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Fish Trade and Policy: A primer on Non-Tariff Measures

Abstract

This paper presents some novel results on the prevalence of Non-Tariff Measures (NTMs) in the fish sector. They are obtained using a dataset recently released by UNCTAD's secretariat. Six major stylized facts emerge. First, products of the fish sector are relatively more affected by NTMs and more intensively than products belonging to non-fish sectors. Second, products of the fish sector are mostly affected by technical regulations and in particular SPS measures. Third, almost all countries impose SPS measures on all imports of products of the fish sector. Fourth, similar types of SPS measures and TBTs affect both fish and non-fish products. However, their incidence is much larger in fish products. Fifth, no product (or type of product) of the fish sector appears to be more affected by NTMs than any other. Sixth, no systematic relationship between tariffs and NTMs incidence can be identified.

Key words: Fisheries, Trade, Non-Tariff Measures, Tariffs
JEL Classification: F13

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Introduction

International trade is crucial to the fish sector especially in the least advanced economies. International trade can act as an employment creator, food supplier, income generator, and thus contributes to maintain food and nutrition security. In this context international trade can be expected to play a core role as a contributor to economic growth and development. FAOs most recent report on the State of World Fisheries and Aquaculture (FAO, 2016) points to the fact that the sustained expansion of trade in fish and fishery products observed in recent decades has been fueled by growing fishery production and driven by high demand. As a consequence the fisheries sector has increasingly operated in a globalized environment and the tendency may further intensify. This may not have only positive consequences as over-capture and acceleration in stocks depletion have already reached worrying thresholds. Sustainability has been at risk for several years and trade and its intensification possibly driven by inadequate policy approaches and instruments may not levy related concerns as discussed in a recent report produced by UNCTAD (UNTAD, 2016). Two broad categories of policy measures are usually considered: tariff and non-tariff measures. While the former category is somewhat narrowly defined the latter encompasses a large number of heterogeneous policy instruments including Sanitary and Phytosanitary measures as well as quantity restrictions or subsidies. Both categories of instruments can apply to either imports or exports. Before being in a position that could allow drawing conclusions about the appropriateness or not of the use of this set of instruments, a clear assessment of their respective incidence is necessary and eventually unavoidable. Such an exercise is also necessary to establish any possible relationship between these various instruments and possible consequences in terms of trade and economic performance. However, data on policy instruments other than tariffs remain scarce especially within a consistent multi-country framework.

This paper presents some analysis of the prevalence of Non-Tariff Measures using a novel dataset recently released by UNCTAD. Although the reference country sample remains limited in terms of country coverage, countries included account for more than 80 percent of world fish trade. As a consequence the picture we obtain is a precise reflection of the types of NTMs implemented around the world and especially in major destination markets. The paper also presents some descriptive statistics related to tariffs and offer some integrated view of two major policy instruments implemented in the fish sector. Subsidies are not part of the study due to limited data availability.

Our analysis allows the formulation of several stylized facts. First, products of the fish sector are relatively more affected by NTMs and more intensively than products belonging to non-fish sectors. Second, products of the fish sector are mostly affected by technical regulations and in particular SPS measures. Third, almost all countries impose SPS measures on all imports of products of the fish sector. Fourth, similar types of SPS measures and TBTs affect both fish and non-fish products. However, their incidence is much larger in fish products. Fifth, no product (or type of product) of the fish sector appears to be more affected by NTMs than any other. Sixth, no systematic relationship between tariffs and NTMs incidence can be identified.

The rest of the paper is organized as follows. Next section provides an overview of trade flows and their main actors in the Fish sector. Section 3 presents some major characteristics of NTM data collected by UNCTAD and discusses some possible limitations in their use. Stylized facts based on these NTM data are established in Section 4. Section 5 investigates how tariffs and NTMs incidence relate to each other. Section 6 discusses possible implications for small-scale and artisanal fisheries. Last section presents some possible implications for policy making and indicates desirable directions for further and deeper investigation.

1. Fish trade: an overview

Fish and fishery products constitute one of the most-traded segments of the world food sector. According to FAO (2106) figures, about 78 percent of seafood products are estimated to be exposed to international trade competition. Fish trade has displayed a strong progression in value over the period between 2000 and 2015 as put in evidence by Table 1 figures. Its value more than doubled despite a slowing down since the financial crisis of 2008 and a drop of about 20 percent in 2015. In relative terms, however, fish trade has grown less rapidly than total trade in most years. Moreover its share in total trade has remained below 1 percent over the last 15 years. It was equal to 0.87 percent in 2000 and fell to 0.71 percent in 2014. Fish trade deceleration has proved to be weaker than that of total trade in 2015 and as a consequence its share moved up to 0.74 percent over that year. Table 3 reveals that the largest group of products traded is raw fish either fresh or chilled or frozen and represented 50 percent of total fish exports in 2015 and 44 percent in 2000. The second largest group includes crustaceans and molluscs either fresh or chilled or frozen. Its share in fish trade was equal to 27 percent in 2015 while it was equal to 34 percent in 2000. The third largest group of fish products is not preparations, whose share has remained stable at about 5 percent over the whole period, but oils and fats and other products unfit for human consumption with a share that has slightly increased since 2000 and was about 19 percent in 2015.

Table 4 reports various country groups shares in world exports and imports. Developing countries (excluding China and LDCs) account for about 40 percent of World exports but only about 23 percent of World imports. While the former has slightly decreased since 2000 the latter doubled. Demand has been growing significantly in developing countries and this is without counting China. China's share in total imports more than doubled since 2000 reaching 5.3 percent in 2015. China is the largest exporter of fish and fish products in 2015. Its share in total exports was equal to 7.3 percent in 2000 and moved up to more than 15 percent in 2015. LDCs experience is more contrasted. Their share in world imports more than doubled since 2000 but remains below 1 percent in 2015. In terms of exports, their presence on international markets has fallen over the 15 years under investigation moving form 3.2 per cent in 2000 to 2.5 percent in 2015. Developed countries have also lost part of their predominant role in World imports observed in 2000 again for the benefit of developing countries and China. Nonetheless, developed countries still represent 70 percent of total imports in 2015. On the exports side, the share of developed countries has also decreased over the same period. It was equal to 46.2 percent in 2000 and to about 41 percent fifteen years later. In other words we observe some convergence in terms of supply influence on international markets between developing and developed countries. If we add China to the developing countries group then this shift in market influence is even sharper. Figures for transition economies suggest some (re)vitalization of the sector especially between 2000 and 2005 with mitigated tendencies afterwards. They represent 2.3 percent of world exports and 2.5 percent of world imports in 2015. Shares have also been computed for some additional sub-groups, African LDCs, Island LCDs plus Haiti and SIDS (UNCTAD definition). While imports share have increased even if only slightly for the three sub-groups exports performance has varied. While the share of SIDS exports has increased since 2000 that of African LDCs has decreased and that of Island LDCs has remained somewhat constant.

Despite overall tiny shares in world trade and somewhat stagnating performance over the last 15 years exports of fish and fishery products remain essential to many economies. Figures 1 to 5 report shares in world and group aggregates of both imports and exports of the four major fish products groups defined previously for seven different country groups.

Table 1. Growth in World exports

Products Group	2000	2005	2010	2013	2014	2015
Fresh-Chilled-Frozen	100	153	213	251	261	238
Dried-Salted-Smoked	100	131	184	204	217	198
Crustaceans-Molluscs	100	114	136	165	188	172
N.E.S	100	146	197	255	255	228
Total	100	138	183	221	233	212

Source: Authors' calculations based on UNCTADSTAT database
Note: The year 2000 represents the base year. All exports values are expressed in terms of exports values in 2000.

Table 2. Share in total World exports

Sector	2000	2005	2010	2013	2014	2015
Fresh-Chilled-Frozen	0.38%	0.36%	0.35%	0.34%	0.35%	0.36%
Dried-Salted-Smoked	0.04%	0.03%	0.03%	0.03%	0.03%	0.03%
Crustaceans-Molluscs	0.29%	0.21%	0.17%	0.17%	0.19%	0.20%
N.E.S	0.15%	0.14%	0.13%	0.13%	0.13%	0.14%
Total	0.87%	0.74%	0.68%	0.67%	0.71%	0.74%

Source: Authors' calculations based on UNCTADSTAT database

Table 3. Share in World fish exports

Products Group	2000	2005	2010	2013	2014	2015
Fresh-Chilled-Frozen	44%	49%	51%	50%	49%	50%
Dried-Salted-Smoked	5%	5%	5%	5%	5%	5%
Crustaceans-Molluscs	34%	28%	25%	25%	27%	27%
N.E.S	17%	18%	19%	20%	19%	19%

Source: Authors' calculations based on UNCTADSTAT database

Table 4. Country Groups participation in World fish exports

Country Group	2000		2005		2010		2013		2014		2015	
	X	M	X	M	X	M	X	M	X	M	X	M
DVG-China-LDCs	41.5 %	13.6 %	37.2 %	15.0 %	36.2 %	19.2 %	37.6 %	20.3 %	40.0 %	21.2 %	37.5 %	22.7 %
LDCs	3.2%	0.3%	2.9%	0.4%	2.4%	0.5%	3.0%	0.8%	2.5%	0.8%	2.5%	0.8%
China	7.0%	2.2%	10.6 %	3.6%	12.7 %	4.2%	14.7 %	4.7%	14.9 %	5.2%	15.3 %	5.3%
DEV	46.2 %	85.7 %	50.6 %	75.0 %	46.2 %	73.1 %	42.7 %	68.8 %	42.9 %	69.7 %	40.6 %	70.0 %
Transition	0.8%	0.9%	1.0%	2.5%	2.5%	3.5%	2.6%	4.1%	2.5%	3.6%	2.5%	2.3%
LDCs_Africa	*1.9%*	*0.2%*	*1.7%*	*0.3%*	*1.3%*	*0.4%*	*1.4%*	*0.7%*	*1.3%*	*0.7%*	*1.3%*	*0.6%*
LDCs_Islands_Haiti	*0.1%*	*0.0%*	*0.1%*	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*0.0%*	*0.1%*	*0.0%*	*0.1%*	*0.0%*
SIDS	*1.0%*	*0.3%*	*1.1%*	*0.5%*	*1.1%*	*0.6%*	*1.4%*	*0.8%*	*1.3%*	*0.8%*	*1.3%*	*0.7%*

Source: Authors' calculations based on UNCTADSTAT database

Figure 1 (panel (a) and (b)) reveals that as far as developing countries (LDCs and China excluded) are concerned, exports of fish products represent a large share of world exports, up to 50 percent for Crustaceans and Molluscs,

about 40 percent for N.E.S group (essentially fats and oils and products unfit for human consumption) and about 30 percent for Fresh, Chilled and Frozen Fish in 2015. Despite this strong presence on fish international markets exports of fish products represent only slightly more than 1 percent of group's total exports. Panels (c) and (d) reveal that developing countries are also large importers of fish products. They count average for 20 percent of world imports of fish products which correspond to about 0.7 percent of total group's imports. Figure 2 reports the same data relating to LDCs. Their exports of fish products represent about 10 percent of world exports in that sector. Their largest share in world exports is observed for Crustaceans and Molluscs products. Fish exports represent about 2 percent of group's total exports. As shown in panel (c) LDCs imports of fish products account for about 2.5 percent of world imports of these products and are concentrated in processed products or other animal products not produced domestically. Figure 3 refers to China's situation. As mentioned previously China is the largest exporter of fish and fish products overall. As shown in panel (d) its performance has been recently driven by significant increases in exports of fats and oils and products unfit for human consumption. Fish and fish products represent about 2 percent of China's total exports which is a large share compared to world aggregates and other country groups figures. As shown in panel (c) and (d) China's imports are driven mostly by imports in the crustacean and molluscs sector and in the fresh, chilled and frozen fish sector.

Figure 1. Fish Trade in Developing countries (LDCs and China excluded)

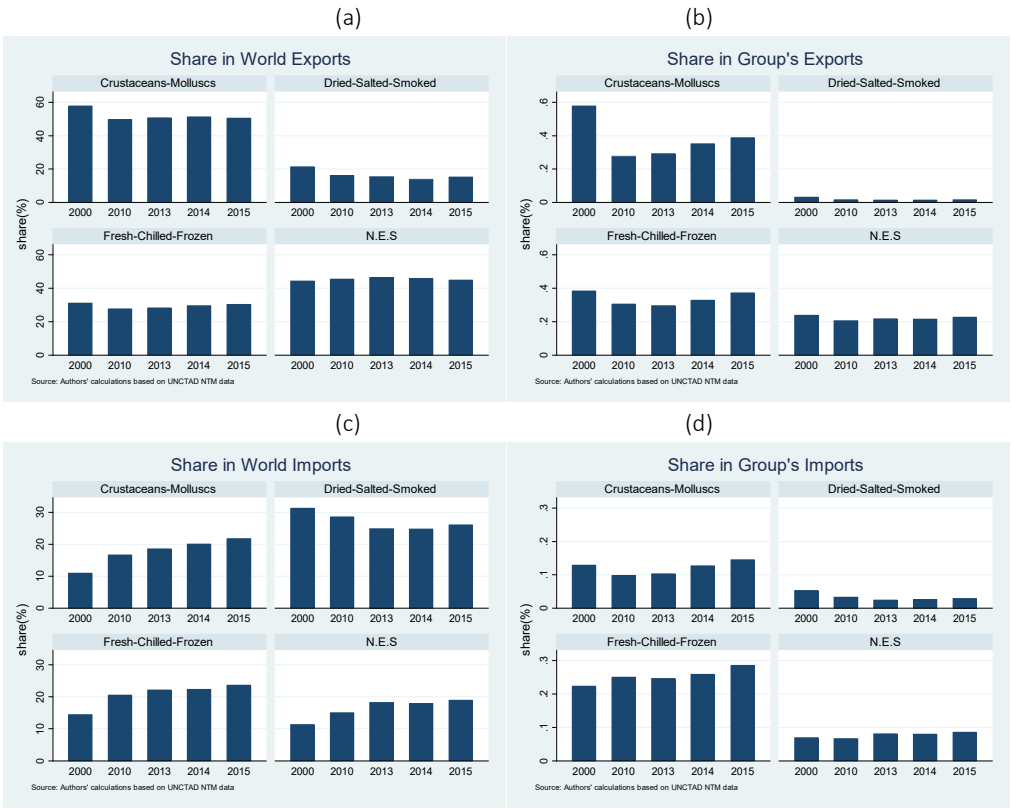


Figure 4 (panels (a) and (b)) indicates that there are two dominant sectors in developed countries exports, namely fresh frozen and chilled fish and processed fish products. In both cases developed countries exports share is around 60 percent. Panels (c) and (d) suggest that developed countries are large importers in all sectors and that fish and fish products represent about 1 percent of their total imports. Transition economics as shown in panels (a) and (b) of Figure 5 export essentially fresh chilled and frozen fish together with dried,

slated and smoked fish products with shares in world exports however never exceeding 4 percent. Imports are also predominantly found in these two sectors.

Figure 2. Fish trade in LDCs

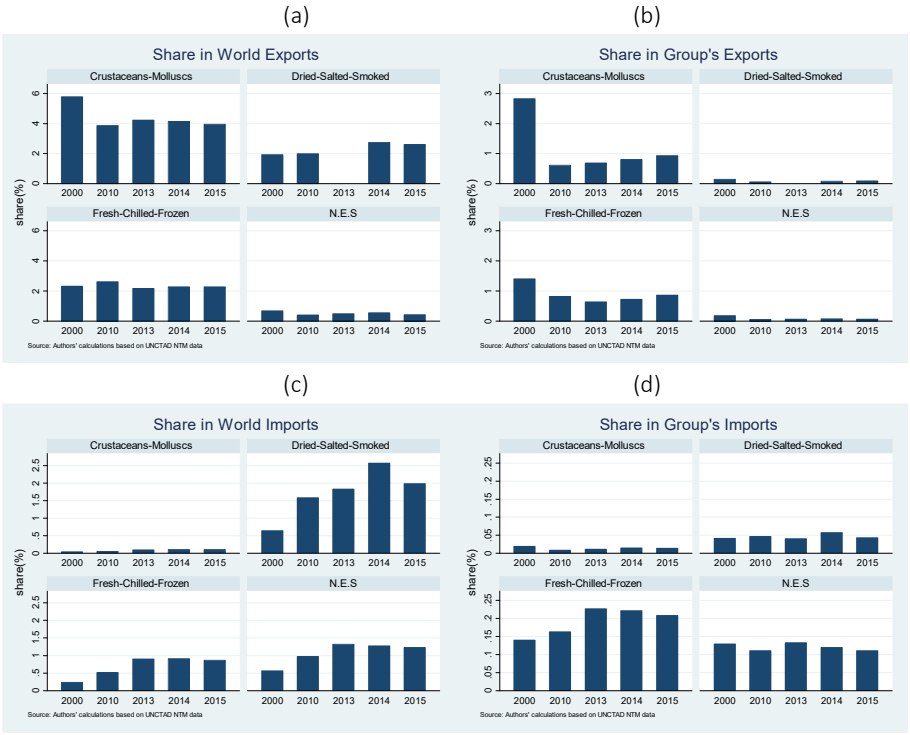


Figure 3. Fish trade in China

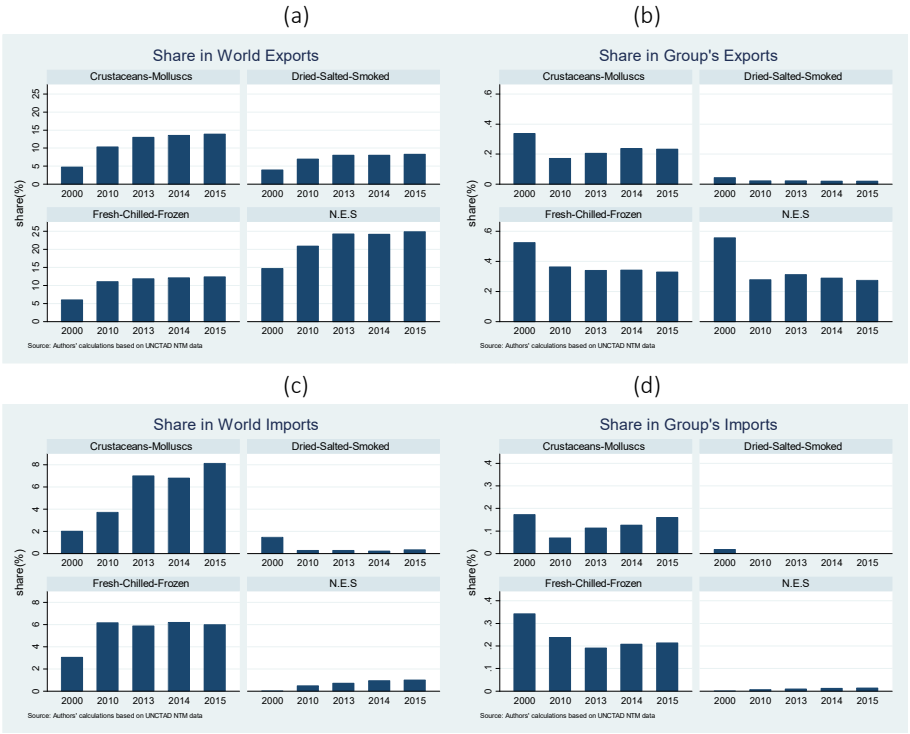


Figure 4. Fish trade in Developed countries

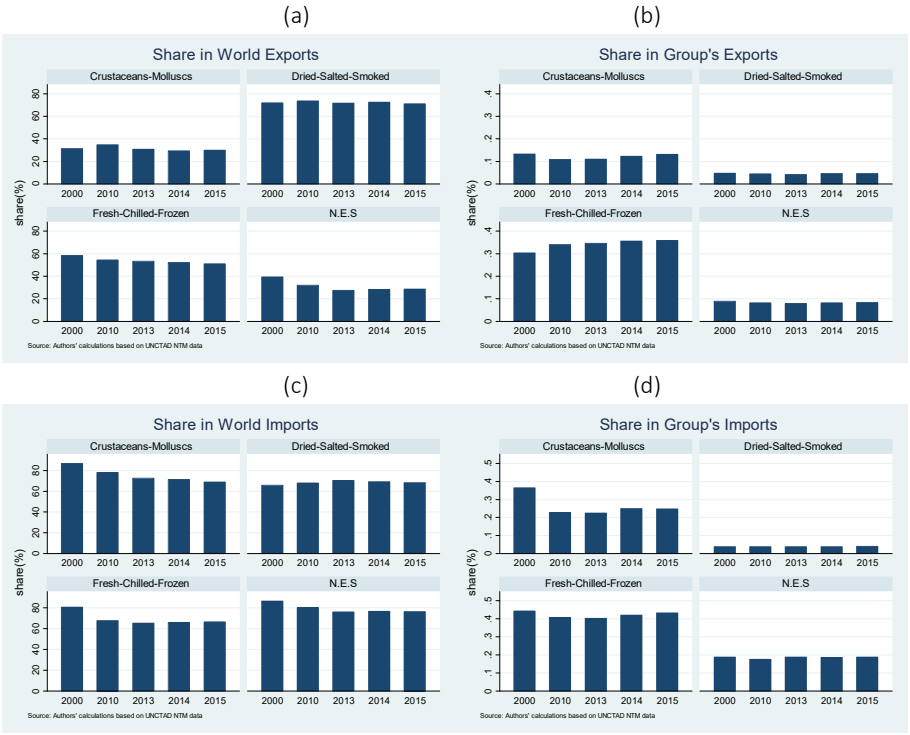
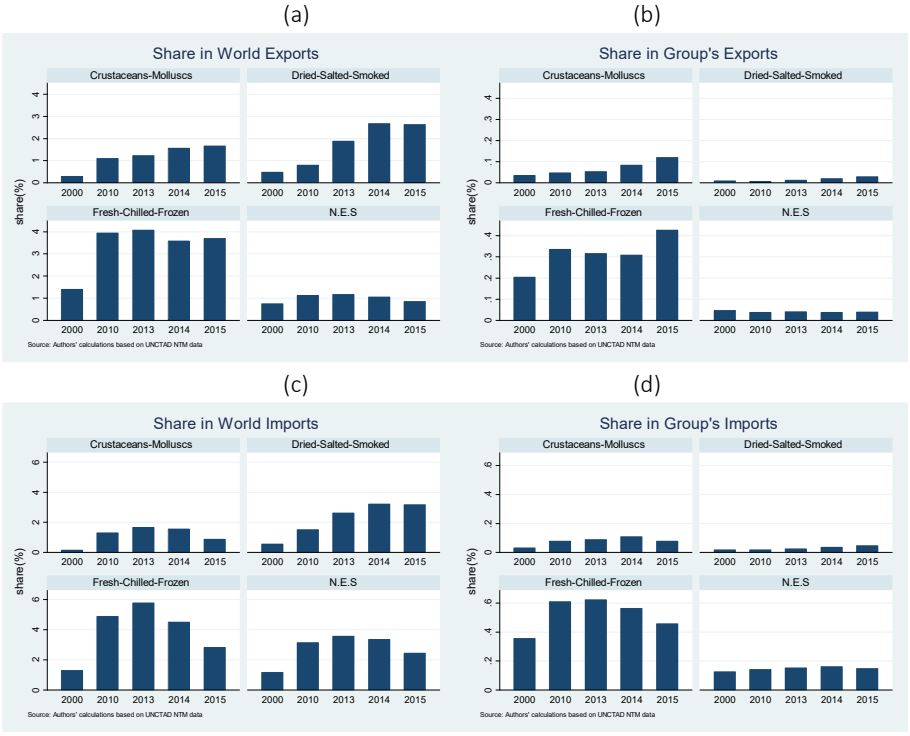


Figure 5. Fish trade in Transition Economies



2. Non-Tariff Measures data

Figures reported thereafter are based on UNCTAD NTMs data as of December 2016.

2.1 Reference groups: countries and products

NTMs information is available for 56 reporting countries. However, it is available only for one single year. Reference years vary from 2012 to 2016. Source information refers to 6-digit products as defined in the fourth version of the Harmonization System classification adopted in January 2012. In this version of the HS classification 223 products (from raw product to semi-processed or processed products) were identified as being part of our reference group.[1] Note, however, that the HS-2012 classification does not allow any distinction between capture and aquaculture origin. This may be seen as strong limitation in the current context of aquaculture production rapid expansion. Some further analysis based on regulatory texts may help identifying those NTMs applying exclusively to products from aquaculture. The issue is discussed in the last section.

Other classifications are used to define specific sub-groups namely the Classification by Broad Economic Categories (BEC)[2] and the Central Product Classification (CPC) Ver.2.1 released in August 2015.[3]

The below analysis and reported statistics are based on non-tariff measures applicable to all countries without discrimination. We refer to this type of measures as MFN-NTMs. Information on NTMs applied either bilaterally or plurilaterally does exist. However, its treatment requires a deep qualitative investigation in order to identify any overlapping elements with MFN-NTMs in place especially those referring to regulatory stringency. Some bilateral measures for instance could be a waiver of some MFN-NTMs. This would go beyond the scope of this paper which is to provide an overall view of NTMs prevalence. NTMs are classified according to the 2012 version of the UNCTAD/MAST NTMs classification as discussed in section 2.1.

2.2 Non-Tariff Measures: definition

NTMs encompass all measures affecting the conditions of international trade, including policies and regulations that restrict trade as well as those that facilitate it.[4] For practical purposes, the commonly used definition of NTMs is: "Non-tariff measures (NTMs) are policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both."[5]

It is frequent that NTMs are erroneously referred to as non-tariff barriers (NTBs). The difference between the two terms is that NTMs include a wider set of measures than NTBs, the latter term being only used to describe discriminatory NTMs imposed by governments to favour domestic over foreign suppliers. In the past most NTMs

[1] Although the number of products remains far below the number of fishery species the 2012 version of the HS classification is a true improvement with respect to earlier HS versions especially in terms of coverage of fishery species originating in developing countries. Such improvements were made possible by a close collaboration between the World Customs Organization and the FAO. Compared with HS 2007 for fish and fishery products the 2012 version saw the implementation of about 190 amendments and the introduction of about 90 new commodities (species by different product form). Within the limits of the available codes, the classification was restructured according to main groups of species of similar biological characteristics. The new version of the HS classification entered into force on January 1, 2017. It includes further amendments for fishery species and/or product forms that need to be monitored for food security purposes and/or for better management of fisheries, in particular for conservation of potentially endangered species.

[2] See https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=10&Lg=1 for a detailed description.

[3] See http://unstats.un.org/unsd/cr/registry/cpc-21.asp for a detailed description.

[4] See UNCTAD (2013) for an extensive presentation and discussion.

[5] See UNCTAD (2010) for a precise motivation.

took essentially the form of quota or voluntary export restraints, the so-called core NTMs. As these measures are restrictive by design and have a clear tariff equivalent, at least from a theoretical point of view, the term barrier was used. Nowadays policy interventions take many more forms, and it is therefore more accurate to refer to them as measures instead of barriers, to underline that the measure may not necessarily be trade or welfare reducing.

Table 5 contains the various categories identified in the UNCTAD/MAST 2012 classification. Imports related measures are separated form export related ones. Within import related measures there is a divide between technical and non-technical measures.[6]

The data collected for countries in our reference sample cover measures from chapters A to G and chapter P. Because of objective difficulties in the collection of data on some measures, data covering other types of measures namely those related to chapters I to O were either not actively collected or only collected for a restricted group of countries.

Table 5. UNCTAD's NTMs classification (2012 Version)

Imports		
Technical Measures	A	SANITARY AND PHYTOSANITARY MEASURES
	B	TECHNICAL BARRIERS TO TRADE
	C	PRE-SHIPMENT INSPECTION AND OTHER FORMALITIES
Non-Technical Measures	D	CONTINGENT TRADE-PROTECTIVE MEASURES
	E	NON-AUTOMATIC LICENSING, QUOTAS, PROHIBITIONS AND QUANTITY-CONTROL MEASURES OTHER THAN FOR SPS OR TBT REASONS
	F	PRICE-CONTROL MEASURES, INCLUDING ADDITIONAL TAXES AND CHARGES
	G	FINANCE MEASURES
	H	MEASURES AFFECTING COMPETITION
	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

[6] A brief description of each category is provided in Appendix A. The complete classification can be downloaded at http://unctad.org/en/PublicationsLibrary/ditctab20122_en.pdf.

3. Non Tariffs Measures in fish trade: stylized facts

Several incidence measures are used to qualify the presence of NTMs in fish trade. Standard incidence measures are the so-called inventory-based measures. We extensively refer to two standard and widely used measures namely the coverage ratio and the frequency index.[7] However, we also use as a measure of NTMs incidence the number of different types of measures applied on average to each product.[8] This type of indicator provides some more precise information about the pervasiveness of NTMs in cases where coverage ratios and frequency indices do not vary much across countries and products and are close to their maximum value. As coverage ratios are only relevant for strictly positive trade flows, other indicators are also computed based on strictly positive trade flows only.[9] We may refer to zero trade flows in some specific tables and figures whenever relevant. Information related to zero trade flows could also be informative in terms of market access conditions. We discuss the scope and relevance of its use in the last section of the paper. Figures and tables reported below are obtained using import related measures information only.

3.1 NTMs' Types

Most products are affected by some NTM and amongst those affected most of them not only face multiple NTMs but in most circumstances the latter are also of different types. This possibly increases complexity in fulfilling regulatory requirements. Table 6 illustrates this point. As far as fish and fish products are concerned, less than three percent of total positive import relationships identified at the importer and product level are not affected by any NTM. NTMs free relationships are found for a limited number products and countries. Most represented ones are Afghanistan, Ecuador and Costa Rica and products are essentially fillets. More than 90 percent of import relationships however face at least 2 different types of NTMs and 35 percent at least 4. Table 7 reports corresponding figures for non-fish products. We have that one fourth of import relationships are not affected by any NTM and only 20 percent of them are affected by more than four different types of NTMs.

Fish and fish products are relatively more affected by NTMs and more intensively than non-fish products.

Table 8 reports the incidence of NTMs by chapter based on prevalence ratios. Shares are not expected to sum up to one hundred as import relationships can be affected by several NTMs. It shows that for fish and fish products, about 93 percent of all import relationships are affected by an SPS measure (Chapter A), more than 82 percent by a Technical Barrier to Trade measure (Chapter B) and about 41 percent by a pre-shipment related measure (Chapter C). Amongst non-technical regulations, price-control measures (Chapter F) are the most present. About 50 percent of import relationships are affected by this group of measures.
Corresponding figures for non-fish product are much lower as shown in Table 9. SPS (Chapter A) affect about 25 percent of import relationships, TBT (Chapter B) measures about 52 percent and inspections related

[7] Both measures take values between 0 and 1 (or 0 and 100 depending on the application of a scale normalization of not). See Fugazza (2013) for a detailed definition of these two measures.

[8] Average number of NTMs types refers to the number of measures belonging to different sub-groups of the UNCTAD NTMs classification and not the absolute number of measures itself. The latter could reflect differences in legal and law-making frameworks without necessarily translating into more or less stringent regulations. In other words, if two or more measures of the same type are reported, that is belonging to the same group corresponding to the highest level of disaggregation (2 or 3-digit) they are by default counted as one in the following sections.

[9] Trade data are taken from the UN COMTRADE international trade statistics database as of December 2016 downloadable at https://comtrade.un.org/. Although figures displayed in section 1 are based on UNCTADSTAT database the root data source remains UN COMTRADE implying that consistency is respected.

measures about 24 percent. As to non-technical regulations price control measures (Chapter F) are also the most pervasive and affect about 43 percent of all import relationships.

Fish and fish products are thus mainly affected by technical regulations and in particular SPS measures. Almost all countries impose SPS measures on all imports of fish and fish products.

Table 6. Number of Reporter-product (only fish products) observations (with positive imports) affected by different types of NTMs (at least one measure by type)

Number of NTMs types	Number of Import Relationships	Share in Total	Share in Affected
0	173	2.76	
1	364	5.81	5.97
2	2040	32.54	33.46
3	1540	24.56	25.26
4	1629	25.98	26.72
5	375	5.98	6.15
6	149	2.38	2.44
	6270		

Source: Authors' calculations based on UNCTAD NTM data

Table 7. Number of Reporter-product (non-fish products) observations (with positive imports) affected by different types of NTMs (at least one measure by type)

Number of NTMs types	Number of Import Relationships	Share in Total	Share in Affected
0	55519	25.50	
1	46889	21.54	28.91
2	49270	22.63	30.37
3	34774	15.97	21.44
4	23065	10.59	14.22
5	6910	3.17	4.26
6	1300	0.60	0.8
	217727		

Source: Authors' calculations based on UNCTAD NTM data

Table 8. Number of Reporter-product (only fish products) pairs affected by an NTM, by NTMs type (at least one measure by type)

NTMs Chapter	Number of Import Relationships	Share in Total	Share in Affected
A	5826	92.92	95.56
B	5112	81.53	83.84
C	2558	40.80	41.96
D	21	0.33	0.34
E	835	13.32	13.70
F	3129	49.90	51.32
G	746	11.90	12.24
H	122	1.95	2.00
Z	173	2.76	

Source: Authors' calculations based on UNCTAD NTM data

Note: Shares are computed with respect to total positive trade relationships (column 3), and with respect to trade relationships affected by at least one NTM type (column 4)

Table 9. Number of Reporter-product (only non-fish products) pairs affected by an NTM, by NTMs type (at least one measure by type)

NTMs Chapter	Number of Import Relationships	Share in Total	Share in Affected
A	53621	24.63	33.06
B	112559	51.70	69.39
C	51751	23.77	31.90
D	2395	1.10	1.48
E	37137	17.06	22.89
F	92069	42.29	56.76
G	28668	13.17	17.67
H	5995	2.75	3.70
Z	55519	25.50	

Source: Authors' calculations based on UNCTAD NTM data

Note: shares computed with respect to total positive trade relationships (3), and with respect to trade relationships affected by at least one NTM type

Figure 6 presents overall coverage ratios which corresponds to the share of imports affected by different groups of NTMs. Qualitatively speaking comments made about prevalence ratios also apply to coverage ratios with some nuances, however. Looking at fish and fish products (panel (a)) figures, the incidence of TBT (Chapter B) and inspection related measures (Chapter C) is slightly larger using coverage ratios. The reverse is true for price controls measures (Chapter F).

Figure 6. Overall Coverage Ratios

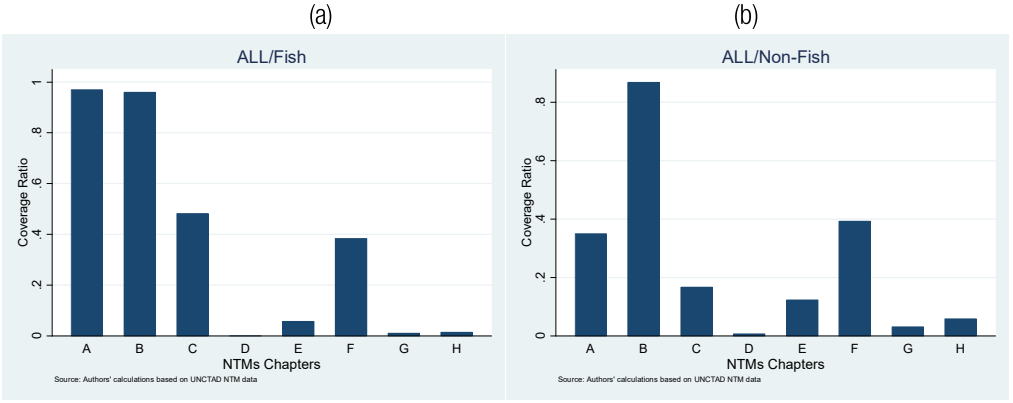


Figure 7 shows the incidence of NTMs at their most disaggregated level based on frequency indices. However, similar conclusions could be drawn using coverage ratios. Prominent measures affecting fisheries are essentially SPS measures and TBTs. Amongst the former category of NTMs measures of type A140, A310, A820, A830 and A840 affect at least 50 percent of all import relationships. A140 measures impose a special authorization requirement for SPS reasons. In order to obtain this authorization, importers may need to comply with other related regulations and conformity assessments.

Figure 7. NTMs incidence by sub-chapters (share of lines affected by NTMs): frequency indices

Source: Authors' calculations based on UNCTAD NTM data

Such measures are likely to be related to measures types such as A820, A830 and A840 which all refer to some conformity assessment related to SPS. Measures of type A310 impose some labelling requirements. Amongst TBTs, only measures of type B310 affect more than 50 percent of import relationships. These are also labelling requirements but not related to SPS reasons. Other predominant measures but with relatively much smaller incidence are of type C300 and F610. Both types affect between 20 and 25 percent of import relationships. C300 measures are obligations for imports to pass through a designated entry point. F610 measures imply additional taxes in addition to customs duties with no internal equivalent in order to cover the costs of custom inspection. As far as non-fisheries products are concerned, we observe a much lower overall incidence of NTM measures except for chapter F type of measures. For those chapters reported here frequency

indices are on average half than in the case of fisheries products. However, in relative terms, most salient measures fall in categories similar to those identified for fish and fish products especially for SPS measures and TBTs.

Similar SPS measures and TBTs affect products in the fish sector and other products. However, their incidence is much larger in products of the fish sector.

Figures 8 and 9 report frequency indexes first computed for some broad products group categories[10] ((a) panels) and then considering the level of processing ((b) panels) amongst these groups.[11] Figure 8 refers to results obtained for fish products and Figure 9 to results obtained for non-fish products but belonging to the same categories and sub-categories. Panels (a) of both Figures reveal first that prevalence ratios are similar across categories for both fish and non-fish products. However, overall incidence remains larger amongst fish products especially those belonging to the animal products category. As suggested by panel (b) of Figure 8, animal products are either primary products dedicated to consumption or processed products dedicated to both consumption and industry. The absolute and relative incidence of NTMs categories is comparable across all these sub categories indicating no presence of escalation or incidence peaks in NTMs. Similar results are obtained for products of non-fish sectors.

Figure 8. Frequency indexes, Fish Products (by Broad Categories)

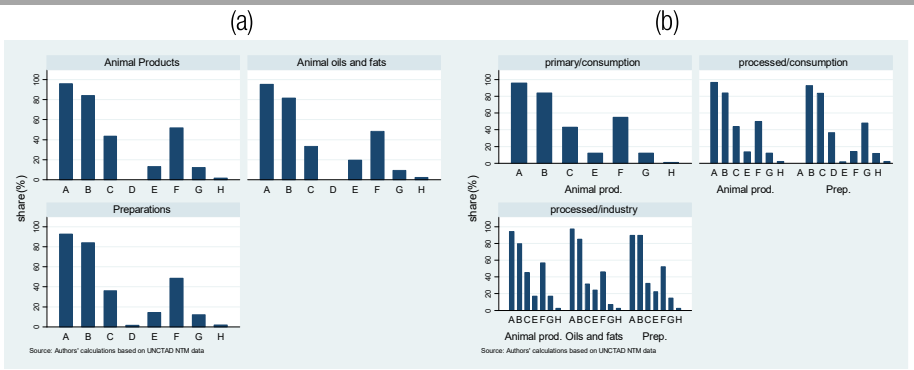
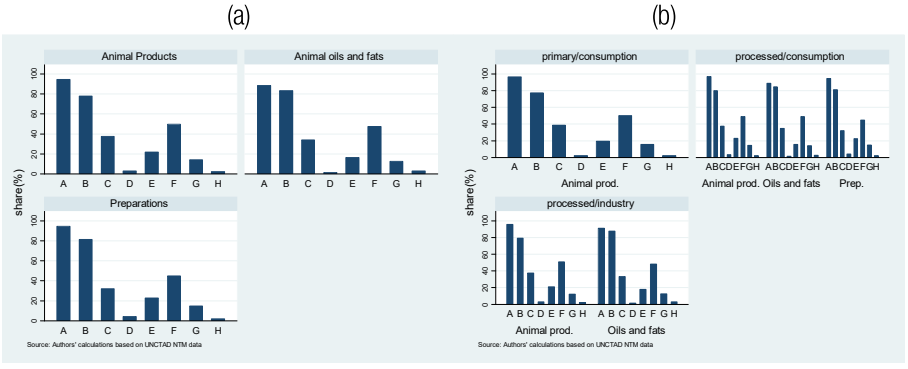


Figure 9. Frequency indexes, Non-fish Products (by Broad Categories)



[10] Categories correspond to aggregations of 2-digit chapters of the HS-2012 classification.

[11] The level of processing is defined according to the Broad Economic Categories classification.

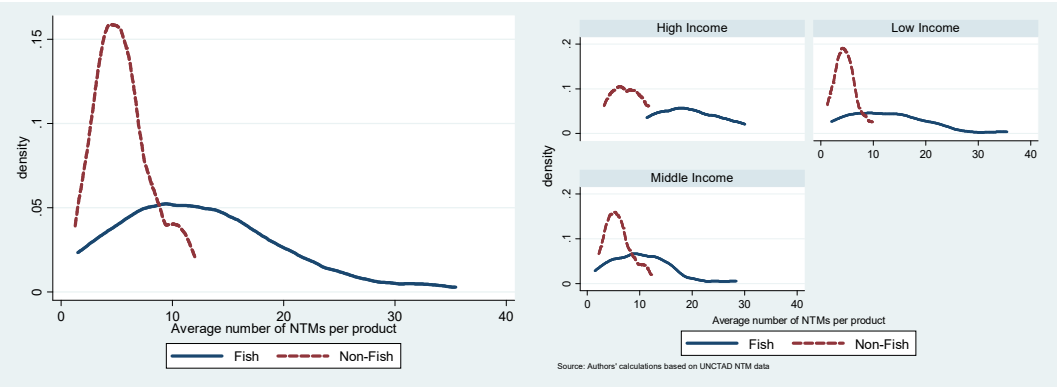
3.2 Country Analysis

Figure 10 depicts non parametric distributions of the average number of NTMs types of measures applied on average across countries. Panel (a) represents the whole sample and panel (b) sub country groups by level of income. Distributions for both fish and non-fish products are estimated and graphed separately. Generally speaking more dispersion across countries is observed for products of the fish sector than for products in other sectors. In fish products, Afghanistan stands at the extreme left of the distribution represented in panel (a). Table A.1 of the appendix reveals that it applies on average no more than two different types of measures on fish products. At the extreme right we find countries such as the Gambia, the United States of America and the Philippines whose average number of applied measures is around 30. As far as non-fish products are concerned, the lowest average number is found for Côte d'Ivoire (less than 2) and the highest for Brazil and Bolivarian Republic of Venezuela (about 10). The sample average for fish products is about 13 and the median is about 12. For non-fish products average and median figures are both about 5.3. The ratio between the number of NTMs applied to fish and that applied to non-fish products is on average about 2.3. The associated median value is about 2.1. In other words, fish products are affected by a larger number of different NTMs' type than non-fish products. Only Afghanistan and Costa Rica impose on average a smaller number of NTMs on fish products than on non-fish products.

On average countries applied twice as many NTMs on products of the fish sector than on other products.

Panel (b) reports non parametric distributions obtained for three sub-groups based on per capita income level. In all cases distributions for non-fish products are less dispersed than those for fish products. Mean and median values are also smaller as it is already the case in panel (a). Mean average number of NTMs is the highest for the high income group and about 19.5 (median is about 18.5).

Figure 10. Countries average number of NTMs per product: Kernel distribution



Source: Authors' calculations based on UNCTAD NTM data

The second highest mean value is found for the low-income country group and is about 12.4. The lowest figure is thus found for Middle income countries and is about 10.5. Not surprisingly highest dispersion is obtained for the low income country group where we find countries like the Gambia and Afghanistan.

Regulatory intensity measured by the average number of different NTMs types is higher but less dispersed amongst high income countries than in other country groups.

As mentioned in the introduction, international imports are driven by a core group of countries and economic zones that includes the US, Japan, China and the European Union. It would thus be relevant to have a closer look at these markets as they are likely to be major destinations for most producers around the world.

Figure 11 shows coverage ratios computed for fish and non-fish products and over NTMs chapters. The incidence of SPS measures is much stronger for fish than non-fish products except for the United States of America where it's similar. On the other hand, TBTs are applied similarly to both fish and non-fish products and across the four economies considered here. As far as fish products are concerned most imports, between 80 percent for China and 100 percent for the other three destinations, are covered by at least an SPS measure and a TBT.

While China appears not to impose any pre-shipment inspection requirements, at least in 2012 the year data were collected, Japan requires such inspection on all its imports. The United States of America not only uses extensively all types of technical regulations but also imposes some price control measures on all imports of fish products.

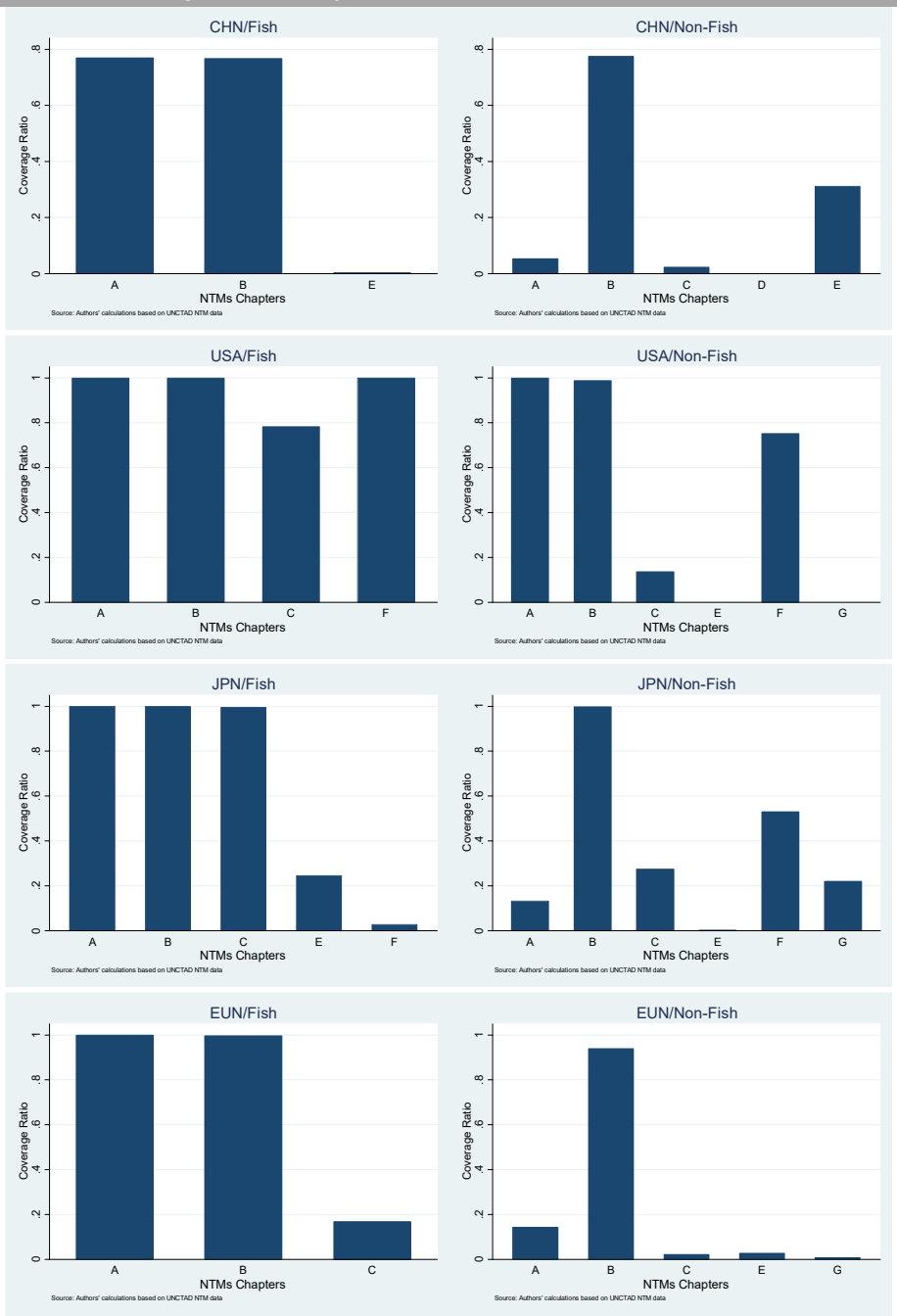
Figure 12 reports prevalence indicators and frequency indices for both fish and non-fish products. Findings of Figure 7 are confirmed as far as frequency indices are concerned. This is expected especially when coverage ratios are close to 100 percent. By definition if all imports are affected automatically all import relationships are also affected. We observe that for China frequency indices tend to take higher values than coverage ratios. We find that SPS measures and TBTs concern about 97 and 95 per cent of import relationships respectively but translate into coverage ratios of about 80 percent. In terms of prevalence ratios, SPS measures are the predominant category for fish products in all four destinations. This is also the case for non-fish products except in the United States of America where TBTs make the prevailing category. We also observe that the average number of different types of SPS measures applied is significantly larger for fish than for non-fish products. The smallest number if found for China and is about 9, the largest number is found for the United States of America and is about 16. The incidence of types of measures at least in terms of prevalence ratios is much weaker. In the case of the United States of America where we have both coverage ratio and frequency index equal to their maximum for price-control measures, the corresponding average number of measures is less than two.

Generally speaking, the United States of America and Japan are found to apply NTMs on products of the fish sector more intensively and more extensively than the European Union and China.

Figures 13 to 15 show prevalence ratios computed at the most disaggregated level of the NTMs classification. As to SPS measures (Figure 13), the United States of America are the biggest user of the four economies represented. They apply sixteen different types of measures to most products. These measures cover all sub chapters of the NTM classification. They include prohibitions (A1 sub-chapter), tolerance limits (A2 sub-chapter), labelling and packaging requirements (A3 sub-chapter), hygienic requirements (A4 sub-chapter), special treatment such as fumigation (A5 sub-chapter), Food and feed processing requirement (A630), Traceability requirements (A85 group). The second largest user is Japan. It applies 10 different types of SPS measures to about all its imports and 4 to about 80 percent of them. Except for prohibitions and special treatment procedures measures are similar to those imposed on US imports. Some particular attention seems to be devoted to traceability. The next largest user is the European Union with 10 different NTMs types applied to most imports. As shown in Figure 13, these are geographical restrictions (A120), tolerance limits (A210), labelling requirements (A310), packaging requirements (A330), hygienic requirements (A4 sub-chapter) and 4 different types of measures imposing some conformity assessment (Sub-chapter A8). China is the last of the group in terms of prevalence ratios. As mentioned previously this does not necessarily means that regulations imposed on imports are necessarily less constraining. It applies 6 different types of SPS measures to almost of its imports and 2 to about 80 percent of them. Conformity assessment related measures (sub-chapter A8)

are the dominant group. Besides these measures we also find restrictions (sub-chapter A1), tolerance limits (A210) and labelling requirements (A310).

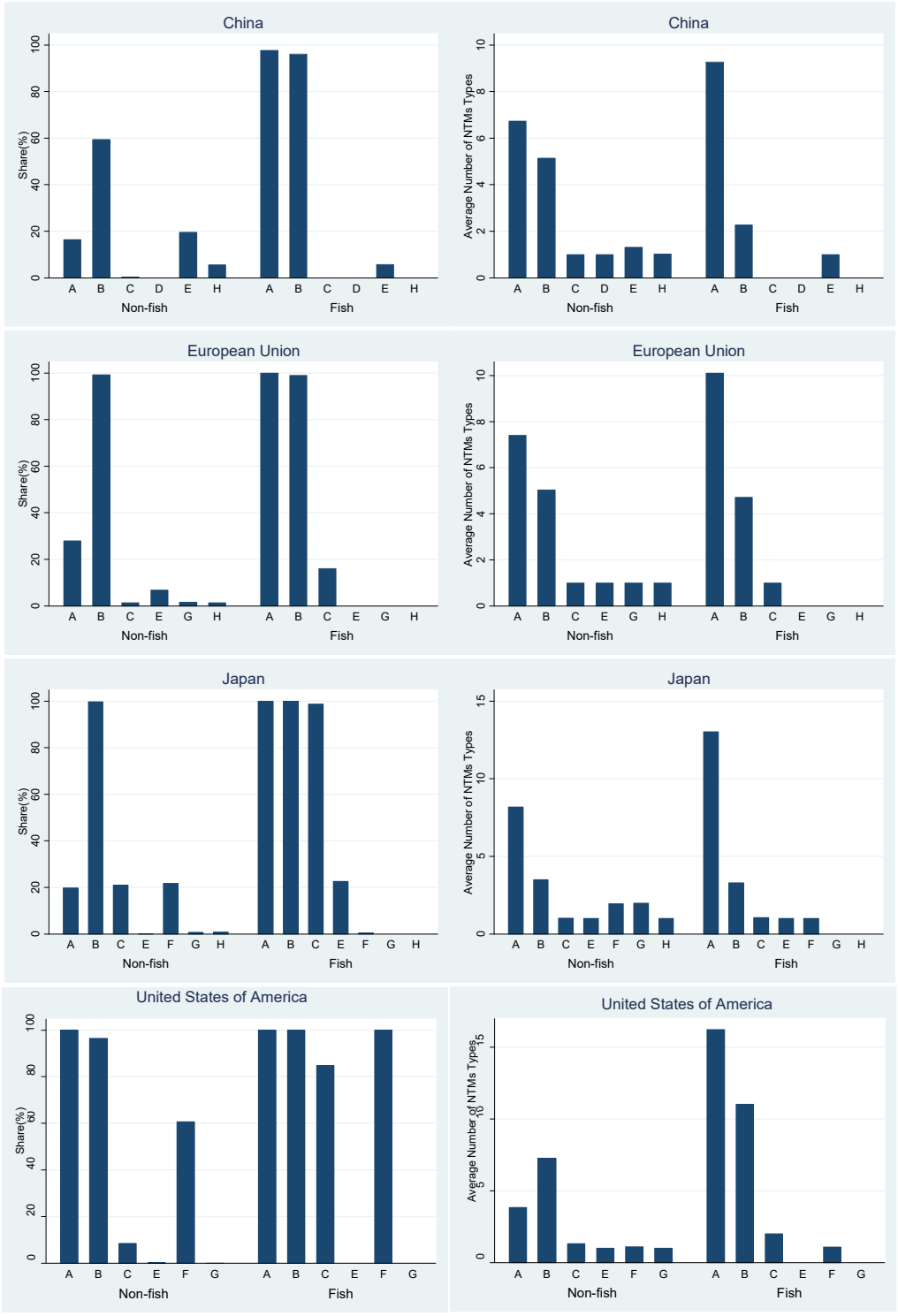
Figure 11. NTMs coverage ratios in major destination markets



Source: Authors' calculations based on UNCTAD NTM data

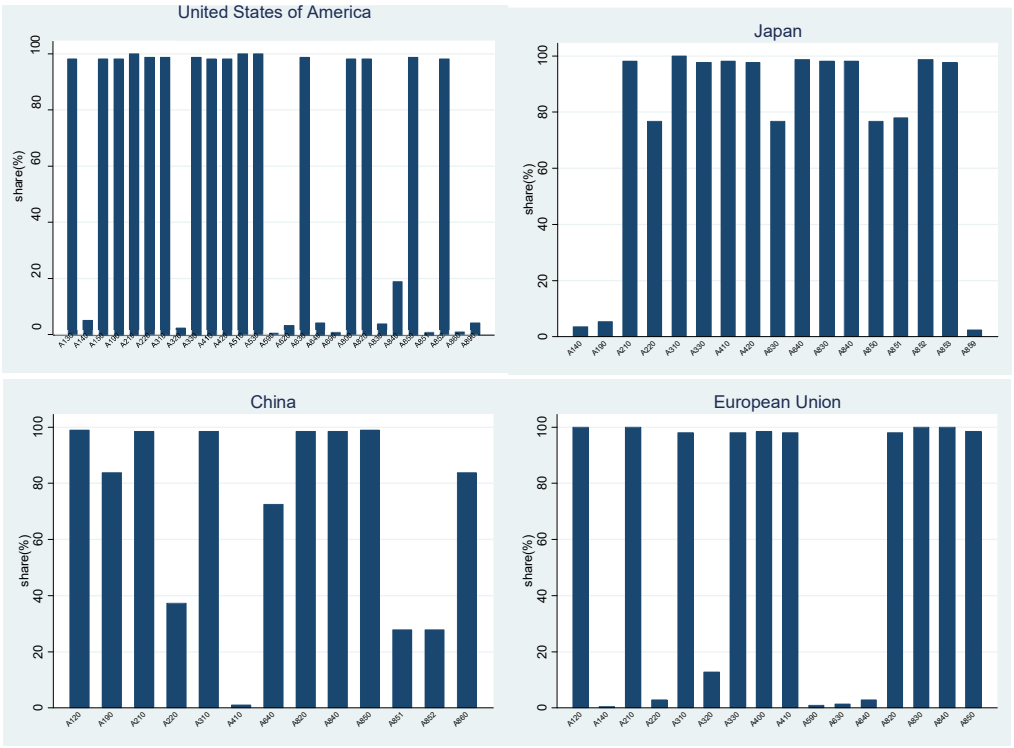
Note: Country and region acronyms are ISO 3166-1 three digit country codes.

Figure 12. NTMs frequency index and prevalence indicator in major destination markets (Fish *vs* Non-Fish)



Source: Authors' calculations based on UNCTAD NTM data

Figure 13. SPS measures frequency indices in major destination markets



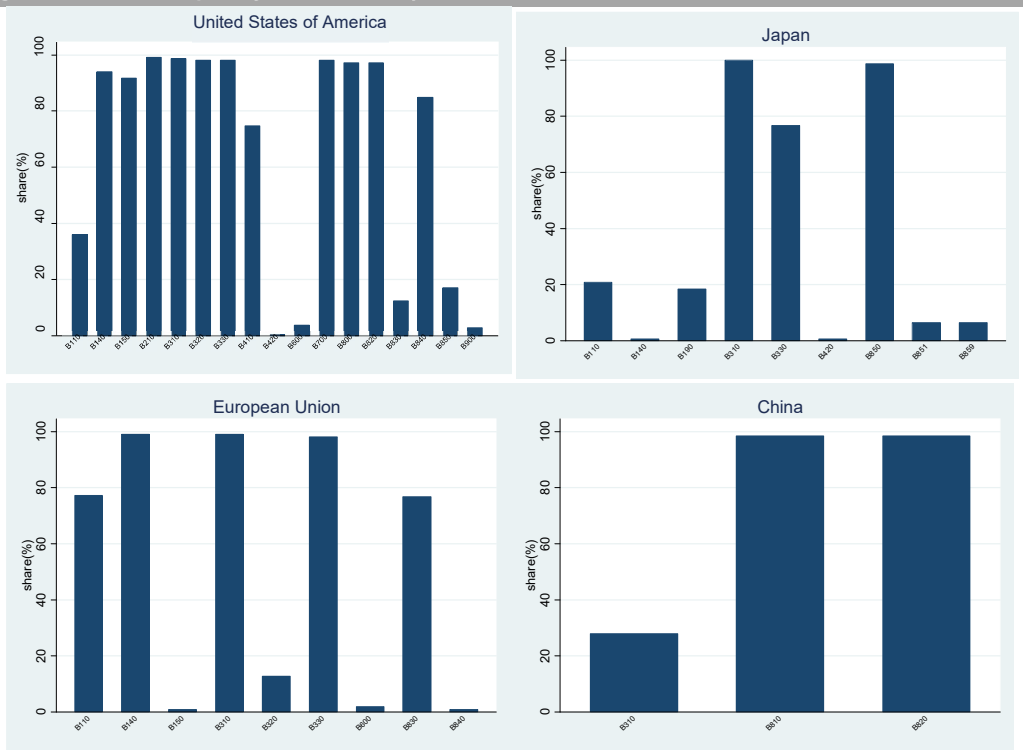
Source: Authors' calculations based on UNCTAD NTM data

Figure 14 reports the same detailed analysis as in Figure 13 but with a focus on TBTs. In most cases TBTs types imposed reflect to a large extent measures types imposed for SPS reasons. This again suggests that SPS measures and TBTs may have to be considered in conjunction in some circumstances. This is clearly the case for fish products.

The United States of America is again the largest user, followed by the European Union, Japan and China. It applies 9 different types of NTMs to almost all its imports and two to about 80 percent of them. Conformity assessment related measures are the prevalent group. The European Union applies 3 different types of measures to most of its imports. These are some authorization requirement (B140), labeling (B310) and packaging requirements (B330). Two other types of measures, namely some prohibition (B110) and certification requirement (B830) apply to almost 80 percent of imports. Japan applies labeling and packaging requirements (B310 and B330) and traceability information requirements (B850) to 80 percent or more of its imports. China requires essentially some conformity assessment.

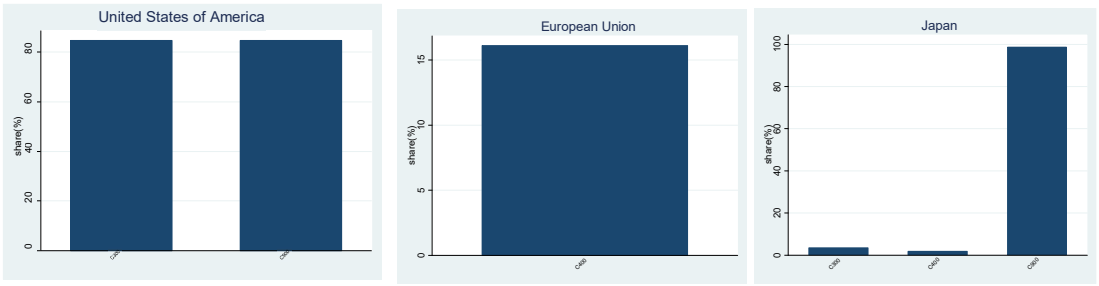
As we can see from Figure 15 only the United States of America, the European Union and Japan require pre-shipment inspections. In addition only Japan requires this sort of formalities on a systematic basis. Figure 16 graphs the incidence of non-technical regulations. China and the European Union do not apply any of them. The United States of America charges some fees related to custom inspection, processing and servicing (F610) to all its imports in fish products and Japan to about 60 percent of them.

Figure 14. TBTs frequency indices in major destination markets



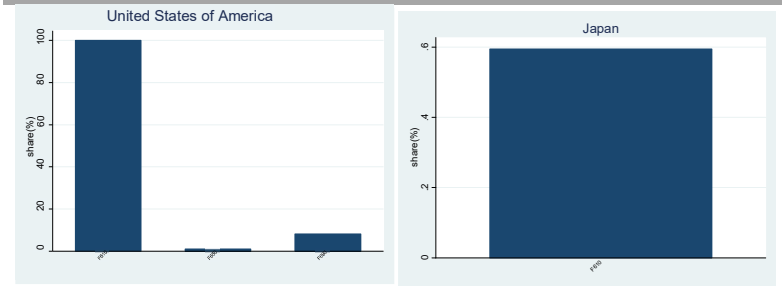
Source: Authors' calculations based on UNCTAD NTM data

Figure 15. Pre-shipment inspections frequency indices in major destination markets



Source: Authors' calculations based on UNCTAD NTM data

Figure 16. Non technical measures frequency indices in major destination markets



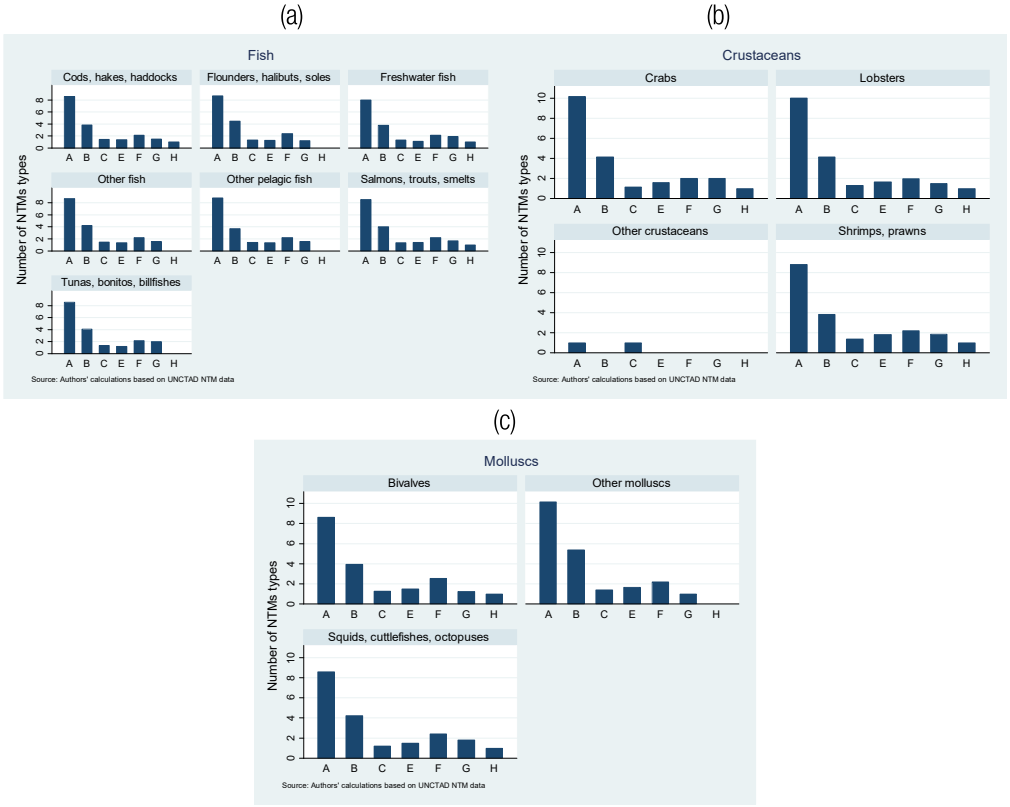
Source: Authors' calculations based on UNCTAD NTM data

3.3 Product Analysis

As discussed previously, primary products represent the core of fish products exports of developing countries and in particular of the least economically advanced ones. Figure 17 shows the number of different NTMs types applied on average on each imported product of various sub-groups of primary fish products. Three large categories of primary products are considered, Fish (panel a), Crustaceans (panel b) and Molluscs (panel c).[12] Within each of these categories NTMs incidence is comparable across products. For instance, products in Fish face on average about 8 different types of SPS measures, about 4 of TBTs, about 2 of Pre-Shipment inspections. The incidence of non-technical regulations is even more homogeneous across products. The latter observation comes from the fact that the coverage of non-technical regulations is broader in general. This is due to the very nature of this type of measures as already mentioned. Crustaceans appear to face more SPS measures than Fish products, in particular Crabs and Lobsters sub-categories. The incidence of other NTM categories, however, is similar. As far as molluscs are concerned, no striking differences are noticed.

No product appears to be more affected by NTMs than any other. Not surprisingly SPS measures prevail.

Figure 17. Prevalence indicators in product groups

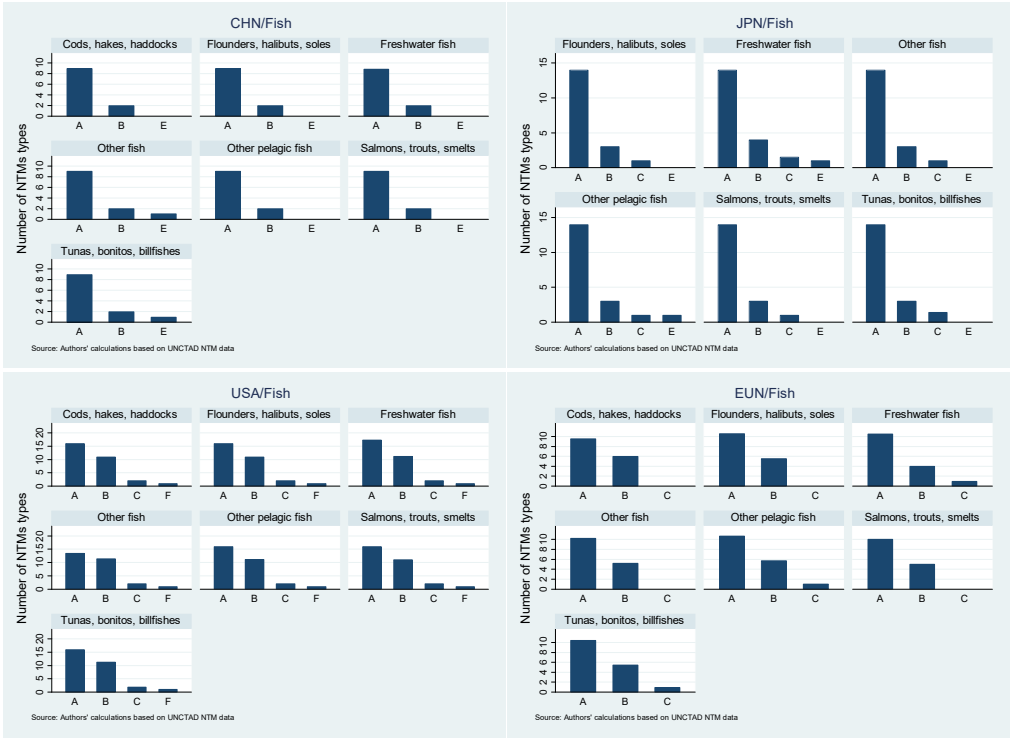


Figures 18 to 20 reproduce the above analysis at the country level with again a focus on China, Japan, the United States of America and the European Union. Findings reflect to a large extent findings of section 2.2. The presence of NTMs is more pronounced in Japan and the United States of America compared to the European Union and China. Once again this could only be an indication of the relative restrictiveness of regulatory framework across countries. Figure 18 illustrates a relative homogenous within country distribution

[12] Sub-groups are identified according to the CPCC classification version 2.1.

of NTMs across products and within our three broad categories. As to Fish, while the European Union only applies technical regulations, Japan applies some quantity control measures to fresh water fish and to some pelagic species. China also applies some quantity control measures to some fish species and in particular to tunas, bonitos and billfishes. On top of technical regulations, the United States of America applies some price control measures to all products in the category.

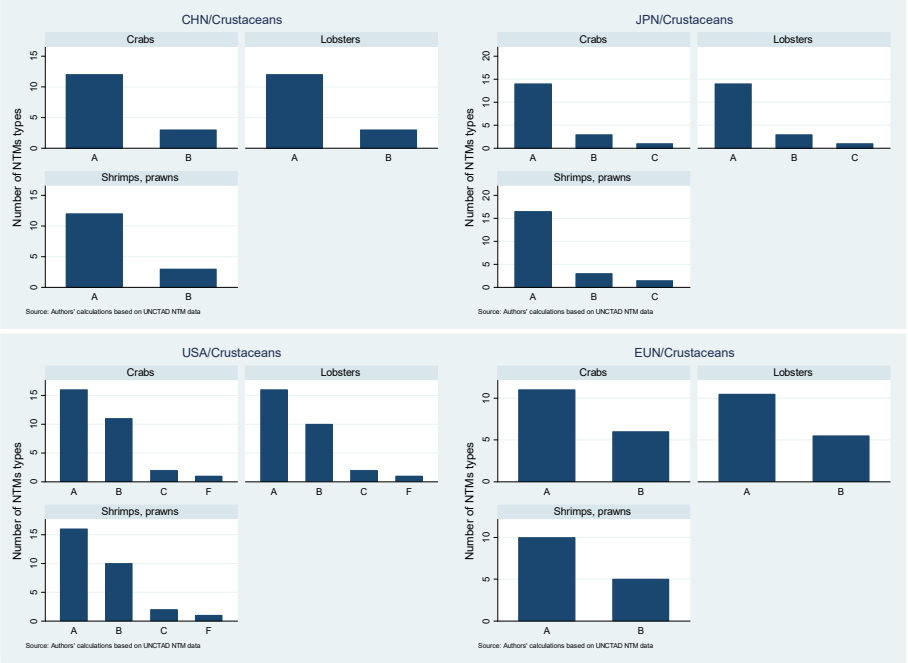
Figure 18. Prevalence indicators in Fish, by major destination market



Note: Country and region acronyms are ISO 3166-1 three digit country codes.

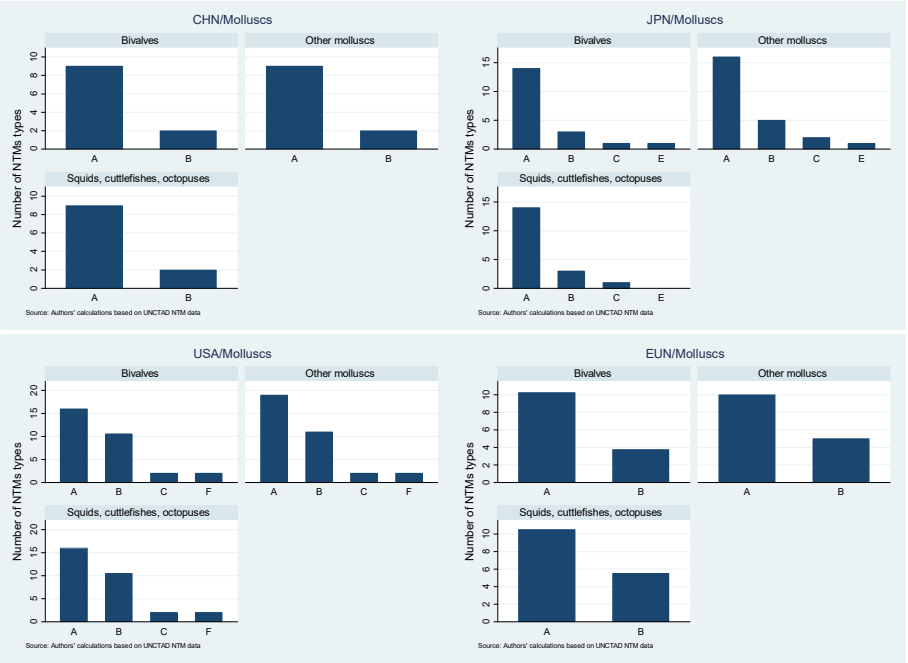
Figure 19 shows that except for the United States of America, only technical regulations affect imports of crustaceans in the four economies under consideration. As in the case of the Fish category, the former impose a price control measure on all crustacean products. NTMs incidence is otherwise comparable to that revealed in Figure 18. Similar comments are also valid for the Molluscs category as shown by Figure 20 with the exception that Japan imposes a quantity control measure on all molluscs but squids, cuttlefishes and octopuses.

Figure 19. Prevalence indicators in Crustaceans, by major destination market



Note: Country and region acronyms are ISO 3166-1 three digit country codes.

Figure 20. Prevalence indicators in Molluscs, by major destination market



Note: Country and region acronyms are ISO 3166-1 three digit country codes.

4. NTMs and Tariffs

This section investigates the relationship between NTMs and tariffs. In order to preserve consistency with previous sections numbers reported below are obtained using non-zero trade relationships which are the reference while computing NTMs incidence indicators.

4.1 Tariffs Data

Tariffs data are retrieved from the UNCTAD/Trains database as of December 2016. Ad Valorem Equivalents of specific tariffs are also accounted for and represented in average values. Three types of tariffs are considered: MFN applied, bound and effectively applied tariffs. All tariffs are reported at the 6-digit level of the HS-2012 classification in correspondence with NTMs and trade data used previously.

4.2 Tariffs and NTMs: stylized facts

Table 10 provides simple averages of MFN, bound and effectively applied tariffs rates computed by category of products (fish versus non-fish) and by NTM chapter. The first column indicates whether fish products ("1" values) or non-fish products are concerned ("0" values). The first two rows refer to the average tariff applied by countries in the NTM sample for each broad category of products.

We observe that both MFN Applied and Effectively Applied average rates are larger for products in the fish sector products than for other products. Bound tariffs appear to be on average slightly larger for products in non-fish sectors.

Table 10. Tariffs by NTMs chapters (average tariff imposed on products affected by NTMs by chapter: one product may be affected by several NTMs)

fish	NTM	MFN Applied	Bound	Effectively Applied	Overhang 1	Overhang 2
0	Overall	8.97	33.40	7.46	24.24	1.51
1	Overall	11.64	30.94	8.33	19.79	3.31
0	A	12.54	44.71	9.63	31.75	2.60
1	A	11.30	28.90	7.87	18.14	3.42
0	B	9.46	34.29	7.62	24.81	1.84
1	B	11.26	29.36	7.86	18.85	3.44
0	C	10.35	30.86	8.27	21.05	2.07
1	C	11.20	28.51	8.14	17.94	3.10
0	E	12.50	37.46	10.36	24.06	2.07
1	E	12.77	34.02	8.84	23.21	3.95
0	F	11.32	38.65	8.96	26.49	2.40
1	F	10.77	28.57	8.18	19.23	2.58
0	G	12.03	25.75	10.43	14.76	1.60
1	G	14.46	31.05	10.30	18.90	4.17

Source: Authors' calculations based on UNCTAD NTM data
Note: In the first column rows identified by the number 1 refer to fish products and those identified by the number zero refer to non-fish products.

The last two columns of Table 10 report two distinct measures of tariff overhang. Overhang 1 corresponds to the average of the difference between Bound and MFN applied tariffs and Overhang 2 to the average difference between MFN Applied and Effectively Applied tariffs. While the first measure reflects the degree of unilateral trade liberalization,[13] the second reflects the degree of trade liberalization implemented on a preferential basis either bilaterally or plurilaterally/regionally. Generally speaking, although unilateral liberalization is more pronounced for non-fish products than for fish one, the reverse is true as far as plurilateral trade liberalization is concerned. In other words, the space of maneuver available with tariffs is more constrained for fish than for non-fish products.

Other rows of the table shows average tariffs levels of products affected by different types of NTMs. Not surprisingly results obtained for the various NTMs related sub-groups are consistent and in line with aggregate findings. MFN applied rates are larger for Fish products except for those affected by an SPS measure. Bound tariffs are smaller for Fish products except for those affected by some finance measures. Effectively Applied tariffs are smaller for Fish products except for those affected by a TBT. As to tariff overhang measures, general remarks made above apply across products categories.

Unilateral trade liberalization is deeper for products of non-fish sectors than for products of the fish sector. The reverse is true if we consider plurilateral trade liberalization.

Some contrasting patterns seem to emerge whether we consider technical (Chapters A, B, C) or non-technical regulations (Chapters E, F and G) especially for products belonging to the Fish category. Within the category, products affected by technical regulations are associated with below average tariff values. This is also the case for products affected by some price-control measure. Products affected by other non-technical regulations are associated with above average tariff values.

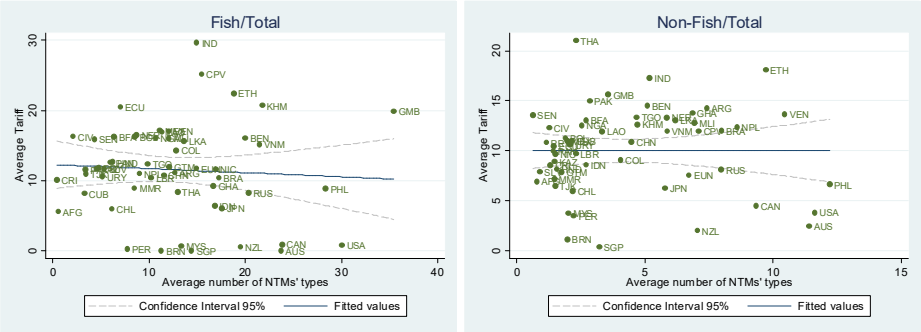
Although exceptions may reflect some product and measure specificity it is difficult to draw any convincing explanation based on average measures. The next set of figures may help us in identifying a possible set of acceptable explanations. Reference tariffs are MFN applied tariffs. Nevertheless results would not drastically change if we chose effectively applied ones. Figure 21(a) shows that on average countries applying larger average numbers of NTMs type per product also apply relatively lower tariffs on fish products. However, confidence intervals suggest that the sign of the relationship is not necessarily very robust. Panel (b) suggests no particular relationship as far as non-fish products are concerned.

Figure 22 reports the same type of relationship but including separately each different type of NTMs applied by each country in the sample. In other words, the reference unit of observation is a country-NTM chapter pair. We implicitly assume that countries define the use of different types of NTMs independently. This is not necessarily realistic in all circumstances but we just aim at identifying some possible relationship between NTMs and Tariffs and this type of hypothesis is only introduced for investigatory purposes. Panels (a) and (b) both suggest that a relatively larger number of measures are on average associated with a relatively lower tariff. Once again results are not extremely robust from a statistical point of view as the sign of the relationship could be reverted within a 95 percent confidence interval.

Figure 23 treats Figure 22 components separately. In other words, the relationship between tariffs and the average number of NTMs types applied is assessed by NTM chapter. Previous overall tendencies are reflected in most cases. Generally speaking, tariffs and NTMs seem to behave as substitutes although substitutability is far from being perfect at least from a statistical point of view. This is particularly the case for fish products as compared with non-fish products. However, the only negative and statistically significant relationship is found for TBTs applied to non-fish products.

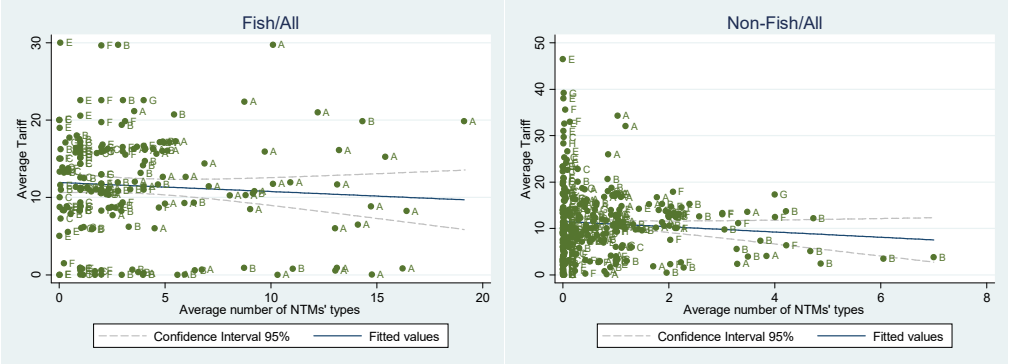
[13] It thus also reflects the latitude a country has to increase its MFN tariff without violating WTO rules.

Figure 21. Average number of NTMs per product (per country) and Tariffs



Source: Authors' calculations based on UNCTAD NTM data and TRAINS database

Figure 22. Average number of NTMs per product (per NTM chapter and country) and Tariffs

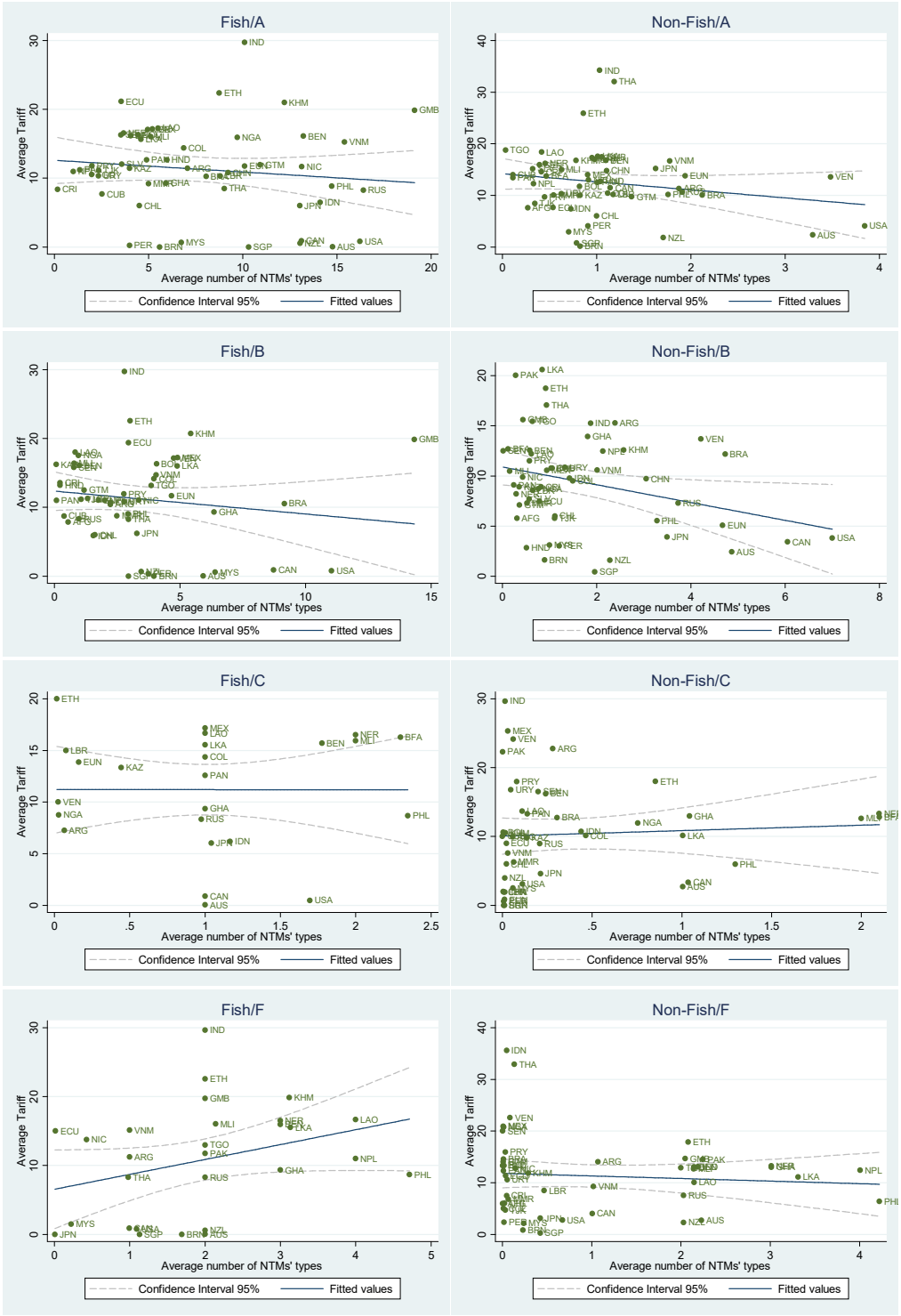


Source: Authors' calculations based on UNCTAD NTM data and TRAINS database

Figure 24 reproduces this analysis for the product groups introduced in previous sections. As before, results do not suggest any strong evidence of either positive or negative relationships between our measure of NTMs incidence and tariffs. Some substitutability is found for SPS measures applied to basic fish products. This is also the case of TBTs when applied to preparations of non-fish products. In all other cases no pattern can be clearly and robustly identified.

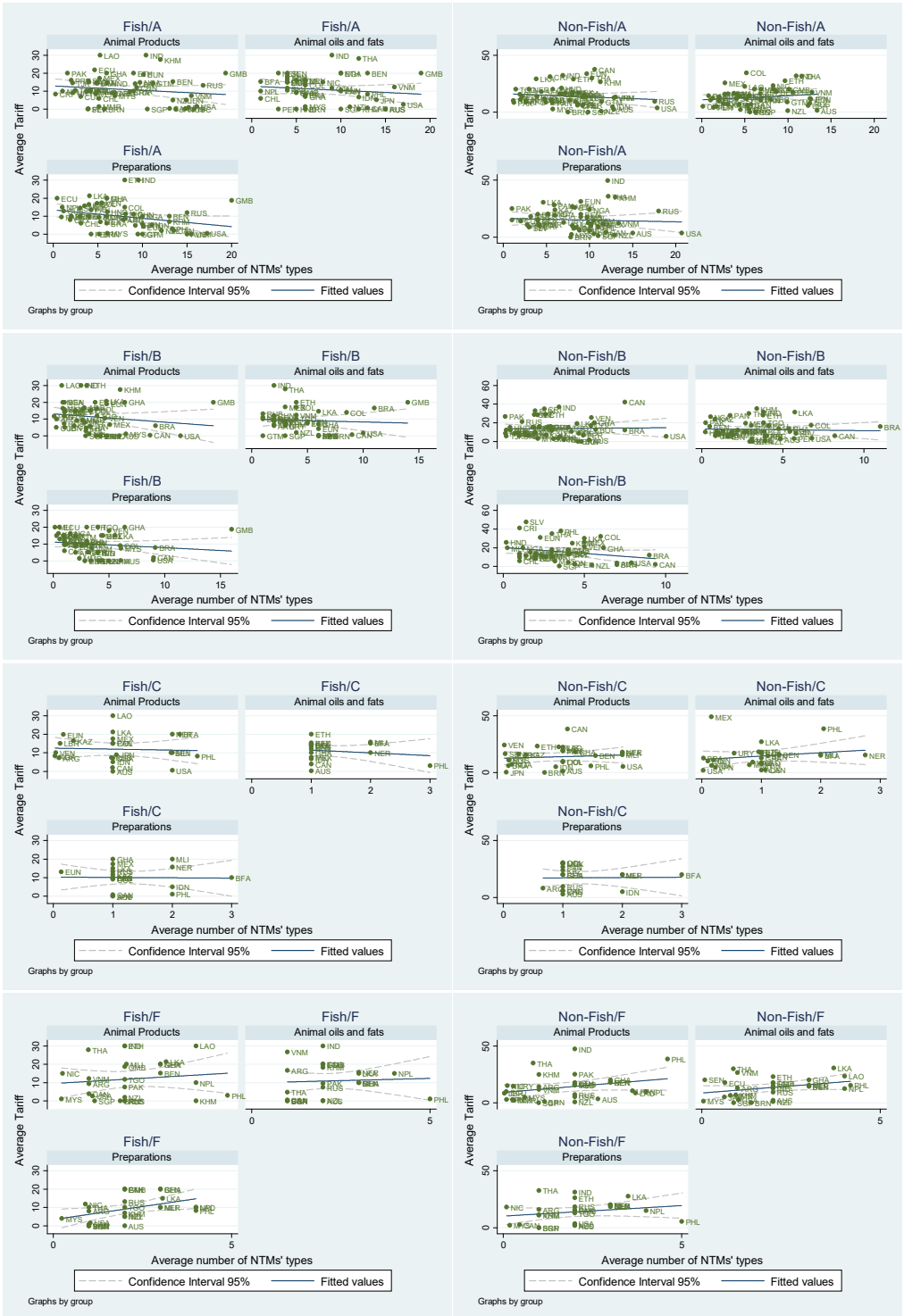
Generally speaking, the sign of the relationship between NTMs incidence and tariffs rates is not robust for products of the fish sector. It is essentially not significantly different from zero. As to non-fish sectors products the relationship is negative if technical regulations are considered and positive otherwise if significantly different from zero.

Figure 23. Average number of NTMs per product by NTM chapter (per country) and Tariffs



Source: Authors' calculations based on UNCTAD NTM data and TRAINS database

Figure 24. Average number of NTMs per product by NTM chapter and groups of products (per country) and Tariffs



Source: Authors' calculations based on UNCTAD NTM data and TRAINS database

5. NTMs and fisheries scale

Existing empirical evidence indicates that, in general, technical measures newly imposed by some partner country affect differently exporting firms of different size. More precisely, larger firms are likely to benefit from the implementation of technical measures abroad while smaller are likely to lose. Gains for larger firms are both in terms of exports value (and eventually market shares) and export duration. Exports of smaller firms decrease and their exit rate increase and as a consequence their market share shrinks. [14] On the imposing country side evidence shows that, instead of displacing foreign firms in favor of domestic ones like tariffs, NTMs also displace small firms in favor of larger ones, including both domestic firms and foreign exporters. Such effects are consistent with a mechanism whereby NTMs raise compliance costs, inducing the exit of smaller firms, while leaving the remaining (larger) ones with expanded market shares on both the export side and the import side.[15]

Small-scale and artisanal fishermen and women tend to fish in areas close to the coast and within the exclusive economic zone of a country. Several reports[16] and case studies[17] have documented that obtaining access to key international markets for fish caught by small and artisanal fishers is a major challenge. Data shown in previous sections revealed that while tariffs on fish and fish products are relatively low in most markets, these products face significantly more non-tariff measures and in particular technical measures (i.e SPS, TBTs and pre-shipment inspections) than products in other food sectors. For small-scale and artisanal fisheries complying with sanitary regulations, ensuring homogeneity in quality, best safety and handling practices, transport and adequate packaging could become particularly complex.

Considering that about 90% of those employed in capture fisheries value chains are engaged in the small-scale sector (despite the fact the small-scale sector captures less than 35 per cent of global catch) an intensification of the implementation of SPS measures and TBTs both on domestic and international markets may have dramatic effects. Small and artisanal fishers may see their export opportunities vanish. Chances to reach target 14.b of SDG 14 could thus be jeopardized. Moreover if more stringent SPS and TBTs are also implemented domestically their access to local markets could be severely compromised. As a consequence, production in the small-scale sector would either shrink or turn unregistered possibly contrasting efforts towards meeting target 14.4 of SDG 14. In both cases employment conditions would become even more precarious that they already are with earnings eventually falling. This may activate a vicious circle leading to an increase in poverty incidence, nutritional deficiency and other related disruptions especially in LDCs and SIDS where the great majority of the labor force working for the fish sector lives. In other words, technical regulations are crucial not only in framing market access conditions both internationally and domestically for the small-scale fish sector but also in determining the efficiency of policy actions directed towards other SDGs.

6. Discussion

[14] Fontagné and al. (2015) and Fugazza, Ugarte and Olarreaga (2017) obtain qualitatively similar results depite the use of totally different datasets.
[15] See Asprilla and al. (2017).
[16] See for instance UNCATD (2016), FAO (2016) and OECD (2013).
[17] See for instance Nyang (2004) for Senegal.

Findings discussed in previous sections unveiled several important stylized facts. First, products of the fish sector are relatively more affected by NTMs and more intensively than products belonging to non-fish sectors. Second, products of the fish sector are mostly affected by technical regulations and in particular SPS measures. Third, almost all countries impose some SPS measure on all imports of products of the fish sector. Fourth, similar types of SPS measures and TBTs affect both fish and non-fish products. However, their incidence is much larger in fish products. Fifth, no product (or type of product) of the fish sector appears to be more affected by NTMs than any other. Sixth, no systematic relationship between tariffs and NTMs incidence can be identified.

The first four stylized facts suggest that the fish sector is highly regulated in most countries of our sample. We found however that regulation appears to be more intensive in developed countries than in developing countries. Moreover, less convergence in terms of intensity use is observed amongst low income countries. Another interesting finding is that a relative lack of convergence is also found for most countries if fish and non-fish products are compared. One must keep in mind however, that incidence expressed in terms of the average number of NTMs types applied per product is lower for non-fish products. Taken together, these facts may indicate that a general trend towards a highly and possibly uniformly regulated sector is on its way. The converging point most probably corresponds to NTMs as imposed by developed countries which remain major exports destinations. However, a global convergence process may have just started and several countries, especially the least economically advanced, are lagging behind.

Whether this convergence process is desirable or not is a sensible but also sensitive question this paper is not really able to answer. However, stylized facts five and six may be useful in determining possibly part of the substance of a plausible answer. Having tariffs rates and NTMs incidence essentially uncorrelated, at least as far as technical regulations are concerned, can indicate a use of NTMs that is not motivated at least not systematically by trade protectionist intentions.

This comment is consistent with recent trends observed in world demand for products of the fish sector. Estimates in FAO (2016) indicate that world per capita apparent fish consumption increased from an average of 9.9 kg in the 1960s to 14.4 kg in the 1990s and about 20 kg in 2015 and a growing proportion of world consumption is from imports. This is particularly the case of developed countries where regulatory intensity convergence is the strongest. A larger exposure to international trade flows has probably induced regulatory bodies to impose a larger set of measures in order to preserve food safety. A weaker convergence of regulatory intensity amongst developing countries and in particular the least advanced ones may be the reflection of the fact that their consumption of fish and fish products tends to be based on locally available products being driven more by supply than demand. In that context and considering that most production units are of modest size regulatory interventions may have deliberately remained contained in order to avoid any strong negative supply shock with probably devastating effects on production and subsequent income distress. An intensification in regulations use may be desirable in the medium-long run especially if demand in developing countries had to rely increasingly on imports. Obviously the main motivation should remain food safety and international initiatives in line with the FAO's Blue Growth Initiative and corresponding to a precisely specified global agenda aiming at promoting food safety in a more general framework of food security should be encouraged. Nevertheless intensification should occur at a reasonable path with possibly some assistance provided to small and medium production units. As discussed in section 6 small-scale and artisanal fisheries could be severely impacted by the implementation of new or more stringent technical-regulations with possibly worrying implications. It is then fundamental to identify policies specifically dedicated to the small-scale sector. Policy can be activated on several complementary grounds. First, access to crucial information concerning export requirements for specific products should be facilitated by all means. Moreover, advisory services related to the production-wise implementation of any specific requirements should be made available. The success of such a policy approach is likely to be determined not only by the availability of public funds to cover the cost of

advisory activities but also by the possibility offered to firms to finance eventual upgrades of their productive technology. Facilitating access to finance is an additional accompanying measure to be considered by policy makers. In addition to technical assistance and capacity building programs, private sector based initiatives could promote the participation of small and medium enterprises in export markets. Governmental and non-governmental organizations could instigate the establishment of cooperatives within which small and medium enterprises could exchange and collaborate on issues related to the compliance with technical regulations on international markets.

It is also clear that support to artisanal fisheries will be most effective with enhanced coordinating and collaboration among all relevant international and regional organizations. For instance, the Aid for Trade initiative and other efforts can encourage exports and value-addition strategies for small scale and artisanal fishers.

Analytical results presented previously provide a unique broad picture of NTMs incidence and presence in fish trade. Their scope remains however somewhat limited due to the very nature of the available information. First of all the context is a cross-country context with no consistent information about changes in NTMs implementation and pervasiveness across time. This lack of a temporal dimension can only be partially compensated by the inclusion of countries with relatively heterogeneous levels of development in the reference country sample. In other words we must remain cautious when inferring any policy strategy involving a preponderant time dimension.

Second, our analysis remains purely quantitative and little can be said in terms of either absolute or relative stringency of the various measures adopted by different countries. In order to get a better sense of stringency some analysis of regulations texts would be necessary. Such analysis would allow for instance the precise identification of tolerated levels of potentially noxious substances present even due to bioaccumulation in fish flesh and fat (e.g. monomethyl mercury). This goes beyond the scope of this paper but it is part of UNCTAD's future research agenda on NTMs.

As was mentioned previously, the HS classification even in its latest version does not allow for any distinction between capture and aquaculture products. This is regrettable not only because of the impossibility to match precisely production trends and trade trends, but also because the match between trade data and NTMs regulatory texts may also be affected. Some ongoing work investigates the possible degree of mismatch between products as defined by the HS classification and NTMs regulations. This however also requires some text analysis and is relatively human capital intensive.

Finally, export-related measures were omitted from the analysis. This omission is intentional as export-related measures are assessed in a companion paper still in process that look more broadly at market access conditions and how they eventually affect export flows.

Appendix

Table A.1. A Concise description of NTM chapters

Chapter A, on SPS measures, refers to measures affecting areas such as restriction of substances, and measures for preventing dissemination of disease. Chapter A also includes all conformity assessment measures related to food safety, such as certification, testing and inspection, and quarantine.
Chapter B, on technical measures, refers to measures such as labelling, other measures protecting the environment, standards on technical specifications, and quality requirements.
Chapter C classifies the measures related to pre-shipment inspections and other customs formalities.
Chapter D, price-control measures, includes measures that are intended to change the prices of imports, such as minimum prices, reference prices, anti-dumping or countervailing duties.
Chapter E, licensing, quotas and other quantity control measures, groups the measures that have the intention to limit the quantity traded, such as quotas. Chapter E also covers licences and import prohibitions that are not SPS or TBT related.
Chapter F, on charges, taxes and other para-tariff measures, refers to taxes other than custom tariffs. Chapter F also groups additional charges such as stamp taxes, licence fees, statistical taxes, and also decreed customs valuation.
Chapter G, on finance measures, refers to measures restricting the payments of imports, for example when the access and cost of foreign exchange is regulated. The chapter also includes measures imposing restrictions on the terms of payment.
Chapter H, on anticompetitive measures, refers mainly to monopolistic measures, such as state trading, sole importing agencies, or compulsory national insurance or transport.
Chapter I, on trade-related investment measures, groups the measures that restrict investment by requiring local content, or requesting that investment should be related to export in order to balance imports.
Chapter J, on distribution restrictions, refers to restrictive measures related to the internal distribution of imported products.
Chapter K, on the restriction on post-sales services, refers to difficulties in allowing technical staff to enter the importing country to provide accessory services (for example, the repair or maintenance of imported technological goods).
Chapter L, contains measures that relate to the subsidies that affect trade.
Chapter M, on government procurement restriction measures, refers to the restrictions bidders may find when trying to sell their products to a foreign government.
Chapter N, on intellectual property measures, refers to problems arising from intellectual property rights.
Chapter O, on rules of origin, groups the measures that restrict the origins of products, or their inputs.
Chapter P, on export measures, groups the measures a country applies to its exports. It includes export taxes, quotas or prohibitions, and the like.

Table A.2. NTMs incidence: average number of different NTMs type per product (fish versus non-fish)

Reporter	Products	Average Number	Reporter	Products	Average Number	Reporter	Products	Average Number
AFG	Non-Fish	4.3	GHA	Non-Fish	6.8	NPL	Non-Fish	8.6
AFG	Fish	2.0	GHA	Fish	16.7	NPL	Fish	9.0
ARG	Non-Fish	7.4	GMB	Non-Fish	3.6	NZL	Non-Fish	7.0
ARG	Fish	12.7	GMB	Fish	35.5	NZL	Fish	19.5
AUS	Non-Fish	11.4	GTM	Non-Fish	9.7	PAK	Non-Fish	2.8
AUS	Fish	23.7	GTM	Fish	12.1	PAK	Fish	3.4
BEN	Non-Fish	5.1	HND	Non-Fish	5.1	PAN	Non-Fish	5.5
BEN	Fish	20.0	HND	Fish	6.2	PAN	Fish	6.0
BFA	Non-Fish	2.7	IDN	Non-Fish	4.7	PER	Non-Fish	5.5
BFA	Fish	6.3	IDN	Fish	16.9	PER	Fish	7.7
BOL	Non-Fish	6.4	IND	Non-Fish	5.2	PHL	Non-Fish	12.2
BOL	Fish	8.5	IND	Fish	15.0	PHL	Fish	28.4
BRA	Non-Fish	9.8	JPN	Non-Fish	5.8	PRY	Non-Fish	4.1
BRA	Fish	17.2	JPN	Fish	17.6	PRY	Fish	4.8
BRN	Non-Fish	4.4	KAZ	Non-Fish	3.3	RUS	Non-Fish	8.0
BRN	Fish	11.4	KAZ	Fish	4.5	RUS	Fish	20.4
CAN	Non-Fish	9.3	KHM	Non-Fish	4.7	SEN	Non-Fish	2.0
CAN	Fish	23.8	KHM	Fish	21.8	SEN	Fish	4.3
CHL	Non-Fish	3.2	LAO	Non-Fish	3.3	SGP	Non-Fish	3.2
CHL	Fish	6.1	LAO	Fish	11.3	SGP	Fish	14.4
CHN	Non-Fish	6.4	LBR	Non-Fish	4.7	SLV	Non-Fish	2.7
CHN	Fish	11.6	LBR	Fish	10.2	SLV	Fish	5.4
CIV	Non-Fish	1.3	LKA	Non-Fish	6.2	TGO	Non-Fish	4.7
CIV	Fish	2.1	LKA	Fish	13.6	TGO	Fish	9.8
COL	Non-Fish	5.4	MEX	Non-Fish	4.6	THA	Non-Fish	7.1
COL	Fish	12.8	MEX	Fish	11.1	THA	Fish	13.1
CPV	Non-Fish	7.1	MLI	Non-Fish	6.9	TJK	Non-Fish	2.2
CPV	Fish	15.5	MLI	Fish	12.0	TJK	Fish	3.4
CRI	Non-Fish	3.6	MMR	Non-Fish	4.2	URY	Non-Fish	3.6
CRI	Fish	1.5	MMR	Fish	8.5	URY	Fish	5.1
CUB	Non-Fish	2.2	MYS	Non-Fish	5.2	USA	Non-Fish	11.6
CUB	Fish	3.7	MYS	Fish	13.4	USA	Fish	30.1
ECU	Non-Fish	4.8	NER	Non-Fish	5.9	VEN	Non-Fish	10.5
ECU	Fish	9.5	NER	Fish	8.7	VEN	Fish	12.1
ETH	Non-Fish	9.7	NGA	Non-Fish	2.9	VNM	Non-Fish	5.9
ETH	Fish	18.8	NGA	Fish	10.7	VNM	Fish	21.5
EUN	Non-Fish	7.2	NIC	Non-Fish	5.2			
EUN	Fish	14.9	NIC	Fish	17.2			

Source: Authors' calculations based on UNCTAD NTM data

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