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Do Non-Tariff Measures in the EU, Japan and the ASEAN Matter for Export Consignments from Malaysia?

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Abstract: *This paper explores the impact of non-tariff measures (NTMs) on Malaysian exports to the major traditional markets of the European Union (EU), Japan and the Association of Southeast Asian Nations (ASEAN), spanning the period 2000-2013. The empirical findings reveal the presence of a dual effect of NTMs on Malaysian exports; The NTMs can facilitate trade or restrict it. From the Malaysian experience in the trade of broad categories of products, NTMs appear to have a beneficial impact on industrial exports but not on agricultural exports. Similarly, positive effects of NTMs are noted in Malaysia's trade with ASEAN and Japan but not with the EU. A possible reason why NTMs act as a catalyst for trade is that its high export concentration in both products and markets results in an "offensive" approach that ensures sustained market access in major importing countries. The findings of the paper are therefore relevant to the current national policy debate on market access in traditional markets and for policy considerations in negotiating comprehensive bilateral free trade agreements (FTAs), specifically the ongoing Malaysia-EU FTA.*

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1. Introduction

Environmental measures, technical regulations and standards known as non-tariff measures (NTMs) related to human health as well as animal and plant health are growing extensively and have emerged as a critical issue on the international trade agenda (Iacovone, 2005). Despite the dismantling of traditional trade barriers (such as tariffs, quotas and subsidies), there is now

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a greater recognition of the implications that NTMs have on trade (Fugazza & Maur, 2008; Winchester, 2009; Yuan & Beghin, 2012). Global trade flows, particularly the trade flows of the developing world (World Bank, 2008), are becoming increasingly sensitive to NTMs (Fontagne Von Kirchbach, & Mimouni, 2005a). This is because most NTMs originate in developed markets, namely the European Union (EU), the United States (US) and Japan.

Typically, the developing world is vulnerable to NTMs for the following reasons: First, NTMs are generally prominent in agriculture (and food generally), textiles, garments and iron and steel (Bora, Kuwahara, & Laird, 2002), thereby principally affecting the trade of developing countries. Second, the associated costs of compliance (financial constraints; climatic conditions; the prevailing system of production and marketing; inadequate technical and scientific expertise and; lack of testing and inspection facilities) can be prohibitive in developing countries (Otsuki, Wilson, & Sewadeh, 2001; Athukorala & Jayasuriya, 2003; Nixson & Wignaraja, 2004; UNCTAD, 2013). Third, developing countries lack the resources to participate effectively in the institutions of the World Trade Organization (WTO) and thus may be unable to exploit the opportunities these agreements present (Henson & Loader, 2001). The NTMs are therefore perceived by the developing world as a form of hidden protectionism, notwithstanding the fact that some measures are indeed justified on scientific grounds. Undeniably, NTMs have profound implications for market access for developing countries, as they have the potential to close down markets, alter competition and modify the terms of trade. To maintain or expand world market share, developing countries can no longer rely on competitive prices alone, as they need to meet the world trading system demands of quality and safety standards.

Understanding the impact of NTMs on Malaysia is particularly interesting because it is a highly trade dependent, non-agriculture based economy with high export concentrations in terms of both products and markets. The findings of this paper are therefore relevant to the current policy debate on market access of traditional markets which has already emerged as a critical item on the national agenda, and for policy considerations in negotiating comprehensive bilateral free trade agreements (FTAs) with major partner countries. The central question the paper seeks to answer is: Do NTMs in major importing countries pose significant barriers to export consignments from Malaysia? This paper contributes to the body of knowledge on the effects that NTMs have on trade from the perspective of the exporter, as the importance of a NTM depends on the structure of exports in terms of products and markets (Disdier, Fontagne, & Mimouni, 2007; Disdier, Fekadu, Murillo, & Wong, 2008). The novelty of this research is to derive a coverage ratio for NTMs from the exporter's perspective to capture

the relative importance of NTMs, moving beyond product groups to focus on country groups. This paper also expands on previous works focusing on other countries, namely to decompose the impacts of trade barriers into distinct tariff and NTM effects; to distinguish the trade impacts that NTMs have on agricultural goods from that of industrial goods; and to distinguish the trade effects on different countries/country groups. To the best of our knowledge, there is still limited empirical research on this issue for the Malaysian case.

2. Survey of Previous Work

The NTMs can be country-specific or harmonised. The sanitary and phytosanitary (SPS) and tehnical barriers to trade (TBT) agreements promote harmonisation chiefly to allow exporters to reduce adaptation costs in importing markets (Maskus, Wilson, & Otsuki, 2001). Others opine that this may come at a cost, though the cost is likely to be small or non-existent in the presence of a network trade (WTO, 2005), as exporters may lose differentiation or product variety that they would otherwise have under a system with country-specific standards. The end result is that the harmonisation of standards and mutual recognition do not necessarily promote trade (Moenius, 2004).

Economic theory does not provide a clear cut explanation of the links between the harmonisation of NTMs (in the form of standards and regulations) and trade. The impact that NTMs have on trade therefore remains unclear and demands an empirical enquiry. Recent studies have sought to clearly quantify the effects of NTMs on trade, though it remains a daunting task because of the vast amount of information required to quantify heterogeneous standards and regulations across countries and over time. In addition, necessary data is either not available or at times incomplete (Korinek, Melatos, & Rau, 2008). The following discussion focuses on the findings of previous related work that have largely employed the gravity model and other models of individual firm export decisions.

Fontagne, Mimouni and Pasteels (2005b) discovered a negative impact of environmental related measures (SPS and TBT), mainly on the global trade of fresh and processed foods relative to manufactured products. In terms of products, the negative impact is mainly on cut flowers, pork, vegetables, citrus, sugar, juices, wine, animal feed and leather. Otsuki et al. (2001) focused exclusively on the effects of Aflatoxin standards on the food (mainly cereals, dried fruits, nuts and vegetables) trade between Africa and Europe (see Gebrehiwet, Ngqangweni, & Kirsten, 2007, for exports between Africa and the Organization for Economic Cooperation and Development [OECD]), while Iacovone (2005) studied the effects of the same SPS

standards on nuts exported from Latin America to Europe. All of the above studies found negative effects of EU standards on the trade flows of Africa and Latin America.

Mehta and George (2003) highlighted the impacts of the complex and constrained market access created by the SPS regime have on the processed food products from a large developing country like India. Their case study revealed that stricter and shifting standards in developed countries have closed down some Indian plants, while other exporters had to explore alternative markets. Likewise, Bao and Qiu (2009) focused on the trade impact of TBTs per se in China. Their study reported on the effects of TBTs on agricultural products and food processing in China, although trade depressing effects are relatively small compared with that of tariffs.

In a firm-level study, Chen, Otsuki and Wilson (2006) showed that technical regulations reduced the export propensity of domestically owned and agricultural firms in developing countries. More importantly, their study revealed that market diversification is reduced when firms are negatively affected by standards, contrary to expectations. This is because compliance with different standards across importing countries requires a single fixed cost that leads to diseconomies of scale in a firm's production. The export market concentration of firms that are negatively affected by trade is found to be even more prevalent in the case of firms engaged in outsourcing, as compliance with standards in destination markets becomes more difficult when the inputs imported from various locations fail to meet the requirements imposed in the market for the final product. Therefore, the WTO (2005) asserts that in the presence of global networks in modern manufacturing, the adoption of an agreed upon standard facilitates the expansion of the market beyond national borders.

However, the macro and micro findings on the trade-restricting impacts of standards is not unanimous. Swann, Temple and Shurmer (1996) found that idiosyncratic national standards encourage imports to the United Kingdom (UK), thereby providing evidence against theoretical predictions that standards are barriers to imports. Similarly, Moenius (2004) found that importer specific (non-shared) standards in the OECD economies promote trade, particularly for manufactured goods (see also Fontagne et al. (2005b) for some non-food items). The implication of the above results is that importer standards provide information to exporters pertaining to both product requirements and consumer preferences (see also Maskus et al, 2001; Chen, Wilson & Otsuki, 2008). Thus, compliance costs associated with importer standards are more than offset by reduced information costs (see Athukorala & Jayasuriya, 2003, for similar reasoning on the trade facilitating possibilities of standards), as information costs are of considerable importance to exporters of manufactured goods that are generally heterogeneous. This theoretical explanation based on a signalling argument

(see also Masakure, Henson, & Cranfield, 2009; Hudson & Orviska, 2012), provides an alternative perspective to the mainstream literature on NTMs as barriers to trade.

The contemporary literature frequently alludes to the signalling theory. A recent study by Chen et al. (2008) indicated that quality standards and labelling requirements are positively correlated with export volume and export scope (measured by the number of export markets and products), while the opposite holds true for certification procedures. The explanation given for the former is that while quality standards reduce consumers' uncertainty and raise their willingness to pay for the product, design standards ensure product compatibility and reduce coordination failures between producers. The same however cannot be said of the burdensome testing and certification procedures, which are repetitive across markets. Subsequently, the study highlights the importance of the type of technical regulation in importing countries in addressing the impact on exporting firms' performance in terms of economies of scale and scope.

The positive impact of NTMs on trade is also gaining wider empirical support with the recognition of the competitive repositioning of some sectors facing stringent standards and regulations in importing countries (Jaffee & Henson, 2004). Jaffee and Henson (2004) illustrated the success of Kenyan fresh produce exporters that have complied with EU requirements and thus improved their access to these markets, as well as the Peruvian asparagus exporters who have met the strict EurepGAP[1] protocol and have benefited as a result. Based on their sectoral analysis of agricultural products, Disdier et al. (2007, 2008) reiterate the beneficial impacts that SPS and TBT measures have for tropical product exporters in Ecuador, Costa Rica and Kenya. Additionally, Masakure et al. (2009) showed that IS9000 certification has clearly benefited Pakistani exporters of textiles, leather and agro-food, while Jayasekhar and Kumar (2010) found evidence of a dual effect of stringent food safety regulations in the OECD on India's exports of seafood.

The findings on the trade impacts that NTMs have for specific countries obviously cannot be generalised given the dissimilarities in trade structure and the heterogeneity of NTMs across trading countries, and the lack of a unifying method of quantifying NTMs. Specifically, the studies surveyed above have different approaches to quantifying NTMs. Some studies have used constructed indicators to measure the trade restrictions or severity of NTMs, while other studies have employed direct measures of a particular standard or regulation. Furthermore, most studies have confined themselves to the effects of NTMs (more specifically SPS measures) on food and agricultural trade, as the developing world primarily exports agricultural products. More importantly, the main implication of the empirical literature is that NTMs may have an ambiguous effect on trade: they either can have

no impact on trade, may facilitate trade or may restrict trade (see also Schlueter, Rau, Wieck, Humphrey, Colen, & Heckelei, 2009; Yuan & Beghin, 2012).

3. Model and Data

3.1 Model specification

In The paper uses an ex-post approach, employing a unidirectional gravity model to analyse the overall impact of NTMs on Malaysian exports. The theoretical foundations of the gravity equation, which provides a measure of the expected bilateral trade given the size of both partners and bilateral transaction costs, have been enhanced over the last few decades by Anderson (1979), Bergstrand (1985) and Anderson and Van Wincoop (2003).

The extended equation of the gravity model (see Wilson & Otsuki, 2004; Chen et al, 2008; Mangelsdorf, Portugal Perez, & Wilson, 2012) is augmented to separate the impacts by product group and importing country and the following equations are estimated in log-linear form:

$$\ln X_{ijt} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln DST_{ij} + \beta_6 ADJ_{ij} + \beta_7 TRF_{ijt} + \beta_8 ECR_{ijt} + \delta_t + \varepsilon_{ijt} \quad (1)$$

$$\ln X_{ijt} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln DST_{ij} + \beta_6 ADJ_{ij} + \beta_7 TRF_{ijt} + \beta_8 ECR*DAGRI_{ijt} + \beta_9 ECR*DIND_{ijt} + \delta_t + \varepsilon_{ijt} \quad (2)$$

$$\ln X_{ijt} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln DST_{ij} + \beta_6 ADJ_{ij} + \beta_7 TRF_{ijt} + \beta_8 ECR*DASEAN_{ijt} + \beta_9 ECR*DEU_{ijt} + \beta_{10} ECR*DJPN_{ijt} + \delta_t + \varepsilon_{ijt} \quad (3)$$

where *Xijt* is country *i*'s (reporter, Malaysia) exports to country *j* (partner) in year *t*. The other variables are defined as below:

GDP	real gross domestic product (GDP)
POP	population
DST	distance between economic centres of *i* and *j*
ADJ	common border between *i* and *j* (dummy variable equal to one if and *j* share a border and 0 otherwise)
TRF	tariff rate
ECR	export coverage ratio (used interchangeably with frequency counts, denoted as FC)
DAGRI	dummy variable equal to one for agricultural products (HS01-24) and 0 otherwise

DIND	dummy variable equal to one for industrial products (HS25-99) and 0 otherwise
DASEAN	dummy variable equal one to for ASEAN countries and 0 otherwise
DEU	dummy variable equal to one for EU15 countries and 0 otherwise
DJPN	dummy variable equal to one for Japan and 0 otherwise
δt	time dummies
ε	error term that picks up other influences on bilateral trade
α	constant term

The GDP, POP, DST and ADJ variables are standard components of the gravity model. The GDP variable is a proxy for country size (market size and production/trading capacity; see Tinbergen, 1962; Poyhonen, 1963). The expected signs for β1 and β2 are positive because a large country is more likely to achieve economies of scale, increase exports and simultaneously possess the capacity to absorb imports. In contrast, the expected sign of the coefficient on POP is ambiguous (Cheng & Wall, 2005). The POP is expected to have a negative sign because a large country is considered to be less open to trade. A further explanation for this is that a country with a large population implies a large domestic market and a more diversified range of output that would result in less dependence on international specialisation. Alternatively, a country with a large population may be able to capture economies of scale in production and therefore, trade more.

Geographical distance (DST) remains important in considering transport costs (Egger, 2000), transaction costs (Bergstrand, 1985; Edmonds, La Croix, & Yao, 2008) and timeliness in delivery (see also Rojid, 2006; Athukorala, 2009) and is included in the estimations. Similarly, ADJ captures additional advantages due to proximity. Thus, the expectations are for $\beta 5 < 0$ (Tinbergen, 1962; Poyhonen, 1963) and $\beta 6 > 0$.

Bilateral tariffs are included as an additional regressor in equations (1) to (3) to allow for a comparative analysis of the impacts that tariffs and NTMs have on exports (see also Disdier et al., 2007). The most favoured nation (MFN) tariff rate is used for TRF, which is considered the most straightforward nominal tariff rate (CIE, 2006) in the case of bilateral trade between EU15 countries and Japan with Malaysia, but the preferential tariff rates are considered for the ASEAN countries' trade with Malaysia.

The primary variable of interest is the ECR, which is distinguished by product group and partner country. The reasons for that is the restrictiveness of NTMs can differ by product traded and by export markets. This paper employs the inventory approach, derived using coverage ratios, to identify NTMs from the Malaysian perspective as an exporter. The ECR is measured as the export value of the products subject to NTMs in the importing country relative to Malaysia's total exports of the affected products to the world; this

is done to reflect the relative importance of the NTM to Malaysia across the various country-pair-HS product groups. The affected products are products that are subject to at least one type of NTM in the importing country. The number of NTMs identified in the 6-digit level of the Harmonized System (HS6) line is added to the HS2 line and the export coverage ratio[2] is then calculated at the level of an HS2 line. The coverage ratio varies among different product groups for different country-pairs and across time. The expected sign on β8 is ambiguous because NTM restrictions can either impede or promote exports. Likewise, there is no prior imposition of the sign of the effect of the interaction terms between ECR with product groups and partner countries.

3.2 Estimation technique

The random effects (RE) estimator is chosen for the following reasons, despite the fact that the Fixed Effects (FE) estimator is much more common in gravity models than the RE estimator (see Egger, 2000). The RE estimator has the advantage of not requiring the exclusion of variables that are time invariant. In this case, both the distance (DST_{ij}) and contiguity (ADJ_{ij}) variables are invariant across time periods, and these variables are of considerable interest to this study. Furthermore, all of the variables exhibit more variation in the data across country-pair-HS product groups (between variation) than over time (within variation). This is not surprising given the large number of cross-section entities (based on country-pair-HS product groups) used for the estimations, which are believed to have some influence on bilateral exports. As such, a FE may not work well for data with minimal within variation or for variables that change slowly over time.

The Breusch-Pagan (1980) Lagrange Multiplier (LM) test is employed to determine whether RE Generalized Least Squares (GLS) is appropriate and the simple pooling can be rejected. The LM statistics are overwhelmingly significant and support the appropriateness of the RE GLS model for all specifications. Further, GLS is more efficient than ordinary least squares (OLS) under heteroscedasticity or autocorrelation.

3.3 Data description

Primary data on trade flows at the 2-digit level[3] of the HS nomenclature is derived from the UN COMTRADE database. The trade partners of Malaysia considered in this study include the EU15 (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Greece, Portugal, Spain, Sweden and the United Kingdom), Japan and the ASEAN4 (Singapore, Thailand, the Philippines and Indonesia). These partner countries are included in this study because they are major markets

for Malaysian exports, and the EU15 and Japan are considered to have particularly stringent SPS standards. The export values of Malaysia to the above-mentioned trading partners are expressed in constant 1990 USD. The period analysed is 2000-2013. The three dimensional panel dataset covers 97 product groups at the HS 2-digit level for the 20 one-way bilateral flows. The total number of observations is 27,160.

The above information is then merged with the UNCTAD database and the Trade Analysis and Information System (TRAINS) included in the World Integrated Trade Solution (WITS) on tariffs and NTMs (for public standards not including private sector requirements). The WITS data does not provide information on NTMs for Indonesia. The ASEAN database[4] is therefore used to identify the ECR of NTMs for Indonesia.

The NTMs are compiled for the latest year available for every reporter. The measures considered by this study included six categories tracked by UNCTAD, which are: para-tariff measures (2000); finance measures (4000); automatic licensing measures (5000); quantity control measures (6000); monopolistic measures (7000) and technical measures (8000). However, Japan, Thailand and the Philippines report their NTMs based on a national coding system. The categories considered for these three countries include seven measures to conform to the UNCTAD classification. These are SPS (A000) measures, TBT (B000), other technical measures (C000), quantity control measures (E000), para-tariff measures (F000), finance measures (G000) and anti-competitive measures (H000).

The other relevant sources of data are the following: The GDP and population data for ASEAN4 countries and Japan is sourced from the online Asian Development Bank (ADB) Statistical Database System (SDBS)[5]. Likewise, the GDP and population data for the EU15 is obtained from the online Eurostat database of the European Commission[6]. Data for geographical distance on the basis of the average distance between the capitals for country-pairs and data for contiguity are extracted from the CEPII database.

There are caveats for the data set. First, the database lists the NTMs with different publication dates and years of commencement for the various NTMs. Nevertheless, the data is still considered to be useful for the purpose of comparing NTMs over a decade without going too far back in time. Second, the database on NTMs does not have a bilateral dimension. However, the NTMs are generally enforced unilaterally by the importing countries and are applicable to all exporting countries, with some rare exceptions.

4. Market Access for Malaysian Exports

Table 1 illustrates the dependency of Malaysia's exports on the markets of the EU, Japan and ASEAN4. All three markets comprise a substantial percentage of total Malaysian exports, with the ASEAN4 commanding the highest export share. In terms of products traded, the corresponding shares in Malaysian exports of agriculture to the three major markets remain lower than that for industry, as Malaysia is predominantly an industry-based exporter. Agricultural products only accounted for approximately 11% of total exports in 2013.

Table 1: Export shares in major destinations, 2000-2013 (%)

	Agriculture			**Industry**			**Total Exports**		
Country/ Group	**2000**	**2007**	**2013**	**2000**	**2007**	**2013**	**2000**	**2007**	**2013**
EU15	11.93	12.55	8.63	13.78	11.98	8.46	13.68	12.03	8.47
Japan	5.39	4.69	3.85	13.53	9.65	11.92	13.07	8.79	5.59
ASEAN4	22.82	15.80	17.70	25.66	24.59	26.34	25.48	23.81	25.41
Total	**40.14**	**33.04**	**30.18**	**52.97**	**46.22**	**46.72**	**52.23**	**44.63**	**39.47**
Share in Total Malaysian Exports	**5.26**	**8.71**	**10.54**	**94.74**	**91.29**	**89.46**	**-**	**-**	**-**

Notes: 1. Agriculture refers to HS 01-24 and Industry to HS 25-99.
2. The export shares for agriculture and industry refer to shares of the total agricultural exports of Malaysia and total industrial exports of Malaysia respectively.
Source: Calculated from UNCOMTRADE.

That Malaysian exports are largely industry based is a crucial point to note when examining the effects that NTMs have on trade. Most of the SPS measures, which have a narrower focus than the TBT (Kelly, 2003), are imposed on food and agricultural products. Therefore, a focus on SPS measures *per se* may not sufficient to capture the degree of trade restrictiveness on Malaysian exports because TBT and other measures that relate to non-risk reducing measures such as product compatibility, quality attributes and conservation issues are relevant for both agricultural and non-agricultural products (see also Fliess & Lejarraga (2005), on how TBTs are the leading concern for developing countries).

The three major markets as shown in Table 1 are not only key export destinations for Malaysian products, but they are also countries that have actively notified the WTO. These notifications provide advanced warning of new or modified measures, and an opportunity for trading partners to raise questions or objections to the proposed measures (Jaffee & Henson, 2004).

The number of notifications by the ASEAN4 and Japan to the WTO for the period 2000- June 2010 were 421 and 175 respectively (calculated from the online SPS-IMS and TBT-IMS portal). The high cumulative number of notifications from the ASEAN4 *vis-a-vis* the other countries/groups plausibly signals an increase in regulatory activity. Most of the notifications fall under the TBT agreement. In contrast to the ASEAN4 and Japan, only 73 notifications were filed by EU countries over the same period. However, the EU measures are considered stringent, and exporters from the developing world are highly affected by them (Maskus et al., 2001; Disdier et al., 2008).

While the notifications mentioned above are not specific to Malaysia, bilateral data are available on notifications and the detention of export consignments of agricultural and food products from Malaysia to the EU. The information, sourced from the Rapid Alert System for Food and Feed (RASFF) portal, is useful because it is widely acknowledged that trade in agricultural and food products is susceptible to NTMs (Henson & Loader, 2001), and the EU is at the forefront of stringent food safety standards and regulations (Alavi, 2009) due to the harmonisation process for such measures between the member states. More importantly, RASFF also provides reasons for the notifications and the detention of the consignments.

A total of 47 notifications on Malaysian exports were filed by the EU from 2000-2010 (June). Most were classified as border rejections[7] (21 notifications), while the remainder were either alert or information[8] notifications. The majority of the notifications originated from the UK (17 notifications), followed by Italy as the distant second. The rejection of export consignments is not limited to the value of the product *per se*, but includes transportation and other export costs which are incurred by the exporter (Otsuki et al, 2001; Henson & Loader, 2001; Athukorala & Jayasuriya, 2003).

The primary reasons for the notifications regarding Malaysia's consignments filed by the EU, based on the RASFF portal, are contamination in the form of organic and chemical compounds, the presence of bacteria, food additives that are unauthorised and prohibited substances in the form of specific drugs and antibiotics. The contaminants were principally found in fish and fish products, poultry, fats and oils (affecting whole milk and palm oil exports). For example, in 2008, Malaysian seafood products were banned from entering the EU market on the grounds of the use of contaminated ice, resulting from the unhygienic condition of ice factories and dirty landing jetties (Alavi, 2009; Henson & Loader, 2001). Malaysian exporters have also voiced their concerns over the phytosanitary controls for fresh fruit (UNCTAD, 2007). Specifically, the SPS measure regarding pesticide residue on fruits is considered difficult (as it is more stringent than International Codex Standards) and costly for exporters to achieve because the maximum residue levels are set at the limit of detection. This is a problem for tropical

fruits. It appears at this stage, based on the reasons for notification and detention of Malaysian exports to the EU, the major problem lies in meeting basic food hygiene requirements (see also Athukorala & Jayasuriya, 2003).

Apart from barriers to export consignments of food and agricultural products from Malaysia, recent selected episodes of export disruption indicate specific labelling problems in food and natural resources such as timber and biodiesel.

In the context of labelling based on production, processes and methods (standards for product harvesting), Austria has contemplated trade measures that may discriminate against timber imports from Malaysia on similar labelling grounds. There are also growing prospects for other European government mandating schemes, such as eco-labels, which indicate the point of origin or the nature of forestry management. The Dutch government has already mandated labelling on imported timber. At present, a 'Voluntary Partnership Agreement (VPA)'[9] which permits the ban of imported forest products to the EU if EU customs officials decide that measures in the exporting countries to verify the legality of the product (which already exists) are not adequate, is being negotiated with Malaysia. Another issue related to timber that has affected Malaysian exporters is Directive 67/548/EEC that adopts a hazard classification system for substances in timber products that are considered dangerous (boric acid). A related issue is the mandated sustainability criteria related to emissions and land use for the cultivation of bio-fuels. Allegations have recently been made by a Dutch non-governmental organisation (NGO) regarding the emissions from the conversion of forest and peat swamp areas conversion into palm oil plantations in Malaysia.

Apart from exports of food and natural resources, the EU's guidelines based on the principle of producer responsibility that deal with end-of-life environmental impacts have also affected manufacturers of electrical and electronic (E&E) products. In 2002, the EU enforced a guideline on wastes (Waste Electrical and Electronic Equipment (WEE) Directive 2002/96/EC) from the E&E industry, which stipulates the responsibilities that producers and exporters have for the treatment, recovery and disposal of related equipment. Similarly, another directive (the Restrictions on Hazardous Substances (RoHS) Directive) was instituted to restrict the use of certain substances, which subsequently affected manufacturers, sellers, distributors and recyclers. Both requirements were transmitted through the supply chain (Vossenaar, Santucci, & Ramungul, 2006), and eventually the small and medium enterprises (SMEs) in Malaysia bore the brunt of the high costs of compliance (Ministry of International Trade and Industry [MITI], 2006).

The selected cases of export disruption (primarily regarding the EU) described above highlight the importance of not only examining the incidence of NTMs which varies distinctly across product groups and

markets, but also identifying the product concentration of Malaysian exports in major destinations and the stringency of those destinations in terms of the number and types of NTMs imposed. Table 2 presents the export coverage of NTMs on Malaysian consignments in major destinations for both agricultural and industrial products.

Table 2: Coverage of NTMs for Malaysian exports in major destinations

	No. of Measures			**Export Coverage (%)**		
Type of Measure	**A**	**I**	**Total**	**A**	**I**	**Total**
EU (2007)						
Quantity Control	509	61	570	12.57	13.83	13.67
Technical	659	120	779	25.31	36.28	17.43
Total	**1168**	**181**	**1349**	**12.64**	**15.81**	**15.38**
Japan (2009)						
Para-Tariff	524	322	846	3.84	22.41	20.73
Quantity Control	532	9	541	1.95	4.60	3.95
SPS	17442	3715	21157	4.57	11.07	10.28
TBT	2168	10705	12873	4.18	10.79	10.12
Total	**20666**	**14751**	**35417**	**4.10**	**12.03**	**10.87**
Singapore (2001)						
Automatic Licensing	18	6	24	7.03	8.19	7.27
Quantity Control	93	109	202	14.62	18.35	18.09
Monopolistic	1	13	14	56.15	17.96	18.53
Technical	182	84	266	16.25	19.76	18.23
Total	**294**	**212**	**506**	**16.27**	**18.40**	**18.23**
Thailand (2008)						
SPS	299	8	307	5.69	0.31	5.67
TBT	0	601	601	-	5.28	5.28
Other Technical	32	1	33	3.84	0.31	3.84
Total	**331**	**610**	**941**	**4.94**	**5.28**	**5.27**
Philippines (2008)						
Para-Tariff	64	101	165	1.59	1.49	1.47
Quantity Control	120	175	295	1.59	1.49	1.47
Anti-Competitive	1	2	3	1.30	1.44	1.42
SPS	779	42	821	1.59	0.73	0.98

Table 2: (Continued)

TBT	19	408	427	3.14	1.46	1.49
Other Technical	17	-	17	1.29	-	1.29
Total	**1000**	**728**	**1728**	**1.59**	**1.39**	**1.42**
Indonesia (2007)						
Para Tariff	55	4	59	8.54	7.77	8.28
Automatic Licensing	12	117	129	14.66	1.22	1.29
Quantity Control	73	666	739	7.86	2.92	3.04
Monopolistic	6	24	30	11.48	6.90	6.96
Technical	185	195	380	2.40	1.30	1.45
Total	**331**	**1006**	**1337**	**4.38**	**2.36**	**2.48**

Notes: 1. The NTMs are examined from the Malaysian perspective as an exporter.
2. A – agriculture; I – industry
Source: Calculated from WITS, ASEAN and UNCOMTRADE.

The first striking observation from Table 2 is the substantial number of NTMs imposed in Japan relative to the other countries. The number of SPS measures for agricultural products and the number of TBT measures for industrial products are astoundingly high in Japan. Nevertheless, the ECR for SPS is only 5 per cent for Malaysian agricultural products, while that from TBT for industrial products is more than double at 11 per cent. In contrast, the EU only has a few principal types of NTMs relative to Japan. This should not be misinterpreted as lower degree of restrictiveness in the EU market vis-à-vis Japan for the following reasons: First, the ECR of all NTMs for Malaysian products is obviously higher in the EU than in Japan. The larger coverage of NTMs for Malaysian industrial export consignments relative to agricultural products, despite the greater number of measures instituted on agricultural products, further illustrates that the number of NTMs *per se* is not an indication of the severity of an export barrier. Second, it may be more difficult to surmount a single barrier than multiple NTMs if the former is imposed with greater intensity.

Among the three ASEAN member countries listed in Table 2, the ECR of NTMs for Malaysian consignments is highest for Singapore. Despite the wide variety of NTMs in the Philippines, the coverage ratio is relatively small for Malaysian exports. It is likely that exports from different product groups may be disproportionately affected by NTMs in the importing countries, depending on the export concentration in those markets.

It is obvious that there are strong variations in NTM coverage by types of measure, commodity and importing country. However, the ECR derived in this section only provide information on the potential trade impact of NTMs, the

empirical results in the following section capture the direction and the magnitude of the impact that NTMs have on Malaysian exports.

5. Results and Discussion

Figure Table 3a presents the results of the RE model. All traditional covariates in the gravity model, with the exception of GDP of reporter and common border, are found to be significant. The common border effects are generally irrelevant for this study given that only Thailand and Singapore border Malaysia is the sample of countries used in this study. Additionally, the negative sign for POP_i, which is contrary to the theoretical prediction, deserves some explanation. The result is, in fact, not unexpected because this study employs unidirectional gravity estimation. Hence, there is a lack of variation in the data within the entity, as the only reporter country in this case is Malaysia. Therefore, the equations have been re-estimated without the inclusion of POP_i (and GDP_i), but the results for the other variables do not change in terms of their signs and significance. As a result, Table 3a reports the gravity estimates with the inclusion of GDP_i and POP_i.

From column (1), tariffs and NTMs in the importing countries have opposite effects on Malaysian exports. Tariffs, though negative, do not significantly affect export consignments. Interestingly, the positive and significant coefficient for ECR indicates that a greater NTM coverage of exports in the importing country promotes Malaysian exports. Column (2) makes a distinction in the export coverage of NTMs between agricultural products and industrial products. The interaction terms of ECR with the respective dummy variables for agricultural products and industrial products are again positive and significant. Column (3) makes a distinction between importing countries. The ECR interaction terms with the dummy variables for ASEAN and EU are positive and significant.

The coverage ratio of NTMs as a proxy of trade policy though widely used (see Pritchett, 1996), Rose (2004) and others believe that it suffers from measurement error, as it suffers from an endogeneity problem. Therefore, to check the sensitivity of the results, equations (1) to (3) are estimated using frequency counts (FC) as an alternative measure. The results reported in Table 3b indicate that the sign on the influence of NTMs becomes negative for agricultural products in equation (2) and for the EU in equation (3), implying that the presence of NTMs negatively affects Malaysia's agricultural exports and exports to the EU. The contradictory results from Tables 3a and 3b suggest the presence of dual effects of NTMs by commodity group and by importing country can either facilitate trade or hinder it.

Table 3a: Panel gravity estimates for Malaysian exports (using coverage ratios)

Variables	**(1)**	**(2)**	**(3)**
lnGDP_i	3.099	3.064	3.323
	(4.508)	(4.518)	(4.513)
lnGDP_j	0.982***	1.124***	1.106***
	(0.121)	(0.120)	(0.128)
lnPOP_i	-13.634	-13.854	-14.856
	(10.827)	(10.861)	(10.854)
lnPOP_j	0.936***	0.874***	0.894***
	(0.102)	(0.101)	(0.100)
lnDST_{ij}	-2.612***	-2.950***	-2.997***
	(0.244)	(0.239)	(0.259)
ADJ_{ij}	-0.627	-1.122*	-0.1.138*
	(0.620)	(0.618)	(0.665)
TRF_{ij}	-0.028	-0.027	-0.029
	(0.020)	(0.020)	(0.019)
ECR_{ij}	0.161***	-	-
	(0.015)		
$ECR*DAGRI_{ij}$	-	0.058***	-
		(0.014)	
$ECR*DIND_{ij}$	-	0.171***	-
		(0.025)	
$ECR*DASEAN_{ij}$	-	-	0.105***
			(0.017)
$ECR*DEU_{ij}$	-	-	2.073***
			(0.516)
$ECR*DJPN_{ij}$	-	-	-0.494
			(6.305)
Constant	142.845*	147.879**	158.751**
	(75.065)	(75.394)	(75.408)
No. of observations	27,160	27,160	27,160
R^2 overall	0.301	0.294	0.301
Breusch-Pagan LM test	χ^2 (1) = 48054.36 (Prob > χ^2 = 0.000)	χ^2 (1) = 47045.18 (Prob > χ^2 = 0.000)	χ^2(1) = 47121.29 (Prob > χ^2 = 0.000)

Notes: 1. The dependent variable is lnX_{ij}.

2. The figures in parentheses are the standard errors, adjusted for clustering on country-pair-HS products.
3. ***significant at 1%, **significant at 5% and * significant at 10%.

Table 3b: Panel Gravity Estimates for Malaysian Exports (robustness checks - using frequency counts)

Variables	**(1)**	**(2)**	**(3)**
lnGDP_i	3.598	3.663	3.730
	(4.533)	(4.533)	(4.534)
lnGDP_j	1.205***	1.229***	1.235***
	(0.122)	(0.121)	(0.125)
lnPOP_i	-15.054	-15.178	-15.346
	(10.897)	(10.897)	(10.901)
lnPOP_j	0.793***	0.742***	0.739***
	(0.103)	(0.103)	(0.103)
lnDST_{ij}	-3.276***	-3.239***	-3.045***
	(0.239)	(0.235)	(0.241)
ADJ_{ij}	-0.151*	-1.361**	-0.985
	(0.631)	(0.613)	(0.628)
TRF_{ij}	-0.030	-0.025	-0.029
	(0.020)	(0.020)	(0.020)
FC_{ij}	-0.080	-	-
	(0.051)		
$FC*DAGRI_{ij}$	-	-0.185***	-
		(0.054)	
$FC*DIND_{ij}$	-	0.611***	-
		(0.207)	
$FC*DASEAN_{ij}$	-	-	0.335***
			(0.084)
$FC*DEU_{ij}$	-	-	-0.172***
			(0.058)
$FC*DJPN_{ij}$	-	-	0.142
			(0.194)
Constant	156.626**	156.825***	156.168**
	(75.637)	(76.636)	(75.661)
No. of observations	27,160	27,160	27,160
R^2 overall	0.291	0.303	0.296
Breusch-Pagan LM test	χ^2 (1) = 48034.23 (Prob > χ^2 = 0.000)	χ^2 (1) = 48048.56 (Prob > χ^2 = 0.000)	χ^2(1) = 48011.19 (Prob > χ^2 = 0.000)

Notes: 1. The dependent variable is lnX_{ij}.
2. The figures in parentheses are the standard errors, adjusted for clustering on country-pair-HS products.
3. ***significant at 1%, **significant at 5% and * significant at 10%.

Why do NTMs facilitate exports? The result is easy to interpret if one keeps in mind that Malaysia's exports are highly concentrated in products and markets, leaving little choice for exporters but to respond in a manner that is the most advantageous to their interests. It is therefore not surprising to find positive coefficients on NTMs for industrial products relative to agricultural products and for Japan and ASEAN relative to the EU as seen in Table 3b. This suggests that Malaysia has responded somewhat positively to the requirements in the importing countries, more so for products that are of economic importance. However, in the case of the EU, EU- wide regulations (the large majority of import requirements for products to enter the markets of the EU member states is set at the EU level and is harmonised across member states, see Rau, Shutes, & Schlueter, 2010) may constrain trade as an exporter from Malaysia needs to adapt its products to meet the requirements of each individual European country, with some rare exceptions.

To further elaborate on the possible reasons for the dual effects of NTMs, the following presents a number of illustrative cases on Malaysia's response to NTMs in importing countries. In the case of agricultural products and food, the stringent regulations and standards have, to some extent, led to agricultural improvements (see also Schlueter et al., 2009, for similar reasoning on the positive benefits of NTMs on developing countries) through adjustments in the production systems. The Malaysian government established the farm accreditation scheme (SALM), based on the principles of Good Agricultural Practice (GAP). As a result, the farms have seen great improvement in terms of the quality of produce. Furthermore, the implementation of a number of certification schemes [such as ISPM (International Standards for Phytosanitary Measures) No.7 (Export Certification Scheme), ISPM No.14 (The Use of Integrated Measures in a Systems Approach for Pest Risk Management) and ISPM No.15 (Guidelines for Regulating Wood Packaging Material in International Trade)] to comply with international standards has reduced export costs. Nonetheless, benchmarking SALM to the EurepGAP (or GLOBALGAP) standard is still important for exporters of fresh fruit and vegetables, as the SALM scheme has yet to be recognised in overseas markets and therefore does not facilitate market access.

Progress has also been made in improving processing facilities and imposing stricter controls on the hygiene standards for seafood products, which are subject to different standards in the EU and Japan. The rate of rejection of seafood products exported to the EU has declined over the years, and Malaysia's border rejection rate in the EU is considerably lower than that of its competitors such as Thailand, Indonesia, Vietnam and China (Alavi, 2009). However, challenges still remain for SMEs in the fish

processing business to meet the EU hygiene requirements for Hazard Analysis and Critical Control Point (HACCP).

Finally, Malaysia's participation in various international standardisation bodies, such as the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), the International Telecommunications Union (ITU), the Codex Alimentarius Commission (CAC), the International Plant Protection Convention (IPPC) and the World Organization for Animal Health (OIE), is testimony of its commitment to compliance. On the regional front, Malaysia is engaged in a programme of harmonising standards within the context of ASEAN and the Asia Pacific Economic Cooperation (APEC). To date, 51.5 per cent of the 3,786 Malaysian Standards are aligned with international standards (Mariani, 2005). To further facilitate trade in regulated sectors, Malaysia has signed the ASEAN EEMRA (Mutual Recognition Arrangement for E&E), regarding the recognition of test and certification results for E&E products among ASEAN member countries. The Mutual Recognition Arrangements (MRA) are important to Malaysia, as network trade in E&E goods forms the backbone of the industrial sector. Malaysia is also a party to some APEC MRAs such as the EEMRA Part 1 on the acceptance of test reports and the APEC MRA on toy safety.

As the above discussion makes clear, the Malaysian government has resorted to a somewhat more "offensive" strategy to address NTMs in importing countries instead of a "defensive" strategy. Despite the stringent requirements in major export destinations, there have been few attempts to redirect exports to less demanding markets. Obviously, the benefits that accrue from economies of scale following compliance with standards and regulations are important, given the small home market and the concentration of exports in products and markets. In this context, NTMs may be considered as an incentive to make the necessary adjustments in the existing systems and modes of production to ensure that exports are not unduly jeopardised.

6. Conclusion and Policy Implications

The empirical findings of this paper support the presence of dual effects of NTMs on Malaysia's export consignments, thereby providing a less pessimistic view on the negative effects of NTMs on trade. From the Malaysian experience in the trade in broad categories of products, NTMs appear to exert a beneficial impact on industrial exports but not on agricultural exports. Additionally, the positive effects of NTMs are present in trade with ASEAN and Japan but not with the EU. Many reasons could explain this result. First, the economic importance of industrial exports has given exporters little choice for except to conform to the standards and

regulations of the importing country to ensure continued access to the major markets. Conversely, compliance costs may be higher for agricultural products, which are prone to various health and safety standards, while information costs remain low for these homogeneous products (Fugazza & Maur, 2008). Second, the harmonisation of standards within ASEAN has most likely facilitated trade between the association and Malaysia. Comparing the EU and Japan, it is not surprising that the beneficial effects of NTMs are only apparent in Malaysia's trade with Japan, as the products traded are primarily industrial goods. As for trade with the EU, Malaysia not only exports an almost equal share of agricultural and industrial exports but also has also to contend with EU-wide regulations.

There a few policy implications stemming from this research. Not all NTMs pose 'barriers' to trade as perceived by many based on sheer ignorance. As such, there should be increased efforts to collect information on specific NTBs at the firm-level to understand the true costs (beyond the aspects of trade volume to include variable costs that capture the effects of NTBs on the extensive margin of trade) of these barriers specifically on agricultural exporters of Malaysia, since they are more likely to impede trade as indicated in the findings of the paper (see also similar findings on trade impeding effects of NTMs, more specifically SPS regulations, on agriculture exports from developing to developed countries; see Yuan & Beghin (2012)). The above information is pertinent to provide more specific policy prescriptions for the agricultural sector and more importantly for guiding negotiations on requirements for reciprocal market access in bilateral agreements so as to minimise the costs for the affected exporters. Relevant to this is the recent and ongoing Malaysia-EU FTA (MEUFTA) initiative. Given the possible market access problems in the EU for agricultural products from Malaysia as noted in the findings of the paper, the next step is for the Malaysian negotiators to obtain a clear mandate on the specific NTBs in the EU that are costly to exporters prior to making any trade commitments. As a small trading economy, though Malaysia is keen to lock in its market access to major traditional markets like the EU, the policymakers are still constrained by lack of data and research support in providing empirically research-based guidance for negotiations in comprehensive FTAs like the MEUFTA (Tham, 2012).

Notes

1. EurepGAP, the world's most widely implemented farm certification scheme, is a prerequisite for doing business with most European consumers of agricultural products. To reflect its expanding international role in establishing Good Agricultural Practices (GAP), it was renamed GLOBALGAP in 2007. GLOBALGAP is a private sector body that sets

voluntary standards for the certification of the production processes of agricultural (including aquaculture) products around the globe.

2. The coverage ratio is not a measure of the degree of restrictiveness or stringency of a given NTM (see Beghin and Bureau, 2001; Schlueter et al., 2009; Rau and Schlueter, 2009, for limitations associated with using the coverage ratio as a proxy for NTM).
3. The two-digit level of aggregation would balance the issue of disaggregated versus aggregated analysis, in addition to reflecting agriculture and industry based products. This level of aggregation also reduces the problem of a standard sample selection bias, as many more trade relationships on a product-specific level at HS6 are nonexistent. Instead at the HS2, the number of observations with zero trade flows that needed to be dropped when log-linearising the gravity equation is at best limited.
4. The ASEAN NTM database is available at http://www.aseansec.org/16355.htm The WITS database that predated the ASEAN database is considered less detailed than the latter (Parsons, Maghfuri, Ariyanto, & Oktaviani, 2007). However, for this paper, the ASEAN database is referred to only for Indonesia as the ASEAN database provides NTMs only at the HS4 line.
5. The ADB SDBS is available at http://www.adb.org/Documents/Books/Key_Indicators/2010/Country.asp
6. The Eurostat database is available at http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home
7. Border rejection relates to consignments that have been tested and rejected at the external borders of the EU when a health risk is found. The notifications are transmitted to all European Economic Area (EEA) border posts to reinforce controls and to ensure that the rejected product does not re-enter the Community through another border post.
8. Alerts are triggered by the member state that detects the problem, and immediate action is taken to withdraw or recall the product. Information notification is performed when a risk is identified in a consignment, but member states do not have to take immediate action because the product has not reached their markets.
9. This requirement is also considered problematic because it could alter Malaysia's WTO rights. However, the VPA is important for Malaysia given that the EU is scheduled to adopt the Due Diligence Regulation in 2011 that will prohibit illegally sourced timber from entering the bloc.

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