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Abstract: This paper examines the drivers of US import refusals in the food sector, with an emphasis on the importance of internal and external factors. A panel-specific negative binomial regression is applied between 2002 and 14. Our study shows that the relative income level of food exporting countries matters when analyzing the factors influencing compilation with the US food safety standards. However, not all developing countries benefit from rising income levels. In some regions, including developing Africa and Europe, a rise in per capita income results in more import refusals. This finding could reflect that factors, which are essential in improving quality, taste, hygiene and productivity in the agriculture and food sectors tend to improve at a significantly slower rate than that of the growth in income. Our study also reveals some suspicions that food safety standards might be used as trade protectionist tools, especially against key food exporters in the US market. In some regions, our quantitative analysis shows that bilateral/regional trade agreements result in a higher number of detained shipments. Furthermore, our study shows that the US FDA tends to use information from other sources, including past refusals from its own country and from a particular region, in imposing detentions on exporting firms in that region. Traditional factors, such as distance and language, have become less crucial in determining import refusals in the US market.

JEL: F14, F50, O13, O50

Keywords: Import refusals, food sector, developed and developing countries

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1. Introduction

Developed country markets have remained major destinations for the food exports of many developing countries over the past three decades, although the composition of agriculture trade has recently changed from predominately traditional (unprocessed) food exports to processed products. However, access to developed country markets poses many challenges. One of the key issues concerns the ability of developing countries to meet the increasingly more stringent food safety standards imposed by developed countries. In principle, the Sanitary and Phytosanitary Standard (SPSS) Agreement and the associated WTO dispute settlement mechanism could ensure that food safety standards are not abused or misused for protectionist aims. Although these standards are subject to frequent changes and are often difficult and costly to comply with, such changes are to be expected, given advances in scientific knowledge about health hazards and improvements in food processing technology. Imposing food standard could, therefore, improve market performance by reducing transaction costs and trade friction as exporters could potentially use such standards as a guide to help them realize the expectations of importers concerning food quality and safety. In addition, they could increase the elasticity of the substitution between similar goods produced in different countries so that relatively more efficient producers would be permitted to thrive through the ensuing export expansion.

However, in practice, suspicions have been provoked that food safety standards are being used as a non-transparent, trade impeding protectionist tool, rather than as a legitimate instrument for the protection of human, plant and animal healthiness. In particular, developing countries are usually placed at a disadvantage when making use of these procedures, because of their limited capacity to access and absorb best practice technology and information, which is constrained by inadequate resources from challenging perceived inequities (Athukorala and Jayasuriya, 2003 and 2005). The SPSS has become a more important issue and a source of tension and friction in international trade negotiations since demand for more stringent SPSS in developed countries tends to increase in accordance with their rising income levels and growing health consciousness. In particular, as traditional trade barriers such as tariffs and quantitative restrictions continue to decline, food safety standards have become an interesting tool for protectionists seeking to block trade. Although there is limited empirical evidence examining the impact of food safety standards on food/processed food exports, most of the studies that have been undertake have found that SPSS tends to reduce exports from developing countries.[1]

The nature of the factors driving import refusals has become an important issue, especially for developing countries. If the food safety standards imposed by developed countries are not abused or misused for protectionist aims, they could provide the impetus for firms and sectors to upgrade production technologies and realize beneficial productivity gains (Jouanjean et.al., 2015 and Maertens and Swinnen, 2009). This also has an implication for policymakers concerning the issue of how best to direct assistance resources so as to support the upgrading of standards systems and the development of compliance mechanisms in their respective countries. By contrast, if the safety standards imposed by developed countries are mostly used for protectionist purposes, there is a little room for firms as well as policymakers in developing countries to change/improve standards systems in order to access developed country markets. Instead, rules and regulations under the Sanitary and Phytosanitary Standard (SPS) Agreement and the associated WTO dispute settlement mechanisms might need to be amended in order to help developing countries access developed country markets, while trade representatives in developing countries need to be play a more active role in identifying and eliminating

[1] See for example Otsuki *et.al* (2000), Wilson (2002), Athukorala and Jayasuriya, 2005, Jongwanich (2010).

unfair measures.[2]

The main objectives of this paper are to examine the factors determining the import refusals imposed by developed countries during the period 2002-14 with an emphasis on the importance of both internal and external factors. The internal factors relate specifically to exporting countries, while external factors relate to importing countries, especially the demand for trade protection from producers in the US. With respect to data limitations, our study focuses only on the US market where we are able to access time-series data of Import Refusal Reports (IRR), published based on the data generated by the FDA's Operational and Administrative Import Support (OASIS) initiative. The IRR data is sorted by both country and product based on the industry code with clear indications of products which have been found to appear in violation of the Act, the origin of such products and the reasons underlying the refusal to these products. In addition, while our study includes all developing countries, we pay particular attention to Thailand in analyzing the factors that drive import refusals. Thailand is chosen for our attention since the country represents one of the key developing countries dominating food exports in developed country markets, especially in the US. Thailand is one of the US's largest exporters of both frozen and processed shrimps, in which the market share of these two products stands at around 20% and 55%, respectively. However, like other developing countries, Thailand is still subjected to a number of detained shipments in the US market. During the period 2002-2014, there were on average almost 200 shipments every year, detained by the Food and Drug Administration (FDA) within the US market. Compared to other key developing countries, in terms of the number of detentions, the number of Thai detained shipments during this period was still higher than Malaysia, but lower than Vietnam, Indonesia, and China. Lastly, food exports, especially processed food, have continued to be one of the crucial components within Thai agricultural exports. The share of food (processed food) exports in terms of total agriculture exports hovered at around 85% (50%) during 2000-14. Understanding the causes of import refusals could help firms and policymakers in the country better prepare which standards systems and compliance mechanisms they adopt.

So far, there have been very few studies examining this issue, e.g. Baylis et.al., 2009; Jouanjean et.al., 2015. Our study is distinct from those few studies in this area in three ways. First, in addition to employing more updated information on US import refusals, our analysis not only examines factors driving import refusals for overall developing countries, as has been mostly the case in previous studies, but also compares the causes of import refusals in terms of income, location and product related factors. In prticular, we compare the causes of the Thai import refusals with other key developing countries in the US market. Second, our study examines the causes of import refusals from both the trade barrier perspective and the ability of developing countries to meet the required food safety standards imposed by developed countries. Alternative measures are used to represent the possible causes of import refusals from both perspectives. Third, to allow variation as an independent variable, a count of the number of import refusals affecting a particular country-product-year combination are applied as the independent variable in our econometric analysis, instead of using a zero-one dummy variable to examine the probability of import refusals. Due to over-dispersion in the data, a negative binomial regression is applied for a count number of import refusals.

The rest of our report is organized as follows. The next section outlines the trends

[2] In the US, for example, trade representatives actively identify trading partners' SPS measures that appear to be unscientific, unduly burdensome, discriminatory, or otherwise unwarranted and create significant barriers to U.S. exports and eliminate such measures. The publication of data concerning such efforts has been established since 2010.

concerning food and processed food exports of developing countries in both the world and US markets. In Section 3, the structure of import refusals are analyzed in terms of income, product and location related factors. Reasons underlying detentions by the US FDA are further analyzed in this sub-section. The import refusals faced by Thai firms are compared with other key developing countries in the US market. Section 4 presents the data and methodology used for our econometric analysis, while Section 5 reveals the results. The last section provides conclusions and policy inferences.

2. Trends and patterns within the food and processed food sectors: first look

Food exports continue to play a key role within agriculture exports in developing countries, although manufacturing exports still dominate. For all regions in developing countries, the share of food exports, both traditional and processed, has accounted for more than 90% of total agriculture exports (Table 1). Within food exports, the relative importance of 'traditional' food products, such as maze, wheat, and rice, has declined and been replaced by processed food products (see Appendix 1 for a list).[3] An increase in the world demand for processed food has been associated with evidence of diet upgrading. Changes in the internationalization of food habits have been shaped mainly by rising incomes, growing health consciousness, and urbanization. Factors such as international migration, the communication revolution and international tourism have also contributed to such diet upgrades. In addition, declines in tariff and non-tariff barriers, as a result of many rounds of international negotiations, both in developed and developing countries, have facilitated the expansion of the processed food trade. In developing Asia and Middle East the share of processed food exports accounted for more than 60% of total food exports, while the share of processed food was slightly less in developing Europe, i.e. at around 52%. Interestingly, in Latin America and Africa, traditional food exports have continued to dominate the market with a share of around 55-60% of total food exports.

[Insert Table 1 here]

The composition shift towards more processed food exports has been attributed mainly to developing countries, particularly since the early 1990s (Table 2). The share of processed food exports from high income countries in the world market is still the largest, but it has declined continuously from around 71% in 1995 to 58% in 2014. By contrast, in upper-middle income countries, the share of processed food doubled from 12% in 1995 to around 25% in 2010, before declining slightly to 20% in 2014. An increase in the share of processed food is also evident in lower-middle income bracket countries. In fact, middle-income countries also play a crucial role

[3] The United States Federal Food, Drug and Cosmetic Act, Section 201, Chapter II defines processed food as: any food other than a raw agricultural commodity and includes any raw agricultural commodity that has been subject to processing, such as canning, cooking, freezing, dehydration, or milling. Generally, the definition of processed food products is based on the International Standard Industry Classification (ISIC). All commodities that belong to ISIC Section 3 are classified as processed food. However, export data used in our analysis is reported under the Standard International Trade Classification (SITC) and Harmonized System (HS). Thus, the SITC commodity listing at the five-digit level and Harmonized System (HS) at the six-digit level is used to be cross referenced to that of the ISIC listing at the four-digit level. See Athukorala and Jayasuriya (2005) for detailed discussion of processed food definitions.

within world traditional food exports. While the share of high income countries in world traditional food exports declined from 73% in 1995 to 61% in 2014, it increased in lower-middle income countries from 8% to 18% during the same period. The share from upper-middle income countries also increased, but at a slower rate.

[Insert Table 2 here]

In terms of regions, developing Asia and Latin America tend to perform better than other regions in expanding their processed food export markets. In particular, the share of processed food exports from Asia as a proportion of total developing countries' processed food exports, over the past decade, stood at around 45% (Table 3). In Latin America, the share of processed food was still relatively high, but manifesting a declining trend. It fell from almost 35% in 1995 to around 25% in 2014. This decline has so far been compensated for a rise in the share of processed food exports in developing Europe, where the proportion increased from 13% in 1995 to 20% in 2014. With regard to traditional food, by contrast, Latin America tends to dominate the market, followed by Asia and Europe. In 2014, their share of traditional food exports in terms of total developing countries' traditional food exports was 44%, while those of Asia and Europe were only 25% and 22%, respectively. Interestingly, the share of traditional food has tended to decline in Latin America and Asia, while rising in Europe.

[Insert Table 3 here]

Developing countries have become the key destination for food exports from developing countries since the global financial crisis in 2008-10. Before the global crisis, developed countries were the key export destinations for food exports (both traditional and processed). Among developed countries, G3 countries import more than 50% of the total developing countries' aggregate processed food exports. The European Union is the most important export destination, followed by the US and Japan, respectively (Table 4). This picture tends to be the same in all regions, except that the US, instead of Europe, represented the most crucial export destination for Asian and Latin American processed food exports. Since the late 1990s, the importance of the G3 market has slightly declined and developing countries have become more important for developing countries' processed food exports. The share of food exports to developing countries increased in many regions during the period 1990-2000 and in 2010 the share of food exports to developing countries exceeded that to G3 countries. The share of processed food exports to G3 countries declined from 56% in 2000 to 31% and 38% in 2010 and 2014, respectively while that to developing countries increased from 33% to 51% and 40% during the same period. The same picture was found with traditional food exports (Table 4).

Among developing countries, Asia has become the key importer of developing countries' food (traditional and processed) products, followed by Europe, the Middle East and Africa. The share of traditional and processed food exports to Asia doubled during the period 2000-2014 and in 2014 the share of these products to Asia was 25% and 23%, respectively. The share of both traditional and processed food in Europe and Middle East was around 10% while in Africa it stood in the range of 6-7%. In fact, trade within the same region still dominates with a rise in the share of food exports to developing countries. For example, in Asia around 30% of total food exports was traded within the region while in the Middle East, Europe and Africa, the share of trade within the region was around 60%, 30% and 30%, respectively. However, these regions tend to export their food products more into Asia, within which the share of food products to Asia in these regions increased by more than 30% during the period 2010-14.

[Insert Table 4 here]

Developing countries have become the key export destinations for Thai processed food exports (Table 4). In 1995 and 2000, the share of processed food exports to the G3 market stood at more than 70%, but it dropped to around 60% and 50% in 2010 and 2014, respectively. Among the G3 markets, exports to Japan dropped more significantly than to other members, i.e. from 32% in 1995 to 16% in 2014, while those of US and EU slumped from around 18% to 13% during the same period. By contrast, the share of developing countries in importing our processed food products jumped from only 13% in 1995 to 41% in 2014. Asia has become the key export destination for Thai processed food products with a 30% market share in 2014, up from only 10% in 1995. Other developing countries, especially those in the Middle East and Africa, have also played a role in absorbing our processed food exports.

Regarding traditional food exports, developing countries, especially developing Asia, continue to play a key role as export destination and their share increased slightly from around 45-50% in 1995-200 to roughly 55% in 2014. The share of Thai traditional food exports to G3 markets remained relatively stable with a slight drop in exports to Japan. In 2014, the market share of Japan was 15% dropping from 20% in 1995, while shares in Europe and US remained relatively stable at approximately 12% and 6%, respectively.

3. Import Refusals in the US Market

To analyze import refusals in the US market, the data of detention from Import Refusal Report (IRR) of the US Food and Drug Administration *(FDA)* is applied. Table 5 shows that the number of detained shipments during the period 2002-14 was highest with manufacturing products, followed by food, beverages and minerals. Detentions in the manufacturing sector on average stood at around 6,250 shipments, while refusals for food products affected about 3,560 during this period (Table 5). However, when the incidence of detentions, defined as the ratio of detentions divided by exports to the US (detained shipments for every $billion), is calculated, the possibility of food exporters meeting US food safety standards is far lower than that in manufacturing sectors. During the period 2002-14, the incidence of detentions reached only 20 in the case of manufacturing products, while in the food sector it exceeded 195.

[Insert Table 5 here]

In the food sector, the likelihood of exporters meeting food safety standard is far lower in middle-income countries than high-income countries. In the period 2010-14, the incidence of detention was only 73 in high-income countries, whereas it reached 129 and 335 in lower-middle income and upper-middle income countries, respectively. However, in lower-middle nations, the incidence of detentions has been declining over the past decade while in upper middle-income and high-income countries, the incidence only dipped during the global financial crisis. From 2010 to 2014 the incidence in these two income groups increased slightly. (Table 5)

Where only developing countries are considered, the number of food detentions is highest in Asia, followed by Latin America, Europe, Africa and the Middle East. (Table 6) Almost 50% of total food detentions in the US emanated from Asian countries while around 20% were from Latin America during the period 2010-14. The incidence of detentions also suggests that Latin America and Africa performed better than Asia in complying with food safety standard in the US. In 2010-14, the incidence of detentions in the former countries reached only 30 and 48, respectively, while the figure was around 110 in Asia. However, Asia performed best among developing countries in reducing the incidence of detentions over the past decade. The incidence of detentions in Asia declined from 214 in the period 2002-06 to 110 in 2010-14, i.e. at a rate of around 55%, whereas in Latin America and Africa the incidence of detention fell by roughly 45% during the same time frame.

[Insert Table 6 here]

Considering Table 7, most detentions of imports from developed countries derive from cases of 'Misbranding', especially supplying inadequate information, instead of 'Adulteration'.[4] As expected, exports from developed countries seem to pass the tests for basic hygiene requirements without any difficulty. Detentions arising from 'Misbranding' seem largely to be more easily rectifiable for exporters than those involving Adulteration. In developing countries, during the period 2002-09, most detentions arose mainly from 'Adulteration', especially concerning products seen to be subject to contamination or infected with poisonous substances, followed by those containing unsafe additive. Six types of pathogen adulteration violations are frequently cited in cases concerning contamination/poisonous factors, these are Salmonella, Listeria, Histamine, Bacteria, Aflatoxin, and Shigella. Interestingly, in 2010-14, Misbranding, especially cases of deficient labelling, constituted the key determinants influencing import refusals in the US for developing countries, instead of Adulteration (Table 7) This, to some extent, implies that tests targeting basic hygiene and production technology have been improved during this period in developing countries. The replacement of Misbranding as the key reason for the US import refusals is found in Latin American countries, but not for Asia and ASEAN nations. In Asia and ASEAN, Adulteration remains the key factor underpinning import refusal from the US. This might imply a slower speed in upgrading production technology, which is an essential pathway towards improving quality and productivity in the agricultural sector allowing compliance with prerequisite standards, than with other regions.

[Insert Table 7 here]

[4] The mention of inadequate information mainly refers to data required by the Act to be included on labels or labeling which does not appear to be conspicuous enough so as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

In Thailand, both the number and incidence of detentions are highest in the agriculture sector, followed by manufacturing (Table 8). In line with the trend observed in upper middle-income countries, the incidence of detentions in Thailand dropped during the global financial crisis, i.e. from 89 in 2002-06 to 44 in 2007-09, before increasing to almost 60 in 2010-14. The decline in incidence during the global crisis might result from the fact that a slump in Thai exports to the US mainly emanated from small firms, who generally still lack the necessary knowledge/knowhow to meet US food safety standards. Interestingly, compared to other middle-income countries, the incidence of detentions in Thailand was still lower than overall mean of these nations, i.e. 60 for Thailand as opposed to around 130 for upper-middle income countries in general during 2010-14. However, the Thai figure was higher than that of Latin American and African countries, which recorded detention incidences of around 30 and 50, respectively.

[Insert Table 8 here]

The number of detentions in Thailand over the past decade have been lower than most of its competitors in the US market, including China, Vietnam and Indonesia, but higher than Malaysia, India, the Philippines and Ecuador. The incidence of detentions in some products, especially HS16 (Edible preparation of meat, fish, crustaceans), which accounts for around 45% of total food exports in Thailand, was far lower than with key competitors, i.e. only 18 shipments for Thailand detained for every billion dollars of exports, contrasting with 136 for China and Indonesia, 184 for Vietnam and 40 for Ecuador. However, incidences of detentions concerning this product category during 2010-14 were comparable to those observed during the period 2002-06 (Table 9). With HS03 (fish and crustaceans), the second largest Thai food export in the US market, the incidence of detentions was still lower than that of some competitors, including Vietnam, Indonesia and India. However, the incidence of detentions of the latter has declined noticeably over the past decade, while the Thai rate has increased. The incidence of detention in Thailand rose to 150 shipments for every billion dollars of exports in 2010-14, from 110 in 2002-06, while those of Vietnam and Indonesia declined from 468 and 406 in 2002-06 to 166 and 252 in 2010-14, respectively. Considering China and India, the incidences of detention declined to 75 and 50 in 2010-14, from their figures in 2002-06 (Table 9). Interestingly, the incidence of detentions concerning Thai Cereals and Prepared Cereals improved noticeably.

Adulteration is the key determinant explaining detentions in Thailand, which is consistent with other Asian countries (Table 10). Considering all detained shipments, adulteration accounted for around 80% of all reasons for detention in Thailand, which is slightly lower than that observed in the Philippines (82%); Malaysia (89%); Vietnam (87%) and Indonesia (98%). Being found as falling into the Contamination/Poisonous sub-category represents the key determinant within Adulteration that led to products from Thailand and other Asian countries being detained. This was found in almost all key Thai exports to the US, especially in HS03 and HS16, where 90% of all detained shipments were judged as falling into the Adulteration category.

[Insert Tables 9 and 10 here]

At the firm level, the top twenty companies having goods detained during the period 2010-15 differed from those during 2002-06. Most of the companies in the top twenty in 2002-06 were not in the list during 2010-15 (Table 11). Our Spearman correlation analysis[5] shows that the ranking of companies facing import refusals over the past decade (2002-2015) is still significantly and positively dependent, but relatively weak (Table 12). This is indicated by the significance, but low correlation, of Spearman rank coefficients of almost all pairwise testing results, i.e. at around 0.2, during the period 2002-15. To some extent, this could imply that there have been positive adjustments of many firms after facing import refusals, which has resulted in a decline in their detained shipments. However, the positive and significance of our Spearman correlation analysis shows that such detentions tended to be persistent in some food-exporting firms, i.e. in every 100 firms where shipments were detained, 20 firms were the same firms as had been found in the previous period.[6] This could cast doubt on the ability of those firms to complying with prerequisite food safety standards in the US.

[Insert Tables 11 and 12 here]

It is important to note that during the period from 2002 until the present, there have been six Import Alerts imposed by the US FDA on Thai food exports.[7] These alerts have had an impact on the number of detentions in Thailand since products that are listed under Import Alerts will be detained without physical examination, unless the producer of such goods is listed on the Green List, or is able to provide documents from an independent, private laboratory for the FDA for review. These six Import Alerts include (1) Detention Without Physical Examination of Dried or Pickled Finfish, mainly due to insects and rodent filth; (2) Detention Without Physical Examination of Shrimps due to filth, decomposition and Salmonella. In this case, to overcome the appearance of a violation concerning detained shrimps, any importer/owner may have the shrimps sampled and analyzed by a private laboratory and submit documentation to the FDA for it to review; (3) Detention without Physical Examination of Canned Shrimps mainly due to decomposition. Under this alert, districts may detain, without physical examination, all canned shrimps from Thailand, except shipments from the packers approved by the FDA, such as Continental Pacific Corp., Ltd., Kingfisher Holding Limited, and NR Instant Produce Co., Ltd.; (4) Detention Without Physical Examination of Canned Crabmeat due to insects, rodents, birds, cats and other filth; (5) Detention Without Physical Examination of Melon Seeds mainly due to the presence of aflatoxin and of illegal color additives; (6) Detention Without Physical Examination of Kwong Hung Seng Brand Yellow Bean Sauce for filth. Import Alerts imposed by the US mostly affect export products under the categories HS16, HS08 for Melon and HS 19 for Yellow Bean Source.

[5] The Spearman correlation assesses monotonic relationships between two variables. A perfect Spearman correlation of +1 or −1 occurs when each of the variables is a perfect monotone function of the other. Intuitively, the Spearman correlation between two variables will be high and significant when observations have a similar rank between the two variables, and low and insignificant when observations have a dissimilar rank between the two variables.

[6] Note that our analysis is based only on an absolute number of detentions, not incidence of detentions, since we do not have export data to the US at the firm level. Thus, our analysis might be exaggerated somewhat.

[7] In fact, there were another two alerts that existed during 2002-14, but are no longer active. These were detention Without Physical Examination of Processed Rice-Based Products due to filth and Red Snapper due to the presence of Lutjanus campechanus, the only fish which is sold as red snapper in the U.S., does not occupy the waters surrounding Thailand. See more information at http://www.accessdata.fda.gov/cms_ia/default.html.

4. Determinants of Import Refusals

This section reviews the potential factors determining FDA import refusals. Based on the previous literature (Jouanjean et.al., 2015; Baylis et.al., 2009) potential factors triggering import refusals, can be allocated into two groups. The first group of factors constitute internal considerations specifically related to an exporting country. The second set of variables relates to importing countries, especially the demand for trade protection in the United States. In the first group, the income of a country could constitute a crucial variable in determining import refusals. High income countries tend to face a lower risk in exporting qualified products to US market recipients. When a country has a higher income level, improvement in the agricultural sector, e.g. upgrading land quality and irrigation systems, and upgrading production technology, tends to be evident and widespread. This represents an essential path necessary to improve quality, taste, hygiene and productivity in the agriculture and food sectors. A number of trade facilitations, e.g. efficient financial markets and extensive, well-maintained infrastructure, tend to improve when a country's income level increases. This potentially helps support supply chains within processed food industries. Sufficient financial support allows firms to more effectively manage risks and uncertainties, mainly related to the transport and storage of raw materials and commodities, together with improving production and distribution technologies. We hypothesize a negative relationship between income per capita ($income_{jt}$) and the number of detentions.

Certain product characteristics in goods from exporting countries may determine the number of detentions recorded. Storable products are likely to be subject to fewer detentions than perishable products. Commodity perishability can lead to product loss and value decline during transport and storage, thereby increasing the probability of facing detentions. A binary dummy variable for product characteristics ($dumperish_{ijt}$) is introduced, where perishable products are coded as one and 0 for storable products. A positive sign is expected for this variable.

Foreign direct investment (FDI_{jt}) is potentially another factor in determining the incidence of import refusals emanating from developed countries, but its influence is inconclusive. The involvement of MNEs in a food/agriculture sector could generate positive effects for food industries, particularly exporting firms. MNEs comprise an international production network so that flows of information to a particular home country and other markets may be completed. In addition, they tend to undertake a large proportion of the world's total research and development and are principal bearers of technology across international borders (Borensztein *et al.*, 1998; Lipsey, 2000; Vernon, 2000). With these advantages, one would expect that a country with a high proportion of FDI would face a lower number of detentions. Besides the direct impact, FDI could increase market competition and influence the performance of incumbent firms. It can create linkages to upstream and downstream industries, while the superior technology associated with MNE affiliates can spill over to local non-affiliated firms. However, the technology and capital involved in producing manufactured food products is mobile within the world food market and the raw materials required for these products are relatively inexpensive to transport. MNEs may, therefore, intend to locate close to consumer markets to minimize distribution costs. Consequently, an increase in *FDI* would not be related directly to the export sector and could not influence import refusals.

Exports ($export_{ijt}$) to the US could be afurther variable explaining import refusals as more exports will likely result in more violations. Meanwhile, English-speaking countries might find it easier to comply with US food safety standards than non-English speaking countries. Thus, a binary dummy variable ($dumEnglish_{jt}$) is introduced, in which 1 represents English-speaking countries and 0 otherwise. We expect a negative relationship between this variable and the number of detentions recorded. Distance ($Dist_{just}$) is also included in the model with the expectation that when all other things being equal, the longer the distance involved in transactions, the greater the number of import refusals will be experienced. This is particularly true for a country where the majority of export products involved is perishable and trade facilitation, especially transport and storage facilities, is not well developed. Bilateral and regional trade agreements (FTA_{jt}) could play a role in influencing import refusals, but the direction of their influence is still inconclusive. Baylis et.al. (2009) hypothesized that firms in bilateral or regional trade agreements with the United States may have invested heavily in the processes and knowledge necessary to meet US import requirements. Thus, the agreements could help to reduce import refusals from the US. However, it is possible that a progressive decline in tariff and nontariff measures under the agreements might result in a higher demand for trade protection within the US. Therefore, a positive relationship between bilateral and regional trade agreements and the number of detentions represent evidence of this phenomenon.

The second set of variables, related mostly to importing countries, is based on the argument that, in practice, there have been suspicions provoked that food safety standards are being used as a non-transparent, trade impeding protectionist tool, rather than as a legitimate instrument helping protect human, plant and animal health. Baylis et.al. (2009) and Jouanjean et.al., 2015 point out that a greater number of import refusals tend to be observed in industries facing increasing import competition and pressure from domestic producers ($USproducer_{ust}$) seeking to protect their market share of the US market.

In addition, while in principle importers and domestic producers are subject to exactly the same food safety standards, in practice the law allows US FDA to make decisions based not only on physical evidence, such as laboratory results and examinations, but also historical data, labeling and information from other sources. Thus, the reputation of exporting countries can come into play in FDA decisions. Past histories concerning violations from similar products and origins ($Detenhis_{ijt-k}$) could be criteria used to justify refusals (Jouanjean et.al, 2015). Moreover, as the US FDA uses information from other sources, Jouanjean et.al (2015) show that after controlling for other factors, the probability that a given country's exports of a particular product are subject to refusal by the US FDA depends on past refusals of the same product from neighboring countries ($Detenneigbor_{ijt-k}$).[8]

All in all, the model determining import refusals is as follows;

[8] Jouanjean et.al., (2015) also show that a given country's exports of a particular product are subject to refusal by US FDA depending on past refusals of related products from the same country. However, the process of defining related products from the same country is quite arbitrary. In particular, when detentions are defined as falling under the 2 digit HS code, related products tend to stay within the same code.

$$Detention_{ijt} = \alpha_0 + \alpha_1 income_{jt} + \alpha_2 dumperish_{ijt} + \alpha_3 FDI_{jt} + \alpha_5 export_{ijt} + \alpha_6 dumEnglish_{jt} + \alpha_7 Dist_{just} + \alpha_8 FTA_{jt} + \alpha_9 USproducer_{ust} + \alpha_{10} Detenhis_{ijt-1} + \alpha_{11} Detenneigbor_{ijt-1} + \alpha_{12} T_t + \varepsilon_{ijt} \quad (1)$$

where $Detention_{ijt}$ is the number of detentions in sector *i*, of country *j*, at time *t* in the US market.

$income_{jt}$ is the income per capita of country *j*, at time *t*

$dumperish_{ijt}$ is a binary dummy variable for product characteristics where perishable products are coded as one and 0 for storable products.

FDI_{jt} is the foreign direct investment of country *j*, at time *t*

$export_{ijt}$ is the exports in sector *i*, of country *j*, at time *t* into the US market

$dumEnglish_{jt}$ is a binary dummy variable for English-speaking countries, where 1 represents English-speaking countries and 0 otherwise.

$Dist_{just}$ is the distance from country j to the US

FTA_{jt} is the bilateral/regional trade agreements of country j at time t, where 1 is for a country signing the agreement with the US and 0 otherwise

$USproducer_{ust}$ is the agriculture/food supply in the US market

$Detenhis_{ijt-1}$ is the number of past histories of violations in sector *i*, of country *j*, at time *t-1*

$Detenneigbor_{ijt-1}$ *is* the number of past refusals from neighboring countries in sector *i*, of country *j*, at time *t-1*

T_t and ε_{ijt} are time trend and error time, respectively

Note that the model as shown in equation (1) is performed for (1) whole countries, which have trade data under the auspices of UN Comtrade; (2) developed and developing countries classified by the World Bank; (3) each region in developing countries, i.e. Asia (East and South Asia), Europe and Central Asia (in short, called Europe), Latin America & Caribbean (in short, called Latin America), Middle East, and Africa; (4) three individual countries in Southeast Asia, including Thailand; Vietnam and Indonesia where food exports, especially fish and crustaceans (HS03) and preparation of fish and crustaceans (HS16) dominate within the US market; and (5) individual products, including fish and crustaceans; preparation of fish and crustaceans; fruits and vegetables (both traditional and processed); and other edible products.

5. Data, Measurement and Methodology

To examine the determinants of import refusals, this paper uses a dataset of US import refusals, which is obtained from Import Refusal Reports (IRRs), during the period 2002-14. The report provides information on the manufacturer's name, country, products, dates and the reasons underlying any refusal of admission of the product. The report clearly provides data on detentions comprising FDA two-digit codes, which can be matched with trade data at the HS two-digit classification.[9] Note that import refusals are reported in terms of detained shipments, not in terms of the value of refusals. IRR data also does not provide information on the total number of food shipments offered to the FDA for admission into the US. Hence, we are unable to calculate the share of shipments refused entry. As mentioned by Jouanjean et.al, (2015), with data limitations existing on appropriate firm-level control variables, we are unable to analyze the determinants of import refusals at the firm-level. The analysis is based on an aggregation of import refusals at the country-sector-year level. Data on detentions is used to generate the past history of violations concerning similar products and origins ($Detenhis_{ijt-1}$) and past refusals of the same product from neighboring countries ($Detenneigbor_{ijt-1}$).[10]

As one of the control variables, country income is proxied by GDP per capita and GDP per capita at PPP terms from World Development Indicators. While there is no data on FDI in the food sector for all our countries of interest, we use net FDI inflows as a percentage of GDP to examine the effects of FDI on import refusals. The data is obtained from World Development Indicators. As the number of detention tends to increase when exports rise, we use US import data at the HS two-digit classification level to control for this variable and the missing import value is replaced with zero to indicate that no trade took place for the given exporter-product-year combination. This is expedited under the assumption that US import data is of high quality. This variable is derived from UN Comtrade.

A binary dummy variable ($dumEnglish_{jt}$), which is 1 for English-speaking countries and 0 otherwise, and distance ($Dist_{just}$) are accessed from CEPII Research and Expertise on the World Economy. Bilateral and Regional Trade Agreements (FTA_{ijt}) stem from the Office of the United States Trade Representative, Executive Office of the Resident. With the binary dummy variable for product characteristics ($dumperish_{ijt}$), we define perishable products as fresh and processed food, while storable products comprise manufactured food. Processed food refers to products that have not undergone major changes from their raw material state. The production location of land-based processed food tends to be influenced by product perishability, high transportation costs and geographical factors. These kinds of products include frozen, canned and slaughtered

[9] Note that Jouanjean et.al., (2015) match import refusal data with the HS four-digit classification and perform the regression only on HS chapter 3, 7, 8, 9, 16 and 20, where most detentions are evident. However, in our study we include all food products in the analysis to avoid biasness in the results, since the US FDA tends to inspect all food products. For a product, where there is no detention record, we assign zero.

[10] Neighboring countries are defined broadly in our study, i.e. past refusals of the same product for all countries (except its own country) in the region. In Asia, neighboring countries are defined for each sub-region as production bases are widely diversified in the region. For South Asia, neighboring countries are defined as all countries only in South Asia while in East (and Southeast) Asia, neighboring countries are all countries within these sub-regions, excluding Pacific countries. For Latin America & Caribbean, we separate neighboring countries between Latin America & Caribbean, i.e. for neighboring countries of Latin America, we include only countries in Latin America, not Caribbean nations. Likewise, for Europe and central Asia, the neighboring countries are different between these two entities, i.e. we include only countries in Europe as neighboring countries for developing European countries and developing countries in central Asia as neighboring countries within this region.

animals. Manufactured food refers to goods that have lost the characteristics of their raw materials in the production process, for example confectionary and bakery products. Such transformation includes not only blending and fermentation practices, but also cooking. The technology and capital in producing manufactured food products is mobile, and the raw materials for these products, for example, refined sugar, starches, wheat and other grains, are relatively nonperishable and inexpensive to transport.

We use four variables to proxy suspicions that food safety standards are being used as non-transparent, trade-impeding protectionist tools, rather than as legitimate instruments for the protection of human, plant and animal health. These are lag of agriculture value added in the US, both level and growth ($USproducer\_1_{ust-1}$ and $USproducer\_2_{ust-1}$) and food production in the US, both level and growth ($USproducer\_3_{ust-1}$ and $USproducer\_4_{ust-1}$). We hypothesize that when the US experiences a decline in agricultural value added/food production, under protectionist circumstances import refusals tend to rise.[11] Note that data on agricultural value added and food production in the US is obtained from World Development Indicators.

Since detained shipments, a count variable, show over-dispersion, the conditional variance exceeds the conditional mean. So, a panel-specific negative binomial regression with random effects is applied. The panel is specified in terms of both country and products. Random effect is applied here since some of our variables of interest are time-invariant. A limitation of the random effects estimator, compared to a fixed effects estimator, is that it can yield inconsistent and biased estimates if the unobserved fixed effects correlate with the remaining component of the error term. However, this is unlikely to be a serious problem in this case, because the number of explanatory variables (*N*) is larger than the number of 'within' observations (*T*) (Wooldridge, 2002: Chapter 10). In addition, our study analyzes sub-samples in terms of both region and product. This is done to redress any wariness concerning unobserved fixed effects.

VI. Results

Our results show that when the whole sample is considered, a negative and significant relationship between a country's income and the number of detained shipments is evident. This result occurs regardless of the proxy of country income applied, i.e. GDP per capital or GDP per capita at PPP (Table 13). It seems that in the agriculture sector, production technology, as well as infrastructure, tends to improve along with income levels risisng. These improvements help firms cope with the food safety standards imposed by the US FDA. Interestingly, however, when the whole sample is divided into developed and developing countries, income level has a negative and significant value only in the case of developed countries (Table 14). This may imply that in many developing countries, factors, which are essential path to improve quality, taste, hygiene

[11] Baylis et.a. (2009) used monthly lobby expenditure by US industry to proxy suspicions of trade protectionism, but uncovering this variable seems to have a little effect on refusals, while Jouanjean et.al., (2015) applied MFN tariff rates for each HS chapter. They found that tariff rates were able to influence the number of detentions in some regions, e.g. East Asia and Middle East. The insignificance of this variable in other regions might be because the MFN tariff itself has become irrelevant for these regions since bilateral and/or regional trade agreements have been signed.

and productivity in the agriculture and food sectors, tend to improve at a slower speed than growth in incomes. It seems that insufficient resources are used to upgrade production technology and trade facilities related to food sectors to cope with the stricter food safety standards imposed by developed countries. Such evidence is found in two regions, namely Africa and Europe (Table 15). By contrast, in developing Asia (both East and South Asia), Latin America and the Middle East, our results show a negative and significant relationship between income and detained shipments, as found in developed countries (Table 15). The coefficient associated with this variable is highest in South Asia, followed by East Asia, the Middle East and Latin America. Note that in Africa, this variable even turns out to be both positive and significant. Baylis et.al, (2009) also show that higher GDP is likely to generate refusals and this could be due to a phenomenon known as familiarity breeding contempt. This raises some concerns on how to allocate resources and upgrade production technology and trade facilities to better match growing income in these countries.

(Insert Tables 13, 14, and 15 here)

Certain product characteristics from exporting countries could influence refusals. A positive and significant coefficient corresponding to $dumperish_{ijt}$ is evident in developed countries and developing countries in South Asia and Latin America (Table 15). This implies that perishable products in these countries are likely to be subject to more detentions than storable products. In other developing countries, we find a positive, but insignificant coefficient corresponding to this variable, implying that statistically these two types of products seem to have an almost equal threat of being subject to refusals. In a divergence from our hypothesis, coefficients corresponding to Distance ($Dist_{just}$) in most regions are statistically insignificant. Moreover, in some regions, such as Africa, this variable turns out to be negative (Table 15). This reflects distance not representing a key obstacle to exporting food products into the US market. The geographical advantages of food exporting firms located close to the US have now become less crucial. The negative and significant coefficient associated with this variable may support the idea of firm heterogeneity and the self-selection hypothesis in which some firms are much larger, more productive and more profitable than others, and only these firms are able to become exporters (Melitz and Trefler, 2012). With the longer distance from their countries to export destinations, these firms tend to adopt more careful management practices to ensure product quality, thereby helping reduce import refusals. A binary dummy variable for English-speaking countries ($dumEnglish_{jt}$) is positive and significant in most developing countries, except Latin America where this variable is negative and significant, as we earlier hypothesized (Table15). The positive sign of this variable could also imply familiarity breeding contempt.

For almost countries the coefficients corresponding to exports ($export_{ijt}$) to the US, which are included as control variables, are positive and significant (Table 15). This implies the higher the exports to the US, the greater the chance of import refusals. A positive value of this variable is also found in Baylis et.al. (2009). In East Asia, by contrast, this variable turns out to be both negative and significant. One possible explanation for this finding is that a learning curve tends to dominate the processes involved. When firms in a country gain more experience in exporting, they tend to be able to comply with the regulations imposed by an importing country.[12] This may also imply that the prerequisite technology and knowledge allowing compliance with US food safety standards are not equally distributed among firms in East Asian countries. Such technology and knowledge tends to be in the domain of large food producing firms.

Foreign direct investment (FDI_{jt}) is negative and significant only in developing European countries (Table 15). In others, this variable turns out to be statistically insignificant. When we analyze the determinants of import refusals by income group, only lower-middle income countries tend to benefit from the entrance of foreign investors in reducing refusals from US authorities (Table 14). The insignificance of this variable could arise from the fact that MNEs in the food industry tend to locate close to consumer markets to minimize distribution costs since the technology and capital employed in producing manufactured food products are mobile within the world food market. Thus, an increase in *FDI* would not be related to the export sector and unable to influence refusals. In addition, MNEs tend to use non-FDI channels, especially MNE buyers, to gain entrance to developing country food industries. These comprise large trading companies (either retailing or wholesaling), and large supermarkets in developed countries, which 'travel' in search of potential suppliers in developing countries to manufacture tailor-made goods. The relationship between MNE buyers and local suppliers resembles "arm's length" transactions in that these buyers and local suppliers contact each other to negotiate the terms of their commercial contracts (e.g., price, quantity, quality, delivery, payments, etc.). MNE buyers not only bring in commercial orders, but also help local suppliers to penetrate international markets successfully, especially developed country markets where final goods must fulfill several quality requirements. However, it is rather difficult to measure this variable in our quantitative analysis.

In addition to internal factors specifically relating to an exporting country, our study revealed suspicious evidence that food safety standards imposed by the US FDA may be being used as non-transparent, trade impeding protectionist tools by domestic producers. When the whole sample is analyzed, our results show a negative and significant relationship between the lag value of food/agriculture production in the US ($USproducer_{ust-1}$) and refusals (Table 13), i.e. the lower the supply of food/agriculture products to the US, the higher the number of refusals imposed by the US FDA. However, in terms of the sub-sample analysis, suspicious evidence is found only in developed countries, developing East Asian and Latin American nations (Table 15). When considering income levels, a negative and significant relationship between the lag value of food/agriculture production in the US ($USproducer_{ust-1}$) and refusals is evident in high income, upper-middle income and lower-middle income countries (Table 15). The coefficient and significant level is lowest in lower-middle income countries. From our results, it seems that such a protectionist tool is used against products from key food exporters to the US market.

Interestingly, when we analyze determinants of detentions by product, the coefficient associated with $USproducer_{ust-1}$ is statistically significant only for fruits and vegetables (both traditional and processed) and coffee, tea, preparation of cereal and other edible products. It becomes insignificant for fish and crustaceans and preparation of fish and crustaceans (Table

[12] Note that the results are unchanged when we use the past value of all food products imported by the US.

16). The insignificance of the latter may result from the fact that the US has the least comparative advantages in producing these product categories (HS03 and HS16), especially shrimps, while demand for such products has continued to grow in the countries. However, when we include interaction terms between $USproducer_{ust-1}$ and five country dummy variable, including Thailand, Vietnam, Indonesia, India and Ecuador, who comprise the key exporters of fish and crustaceans and preparation of fish and crustaceans into the US market, a negative and significant relationship between ($USproducer_{ust-1}$) and refusals is evident. Suspicion of US protectionism is highest in the case of Vietnam, and lowest with Ecuador (Table 16).

(Insert Table 16 here)

Another variable that drives suspicion concerning the use of food safety standards to protect domestic producers in the US lies in the positive and significant relationship between the bilateral dummy variable of bilateral/regional trade agreements (FTA_{jt}) and refusals in some regions, namely Latin America and Middle East (Table 15). This result may imply that trade representatives in developing East Asian countries need to play a more active role in identifying and eliminating unfair measures concerning their food exporting firms. Suspicions regarding the use of the US FDA as a trade impeding protectionist tool are also cited in Baylis et.al. (2009) and Jouanjean et.al. (2015).

In addition to $USproducer_{ust-1,}$ our results show that the existence of past violations concerning similar products and origins ($Detenhis_{ijt-1}$) have a positive and significant relationship in both developed and developing countries (Tables 14 and 15). This implies that once a country has a past history of violations, more import refusals tend to ensue. All things being equal, this could occur due to the stricter food safety standards imposed by the US authorities on new product shipments. In addition, the US authorities tend to use information concerning past cases of violations to set ‘Import Alerts’. Import Alerts have repercussions on the number of detentions since products that are listed under Import Alerts will be detained without physical examination, unless the company involved is included on the Green List or is able to provide documents from an accredited private laboratory to the FDA for review. In most developing countries, Import Alerts are predominately imposed in cases concerning HS03 and HS16 commodities, i.e. fish and crustaceans and preparation of fish and crustaceans.

In addition to the importance of assessing any past history of violations , our results show that the US FDA tends to use information from other sources, including past refusals from a particular region ($Detenneigbor_{ijt-1}$) in imposing detentions on exporting firms in that region (Tables 14 and 15). This implies that regional cooperation ensuring food safety may help to reduce a number of detained shipments in both individual countries and at the regional level. Note that among developing countries the coefficient corresponding to this variable is highest in Africa, followed by Middle East, South Asia and Latin America. The coefficient is lowest in the case of East Asia.

When we focus our analysis on Thailand, the results show some suspicious evidence concerning using food safety standards as trade barriers to Thai products to US markets, while simultaneously protecting domestic US producers. This is reflected by the negative and significant coefficients associated with the lag value of US food/agriculture production (Table 17). Suspicion of protection is also found in the categories of fish and crustaceans (HS03) and preparation of fish and crustaceans (HS16), for which there is a high US local demand. Considering fish and crustaceans (HS03), the coefficient associated with the lag value of food/agriculture production in the US is even higher in this product category. This implies that when food production in fish and crustaceans declines in the US, stricter food safety standards are likely to be imposed on Thai fish and crustaceans by US authorities. Skepticism concerning protectionism is also found in Vietnam and Indonesia. The results are consistent with our findings when analyzing import refusals at the product level, as shown in Table 16.

(Insert Table 17 here)

A learning curve concerning exporters is evident in Thailand, as reflected by the negative and significant coefficients of exports ($export_{ijt}$) to the US (Table 17). The significance of this variable, to some extent, could imply that large firms have more advantages in terms of complying with the food safety regulations imposed by US authorities than smaller firms. Our results show further that the advantageous situation of large firms entering the US market is even more marked in the case of the preparation of fish and crustaceans (HS16) category. The coefficient corresponding to the interaction term between $USproducer_{ust-1}$ and the binary dummy variable of the HS product code 16 is statistically significant. Such a learning curve tends to be evident in other East Asian countries like Indonesia, but we do not find significant evidence concerning Vietnam.

Interestingly, the coefficient corresponding to income per capita in Thailand is insignificant and even turns out to be positive with respect to fish and crustaceans (HS03) and the preparation of fish and crustaceans (HS16) (Table 17). This reflects the fact that when all things are equal, import refusals tend to rise in Thailand in line with an increase in per capita income. Two implications can be drawn. One is that factors which are essential in the path to improving quality, taste, hygiene and productivity in the agriculture and food sectors, tend to improve at a slower rate than that of any growth in income. Secondly, while the coefficient corresponding to exports to the US is negative and significant, the unexpected value of this variable might arise from the fact that when income increases, the technological improvements inherent in complying with US food safety standards are concentrated mostly in large firms. From examining the US FDA website and Table 12, it can be seen that most Thai firms whose shipments have been detained comprise small and medium sized companies. This raises issues not only of how to improve production technology in complying with US food safety standards, but also of how to disperse knowledge and technological improvements to small/medium size firms. To clearly analyze these issues, a firm-level survey is needed which should pay attention more on small and medium size companies whose shipments were detained by the US FDA. There are a few previous studies examining this issue using firm surveys (e.g. Meer, 2014 and Nidhiprabha, 2002). However, these studies tend to cover only larger operations. This issue becomes even more serious since the coefficient associated with the income per capita variables of our key food competitors, such as

Vietnam, and of developing East Asia in general are negative and significant, which is in line with the hypothesis that the development of the agriculture sector, production technology, together with infrastructure tends to improve along with rising income levels.

Coefficients associated with other variables in Thailand are similar to those that revealed with East Asian countries. Of particular note is the positive and statistically significant coefficient of $detenneigbor_{ijt-1}$ (Table 17). This shows that import refusals concerning Thailand are likely to increase if the detained shipments of our neighbors rise. Thus, regional cooperation in food safety is needed to ensure the improvement of food safety standards in all countries in the region, which would eventually help Thailand experience a reduction in the amount of detained shipments concerning the US. Regional cooperation in food safety is addressed by ASEAN countries attempting to achieve deeper economic integration under the ASEAN Economic Community. A sectoral mutual recognition arrangement (MRA) has been signed to supplement this and contribute positively to the harmonization of standards, technical regulations, conformity assessment procedures and sanitary or phytosanitary measures in ASEAN (14th TF MRA Meeting, 1 June 2016). However, the progress of this cooperation has been notably slow. As of the 14th MRA meeting on 1st June 2016, scope and coverage under the agreements has not yet been finalized and the joint sectoral committee (JSC), which shall be responsible for the effective functioning of this sectoral MRA, has not yet been established. Meanwhile, it seems that the products which will be covered under this sectoral MRA include only HS code 16-22 and the arrangements still allow each member country to establish its own regulations, as long as they follow ASEAN Principles and Guidelines for food imports and export inspection and certification.[13] In addition to the slow progress and limited product range which will be included under the sectoral MRA, our study shows that cooperation in food safety might need to go beyond ASEAN countries to include developing North-East Asian countries. The level of detained shipments amongst countries in North-East Asia could potentially influence the number of detained shipments concerning Thailand and other ASEAN countries.

V. Conclusions and Policy Inferences

This paper examines the determinants of US import refusals in the food sector during the period 2002-14 with an emphasis on the importance of both internal and external factors. The internal factors relate specifically to exporting countries, while external factors pertain to importing nations, especially regarding demand for trade protection from producers in the US. While our study includes all developing countries, we pay particular attention to Thailand in analyzing factors that drive import refusals. Our study shows that external factors, especially suspicions about the demand for trade protection from producers in the US, are significant in determining import refusals. This could emerge because food safety measures tend to be less transparent than tariffs or quotas. Thus, there is ample room for developed countries to tweak the standards to be stronger than necessary for achieving optimal levels of social protection, and to tweak the related

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[13] In fact, there are five ANNEXES relating to adopting sectoral MRA, which are (1) ANNEX 1 (ASEAN Principles and Guidelines for National Food Control Systems; (2) ANNEX 2 (ASEAN General Principles of Food Hygiene; (3) ANNEX 3 (ASEAN Principles for Food Import and Export Inspection and Certification; (4) ANNEX 4 (ASEAN Guidelines for the Design, Operation, Assessment and Accreditation of Food Import and Export Inspection and Certification Systems; (5) ANNEX 5 (ASEAN Guidelines for Food Import Control Systems).

testing and certification procedures to make their local imports more competitive. In developing countries, evidence is found only in two key food exporting regions, East Asia and Latin America. Thailand is among other developing East Asian countries, within which we find some suspicious evidence concerning using food safety as a de facto trade protection tool. At a product level, our study reveals evidence driving suspicion in the case of fruits and vegetables (both traditional and processed), coffee, tea, preparation of cereal and other edible products. Meanwhile, concerning fish and crustaceans and the preparation of fish and crustaceans, suspicious evidence is found only in connection with key exporters of these products to the US, including Thailand, Vietnam, Indonesia, India and Ecuador.

Our study uncovers that bilateral/regional trade agreements (FTA_{jt}) do not significantly influence the level of US import refusals. In some regions, including Latin America and the Middle East, signing FTAs results in a higher number of detained shipments. This finding raises suspicion about the use of food safety standards in protecting domestic producers within the US. In addition, our study shows that the reputation of exporting countries can come into play in FDA decisions. Furthermore, the US FDA tends to use information from other sources, including past refusals from within a region, in imposing detentions on exporting firms from that region. Such evidence is also found in the case of Thailand.

With regard to internal factors, income level is found to be crucial in determining import refusals. Conditions related to the agriculture sector, production technology and local infrastructure tend to improve exponentially in line with rising income levels, thereby reducing the totality of refusals. We find this evidence in almost all regions with developing countries, except Africa and Europe. Particularly in the case of Africa, we highlight that increasing income leads to more import refusals, all things being equal. Our study shows that a learning curve tends to be evident in developing East Asian countries, i.e. when companies in a country gain more experience in exporting, they tend to be able to better comply with regulations imposed by the US authorities.

In Thailand, our study revealed an unexpected value concerning coefficients corresponding to income level. The coefficient corresponding to income per capita becomes insignificant, and even turns out to be positive in the case of fish and crustaceans and the preparation of fish and crustaceans. This implies that factors, which constitute an essential path to improving quality, taste, hygiene and productivity in the agriculture and food sectors, tend to improve at a slower rate than that of income growth. However, we still find evidence of a learning curve in Thailand. Such evidence tends to suggest that the technological improvements prerequisite in complying with US food safety standards tend to be concentrated mostly among large firms. This raises issues not only of how to improve the production technology necessary to comply with US food safety standards, but also of how to dispense knowledge and technology improvement to small/medium size firms. This issue becomes more serious since in other key food competitors like Vietnam, and other developing East Asian nations, income per capita is negative and significant, which is in line with the hypothesis that the development of the agriculture sector, production technology and infrastructure tends to improve in tandem with rising income levels.

There are three policy inferences that can be drawn from our study. First, concerning suspicions about using food safety standards as a trade protectionist tool by the US, trade representatives in developing countries, including Thailand, need to play a more active role in identifying and eliminating unfair measures concerning their food exporting firms. In the US, for example, the trade representatives actively identify trading partners' SPS measures that appear to be unscientific, unduly burdensome, discriminatory, or otherwise unwarranted and which create significant barriers to U.S. exports. Subsequently, they try to eliminate such measures. The publication of details regarding such efforts has been established since 2010.

Second, the task of complying with SPS measures should be viewed not just as a barrier, but also an opportunity to upgrade quality standards and market sophistication within the food export sector in developing countries. This is supported by our finding that internal factors matter in reducing refusals. Improvements in the agriculture sector, especially upgrading land quality and irrigation systems, together with production technology represent an essential path to enhancing quality and productivity in the agricultural sector. Revamping certain technologies would lead to a more extended seasonal yielding pattern, improved taste and hygiene and uniform output. The timing (seasonality) of production could be better controlled, thereby reducing risks and enabling producers to diversify their crop/livestock mix. Supporting vertical integration, either complete or partial, would become important and relevant in the context of the processed food industries. The logistical costs associated with the procurement of raw materials and/or the sale of finished products could be reduced. In particular, transport costs can be potentially saved, especially concerning bulky and perishable raw materials, as vertical integration involves bringing together in one location formerly distinct operating units. The level of required inventories can be reduced because internal planning allows for a better match of supply and demand in terms of quantity and location. Problems regarding risks and uncertainties could also be redressed. In particular, the variability of supplies and outlets could be eliminated as more direct control over raw materials can be exercised under completed or even partial vertical integration. In countries where income per capita becomes insignificant or even turns out to be positive in our analysis, more attention needs to be paid to development in these areas along with initiatives supporting income growth.

In Thailand, in addition to stimulating improvements in the agriculture and food sectors to correspond more closely with rising incomes, greater attention should be paid to dispersing knowledge and technological improvements efficiently and swiftly to small/medium size firms. To clearly analyze these issues, a firm-level survey needs to be conducted, focusing directly on small and medium size companies, whose shipments have been detained by the US FDA.

Finally, our results suggest that regional cooperation concerning food safety is needed to ensure the improvement of food safety standards in all countries in the region. This would eventually help such countries, including Thailand, reduce the incidence of detained shipments when trading with the US. In fact, regional cooperation in the sphere of food safety is addressed by ASEAN countries in achieving deeper economic integration under the banner of the ASEAN Economic Community. Sectoral mutual recognition arrangements (MRA) have been signed to supplement and contribute positively to the harmonization of standards, technical regulations, conformity assessment procedures and sanitary or phytosanitary measures in ASEAN (14^{th} TF MRA Meeting, 1 June 2016). However, the progress of this cooperation initiative has lagged. As of the 14^{th} MRA meeting on 1^{st} June 2016, the scope and coverage under the agreements have not yet been finalized and the joint sectoral committee (JSC), which will ultimately be responsible for the effective functioning of this sectoral MRA, has not yet been established. Meanwhile, it seems that the products which will be covered under this sectoral MRA, only comprise those under HS code 16-22 and the arrangement still allows each member country to establish its own regulations as long as they follow ASEAN Principles and Guidelines concerning food imports and exports. Our study has revealed that import refusals concerning other products, including fish and crustaceans (HS code03) and in fruit and vegetable categories, are still affected by the past refusals of other East Asian countries. Including only HS code 16-22 would not be sufficiently comprehensive for food exporting firms as a whole in the region. In addition, cooperation in food safety might need to go beyond ASEAN countries to include developing North-East Asian countries. From our study, the detained shipments of countries in North-East Asia potentially still influence the number of detained shipments experienced by Thailand and other ASEAN countries.

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Table 1: The Share of Food Exports in Agricultural Exports of Developing Countries

	1995		2000		2010		2014	
	% of total exports	% of total agriculture	% of total exports	% of total agriculture	% of total exports	% of total agriculture	% of total exports	% of total agriculture
Developing countries								
- Agriculture	17.8		10.6		9.6		9.7	
- Traditional Food	6.9	38.7	4.0	37.7	3.8	39.8	4.1	42.8
- Processed Food	8.2	46.1	5.0	47.6	4.8	50.3	4.8	50.5
- Manufacturing	60.9		58.1		57.8		60.9	
Asia								
- Agriculture	15.4		10.0		8.0		7.6	
- Traditional Food	4.1	26.5	2.7	27.2	1.9	24.2	2.1	28.0
- Processed Food	8.1	53.0	5.7	56.9	4.7	58.1	4.6	60.0
- Manufacturing	73.3		78.4		79.3		81.4	
Latin America								
- Agriculture	28.3		18.9		22.3		23.9	
- Traditional Food	14.1	49.8	9.7	51.1	13.1	58.7	14.4	60.2
- Processed Food	11.5	40.8	8.0	42.1	9.4	42.1	10.0	41.6
- Manufacturing	52.4		61.8		45.9		47.2	
Europe								
- Agriculture	15.5		8.2		8.5		10.2	
- Traditional Food	5.8	37.5	2.5	30.3	3.3	39.0	4.5	43.8
- Processed Food	7.8	50.4	3.6	43.8	4.2	49.0	4.9	48.0
- Manufacturing	75.3		60.0		56.1		57.3	
Africa								
- Agriculture	29.0		12.6		10.3		12.1	
- Traditional Food	16.1	55.7	5.3	41.6	4.9	47.5	5.5	45.6
- Processed Food	6.5	22.3	4.4	34.8	3.8	36.6	4.8	39.5
- Manufacturing	25.6		24.9		21.5		21.7	
Middle East								
- Agriculture	28.3		18.9		22.3		23.9	
- Traditional Food	14.1	29.5	9.7	31.6	13.1	25.5	14.4	37.1
- Processed Food	11.5	57.2	8.0	54.3	9.4	70.2	10.0	59.2
- Manufacturing	52.4		61.8		45.9		47.2	

Source: Authors' compilation from http://comtrade.un.org/db/dqBasicQuery.aspx for exports

Table 2: The Share of Food Exports, by Income Level

	1995	2000	2010	2014
Traditional food				
Low	6.5	5.4	0.5	0.8
Lower-middle	7.8	8.8	6.7	17.6
Upper-middle	12.6	15.0	10.3	20.5
High	73.2	70.8	82.4	61.1
Processed food				
Low	6.2	5.8	0.8	0.3
Lower-middle	11.5	12.4	20.1	21.5
Upper-middle	11.8	14.7	24.5	20.3
High	70.5	67.2	54.7	57.9

Source: Authors' compilation from http://comtrade.un.org/db/dqBasicQuery.aspx for exports

Table 3: The Share of Food Exports, by Region

Processed food				
	1995	2000	2010	2014
Europe	13.6	13.5	17.7	20.4
Latin America	34.3	32.4	27.3	25.8
Middle East	1.7	3.4	6.2	4.0
Asia	47.5	44.6	43.9	45.3
Africa	2.9	6.1	4.9	4.5
Traditional food				
	1995	2000	2010	2014
Europe	12.1	11.8	17.9	22.0
Latin America	50.0	49.6	48.1	44.1
Middle East	1.0	2.5	2.9	3.0
Asia	28.3	26.9	23.1	24.9
Africa	8.7	9.2	8.0	6.1

Source: Authors' compilation from http://comtrade.un.org/db/dqBasicQuery.aspx for exports

Table 4: Export Destinations of Traditional and Processed Food Exports in Developing Countries

	1995				2000				2010				2014			
	G3	USA	EU	Japan	G3	USA	EU	Japan	G3	USA	EU	Japan	G3	USA	EU	Japan
Developing countries																
- Traditional Food	51.1	10.7	29.9	7.9	48.3	11.6	26.7	7.1	36.3	7.3	22.0	4.6	33.2	7.1	19.9	3.1
- Processed Food	56.2	14.7	21.9	17.0	56.2	17.8	20.2	15.3	31.4	11.7	18.1	6.8	38.1	11.9	17.1	6.2
Asia																
- Traditional Food	31.8	5.7	11.6	12.9	34.0	6.3	12.4	12.8	29.4	6.9	11.1	9.0	26.5	6.0	11.0	7.2
- Processed Food	55.9	10.0	15.3	27.7	58.1	14.3	14.1	26.5	39.4	10.9	13.8	11.4	36.8	11.0	12.4	10.0
ASEAN																
- Traditional Food	38.0	8.0	11.8	15.3	38.7	8.8	13.6	12.8	31.4	7.5	11.6	8.7	31.6	7.0	12.1	8.6
- Processed Food	53.7	11.4	15.9	22.5	53.9	16.7	13.8	19.4	36.6	10.9	13.8	8.5	36.8	11.0	13.4	7.9
Thailand																
- Traditional Food	35.8	7.1	5.8	19.8	43.5	6.3	13.8	20.6	38.2	6.2	13.6	15.1	37.2	6.3	12.5	15.4
- Processed Food	73.5	18.0	17.2	32.2	72.3	26.2	14.1	25.4	58.6	18.8	15.0	18.1	49.4	12.7	13.9	16.1
Latin America																
- Traditional Food	66.3	17.3	40.6	5.6	61.6	18.7	35.2	4.6	39.9	10.3	23.4	3.7	35.6	11.4	18.9	3.1
- Processed Food	60.8	30.8	23.2	5.4	62.2	34.3	20.3	5.3	47.7	24.5	17.8	3.9	47.3	26.4	15.2	3.9
Europe																
- Traditional Food	37.5	3.8	31.9	0.5	37.7	3.7	31.4	0.9	39.5	1.2	37.0	0.5	38.1	1.0	35.6	0.5
- Processed Food	53.1	2.2	47.3	1.0	48.2	2.8	39.7	2.8	39.1	1.2	35.3	1.2	37.9	1.1	34.2	1.0
Africa																
- Traditional Food	77.0	5.0	63.5	2.4	59.3	7.0	43.6	4.7	45.6	5.8	35.6	1.9	43.3	6.3	32.0	2.9
- Processed Food	71.7	2.3	64.2	3.6	63.4	2.8	54.6	3.6	42.2	3.2	34.6	2.1	34.4	1.9	29.2	1.4
Middle East																
- Traditional Food	5.4	0.8	4.4	0.0	7.1	1.8	4.6	0.4	6.5	1.0	5.0	0.2	3.6	0.6	2.5	0.1
- Processed Food	15.7	0.4	14.4	0.8	12.4	0.9	9.4	0.9	7.0	0.5	5.8	0.2	7.4	0.8	5.7	0.3

Source: Authors' compilation from http://comtrade.un.org/db/dqBasicQuery.aspx for exports

Table 4 (cont.): Export Destinations of Traditional and Processed Food Exports in Developing Countries

	1995						2000						2010						2014					
	Developing	Asia	Latin	Europe	Africa	Middle East	Developing	Asia	Latin	Europe	Africa	Middle East	Developing	Asia	Latin	Europe	Africa	Middle East	Developing	Asia	Latin	Europe	Africa	Middle East
Developing																								
- Traditional	36.9	13.6	6.2	8.9	2.4	5.9	40.7	12.2	7.1	8.6	4.6	8.4	53.6	20.2	5.3	10.2	7.1	10.7	55.1	24.5	4.3	9.5	7.2	11.4
- Processed	31.4	12.9	5.3	6.0	1.0	5.9	32.7	13.0	5.5	5.5	2.7	5.9	51.3	22.5	4.9	9.4	5.2	9.4	40.4	23.1	4.5	9.3	5.6	8.5
Asia																								
- Traditional	44.3	25.4	0.6	7.3	2.9	8.2	42.9	20.2	1.2	5.6	5.3	10.6	56.3	29.1	1.7	3.4	8.8	13.2	58.8	31.7	1.2	3.6	8.4	13.9
- Processed	26.0	15.3	0.7	4.1	0.8	5.1	26.8	16.6	0.7	2.5	1.5	5.5	49.0	31.6	2.0	4.6	3.9	7.0	49.4	31.8	2.0	4.0	4.9	6.6
ASEAN																								
- Traditional	41.1	30.8	0.7	1.9	3.0	4.8	43.1	26.3	0.9	2.5	6.0	7.4	55.1	35.2	1.9	2.1	11.1	4.8	53.9	38.1	1.2	2.1	9.1	3.5
- Processed	30.8	22.8	0.7	1.4	0.9	5.0	31.1	23.1	0.6	1.3	1.7	4.5	54.3	39.1	1.5	3.1	4.3	6.2	52.5	37.0	1.7	2.6	5.5	5.7
Thailand																								
- Traditional	49.3	34.9	1.2	1.6	4.5	7.2	42.2	19.3	0.1	1.6	12.7	8.5	53.5	25.6	0.1	0.9	20.5	6.5	54.7	31.6	0.5	0.6	19.0	3.1
- Processed	13.4	9.8	0.6	0.5	0.2	2.3	15.0	11.0	0.6	0.7	0.5	2.2	34.2	25.5	1.0	1.6	2.5	3.5	41.0	30.0	1.3	1.7	3.3	4.8
Latin America																								
- Traditional	28.1	5.4	13.7	4.1	1.0	3.9	34.0	7.3	15.2	4.6	1.8	5.1	51.4	20.2	10.6	7.5	3.6	9.5	54.7	25.9	9.5	6.5	4.2	8.5
- Processed	32.8	5.5	18.9	2.1	1.3	5.0	32.0	4.4	19.8	1.7	1.8	4.3	43.8	6.5	17.5	6.1	4.8	8.9	41.3	8.8	16.4	6.7	3.6	5.9
Europe																								
- Traditional	59.7	4.2	0.9	46.1	2.4	6.1	57.8	4.5	0.4	43.9	2.1	6.9	55.5	5.6	0.3	36.5	2.8	10.4	55.9	7.7	0.5	29.3	4.4	14.0
- Processed	44.7	3.6	0.4	33.8	1.7	5.2	47.6	6.0	0.7	34.8	1.9	4.2	56.2	7.9	0.3	39.5	1.7	6.9	56.9	9.8	0.4	35.2	2.5	9.0
Africa																								
- Traditional	17.4	2.0	0.3	4.5	7.0	3.7	35.1	3.2	1.2	4.3	18.3	8.3	45.5	6.7	2.9	4.4	26.3	5.2	49.4	11.7	0.6	4.2	28.5	4.3
- Processed	21.9	1.8	0.1	4.3	12.3	3.4	31.8	4.6	0.4	0.7	21.9	4.1	50.2	8.1	1.1	2.5	33.5	4.9	57.8	14.1	0.8	2.8	35.6	4.6
Middle East																								
- Traditional	89.9	11.3	0.3	2.7	3.7	71.9	76.2	5.7	0.4	4.8	4.5	60.8	72.9	7.8	0.2	2.2	7.2	55.5	85.2	10.9	0.4	1.2	9.1	63.6
- Processed	79.0	1.4	0.0	3.0	1.6	73.0	71.3	12.8	0.4	6.3	3.3	48.5	75.0	10.2	0.3	4.9	7.2	52.4	87.7	7.0	0.3	4.5	9.8	66.1

Source: Authors' compilation from http://comtrade.un.org/db/dqBasicQuery.aspx for exports

Table 5: Number of Detentions and Incidence of Detention in the US Market

	No. of Detentions			% of exports to US Market		
Food	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14
high income	1421.6	799.3	1293.4	12.3	5.7	7.2
upper-mid income	1237.6	1023.0	1584.6	21.9	11.3	12.9
lower-mid income	753.4	1030.0	1523.0	68.1	53.4	33.4
low income	1.0	0.3	0.6	4.4	1.2	1.9
Beverage	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14
high income	339.4	172.3	195.2	5.6	2.2	2.1
upper-mid income	1048.0	646.7	655.6	85.2	36.6	29.1
lower-mid income	151.8	167.0	194.2	870.6	181.7	180.6
low income	0.0	0.7	0.0	0.0	12.9	0.0
Mineral	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14
high income	318.4	211.0	271.0	0.6	0.2	0.3
upper-mid income	218.2	156.3	205.2	1.3	0.5	0.6
lower-mid income	79.6	135.0	112.4	17.9	1.5	1.8
low income	0.0	1.7	1.2	0.0	14.2	6.0
Manufacture	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14
high income	4025.8	2330.0	4397.2	1.1	0.6	1.1
upper-mid income	1354.0	1250.0	2002.4	1.5	1.0	1.2
lower-mid income	996.0	892.0	1484.0	5.0	3.2	4.0
low income	2.0	4.3	7.6	1.1	1.2	1.8

Source: Authors' compilation from http://www.accessdata.fda.gov/scripts/importrefusals/ for import refusals and http://comtrade.un.org/db/dqBasicQuery.aspx for exports to the US

Table 6: Number of Food Detentions and its Incidence of Developing Countries in the US Market

	No. of Detention			% of exports to US Market		
	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14
Asia	1826	1814	2219	21.4	13.0	11.0
ASEAN	991	915	1018	18.9	10.6	8.7
Latin America	916	529	1044	5.1	2.1	3.0
Europe	125	58	179	17.1	6.0	16.0
Africa	76	55	83	9.0	4.6	4.8
Middle East	107	71	80	123.0	51.9	53.5

Source: Authors' compilation from http://www.accessdata.fda.gov/scripts/importrefusals/ for import refusals and http://comtrade.un.org/db/dqBasicQuery.aspx for exports to the US

Table 7: Causes of Import Refusals in the US Market

Cause of Detention	All countries			Developed countries			Developing countries			Asia			ASEAN10			Latin America		
	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14
1. Adulteration	**40.6**	**44.6**	**27.4**	**33.7**	**33.6**	**29.6**	**46.3**	**52.2**	**26.5**	**49.8**	**52.1**	**44.2**	**68.5**	**70.7**	**62.3**	**46.0**	**53.3**	**21.1**
- Unsafe additive	7.4	9.4	5.3	6.8	8.9	7.2	8.1	9.7	4.4	9.2	11.3	8.3	7.3	9.3	8.2	8.9	8.0	3.5
- Contamination/ Poisonous	25.0	27.7	17.0	17.3	15.9	13.9	30.8	35.8	18.4	32.0	33.2	27.9	54.1	54.3	46.6	29.8	38.8	15.6
- Insanitariness	3.1	2.2	2.9	4.0	2.3	5.6	2.5	2.2	1.8	2.2	1.7	4.0	2.2	1.4	4.3	4.1	3.4	1.2
- Acidification	4.5	4.5	1.2	5.2	6.2	2.1	4.2	3.3	0.8	5.3	4.5	1.9	4.8	4.9	2.8	3.1	2.9	0.4
- Under-processed	0.6	0.8	1.0	0.4	0.3	0.7	0.8	1.1	1.1	1.1	1.4	2.1	0.1	0.9	0.4	0.1	0.2	0.5
2. Misbranding	**44.4**	**46.1**	**65.3**	**49.2**	**57.9**	**59.5**	**40.4**	**38.0**	**67.8**	**38.4**	**39.0**	**46.9**	**25.7**	**23.3**	**29.7**	**39.9**	**37.2**	**74.2**
- Inadequate information	36.3	39.0	56.5	40.1	49.9	45.2	33.2	31.5	61.3	32.9	33.5	36.4	23.4	21.4	25.5	29.5	26.7	68.3
- Deficiency labelling	8.1	7.1	8.8	9.1	8.1	14.3	7.1	6.5	6.4	5.5	5.5	10.4	2.2	1.8	4.2	10.4	10.5	5.8
3. Others	**15.0**	**9.3**	**7.3**	**17.0**	**8.5**	**10.9**	**13.3**	**9.9**	**5.7**	**11.8**	**8.9**	**8.9**	**5.8**	**6.0**	**8.0**	**14.1**	**9.5**	**4.7**
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors' compilation from http://www.accessdata.fda.gov/scripts/importrefusals/

Table 8: Number of Detentions and Incidence of Detention of Thailand in the US Market

	Number of Detentions			% of exports to US market		
	2002-06	2007-09	2010-14	2002-06	2007-09	2010-14
Food	186	132	202	8.9	4.4	5.8
Beverages	2	0	1	3.6	0.3	1.1
Minerals	10	3	9	6.4	0.8	2.2
Manufacturing	153	100	154	1.2	0.7	0.9

Source: Authors' compilation from http://www.accessdata.fda.gov/scripts/importrefusals/ for import refusals and http://comtrade.un.org/db/dqBasicQuery.aspx for exports to the US.

Table 9: Number of Detentions and Incidence of Detention of Thailand in the US Market

	Products	Thai	Malaysia	Vietnam	Indonesia	India	China	Philippines	Ecuador
2002-06	Fish and crustaceans (HS03)	77.0	13.0	237.4	173.0	58.0	124.4	93.0	29.6
	preparation of fish and crustaceans (HS16)	25.4	6.0	42.2	62.0	45.8	23.4	27.0	12.8
	Fruits and Vegetables (HS07+08+20)	75.4	4.6	44.2	184.6	5.4	275.0	53.8	12.0
	Cereals and prep. Cereals (HS10+19)	38.8	5.8	32.6	251.6	10.6	41.6	43.2	0.6
	Coffee, tea, cocoa, sugar (HS09+18+17)	23.2	9.2	24.0	214.0	25.0	47.4	13.4	1.2
	Meat (HS02)	0.0	0.2	0.0	0.0	0.0	2.6	0.0	0.8
	Other Edible products (HS 21 + 15 + 04)	21.4	2.4	9.6	70.2	4.0	51.8	25.6	0.8
2007-09	Fish and crustaceans (HS03)	57.3	25.3	223.3	229.7	21.0	182.7	82.7	27.7
	preparation of fish and crustaceans (HS16)	20.7	12.0	50.0	115.7	10.3	55.0	22.3	0.7
	Fruits and Vegetables (HS07+08+20)	43.0	0.7	36.3	150.3	5.0	178.7	31.3	5.7
	Cereals and prep. Cereals (HS10+19)	34.3	3.0	33.7	264.7	9.0	91.0	36.0	0.7
	Coffee, tea, cocoa, sugar (HS09+18+17)	22.0	6.7	29.0	285.0	31.0	71.3	10.3	7.3
	Meat (HS02)	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
	Other Edible products (HS 21 + 15 + 04)	20.0	1.0	9.0	115.0	6.7	30.0	18.3	6.3
2010-14	Fish and crustaceans (HS03)	121.8	33.8	152.2	252.8	39.2	156.6	77.8	43.0
	preparation of fish and crustaceans (HS16)	22.4	24.4	55.8	52.4	40.4	93.6	18.8	5.0
	Fruits and Vegetables (HS07+08+20)	60.4	1.6	43.8	198.8	6.6	216.6	31.6	32.4
	Cereals and prep. Cereals (HS10+19)	33.8	4.0	28.4	440.0	5.2	141.2	45.6	0.6
	Coffee, tea, cocoa, sugar (HS09+18+17)	25.4	12.2	29.0	492.8	10.4	55.8	16.8	3.2
	Meat (HS02)	0.0	0.4	0.0	0.0	0.0	2.2	0.0	0.2
	Other Edible products (HS 21 + 15 + 04)	15.6	3.6	3.6	85.8	10.6	38.0	20.2	1.8
	US imports from Thailand (average)	**Thai**	**Malaysia**	**Vietnam**	**Indonesia**	**India**	**China**	**Philippines**	**Ecuador**
2002-06	Fish and crustaceans (HS03)	700.3	88.3	507.4	425.8	382.3	1072.7	121.3	384.6
	preparation of fish and crustaceans (HS16)	868.7	17.9	167.6	204.3	27.1	330.5	111.8	144.3
	Fruits and Vegetables (HS07+08+20)	312.6	9.0	152.7	79.2	327.2	766.4	255.9	458.2
	Cereals and prep. Cereals (HS10+19)	227.1	9.7	11.0	20.9	65.7	83.3	12.7	1.4
	Coffee, tea, cocoa, sugar (HS09+18+17)	48.2	100.4	167.3	498.4	94.7	199.9	68.0	76.1
	Meat (HS02)	0.033	n.a.	1.519	0.282	0.033	9.521	0.000	0.001
	Other Edible products (HS 21 + 15 + 04)	107.9	303.0	21.8	81.2	83.9	116.1	210.4	30.0

2007-09	Fish and crustaceans (HS03)	931.9	154.3	568.0	708.1	209.9	1697.6	126.7	515.6
	preparation of fish and crustaceans (HS16)	1082.7	30.3	183.3	297.8	41.9	480.7	146.7	105.3
	Fruits and Vegetables (HS07+08+20)	449.5	10.9	281.5	95.1	341.4	1665.0	294.9	573.6
	Cereals and prep. Cereals (HS10+19)	434.6	15.1	28.4	26.5	161.7	145.5	22.0	2.6
	Coffee, tea, cocoa, sugar (HS09+18+17)	54.0	172.2	331.3	596.8	163.4	320.5	89.2	106.7
	Meat (HS02)	0.1	0.0	0.4	0.0	0.0	18.4	0.0	0.0
	Other Edible products (HS 21 + 15 + 04)	174.8	1001.3	41.3	209.2	131.1	198.3	383.6	4.7
2010-14	Fish and crustaceans (HS03)	816.6	170.4	918.1	1003.4	783.8	2069.8	147.1	790.0
	preparation of fish and crustaceans (HS16)	1267.8	16.5	303.5	386.4	86.7	688.6	159.7	124.4
	Fruits and Vegetables (HS07+08+20)	536.2	7.7	471.5	101.4	432.4	1824.0	356.3	680.7
	Cereals and prep. Cereals (HS10+19)	582.0	21.2	63.2	27.0	240.1	180.1	32.2	3.8
	Coffee, tea, cocoa, sugar (HS09+18+17)	67.8	220.8	677.7	819.0	280.7	424.0	118.1	218.3
	Meat (HS02)	0.0	1.1	2.6	0.0	0.0	20.3	0.0	0.0
	Other Edible products (HS 21 + 15 + 04)	248.4	1323.9	99.0	403.9	242.7	275.4	564.1	6.7
	Detained shipments for every $ biliion	**Thai**	**Malaysia**	**Vietnam**	**Indonesia**	**India**	**China**	**Philippines**	**Ecuador**
2002-06	Fish and crustaceans (HS03)	110	147	468	406	152	116	767	77
	preparation of fish and crustaceans (HS16)	29	335	252	304	1,687	71	242	89
	Fruits and Vegetables (HS07+08+20)	241	510	290	2,332	17	359	210	26
	Cereals and prep. Cereals (HS10+19)	171	595	2,976	12,026	161	499	3,398	431
	Coffee, tea, cocoa, sugar (HS09+18+17)	481	92	143	429	264	237	197	16
	Meat (HS02)	0	n.a.	0	0	0	273	n.a.	594,001
	Other Edible products (HS 21 + 15 + 04)	198	8	441	865	48	446	122	27
2007-09	Fish and crustaceans (HS03)	62	164	393	324	100	108	653	54
	preparation of fish and crustaceans (HS16)	19	396	273	388	247	114	152	6
	Fruits and Vegetables (HS07+08+20)	96	61	129	1,581	15	107	106	10
	Cereals and prep. Cereals (HS10+19)	79	199	1,187	10,000	56	625	1,637	260
	Coffee, tea, cocoa, sugar (HS09+18+17)	408	39	88	478	190	223	116	69
	Meat (HS02)	0	n.a.	0	n.a.	n.a.	36	n.a.	0
	Other Edible products (HS 21 + 15 + 04)	114	1	218	550	51	151	48	1,340
2010-14	Fish and crustaceans (HS03)	149	198	166	252	50	76	529	54
	preparation of fish and crustaceans (HS16)	18	1,476	184	136	466	136	118	40

	Fruits and Vegetables (HS07+08+20)	113	209	93	1,961	15	119	89	48
	Cereals and prep. Cereals (HS10+19)	58	189	449	16,305	22	784	1,416	159
	Coffee, tea, cocoa, sugar (HS09+18+17)	375	55	43	602	37	132	142	15
	Meat (HS02)	0	377	0	0	n.a.	108	n.a.	76,799
	Other Edible products (HS 21 + 15 + 04)	63	3	36	212	44	138	36	269

Source: Authors' compilation from http://www.accessdata.fda.gov/scripts/importrefusals/ for import refusals and http://comtrade.un.org/db/dqBasicQuery.aspx for exports to the US.

Table 10: Causes of Import Refusals in the US Market in Selected Asian Countries

Cause of Detention	Thailand			Malaysia			Vietnam			Indonesia			India			China			Philippines		
	2002 -06	2007 -09	2010 -14	2002 -06	2007 -09	2010 -14	2002 -06	2007 -09	2010 -14	2002 -06	2007 -09	2010 -14	2002 -06	2007 -09	2010 -14	2002 -06	2007 -09	2010 -14	2002 -06	2007 -09	2010 -14
1. Adulteration	**83.4**	**85.4**	**81.2**	**76.5**	**88.0**	**88.8**	**81.5**	**83.7**	**86.9**	**91.0**	**94.2**	**97.5**	**51.2**	**71.6**	**38.0**	**87.3**	**87.2**	**75.1**	**81.1**	**85.0**	**82.1**
- Unsafe additive	5.9	5.8	4.0	13.7	9.0	24.6	6.6	14.6	6.9	3.8	5.6	7.5	2.1	16.4	13.1	5.8	26.5	13.9	11.8	13.8	17.4
- Contamination/ Poisonous	70.3	71.2	65.6	53.6	72.9	54.9	69.1	65.6	73.7	84.2	86.9	85.0	47.4	50.4	23.0	78.3	57.7	57.7	59.2	57.1	49.1
- Insanitariness	1.9	3.6	8.7	3.8	1.2	9.3	3.5	1.6	5.1	2.7	0.7	4.3	1.5	0.9	0.2	1.4	2.2	2.4	4.3	3.3	9.4
- Acidification	5.3	3.6	2.8	5.5	1.2	0.0	2.3	0.9	0.7	0.3	0.1	0.3	0.2	3.9	1.6	1.5	0.8	1.1	5.9	9.1	5.6
- Under-processed	0.0	1.2	0.1	0.0	3.6	0.0	0.0	1.0	0.5	0.0	1.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.7	0.5
2. Misbranding	**16.6**	**14.6**	**18.8**	**23.5**	**12.0**	**11.0**	**18.5**	**16.2**	**13.1**	**9.0**	**5.8**	**2.5**	**48.8**	**28.4**	**60.9**	**12.7**	**12.8**	**24.8**	**18.9**	**15.0**	**17.3**
- Inadequate information	14.8	12.9	15.9	21.9	10.2	9.5	17.7	14.7	11.6	7.0	5.0	2.4	45.2	26.6	55.9	10.8	12.1	20.3	17.5	14.8	16.9
- Deficiency labelling	1.8	1.7	2.9	1.6	1.8	1.4	0.9	1.5	1.5	2.0	0.8	0.1	3.5	1.9	5.0	1.9	0.7	4.4	1.4	0.2	0.4
3. Others	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**0.0**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.1**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.5**
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Authors' compilation from http://www.accessdata.fda.gov/scripts/importrefusals/

Table 11: Detentions in the Top Twenty Companies in Thailand

Rank	Company name	HS code	% of total detentions in Thailand		Company name	HS code	% of total detentions in Thailand	
			2002-06	*2010-14*			2010-14	*2002-06*
1	A	16	4.0	*0.5*	F	16	13.80	*1.9*
2	B	16	3.2	*0.4*	AA	16	7.90	*0.1*
3	C	4	2.1	*0.8*	G	3,16	5.14	*1.8*
4	D	16,21	2.1	*0.1*	BB	16,20,21	3.14	*0.0*
5	E	16	2.0	*0.2*	CC	16	2.28	*0.1*
6	F	16	1.9	*13.8*	DD	16	2.19	*0.1*
7	G	16	1.8	*5.1*	EE	20	2.09	*0.2*
8	H	16	1.8	*1.1*	FF	16	2.00	*0.0*
9	I	16	1.7	*0.0*	GG	3,16,21	1.90	*0.0*
10	J	16	1.7	*0.0*	HH	16	1.71	*0.1*
11	K	2,4	1.6	*0.4*	II	3	1.62	*0.0*
12	L	2	1.6	*0.0*	JJ	16	1.52	*0.0*
13	M	16,21	1.5	*1.3*	KK	16,21	1.52	*0.4*
14	N	16	1.4	*0.0*	LL	16	1.43	*0.0*
15	O	16	1.4	*0.0*	M	16,21	1.33	*1.5*
16	P	21	1.3	*0.0*	NN	3,16	1.24	*0.2*
17	Q	4,21	1.2	*0.0*	OO	16,21	1.14	*0.5*
18	R	20,21	1.1	*0.4*	PP	16	1.14	*1.8*
19	S	20,21	1.1	*0.3*	QQ	2	1.05	*0.0*
20	T	16	1.1	*0.0*	RR	20,21	0.95	*0.1*

Source: Authors' compilation from http://www.accessdata.fda.gov/scripts/importrefusals/

Table 12: Spearman Rank Correlation among Thai Firms where Shipments were Detained, 2002-16

	y2002	y2003	y2004	y2005	y2006	y2007	y2008	y2009	y2010	y2011	y2012	y2013	y2014	y2015	y2016
y2002	1														
y2003	0.2475*	1													
y2004	0.2324*	0.1941*	1												
y2005	0.1922*	0.1434*	0.2463*	1											
y2006	0.1734*	0.1168*	0.1758*	0.2630*	1										
y2007	0.1404*	0.1496*	0.2327*	0.2322*	0.1913*	1									
y2008	0.1646*	0.1183*	0.2098*	0.2129*	0.1588*	0.2769*	1								
y2009	0.1616*	0.0934*	0.2756*	0.2616*	0.1607*	0.2260*	0.3054*	1							
y2010	0.1132*	0.0633*	0.1999*	0.1290*	0.1847*	0.2001*	0.2238*	0.2722*	1						
y2011	0.0865*	0.0786*	0.1887*	0.0745*	0.1031*	0.1158*	0.1568*	0.1968*	0.2442*	1					
y2012	0.0364	0.0839*	0.1378*	0.0978*	0.1116*	0.0965*	0.1328*	0.1627*	0.1456*	0.2697*	1				
y2013	0.0742*	0.0855*	0.1876*	0.1076*	0.1229*	0.1394*	0.2140*	0.2301*	0.2006*	0.2432*	0.2870*	1			
y2014	0.0546*	0.0292	0.0981*	0.1066*	0.1201*	0.1229*	0.1383*	0.1903*	0.1787*	0.1949*	0.1569*	0.2799*	1		
y2015	0.0722*	0.0885*	0.1328*	0.0596*	0.0657*	0.0722*	0.0456	0.1259*	0.1409*	0.1282*	0.1471*	0.1918*	0.2740*	1	
y2016	0.0232	0.0323	0.0371	0.0476	0.0885*	0.0513*	0.0733*	0.0634*	0.1047*	0.0841*	0.1402*	0.0666*	0.1942*	0.1124*	1

Source: Authors' calculation

Table 13: Negative Binomial Regression on US Import Refusals, the Whole Sample

	A	B	C	D	E	F	G	H
$export_{ijt}$	0.0516 (13.33)*	0.048 (12.40)*	0.052 (13.31)*	0.048 (12.38)*	0.052 (13.31)*	0.048 (12.37)*	0.052 (13.30)*	0.048 (12.36)*
$dumperish_{ijt}$	0.145 (2.59)*	0.152 (2.68)*	0.151 (2.69)*	0.157 (2.79)*	0.152 (2.70)*	0.158 (2.80)*	0.152 (2.70)*	0.158 (2.81)*
$detenhis_{ijt-1}$	0.002 (7.02)*	0.002 (7.38)*	0.002 (7.12)*	0.002 (7.48)*	0.002 (7.17)*	0.002 (7.53)*	0.002 (7.16)*	0.002 (7.53)*
$dist_{just}$	-0.00004 (-5.48)*	-0.00003 (-5.06)*	-0.00004 (-5.49)*	-0.00003 (-5.06)*	-0.00004 (-5.49)*	-0.00003 (-5.06)*	-0.00004 (-5.49)*	-0.00003 (-5.06)*
FTA_{jt}	0.196 (3.47)*	0.181 (3.20)*	0.198 (3.49)*	0.183 (3.24)*	0.198 (3.50)*	0.184 (3.25)*	0.198 (3.50)*	0.184 (3.25)*
fdi_{jt}	-0.061 (-3.83)*	-0.059 (-3.69)*	-0.061 (-3.84)*	-0.059 (-3.70)*	-0.061 (-3.84)*	-0.059 (-3.70)*	-0.061 (-3.84)*	-0.059 (-3.70)*
$detenneigbor_{ijt-1}$	0.002 (21.14)*	0.002 (21.05)*	0.002 (20.72)*	0.002 (20.63)*	0.002 (20.56)*	0.002 (20.48)*	0.002 (20.45)*	0.002 (20.38)*
$dumEnglish_{jt}$	0.092 (1.57)	0.071 (1.21)	0.093 (1.59)	0.072 (1.24)	0.094 (1.60)	0.073 (1.24)	0.094 (1.60)	0.073 (1.24)
$USproducer\_1us_{t-1}$	-0.879 (-2.32)**	-0.937 (-2.47)**						
$USproducer\_2us_{t-1}$			-0.005 (-1.87)***	-0.005 (-1.92)***				
$USproducer\_3us_{t-1}$					-2.720 (-1.62)	-2.773 (-1.64)		
$USproducer\_4us_{t-1}$							-0.021 (-1.44)	-0.021 (-1.43)
$income_{it}$	-0.129 (-6.82)*		-0.129 (-6.79)*		-0.128 (-6.78)*		-0.128 (-6.78)*	
$income1_{it}$		-0.118 (-4.28)*		-0.117 (-4.23)*		-0.117 (-4.22)*		-0.117 (-4.22)*
No. of observations	46,137	45,675	46,137	45,675	46,137	45,675	46,137	45,675
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald	1451.11	1382.75	1452.88	1382.09	1453.26	1384.29	1453.82	1384.72
Log-likelihood	-18232.689	-17987.873	-18233.57	-17989	-18234.016	-17989.501	-18234.286	-17989.831
LR-test	9160.04	9058.64	9155.96	9054.05	9152.53	9050.48	9148.76	9046.41

Note: *, ** and *** denote significance at 1%, 5% and 10% respectively and the value in parenthesis is z-statistics. All variables, except dumperish, dist, FTA, detenneigbor, dumEnglish, are in logarithm.
Source: Authors' estimations

Table 14: Negative Binomial Regression on US Import Refusals, by Country and Income Bracket

	Developed (high income)	Developing	Upper middle	Lower middle	Low
$export_{ijt}$	0.138 (13.32)*	0.029 (7.01)*	0.114 (11.40)*	0.025 (4.63)*	0.002 (0.24)
$dumperish_{ijt}$	0.337 (3.57)*	0.050 (0.67)	0.225 (1.99)**	-0.035 (-0.30)	-0.004 (-0.02)
$detenhis_{ijt-1}$	0.004 (5.31)*	0.002 (6.53)*	0.002 (2.66)*	0.001 (2.46)**	-0.0004 (-0.37)
$dist_{just}$	-0.00001 (-1.18)	-0.00002 (0.02)	-0.00003 (-1.52)	0.00003 (1.65)***	-0.00003 (-0.76)
FTA_{jt}	0.0006 (0.01)	0.328 (4.50)*	0.243 (2.07)**	0.293 (2.58)*	_
fdi_{jt}	-0.027 (-1.18)	-0.054 (-2.33)**	-0.060 (-1.34)	-0.132 (-3.73)*	-0.047 (-0.85)
$detenneigbor_{ijt-1}$	0.003 (14.59)*	0.002 (15.98)*	0.002 (10.85)*	0.002 (11.95)*	0.005 (8.54)*
$dumEnglish_{jt}$	-0.093 (-0.87)	0.240 (2.97)*	-0.062 (-0.43)	0.110 (0.90)	1.136 (4.94)*
$USproducer\_1us_{t-1}$	-1.287 (-4.38)*	-0.749 (-1.60)	-1.226 (-2.74)*	-1.114 (-1.71)***	-0.491 (-0.62)
$income_{it}$	-0.173 (-1.73)***	-0.007 (-0.18)	-0.138 (-0.99)	-0.076 (-0.71)	1.749 (7.02)*
No. of observations	11,844	34,293	10,752	12,789	10,731
Year dummy	Yes	Yes	Yes	Yes	Yes
Wald	646.76	751.09	373.25	455.28	281.45
Log-likelihood	-5976.8591	-12101.899	-4535.914	-5793.4446	-1988.5049
LR-test	2160.15	7016.24	1675.08	3171.50	1341.50

Note: *, ** and *** denote significance at 1%, 5% and 10% respectively and the value in parenthesis is z-statistics. All variables, except dumperish, dist, FTA, detenneigbor, dumEnglish, are in logarithm.

Source: Authors' estimations

Table 15: Negative Binomial Regression on US Import Refusals of Developing Countries, by Region

	Europe	Latin	MiddleEast	Africa	East Asia	South Asia
$export_{ijt}$	0.092	0.027	0.039	0.039	-0.012	-0.011
	(4.59)*	(3.40)*	(3.02)*	(2.78)*	(-1.92)***	(-0.93)
$dumperish_{ijt}$	0.220	0.212	0.272	-0.150	0.283	0.552
	(1.02)	(1.76)**	(0.82)	(-0.58)	(1.47)	(2.03)**
$detenhis_{ijt-1}$	0.032	0.002	0.0176	0.008	0.001	0.002
	(3.45)*	(4.34)*	(1.61)***	(1.67)***	(2.34)**	(3.42)*
$dist_{just}$	-0.0002	-0.00008	0.0001	-0.0004	0.0001	0.00003
	(-1.24)	(-2.26)*	(1.30)	(-6.31)*	(0.55)	(0.18)
FTA_{jt}	–	0.293	0.928	–	–	–
		(3.50)*	(2.88)*			
fdi_{jt}	-0.201	0.024	0.148	-0.030	-0.017	0.0519
	(-2.01)**	(0.46)	(1.54)	(-0.57)	(-0.40)	(0.61)
$detenneigbor_{ijt-1}$	0.003	0.003	0.028	0.054	0.002	0.004
	(4.13)*	(13.25)*	(6.95)*	(8.85)*	(7.71)*	(7.02)*
$dumEnglish_{jt}$	–	-0.895	0.953	1.982	-0.210	2.916
		(-5.67)*	(1.84)***	(6.36)*	(-0.40)	(8.57)*
$USproducer\_1us_{t-1}$	-0.248	-1.423	-1.341	0.753	-2.383	0.742
	(-0.15)	(-4.70)*	(-0.99)	(0.59)	(-2.85)*	(0.99)
$income_{it}$	0.061	-0.130	-0.527	0.241	-0.466	-1.093
	(0.32)	(-1.90)**	(-2.03)**	(2.07)**	(-2.30)**	(-2.84)*
No. of observations	5,607	7,308	2,961	11,445	4,851	2,121
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Wald	125.55	311.70	104.29	206.95	221.37	375.61
Log-likelihood	-1210.8919	-4263.0525	-903.71149	-1203.4921	-2470.8281	-1559.5305
LR-test	347.92	1927.12	262.63	384.34	1440.58	856.44

Note: *, ** and *** denote significance at 1%, 5% and 10% respectively and the value in parenthesis is z-statistics. All variables, except dumperish, dist, FTA, detenneigbor, dumEnglish, are in logarithm.
Source: Authors' estimations

Table 16: Negative Binomial Regression on US Import Refusals of Developing Countries, by Product

	HS16	HS16	HS03	HS03	Fruits and Vegetables	Other Edible Products
$export_{ijt}$	0.023 (3.36)*	0.021 (3.02)*	0.044 (3.79)*	0.023 (2.87)*	0.095 (7.06)*	0.052 (5.51)*
$dumperish_{ijt}$	–	–	–	–	-1.040 (-7.22)*	–
$detenhis_{ijt-1}$	0.002 (3.04)*	0.0009 (1.68)**	0.006 (4.79)*	0.001 (1.53)***	0.008 (4.89)*	0.002 (4.27)*
$dist_{just}$	0.00001 (0.70)	0.00004 (0.22)	0.00002 (0.01)	-0.00006 (-2.37)*	0.00006 (2.94)*	-0.00003 (-1.97)**
FTA_{jt}	0.250 (2.22)**	0.250 (2.21)*	0.587 (3.60)*	0.610 (3.77)*	0.300 (1.99)**	0.050 (0.42)
fdi_{jt}	-0.032 (-1.06)	-0.018 (-0.59)	0.030 (0.62)	0.032 (0.68)	-0.080 (-2.06)**	0.019 (0.48)
$detenneigbor_{ijt-1}$	0.002 (8.54)*	0.002 (8.42)*	0.005 (5.20)*	0.005 (7.65)*	0.008 (7.78)*	0.002 (8.48)*
$dumEnglish_{jt}$	-0.358 (-2.48)**	-0.340 (-2.34)*	-0.076 (-0.44)	0.130 (0.72)	0.576 (3.87)*	0.010 (0.08)
USproducer_1us$_{t-1}$	-0.052 (-0.07)	-1.374 (-4.04)*	0.170 (0.16)	0.566 (0.79)	-1.642 (-1.97)**	-2.562 (-2.99)*
USproducer_1us$_{t-1}$_THA		0.762 (0.92)		-0.084 (-3.83)*		
USproducer_1us$_{t-1}$_VNM		-1.487 (-1.70)**		-6.830 (-4.51)*		
USproducer_1us$_{t-1}$_IDN		-0.172 (-0.14)		-1.617 (-1.68)***		
USproducer_1us$_{t-1}$_IND		-0.333 (-0.33)		-1.719 (-2.97)*		
USproducer_1us$_{t-1}$_ECU		2.607 (2.86)*		-0.044 (-0.56)		
$income_{it}$	-0.152 (-3.18)*	-0.103 (-2.10)*	-0.037 (-0.65)	0.083 (1.40)	0.037 (0.72)	-0.218 (-4.92)*
No. of observations	2,197	2,197	2,197	2,197	13,182	15,379
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Wald Chi2	310.01	406.09	119.36	345.40	306.08	241.68
Log-likelihood	-3369.1109	-3352.3906	-2215.0679	-2173.0925	-3097.2926	-4307.6299
LR-test	987.45	1003.10	544.03	513.39	1156.88	2307.11

Note: *, ** and *** denote significance at 1%, 5% and 10% respectively and the value in parenthesis is z-statistics. All variables, except dumperish, dist, FTA, detenneigbor, dumEnglish, are in logarithm.
Source: Authors' estimations

Table 17: Negative Binomial Regression on US Import Refusals of Thailand, Vietnam and Indonesia

	Thailand	Vietnam	Indonesia
$export_{ijt}$	-0.113 (-1.54)***	0.018 (2.52)*	-0.089 (-1.79)**
$export_{ijt}$_HS03	0.242 (0.242)		0.011 (0.18)
$export_{ijt}$_HS16	-0.969 (-1.65)**		0.051 (1.06)
$dumperish_{ijt}$	1.227 (1.88)**	1.859 (2.44)*	-0.600 (-0.60)
$detenhis_{ijt-1}$	0.0002 (0.12)	-0.0003 (-0.70)	0.0002 (0.56)
$dist_{just}$	-	-	-
FTA_{jt}	-	-	-
fdi_{jt}	0.113 (1.30)	0.094 (1.03)	-0.434 (-3.95)*
$detenneigbor_{ijt-1}$	0.002 (4.60)*	0.001 (5.19)*	0.002 (8.68)*
$dumEnglish_{jt}$	-	-	-
USproducer_$1us_{t-1}$	-1.266 (-1.69)**	-3.770 (-2.51)*	1.050 (1.18)
USproducer_$1us_{t-1}$_HS03	-1.183 (-1.50***	-0.979 (-0.40)	-1.168 (-2.14)*
USproducer_$1us_{t-1}$_HS16	-0.056 (-0.16)	2.692 (2.36)*	-0.261 (-1.58)***
$income_{it}$	-0.297 (-0.39)	1.149 (1.32)	1.168 (0.47)
$income_{it}$_HS03	3.496 (2.10)*	-2.432 (-1.99)**	4.515 (1.23)
$income_{it}$_HS16	3.112 (2.40)*	-2.579 (-3.32)*	1.626 (0.66)
No. of observations	273	273	252
Year dummy	Yes	Yes	Yes
Wald	104.57	140.55	239.05
Log-likelihood	-353.9282	-339.7152	-187.4135
LR-test	89.62	146.69	150.3

Note: *, ** and *** denote significance at 1%, 5% and 10% respectively and the value in parenthesis is z-statistics. All variables, except dumperish, dist, FTA, detenneigbor, dumEnglish, are in logarithms.
Source: Authors' estimation