025	.	−0.186	.
63	Other made-up textile articles, ...	.	0.045	.	−7.205
64	Footwear, gaiters and the like, ...	−0.107	.	0.872	.
65	Headgear and parts thereof	.	0.161	7.469	.
66	Umbrellas, sun umbrellas, ...	.	0.537	.	.
67	Prepared feathers ...	.	−0.694	.	.
68	Articles of stone, plaster, ...	.	−0.005	.	.
69	Ceramic products	.	.	.	.
70	Glass and glassware	.	.	.	.
71	Natural or cultured pearls, ...	.	.	.	.
72	Iron and steel	.	.	−0.279	.
73	Articles of iron or steel	0.263	.	.	−0.415
74	Copper and articles thereof	.	−0.130	.	.
75	Nickel and articles thereof	.	0.775	0.077	.
76	Aluminum and articles thereof	.	−0.103	.	.
78	Lead and articles thereof	.	.	.	.
79	Zinc and articles thereof	.	.	.	.
80	Tin and articles thereof	.	−0.896	2.122	.
81	Other base metals, cermets, ...	.	0.203	.	.
82	Tools, implements, cutlery, ...	.	−0.038	.	.
83	Miscellaneous articles ...	.	−0.244	.	.
84	Nuclear reactors, boilers, ...	.	−0.004	.	.
85	Electrical machinery and equipment, ...	.	.	.	.
86	Railway or tramway locomotives, ...	.	−6.851	2.626	.

Table A3. Cont.

HS 2	Description	SPS	TBT	QR	SG
87	Vehicles other than railway ...	−3.594	.	.	−1.050
88	Aircraft, spacecraft, and ...	.	.	.	.
89	Ships, boats and floating ...	.	−0.141	−4.116	.
90	Optical, photographic ...	.	−0.004	.	−2.034
91	Clocks and watches ...	.	.	0.785	.
92	Musical instruments, parts and ...	.	.	.	.
93	Arms and ammunition, parts ...	.	0.278	.	.
94	Furniture, bedding, mattresses, ...	−46.767	−0.058	.	.
95	Toys, games and sports, ...	.	0.027	.	.
96	Miscellaneous manufactured ...	.	.	0.593	.
97	Works of art, collectors' pieces ...	.	.	.	.

Results significant at least at $p < 0.10$ level.

Table A4. AVEs of NTMs at the sectoral level.

Sector	SPS	TBT	QR	SG
Agrifood	−0.138	0.003	2.072	2.210
Manufacturing	1.284	−0.144	0.913	−0.793

Note: Calculated based on simple averages.

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