Barriers to Fishery Exports from Developing Countries: The Impact of U.S. FDA Food Safety Regulation

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Abstract

The United States is the third largest consumer of seafood products in the world. The percentage of imported seafood consumed in the U.S. has steadily increased from 66% in 1999 to over 84% in 2009 (NOAA, 2012). Food safety, especially of imported foods and products from developing countries, has raised increasing concerns among American consumers and policy makers. Accordingly, the Food and Drug Administration's (FDA) border inspection system is considered critical for ensuring the safety of domestic seafood consumers (Ababouch et al., 2000). However, the potential non-tariff barrier to trade posed by FDA regulations, especially for many developing country exporters have been frequently cited in the literature.

This paper investigates trends and patterns in U.S. import detentions and refusals of seafood products between 2000 and 2010. Data from U.S. FDA import refusal report is used to uncover patterns of detainments and import refusals across major exporting countries, World Bank income classification and time. The analysis in this paper suggests that the FDA's approach to food safety regulation for seafood at U.S. ports of entry does not follow random selection based inspections. Instead, a system of Import Alerts results in targeted inspections and mandatory "flagging" of repeat code violation. We find evidence of increasing levels of seafood shipment detentions without physical examinations targeted at predominantly lower-middle income seafood exporting countries which make up the majority of the U.S. seafood supply.

Introduction

The United States is one of the world's largest consumers and importers of seafood products, importing 86% of their total seafood supply to meet demand (NOAA, 2012). In 2010, total seafood imports to the U.S were in excess of 5.5 billion pounds, and valued at over $14.8 billion, an increase $8.7 billion only a decade earlier. Much of this growth in imports has been satisfied by worldwide

aquaculture production, especially from developing countries (National Marine Fisheries Services, 2011).

Rapid growth in imports from developing economies, many of whom have not developed extensive food safety systems, has raised concerns about the safety of imported foods. The potentially rapid spread of food safety hazards in international agri-food trade has motivated the introduction of stricter regulatory standards and enforcement measures. All seafood imported into the U.S must meet mandatory Hazard Analysis and Critical Control Points (HACCP) safety standards. Implemented in 1997, HACCP standards are in accordance with the Agreement on the Application of Sanitary and Phytosanitary (SPS) of the World Trade Organization (WTO). Imported seafood products have been found to consistently rank highest for violations of U.S. import regulations for reasons of adulteration (Buzby and Roberts 2010; Allen et al. 2008).

The objective of this paper is to investigate the U.S. Food and Drug Administration (FDA) data from import refusal reports of seafood imports into the United States from 2000-2010. Descriptive data analysis is used to highlight trends and patterns in seafood import refusals across major U.S. trade partners ordered by the World Bank income classification criteria and categories of FDA code. The analysis matches FDA product descriptions to international trade data to quantify the economic impact of the FDA's enforcement of U.S. food safety border regulations on its major trade partners located in developed and developing countries. Previous studies that have used FDA import refusal data (Buzby and Roberts 2010; Allen et al. 2008) have focused on either refused shipments or total detentions. The following analysis contributes to the literature by updating previous research with actual data. Furthermore, we also explicitly distinguish between the overall patterns of border detentions and seafood shipments that were ultimately refused by the FDA. This step allows for a more precise measurement of the impact FDA import refusals had on trade and therefore whether U.S. regulatory policy did act as a barrier to trade for specific countries.

Several studies in the trade literature agree that food safety related standards can amount to "standards as barriers" to trade and frequently violate fairness in trade by disadvantaging particularly poorer developing countries. While essential to assuring domestic food safety, the risk of new trade measures is their potential as a non-tariff barrier to trade, especially for exporters in developing countries who may not have the appropriate infrastructure in place or resources to comply. In contrast to the above view, Jaffee and Henson (2008) argued that the competitive pressure and opportunity provided by emerging food safety standards, the "standards as catalysts" view, may force export oriented countries to quickly adapt to new trade rules to increase their competitive advantages.

The increasing dependence of the U.S. economy on food imports from developing countries have culminated in public pressure that forced the FDA to apply stricter inspection and enforcement measures to assure the safety of imported seafood products. Recently, the FDA has been pressured to additionally strengthen its oversight of food imports by improving enforcement methods and increasing available resources (GAO, 2010). The mandatory nature of many food safety policies deployed by the U.S. FDA may pose non-tariff trade barriers to foreign competitors resulting in changes in bilateral seafood trade flows.

Literature Overview

The existing trade literature suggests that food safety standards imposed by developed countries can have harmful effects on trade (Swann, 2010), and particularly for commodity exports from developing countries (Henson and Loader, 2001; World Bank, 2005; Henson and Jaffee, 2008). For the case of standards as barriers to seafood trade, the papers by Anders and Caswell (2009) and Nguyen and Wilson (2009) are cases in point. Although most studies support a standards-as-barriers hypothesis, they present different theories as to how food safety standards affect trade, and the extent of trade impediment.

For example, Henson and Jaffee (2008) state that food-safety or quality standards may in fact benefit producers in developing countries by forcing technological progress and learning through the

implementation of stricter standards thereby creating a competitive advantage that may lead to gains in international trade.

For the specific case of seafood exports to the U.S, Anders and Caswell (2009) found that the mandatory implementation of HACCP in the U.S. seafood sector resulted in trade losses for the majority of developing country exporters. However, the analysis revealed that originally the largest trading partners in the international seafood market where able to gain trade and expand their U.S. market share regardless of development status, mostly at the expense of smaller seafood exporters. A similar study by Nguyen and Wilson (2009) confirmed that HACCP standards had a continuous negative effect on seafood trade from all developing countries, but the magnitudes of trade effects differed across seafood products. The above share the common goal of quantifying the impact of food standards on bilateral trade flows, specifically for developing countries. An alternative approach to measuring the impact of food standards in trade is to directly analyse the extent to which regulatory measures are enforced at border, leading to the refusal of products deemed for import into a country. Observing trends in border refusals of commodities such as seafood can pinpoint countries of origin and/or individual products that caused large number of violations of existing standards and therefore faced a significant barrier. This approach also often provides insights into the reasons behind the rejection of products. Border refusal information can then provide more detailed, policy relevant information on the impact of specific policy measures and their potential impact as barriers to trade.

To date several studies have used import refusal report information to study the impact of border food safety policies, encompassing all food categories. The existing evidence suggests that seafood accounts for a relatively large share of all import refusals at U.S. ports of entry[1](Buzby et al., 2008; Buzby and Regmi, 2010; Gale and Buzby, 2009). Papers by Allshouse et al. (2003), Buzby et al. (2008), FAO (2005), and Food and Water Watch (2007) focusing exclusively on U.S. import

refusals of seafood, concluded that the majority of seafood shipments ultimately refused (as opposed to those shipments simply detained at the border) originated from developing countries. The above studies found that filth, salmonella and listeria were among the most frequent reasons for the violation of U.S. FDA food safety rules for seafood imports and shrimp was found to be the product associated with the most violations. A report published by the Food and Water Watch also highlighted the rise of veterinary drug residues in imported seafood products associated with the growth in aquaculture and predominantly products originating from China.

FDA Import Refusal Reports

Mandatory HACCP compliance was implemented in the U.S. seafood market in 1998 as a regulatory food safety measure to mitigate and control seafood-borne health hazards to consumers. The FDA's statutory authority and responsibility is to protect the health and safety of U.S. consumers by inspecting shipments into the U.S. market at the port of entry that appear to violate one or more of the code regulations.

The border detention of shipments and subsequent inspection by FDA staff, however, does not imply that detained shipments are necessarily in violation of FDA code regulations. According to Section 801(a) of the Federal Food, Drug, and Cosmetic (FD&C) Act, detention of imports occurs, if they "appear to be in violation of one of the laws enforced by the FDA" and "the appearance of a violation may arise by the examination of physical samples, a field examination, review of entry documents, or based upon the history of prior violations by the same shipper". Complete sensory and/or laboratory testing however is only conducted on about 2% of all imported seafood shipments. Moreover, shipments are not chosen randomly, but according to a set of FDA risk based criteria (Buzby et al. 2010). For the majority of shipments the FDA relies on self-reported HACCP

[1] Between 1998 and 2004, seafood products accounted for 20.1% of all food products refused by the FDA, which is the second largest number of refusals after vegetables at 20.6% (Buzby, 2008).

compliance documentation provided by the (seafood) exporter to the U.S. (Food and Water Watch, 2007).

One such measure is the issuing of "import alerts". Also known as "flagging", FDA Import Alerts instruct FDA staff to automatically detain without physical examination (DWPE) all imports of the affected product(s) from a listed manufacturer and/or country of origin that fall under a notice until the exporter demonstrates to the FDA that the violation has been corrected (Buzby, 2010). It is the responsibility of the importer to present the required evidence (usually in the form of test results and/or shipment documentation) that allows the FDA to confirm complies with relevant FDA code regulations. Table 1 depicts the pattern of DPWE of seafood imports at U.S. ports of entry over the period of observation by World Bank country income classification.

Table 1: Detainments of U.S. Seafood Imports Without Physical Examination, 2000-2010

	2000	2001	2007	2008	2009	2010
Total Detainments	**2569**	**2764**	**6442**	**7368**	**8007**	**5948**
High-income	559	650	720	581	791	622
Upper-middle Income	483	357	755	427	411	303
Lower -middle Income	**1495 (58%)**	**1700 (61%)**	**4821 (75%)**	**6151 (83%)**	**6660 (83%)**	**4863 (81%)**
Low-Income	32	57	146	209	145	160

Source: FDA 2011. (%) = share of total number of refused shipments.

Table 1 demonstrates that the vast majority of shipments detained without physical examination originate from lower-middle income countries[2]. While lower middle-income countries accounted for 50% to 56% of seafood exports (by value), their share of DWPEs has increased to above 80% since 2008. The primary country driving this trend is China, which accounted for less than 2.5% of DWPEs in 2000 and 55% by 2010 (Table 2). Much attention has been paid to safety

[2] Countries were classified in income groups in accordance with the World Bank"s Classification System by Income Group at http://econ.worldbank.org/.

and reliability of Chinese food (particularly seafood) exports, especially once it was discovered that Chinese fishmeal fed to farmed fish was contaminated with melamine, and when U.S. food inspectors found traces of illegal antibiotics in Chinese farm-raised catfish (Food and Water Watch, 2007).

Table 2: Detentions of Shipments Without Physical Examination Originating from China

	2000	2001	2007	2008	2009	2010
#	60	37	2567	4035	3261	2167
% of total	2.34	1.34	39.85	54.76	40.73	36.43

Overall, the implications of the FDA‟s Import Alert system are that import refusal reports are not an accurate depiction of seafood food safety compliance among trading countries. In fact, refusal reports appear to be the outcome of where the FDA concentrates its inspections. This issue and related complication have been previously raised by the GAO (2010) and other institutions.

Data

Two datasets are applied in this paper. The first includes information on annual bilateral trade flows of seafood exports from major countries of origin to the U.S broken down by product type over the period 2000 to 2010. The data was obtained from the U.S. Department of Agriculture's Foreign Agriculture Service (AFS) and BICO trade database (USDA 2011).

Data from U.S. FDA Import Refusal Reports (IRR) for the period of 2000-2010 were obtained directly from the FDA through a Freedom of Information Act (FOIA) data request. FDA records include information on the detention and/or refusal of individual shipments of seafood destined for the U.S. market. The data further provides information on the reasons for detention (refusal) following FDA IRR classifications together with the size (quantity in kg) and value of the affected product. Individual IRR records include a shipment’s country of origin, product description, FDA product code, charge or reason for detention, the value ($) and size (kg) of the affected

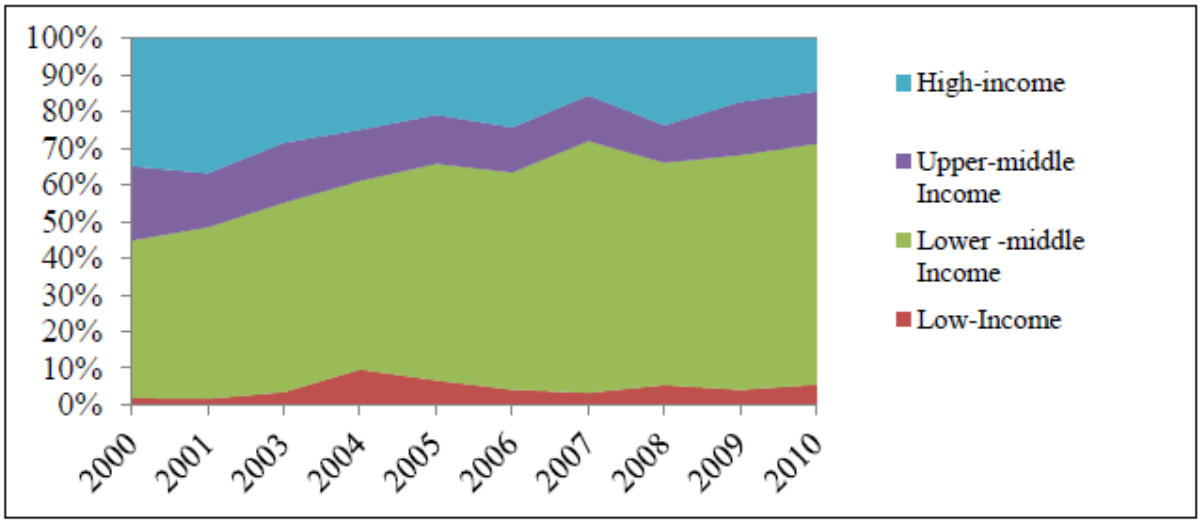
shipment, whether or not the shipment was detained with or without physical examiniation, and if the shipment was ultimately released or refused.

Product description information was categorized into the main seafood classes using the FDA's code builder, and one of seven most common seafood species: Shrimp, Tuna, Salmon, Lobster, Crab, Mahi Mahi, Catfish, and Tilapia. The classification of FDA code violations revealed two main reasons for detention: adulteration and misbranding. Detentions for reasons of adulteration refer to physically product deficiencies such as: filth, bacterial contaminations from Salmonella or Listeria, traces of unapproved veterinary drug residues, or other unsafe additives). Detentions for reasons of misbranding refer to incomplete or missing product labeling and/or shipment documentation. Individual shipments can be charged with multiple reasons for detention, leading to several observations in the FDA's IRR data.

Trends and Patterns in U.S. FDA Seafood Refusals

Between 2000 and 2010, lower-middle income countries have grown to become the largest exporters (by value) of seafood to the U.S. In 2000, lower-middle income countries accounted for 43% of all seafood exports to the U.S and 56% in 2010. The market share of all other income classes has been declining; most notably for upper-middle income economies. In the year 2000, Canada was the top exporter, followed by Thailand, China, Mexico and Chile. Since then, the annual value of seafood shipments from China have grown over 300%, making China the leading supplier of seafood to the U.S. market. Thailand, Indonesia, Vietnam and Ecuador are all among the largest exporters while Canada, Mexico and Chile have fallen behind and lost market share in the U.S. In 2010, among the top 25 seafood exporters, 9 were high-income countries, 7 upper-middle income countries, and 8 lower-middle income countries. Bangladesh was the only low-income seafood exporting country among the top 50 seafood exporters to the U.S. The above trends in U.S. market shares are also reflected in FDA border detentions of seafood shipments detentions and product refusals depicted in Figure 1.

Figure 1: Share of Total Number of Refused Shipments by Income Group, 2000-2010



Following their rise in exports to the U.S., low-middle income countries' share of FDA refusals has grown from 43% in 2000 to 64% in 2009. During the same time period, refusals of seafood originating from high-income and middle-income countries have declined substantially, from 35% to 17%. Low-income countries which account for less than1% of U.S. seafood imports (by value) were responsible for 5.5% all refusals in 2009.

Similar to the trend in which the concentration of U.S. seafood imports has narrowed to originate from a smaller number of countries, a smaller number of exporting countries is responsible for a greater proportion of total product refusals. Refusals from the three countries with the most violations in the year 2000 comprised of 26% of all refused shipments, but by 2009, the three top violating countries' share of refusals was 43% (see Table 3).

Table 3: Share of Total Refusals Made up by the Countries with the Most Refusals

	2000	2001	2003	2004	2005	2006	2007	2008	2009	2010
Top 3	26.58	28.95	28.22	34.81	33.79	42.97	50.68	45.72	41.41	43.11
Top 5	39.49	43.68	40.88	45.53	46.76	54.17	60.72	57.33	53.34	56.97

Ranking of Top 5 seafood exporters to the U.S. market: China, Vietnam, Indonesia, Thailand, Philippines.

In line with the development of aquaculture production systems around the world and the growth in the demand for popular tropical seafood species, the proportion of refusals across species

and production system has also changed. Refusals of seafood harvested from aquaculture systems have steadily grown from 1% in 2000 to roughly 11% in 2009. Shrimp products collectively from aquaculture and wild caught systems made up 21% of all refusals, although the proportion of refusals of wild caught shrimp and aquaculture shrimp of all refused shrimp shipments is now similar as aquaculture production has become more important. Shrimp is by far the largest category of seafood imports by value in the United States, and in 2009 accounted for 14% of all seafood border refusals. Meanwhile, in 2008 and 2009, Tuna was actually product with the most refusals; generating 22% and 17% of total refused shipments respectively. (Appendix, Table A).

Table 4: FDA code violations by exporter income class (% refused of detained shipments), 2000-2010

Income class		2000	2001	2003	2004	2005	2006	2007	2008	2009	2010
High	All refusals (#)	138	70	608	547	380	306	264	405	290	183
	Filthy/Insanitary	46.4	32.9	30.6	21.2	34.2	22.2	27.7	26.7	37.9	34.4
	Needs FCE	17.4	12.9	18.8	19.2	11.1	12.4	17.1	18.8	17.6	22.4
	No process	27.5	18.6	21.9	25.2	20.3	15	19.3	21.7	21.4	29
	Nutrition label.	15.2	20	7.4	4.4	12.9	6.2	10.2	17.5	12.8	13.7
	Salmonella	3.6	12.9	6.9	7	9	12.1	16.7	12.8	13.8	7.1
Upper-Middle	All refusals (#)	80	28	349	306	243	155	210	174	244	180
	Filthy/Insanitary	32.5	60.7	44.7	44.8	46.5	34.8	45.2	56.9	56.1	68.3
	No process	3.8	10.7	11.5	7.5	10.3	8.4	3.3	58	8.2	3.3
	Salmonella	35.0	7.1	17.5	33.7	27.6	23.9	13.8	28.2	20.9	15.00
Lower-Middle	All refusals (#)	170	89	1104	1129	1077	747	1165	1036	1075	830
	Filthy/Insanitary	69.4	66.3	47.6	58.7	46	38.7	47.	49.2	55.1	46.4
	Needs FCE	4.1	2.3	6.7	3.6	2.2	5.4	3.3	4	2.8	5.4
	No process	4.1	2.3	7.6	4.69	4.2	6.3	5	6.2	4.4	7.6
	Salmonella	36.5	43.8	37.1	38.2	39.7	27.7	21.7	22.8	24.5	32.2
	Vet drugs	0	0	7.3	5.4	6.1	13.9	16	12.7	10.2	7.6
Low	All refusals (#)	7	3	72	210	120	51	54	91	67	69
	Filthy/Insanitary	57.1	66.7	73.6	77.1	72.5	45.1	74.1	63.7	642	59.4
	Salmonella	0	33.3	19.4	76.2	41.7	41.2	13	69.2	50.8	56.5

In Table 4, patterns of the most frequent FDA code violations across country income classes are depicted as the percentage share of detained shipments that ultimately were refused entry into the U.S. market. In general, high-income seafood exporters accounted for a larger proportion of refusals for misbranding code charges. Common violations were lacking required documentation, such as

Food Canning Establishment Number (FCE) labeled “needs FCE”, inadequate process documentation coded as “no process” and false or incomplete mandatory “nutrition labeling”. Although code violations for “no process” and “needs FCE” are directly related to incomplete shipment documentation, the FDA classifies these charges as adulteration. This may ultimately lead to an overestimation of the significance and impact of adulteration as a food safety threat associated with imported seafood products.

Over the entire course of the data, code violations due to adulteration were the most common reason for the detention and/or refusal of seafood at a U.S. port of entry. Filth, insanitary conditions of shipments were found in over 50% of all shipments detained by the FDA, Shipments contaminated with Salmonella accounted for 23% of all FDA detentions. For all exporters but those from high-income countries FDA code violations for adulteration account for close to 90% of all detentions. Especially in the case of lower-middle income seafood exporters, which account for the largest market share in the U.S., FDA charges almost exclusively are based on Salmonella and generally insanitary product/shipment conditions.

Detention vs. Refusal

Growing public pressure on the FDA to strengthen its oversight and enforcement of U.S. food safety regulations has also included criticisms regarding its reliance on exporter supplied documentation and due process as a substitute for larger numbers of physical examinations of import shipments (Food and Water Watch, 2007)[3].

Among the FDA’s strategies to cope with the thousands of seafood shipments arriving in U.S ports every day is the Import Alert system, or “flagging”. Based on repeated FDA code violations over time, manufacturers, shippers or countries can be “flagged” which triggers the release of an

[3] Improvements have been made, most notably the opening of FDA offices in important countries of origin in an effort to improve point of origin inspections (GAO, 2010) following the example of other major seafood importers such as the E.U. and Japan (FAO, 2005).

Import Alert by the FDA notifying border staff that each affected shipment has to be detained without the need for physical examination (Buzby, 2010). The procedure of Import Alerts aimed at disseminating import information on violation trends and issues to FDA inspectors, triggers the intensified surveillance of particular products and/or country of origin and may in fact lead to several unintended consequences. Import Alerts, once published, may remain indefinitely potentially causing significant entry barriers to the U.S. market for those producers flagged. It is the responsibility of the exporters to provide additional documentation to prove a shipment's compliance with FDA code regulations, therefore, import alerts create an extra step and extra expense for those flagged producers, potentially even long after the initial import alert was issued.

Table 5: Seafood import detention, refusal and market share for selected exporting countries (%), 2000-2010

	Detained	Refused	Market share
China	34.86	11.87	15.56
Thailand	5.05	4.53	15.41
Indonesia	10.66	12.83	7.03
Vietnam	17.95	16.71	5.23
South Korea	3.90	3.34	0.74
All other	1.11	1.42	7.92
(Canada)	1.80	1.65	15.48
Total	**73.52**	**50.70**	**51.89**

* Aggregate totals are for the top 18 exporters to the U.S. market.

Table 5 highlights the divergence between market share and share of detainments that can at least, partially be attributed to the FDA's Import Alerts system. Across the top seafood exporting countries, percentage shares of detentions and refusals of shipments relative to a country's market share in the U.S. can be disproportional. Most upper-middle and high income countries (i.e. Canada) tend to account for smaller shares of detainments and refusals relative to their market share. In contrast, lower-middle income countries such as China, Vietnam and South Korea's shares of total detainments are much higher than their market share. China, the top seafood supplier to the U.S., had

a detainment rate three times the actual rate of shipment refusals; noticeable evidence that the FDA has taken actions to address reoccurring food safety issues associated with fishery and seafood imports from China (Food and Water Watch, 2007; Gale and Buzby, 2009). Table 5 seems to indicate a definite bias in arising from targeted food safety related border inspections towards seafood products originating from China. Even though, both Vietnam and Indonesia had higher refusals rates compared to China in 2009, their share of detainments were lower and both countries pose less than a third of China's market share in the U.S. Overall, these figures suggest that detainments of shipments from a particular country is not directly driven by how much that country exports, or their past violation history.

Patterns in the targeting of FDA border detentions were also evaluated using the data depicted in Table 6. Here, a comparison is made between the percentage of shipments ultimately refused after routine detentions; shipments detained based on a suspected violation of code rules usually after a brief physical examination, and the percentage of shipments refused after detentions without physical examination; detentions based on previous violations and existing Import Alerts for particular exporters.

It is to be expected that shipments detained after some kind of physical examination are more likely to be refused, as they have already exhibited some form of violative characteristic. Therefore, it is not surprising that the refusal rates for these shipments are often greater than 50%. Since there is no information available on the number of total shipments inspected, it is difficult to look for any signs of country-level targeting here.

However, the data for detentions without physical examination where all shipments were targeted, not only shows that there were always a disproportionately large number of shipments detained from lower-middle income countries as mentioned earlier in this paper, but also that the percentage of shipments refused from the lower-middle income country group is actually consistently lower than higher-middle and high-income country groups. In 2009 for example, shipments from

lower-middle income countries accounted for 83% of all shipments detained without physical examination. Only 5.3% of their shipments were refused but 15% of shipments detained from high-income countries were refused and 17.7% from upper-middle income countries were refused.

Table 6: Detentions and Detentions Without Physical Examination of Seafood Imports at U.S. Ports of Entry by Exporter Income Class, 2000-2010

	2000		2001		2007		2008		2009		2010	
Income class	#	%	#	%	#	%	#	%	#	%	#	%
Detained	**1003**	**25.42**	**1364**	**10.34**	**1857**	**51.05**	**1933**	**52.3**	**2051**	**54**	**1388**	**53.2**
High	436	25.5	516	10.7	455	33.2	584	46.8	443	38.8	249	50.6
Upper-middle	128	26.6	166	14.5	255	52.2	205	53.2	335	51	181	55.8
Lower-middle	416	24.8	669	8.8	1079	57.3	1094	54.2	1225	59.2	912	52.7
Low	23	30.4	13	23.1	68	67.7	50	70	48	81.3	46	67.4
Detained w/o Exam	**2569**	**5.5**	**2764**	**1.8**	**6442**	**11.6**	**7368**	**9.5**	**8007**	**7.1**	**5948**	**8.8**
High	559	4.8	650	2.3	720	15.7	581	22.7	791	14.9	622	9.2
Upper-middle	483	9.5	357	1.1	755	10.2	427	15.2	411	17.8	303	26.1
Lower-middle	1495	4.5	1700	1.8	4821	11.4	6151	7.20	6660	5.3	4863	7.2
Low	32	0	57	0	146	5.5	209	26.8	145	19.3	160	23.8

While the total number of refused shipments from lower-middle income countries still exceeds the actual number of refused shipments from the other income classes, this developing country group of seafood exporters receives a remarkable level of scrutiny. This data reveals that relative to higher-income country groups, more producers from lower-middle income countries whose shipments are not in fact violative, must face the expense and burden of detainments.

Overall, detentions of seafood products entering the U.S. grew by 104% between 2000 and 2009, while detentions without examination grew by 212%. For lower-middle income exporters detentions of shipments grew by 194% to 2009, while detentions without examination grew by 341%.

This finding, in conjunction with the above results seems to indicate a bias in the FDA's strategy towards food-safety border inspection to the detriment of lower-middle income countries. In summary, seafood exporters to the U.S. located in lower-middle income countries face significant barriers to trade from U.S. FDA food safety import regulations.

Conclusion

The FDA's approach to food safety regulation for seafood at U.S. ports of entry does not follow random selection based inspections but instead, a system of Import Alerts results in targeted inspections and mandatory "flagging" of repeat code violation. Our analysis of seafood detainments at the U.S. border finds evidence of increasing levels of shipment detentions without physical examinations targeted at predominantly lower-middle income seafood exporting countries which make up the majority of the U.S. seafood supply. Therefore, bias in the FDA's strategy towards food-safety border inspection seems to especially burden lower-middle income countries and as such create a barrier to trade for lower-middle income country seafood exporters to the U.S.

Despite the bias observed towards this income-group at the border, during the same time period, lower-middle income countries have been increasing their market share of seafood shipments to the U.S. The analysis in this paper reveals that both the increase in market share and the growth in refusals from the lower-middle income category have been generated by the same concentrated group of countries. In other words, the same countries experiencing the highest degree of targeting are also experiencing some of the highest growth levels in seafood exports to the U.S. Therefore, our findings appear to align with Henson and Jaffee (2008) that stricter standards will lead to differential performance outcomes within exporting countries, as individual producers react differently to new requirements. Given the aggregate national level of the FDA Import Refusal data records however, we cannot resolve the contradiction between high refusal rates and successful bilateral trade with the U.S. for countries within the lower-middle income group. If at all, the standards-as-catalyst hypothesis may apply at the firm level and not at the national level.

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Appendix

Table A: Refusals shares by seafood product category and species, 2000-2010

	2000	2001	2003	2004	2005	2006	2007	2008	2009	2010 (Jan - Sept)
AQUACULTURE HARVESTED FISHERY/SEAFOOD PRODUCTS	**1.52**	**5.79**	**10.83**	**15.05**	**16.70**	**9.37**	**11.93**	**11.90**	**10.68**	**11.57**
SHRIMP	1.01	5.26	9.99	14.46	14.89	7.78	9.98	9.09	7.76	6.89
Other	0.51	0.53	0.84	0.59	1.81	1.59	1.95	2.81	2.92	4.68
CRUSTACEAN	**27.85**	**21.58**	**19.78**	**23.86**	**22.86**	**18.19**	**18.02**	**15.94**	**19.93**	**16.72**
CRAB	3.54	4.21	5.67	9.26	5.66	3.97	6.14	7.97	7.88	5.86
LOBSTER	3.29	1.05	2.11	4.11	5.16	3.65	1.00	1.52	3.40	3.09
SHRIMP	20.25	15.79	11.49	10.13	11.37	9.93	10.69	5.86	6.03	7.21
Other	0.76	0.53	0.52	0.36	0.66	0.64	0.18	0.59	2.63	0.55
ENGINEERED SEAFOOD	**0.00**	**0.00**	**0.28**	**0.59**	**0.77**	**0.56**	**0.47**	**0.06**	**0.18**	**0.55**
FISH	**41.52**	**58.42**	**51.24**	**44.71**	**45.93**	**52.90**	**56.17**	**56.39**	**54.77**	**61.57**
MAHI MAHI	2.28	3.16	2.48	5.98	3.30	2.78	4.19	5.22	4.89	5.23
SWORDFISH	3.04	4.21	5.58	2.97	2.64	1.99	3.84	1.52	2.27	2.69
TUNA	7.09	7.89	10.36	6.98	9.18	8.82	13.76	22.68	16.83	24.56
Other	29.11	43.16	32.82	28.79	30.82	39.32	34.38	26.96	30.79	29.08
MIXED FISHERY PRODUCTS	**1.52**	**1.05**	**1.88**	**1.00**	**1.70**	**1.11**	**0.95**	**1.35**	**0.84**	**0.63**
OTHER AQUATIC SPECIES	**9.87**	**3.68**	**5.06**	**6.07**	**4.95**	**7.31**	**5.73**	**6.62**	**7.16**	**2.93**
OTHER FISHERY PRODUCT N.E.C	**9.11**	**3.68**	**5.30**	**5.38**	**3.85**	**4.92**	**4.78**	**5.22**	**4.89**	**4.60**
SHELLFISH	**8.61**	**5.79**	**5.63**	**3.33**	**3.24**	**5.64**	**1.95**	**2.52**	**1.55**	**1.43**

Source: FDA 2011.