The international platform of Ludwig-Maximilians University's Center for Economic Studies and the Ifo Institute

CESifo Working Papers
www.cesifo.org/wp

Hidden Protectionism? Evidence from Non-tariff Barriers to Trade in the United States

Robert Grundke
Christoph Moser

CESIFO WORKING PAPER NO. 5142
CATEGORY 8: TRADE POLICY
DECEMBER 2014

CESifo
Center for Economic Studies & Ifo Institute

CESifo *Working Paper No. 5142*

Hidden Protectionism? Evidence from Non-tariff Barriers to Trade in the United States

Abstract

Are product standards protectionism in disguise? This paper estimates the costs of non-compliance with U.S. product standards, using a new database on U.S. import refusals from 2002 to 2012. We find that import refusals significantly decrease exports to the United States. This trade reducing effect is driven by developing countries and by refusals without any product sample analysis, in particular during the Subprime Crisis and its aftermath. This empirical result is consistent with (but does not prove) the existence of counter-cyclical, hidden protectionism due to non-tariff barriers to trade in the United States.

JEL-Code: F130, F140, O240, F630.

Keywords: hidden protectionism, international trade, developing countries, import refusals, regulatory costs, disaggregated, United States.

Robert Grundke
Department of Economics
LMU Munich
Kaulbachstrasse 45
Germany – 80539 Munich
Robert.Grundke@econ.lmu.de

*Christoph Moser**
ETH Zurich
KOF Swiss Economic Institute
Weinbergstrasse 35
Switzerland – 8092 Zurich
moser@kof.ethz.ch

*corresponding author

December 18, 2014
For comments and suggestions, we thank Raquel Artecona and Fernando Flores from UN-ECLAC Washington Office, Peter Egger, Gabriel Felbermayr, Michael Lamla, Andrea Lassmann, Thierry Mayer, Ralph Ossa, Lars Riemer, Alexander Tarasov, Christoph Trebesch and Yoto Yotov as well as seminar participants at IO and Trade Seminar (LMU Munich) and the annual meetings of the Austrian Economic Association (NOeG), the Spring Meeting of Young Economists (SMYE) and the European Trade Study Group (ETSG).

1. Introduction

Non-tariff barriers to trade (NTBs) like product standards and technical regulations have increased in importance compared to tariffs that are at historical lows.[1] NTBs are characterized by two opposing trends. While some countries aim at harmonizing product standards to reap further gains from trade (e.g., trade talks between the United States and European Union), fear of protectionism has led to a close monitoring of NTBs worldwide during the Great Recession (e.g., Baldwin and Evenett, 2009).

Product standards are imposed to overcome market failures and protect the health and safety of domestic consumers. In the United States, the Food and Drug Administration (FDA) is responsible for ensuring the safety of domestic and foreign products. Those import shipments not complying with U.S. product standards are refused entry into the market by the FDA. In this study, we collect a new data set that combines disaggregated import data from the U.S. International Trade Commission (ITC) with import refusals from the FDA.

This paper provides estimates on the costs of non-compliance with U.S. product standards at different times of the business cycle. We show that the trade costs associated with non-compliance with U.S. product standards are substantial for poorer countries. While there is a negative impact of import refusals on imports to the United States for non-OECD countries, OECD countries are largely unaffected. Our estimates imply that a one standard deviation increase in refusals reduces short- and long-run exports from an average developing country by USD 6 to 11 billion. We gain further insights by examining the type of inspection that underlies a given import refusal. It turns out that the trade reducing effect is mainly triggered by refusals without any product sample analysis and the implied trade costs quadruple during the Subprime Crisis and its aftermath. We conclude that these results for the United States are consistent with (but do not prove) the hypothesis that product standards are counter-cyclical protectionism in disguise.

We estimate a bilateral gravity model for 93 imported product-groups to the United States for the years 2002 to 2012. We proceed in three steps by reporting OLS estimates, standard fixed effect estimates and, then, dynamic panel estimates. The last and preferred specification does not only allow us to control for past import flows and use lagged import

[1] Similarly, Baldwin's famous quote says that "[t]he lowering of tariffs has, in effect, been like draining a swamp. The lower water level has revealed all the snags and stumps of non-tariff barriers that still have to be cleared away." (Baldwin, 1970, quoted in Baldwin, 2000).

refusals as internal instruments for our non-compliance measure (as suggested by Essaji, 2008), but we can also extend the framework to include additional, external instruments drawn from the EU - Rapid Alert System for Food and Feed (RASFF) database. Since EU refusals and notifications are plausibly exogenous to U.S. import demand, but likely to be correlated with U.S. refusals, they constitute a valid instrument.

Why are thousands of shipments blocked from entering the U.S. market each year? The FDA names two main reasons for import refusals: adulteration and misbranding. Recent reports on blocked U.S. imports of toys containing lead fall in the first category with products being inferior and entailing substantial health risks.[2] But adulteration can also simply stem from differing product standards between trading countries. Second, a product might be denied entry into the United States due to misbranding, i.e., U.S. labelling standards are not met or necessary certificates for conformity assessment are not provided by the exporter.

The FDA might be also subject to lobbying and political pressures.[3] In one of its most controversial moves, the FDA issued an outright ban of all grapes from Chile in March 1989 due to a non-lethal contamination of two grapes with cyanide (Engel, 1999; Hawthorne, 2005). It remains unclear to date, whether the FDA simply overreacted or the U.S. government aimed for a weakening of the Pinochet regime. Similar to technical regulations (see Trefler, 1993 and Essaji, 2008), stricter product standards and border inspections may be imposed for protectionist motives in the United States. Lamb (2006) provides anecdotal evidence that political pressure from U.S. avocado producer associations has been driving the boycott of Mexican Hass avocados until 1997. More recently, U.S. catfish producers have lobbied for more frequent inspections of catfish imports to protect their industry.[4,5] According to Watson and James (2013) regulatory protectionism exists in the United States and Baldwin (2000) is especially concerned about its effect on developing countries.

---

[2] Decker, Brett and William Triplett "China's Poisonous Exports: PRC Products Aren't just Cheap, They're Dangerous," The Washington Times, November 16th, 2011.

[3] After all, the FDA is a government agency, its commissioner a political appointee and the revolving door also spins at the FDA. For the U.S. Department of Defense, Luechinger and Moser (2014) show that conflicts of interest can arise due to the revolving door. The Government Accountability Office indeed acknowledges a staff turnover rate at the FDA above the federal government average in 2002 (cited in Hawthorne, 2005, p. 30).

[4] Nixon, Ron, "Number of Catfish Inspectors Drives a Debate on Spending," The New York Times, July 26th, 2013.

[5] Jouanjean (2012) provides evidence that U.S. producer associations influence U.S. market access regulation for imports of fresh fruits and vegetables. As exemplified for Russia, product standards and stricter inspections at the border might be even used for foreign policy purposes. See Kramer, Andrew, "Chocolate Factory, Trade War Victim," The New York Times, October 29th, 2013; Herszenhorn, David, "Russia Putting a Strong Arm on Neighbors," The New York Times, October 22th, 2013.

Graph 1 sheds some first light on the enforcement of U.S. product standards. This figure shows that the total number of shipments inspected by the FDA increased hand in hand with the unemployment rate due to the Subprime Crisis from less than 140,000 in 2008 to close to 280,000 in 2011. These FDA-inspections include inspections with and without a product sample analysis. Even more striking, incidences of non-compliance with U.S. product standards rose sharply in the aftermath of the crisis, with import refusals without any product sample analysis being the main driver. Our regression analyses will further deal with this type of inspection that is arguably most prone to potential hidden protectionism.

Our paper contributes to the existing literature in several ways. First, we contribute to the recent empirical literature on protectionism (see Rose, 2013; Bown and Crowley, 2013; Kee et al., 2013) by highlighting another channel through which governments might temporarily seek import protection: a stricter enforcement of product standards. Most importantly, we are to the best of our knowledge the first to link the effect of import refusals to the business cycle and to consider the type of inspection leading to import refusals. Second, we add to the trade and development literature by quantifying the short- and long-run trade costs due to non-compliance with U.S. product standards. Most alternative measures of product standards, e.g., notifications to the WTO, are based on technical regulations that are most favoured nation (MFN) measures without variation across exporters. In contrast, our measure substantially varies across countries, product-groups and time. This allows us to factor in that any potential import protection is trading partner- and product-specific and to control for country-product-specific factors that are often omitted in other studies. Third, we contribute to the literature on import refusals by demonstrating how important it is to account for the endogenous nature of refusals.[6] Thereby, endogeneity can arise due to import protection or risk-guided inspections. Product-groups with increasing imports are more closely monitored and inspected by the FDA.

The remainder of the paper is organized as follows. Sections 2 and 3 discuss the related literature, the institutional background of the U.S. Food and Drug Administration (FDA) and some descriptive statistics for the new import refusal database. Section 4 provides a description of our data set and an outline of the empirical strategy. Section 5 presents the empirical results and Section 6 offers concluding remarks.

[6] In contrast to other studies, we quantify the impact of import refusals not only for food products, but also for pharmaceuticals, cosmetics and manufacturing products. This is a smaller contribution to the literature.

2. Related Literature

Our paper is related to the literature on endogenous protectionism, the theory on product standards and the effect of non-tariff barriers to trade, in particular for developing countries.

In a seminal paper, Trefler (1993) argues that the level of trade protection is not exogenous but increasing in import competition and domestic lobbying efforts. Similarly, the paper closest to our study is Essaji (2008) who analyzes the effects of technical regulations for a cross-section of sectoral trade flows to the United States. To address potential endogeneity of technical measures, Essaji (2008) instruments U.S. technical regulations with such regulations of countries with similar regulatory processes, but different import patterns. Both important contributions clearly show that the effects of protectionism are economically large, once endogeneity is taken into account.

Several recent empirical papers investigate whether countries fall back into protectionism in bad economic times. The empirical evidence on this issue is mixed. While Rose (2013) argues forcefully that protectionism – as measured by a broad set of tariff and non-tariff barriers – has neither been counter-cycle in the United States nor worldwide after World War II, Bown and Crowley (2013) and Kee et al. (2013) offer a more nuanced picture. Kee et al. (2013) conclude that only few countries have markedly increased their tariffs from 2008 to 2009, but the relatively modest U.S. trade policy reaction has been an NTB, namely antidumping.[7] Bown and Crowley (2013) investigate the relationship between the business cycle and another NTB for five OECD countries. The most relevant result for our paper: Bown and Crowley (2013) provide evidence that the number of disaggregated product groups affected by temporary trade barriers increases with negative macroeconomic shocks in the United States. In particular, the domestic unemployment rate proves to be an important determinant of this NTB before and after the onset of the Subprime Crisis.

The theoretical literature mainly views product standards as protectionist, since minimum quality standards increase the compliance costs for foreign firms relative to domestic ones. Fischer and Serra (2000) argue that standards chosen by a domestic social planner are always protectionist. In a similar framework, Marette and Beghin (2010) show that domestic standards are not necessarily protectionist, if domestic and foreign producers

[7] In another study, based on the Global Trade Alert (GTA), Boffa and Olarreaga (2012) conclude that countries have not retaliated during the Great Recession.

differ in meeting these costs. However, this only holds for foreign producers being more efficient, an unlikely assumption for developing countries exporting to the United States. Essaji (2010) is interested in the interplay between trade liberalization and the use of product standards. Sturm (2006) offers a political economy model, where uncertainty about the optimal safety level might open the door for hidden domestic transfers.

Our paper is obviously also related to and builds on the empirical literature on product standards.[8] Moenius (2004) provides an important early account on the effects of standards on trade between OECD countries at the industry-level. Several studies exploit the number of notifications of newly imposed product standards by importing countries under WTO's Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) agreements or counter-notifications under the SPS for a cross-section or panel of trade flows (see Disdier et al., 2008; Crivelli and Gröschl, 2012; Fontagne et al., 2013). Crivelli and Gröschl (2012) find for a disaggregated gravity model for agricultural and food products that SPS measures decrease the probability of market entry, but positively influence the intensive margin of exporters. For a rich panel data set of French exporting firms, Fontagne et al. (2013) show that restrictive SPS measures in the importing country negatively affect the extensive margin of firms and, in contrast to Crivelli and Gröschl (2012), also the intensive margin of trade.

3. Background

3.1. The U.S. Food and Drug Administration (FDA)

The U.S. Food and Drug Administration (FDA) is located within the U.S. Department of Health and Human Services.[9] The FDA is responsible for enforcing the Federal Food, Drug, and Cosmetic (FD&C) Act of 1938 and other laws designed to protect consumer health. The following product categories fall under FDA jurisdiction: food, drugs, cosmetics, medical devices, electronic items that emit radiation, vaccines, blood and biologics, animal feed and veterinary, and tobacco products. To ensure that products from these categories comply

[8] We focus here on the most closely related papers. Other studies differ in their measurement of product standards, the sectors and time covered as well as their approach to the endogeneity issue. The earlier literature focuses on one particular standard in a given product-group (see for instance Otsuki et al., 2001, on African groundnut exports to Europe; Anders and Caswell, 2009, on U.S. seafood imports; Maertens and Swinnen, 2009, on vegetable exports from Senegal; Baylis et al., 2010, on seafood exports to the EU).

[9] For an excellent overview of the FDA, see for instance Buzby et al. (2008), Josling et al. (2004), Hawthorne (2005) and Liu (2010).

with U.S. product standards, the FDA has the authority to inspect domestically produced and imported products and eventually refuse entry into U.S. markets. An inspected domestic product is refused entry if it violates U.S. product standards. However, an imported product can already be refused entry "if it [only] appears to violate" a certain U.S. product standard (Buzby et al., 2008; Liu, 2010). This formulation in Section 801(a) of the Federal Food, Drug, and Cosmetic (FD&C) Act leaves room for discriminatory action of FDA officials with respect to imports.[10] The FDA separates violations into two main categories: adulteration and misbranding. According to the FD&C Act, adulteration means that due to the addition of a substance a product is inferior, impure and not genuine. Most violations for adulteration deal with safety, packaging integrity or sanitation, but differing product standards between trading partners might also be the cause.[11] Besides adulteration, a product might also be denied entry in the United States due to misbranding. Misbranding includes untruthful or misleading statements on product labels or products missing appropriate labeling or packaging (Buzby et al., 2008). This category also comprises products that were rejected by the FDA due to the lack of necessary certificates for conformity assessment.

According to the FD&C Act, every importer of an FDA-regulated product has to file an entry notice with U.S. Customs and Border Protection (CBP), which then notifies the FDA of the entry. The import requests are collected and processed by the computer-based system "Operational and Administrative System for Import Support (OASIS)". The FDA uses OASIS to review the entry documents and to make admissibility decisions. If the FDA does not wish to inspect the entry, the product will proceed into U.S. commerce. If the FDA decides to examine the entry, the importer will not be allowed to further distribute the shipment until the result of the inspection is received. Two types of inspections exist: field exams and sample analysis involving a laboratory test of product samples. The overwhelming majority of inspections are field exams at the ports of entry, whereby FDA inspection officers mainly use organoleptic testing (e.g., appearance and smell) to decide whether a product complies with U.S. product standards.[12] If the product appears to violate these standards, the

[10] Imported products can be refused without any physical evidence, e.g. just on the basis of bad reputation due to past events of non-compliance at the firm or country-product level (see for instance Jouanjean et al., 2012).
[11] Non-food products can also be refused due to adulteration, i.e., if product-specific regulations are not met.
[12] Barrionuevo, Alexei "Food Imports Often Escape Scrutiny," The New York Times, May 1st, 2007.

importer will be given the opportunity to submit a petition to recondition the product into compliance (Buzby et al., 2008; Liu, 2010; FDA, 2011a).[13]

Based on OASIS, the FDA collects information on all ultimately refused shipments in the Import Refusals Report (IRR). The IRR database is available from the beginning of 2002 onwards and includes the exact date of the refusal, name, address and country of origin of the exporting firm, an FDA-specific product code and the product description, port of entry, reason for the refusal and the type of inspection. The database does not include information on the quantity, weight or value of refused shipments, but it is the best source of information on import refusals due to non-compliance with U.S. product standards.

It is important to bear in mind that the FDA´s decision to inspect an entry is not random. The FDA is only able to inspect about 1% of all imported products under its jurisdiction (Buzby et al., 2008; FDA, 2010). To economize its resources for inspections, the FDA employs risk-based criteria to guide its inspections. Using the OASIS database and past import refusals, the FDA identifies exporting countries, product-groups, products or certain firms that have a higher risk of violating U.S. product standards. To react to urgent risks, the FDA additionally issues import alerts that place a product from a certain country or a particular firm on detention without physical examination. Thus, subsequent shipments from this company or country-product-group will be refused automatically, unless the importer can present evidence to overcome this violation.[14] The FDA may also use external information to identify risk products such as the information from the EU-RASFF authorities (Jouanjean et al., 2012). Import surges in a given country-product-group can also trigger more inspections, since any non-compliance represents a higher risk for U.S. citizens. Another reason for an increase in inspections of country-product-groups with higher imports may be protectionism (Trefler, 1993; Essaji, 2008; Baylis et al., 2009).

The United States is an important export market for many countries and about 20% of the overall U.S. imports fall under the jurisdiction of the FDA.[15] 25 cents of every dollar spent on commodities by U.S. consumers are for products regulated by the FDA (FDA,

[13] Many law firms in the U.S. are specialized on contesting FDA decision of detentions and refusals (e.g., FDAimports.com, LLC: http://www.fdaimports.com/). The services of these law firms are expensive and it is hard(er) for exporters from developing countries to cover such legal costs.

[14] It can be quite costly, in particular for exporters from developing countries, to obtain the necessary documents for conformity assessment from accepted certification bodies (Jaffee and Henson, 2005).

[15] The FDA estimates this share to be over 10%, but only considers food, drugs and cosmetics (FDA, 2011b). Hence, our estimate of around 20% in the year 2011 also includes medical devices, electronic items emitting radiation, animal feed and animal drugs and biologics under the jurisdiction of the FDA.

2011b). A growing share of these products comes from developing countries.[16] In 2010, 15% of food products, 28% of drugs and 52% of medical devices sold in the U.S. markets were imported. Import lines of FDA regulated products have grown from 6 million in 2001 to 24 million in 2011, corresponding to a 15% annual increase (FDA, 2011b). Note that the resources dedicated to the FDA and the funding provided for FDA officers in the field (who are responsible for product inspections) vary over time. In the aftermath of the September 11 terrorist attacks in 2001 and the Subprime crisis in 2008, the U.S. Congress granted more authority and additional resources to the FDA. The majority of the FDA investigators are assigned to inspect domestic products and facilities.[17] It is difficult to identify the number of FDA officers assigned to the border from official documents.

3.2. Descriptive Statistics on U.S. Imports and Import Refusals

Graph 2 shows total U.S. imports in FDA regulated products and the total number of refused shipments (total refusals) for the years 2002 to 2012. Except for the Great Recession, U.S. imports have been steadily increasing and the overall volume of imports in FDA regulated products more than doubled during the sample period.[18] In contrast to imports, import refusals exhibit more variation over time. Graphs 3 and 4 allow for a comparison between OECD and non-OECD countries. There are two main takeaways. First, both country groups share a similar growth pattern in imports, but non-OECD countries account for on average USD 250 billion or about twice the overall import volume of OECD-countries. Second, while both groups had to face an increase in import refusals after the Subprime crisis, this increase is more pronounced for poorer countries and starts from a higher level of total refusals (around 10,000 vs. 4,000 refusals in the year 2009). Furthermore, non-OECD countries are responsible for the noticeable spike in import refusals in 2004/2005.

To shed more light on the distribution of U.S. import refusals across product-groups, Table A1 in the Appendix shows import refusals at a more disaggregated product level. Food

[16] Emerging markets like China, India and Mexico have increased their exports in FDA regulated products to the U.S. significantly in the last years. Drugs, medical devices and electronic items emitting radiation are the product categories that have experienced the strongest rise in imports from developing countries (FDA, 2011b).

[17] Racino, Brad (2011), "Inspectors Struggle to Keep Up with Flood of Imports," News 21 (http://foodsafety.news21.com/2011/imports/border/; download on October 29th, 2014).

[18] Note that the shares for five aggregated product-groups have been quite stable over time (see Online Appendix 1), i.e., the growth in imports is fairly spread over different sectors. Furthermore, the non-food product-groups pharmaceuticals, cosmetics and other manufacturing goods combine for about 75% of total imports in FDA regulated products and are responsible for an increase in total import refusals during the sample period (see Online Appendix 2).

products play a prominent role among those products most often refused during the sample period. Fish products, fruits and vegetables, sugar confectionary, bread and pastry as well as sauces, mixed dressings and condiments are among the top ten most refused product-groups. However, the two product categories with most import refusals are other drugs and medical devices. Table A2 in the Appendix includes the ten most frequent reasons for import refusals from 2002 until 2011, showing that import refusals due to adulteration are less frequent than refusals due to misbranding or missing certifications.

To emphasize the importance of FDA regulated products for countries exporting to the U.S., we compute the share of FDA regulated products in total exports to the U.S. for 2012. For most countries, FDA regulated products comprise more than 20% of total exports to the United States, whereby for some developed and developing countries like Ireland or Denmark and Ghana or Thailand this share rises above 50%. Tables A3 and A4 provide further descriptive statistics on OECD and non-OECD countries.

4. Data and Empirical Strategy

4.1. Data

This paper is based on a newly collected data set. We carefully gather detailed information from two main data sources. Since the FDA uses its own unique product classification system, the main challenge has been to combine the FDA's Import Refusals Report (IRR) database with disaggregated international trade data (c.i.f.) as provided by the U.S. International Trade Commission (ITC). The raw data provided by the FDA reports incidences of import refusals at the firm- and product-level. We aggregate import refusals to the most fine-grained product-group for which a consistent match between the FDA and the Harmonized System (HS) classification is possible. Our guiding principle for this careful matching procedure has been that any FDA product code uniquely falls into the assigned HS product categories. We have succeeded in matching all FDA regulated products to the corresponding HS categories. The exact mapping for our 93 food and non-food product-groups is documented in the table of Online Appendix 3.[19]

[19] In principle, we match FDA product codes to HS 4 digit codes and preserve as much detailed information as possible. For some matched groups, we have to use additional HS 5 or HS 6 digit information. We have succeeded in creating 93 matched product-groups. Note that for medical devices and radiation emitting

Our panel data set starts with the first year for which the IRR data is available, covering on a yearly basis all country-product-groups with at least one notified refusal during the sample period 2002 to 2012. For an important extension of our baseline regression model, we draw on an additional data source. We use EU notification data from the Rapid Alert System for Food and Feed (RASFF) database to instrument for U.S. refusals.[20] The RASFF database uses yet another own production classification system and covers only food products and animal feed. After another careful match, this leaves us with 17 aggregated product-groups that consistently combine our 78 food and animal feed product-groups with 35 broad product-groups by the RASFF. The exact mapping is presented in the table of Online Appendix 4.

4.2. Empirical Strategy

We proceed in three steps. We start with OLS and standard fixed effects estimates. Then, we follow Arellano and Bond (1991) and estimate a dynamic panel model, where variations within the country-product-group are used for identification. The Arellano-Bond estimator is a natural choice against the background of large N and small T, a dynamic data generating process and concerns about potential endogeneity. Our bilateral gravity model for disaggregated import flows to the United States covers up to 93 product-groups per country for the years 2002 to 2012, with 166 exporting countries entering our baseline regression. We estimate the following reduced form model:

$$\ln Imp_{i,k,t} = \sum_{s=1}^{S}\left(\alpha_s \ln Imp_{i,k,t-s}\right) + \beta\, Refusals_{i,k,t-1} + \mu_t + \gamma_{i,k} + u_{i,k,t}, \qquad (1)$$

whereby the dependent variable measures the real value of imports (in logarithm) from country *i*'s product-group *k* at time *t* to the United States. We control in all our main specifications for time fixed effects (μ_t) and for country-product-group fixed effects ($\gamma_{i,k}$).

Our coefficient of main interest is β, which captures the effect of import refusals on sectoral trade flows to the United States. Following the literature, we employ two different measures for import refusals in our empirical analysis. First, we use a dummy variable which

products, the constructed product-groups may include more HS products than necessary for matching, because it was not possible to isolate FDA regulated products at the HS 6 digit or even at the HS 10 digit classification.

[20] We use all the information available in the RASFF notification database (i.e., import refusals and information on detentions, import alerts and firms own inspections) to construct our instrument, since all these types of information are relevant for inspection authorities at the U.S. FDA (Jouanjean et al., 2012).

takes the value of one, if in a given product-group *k* from country *i* at least one incidence of a refusal has been recorded at time *t.* Second, we use the log(1+refusals) in order to account for the intensity of import refusals, i.e., the total number of refusals in such a country-product-group in time *t*. The refusal indicator enters equation (1) with a lag for two main reasons. First, export contracts tend to be signed a few months in advance and cannot be cancelled short-term. Second, we measure imports to the United States as the import value (c.i.f.), i.e., cost, insurance and freight implies among other things that export shipments to the U.S. that have been refused by the FDA still enter the import statistics in a given year.

Note that the time fixed effects capture time-varying characteristics of the importing country, global macroeconomic conditions and factors affecting trade costs for all exporting countries to the United States alike. This time fixed effect also absorbs any changes in FDA inspection capacity in the United States. Furthermore, the country-product-group fixed effects control for the time average of the multilateral resistance terms at the country-product-group level and time invariant country-product-group characteristics, like trade costs or production levels. Since the country-fixed effects are a linear combination of these country-product-group specific effects, we are not able to either include country dummies or distance to the United States (a classical gravity variable) separately in the regression.[21]

The Arellano-Bond GMM estimator allows for using internal and external instruments. On the one hand, we instrument endogenous refusals with lagged refusals as internal instruments. Essaji (2008) argues that in a panel data setting lagged values of technical regulations in the U.S. represent plausible instruments for these regulations. In our context, this strategy is even more sensible, since FDA inspections are inter alia guided by past incidences of refusals. To foresee two important specification tests of our dynamic panel estimates, the null hypothesis of the validity of the overidentifying restrictions of the Sargan and Hansen tests will indeed never be rejected. On the other hand, in an important extension, we additionally incorporate EU notifications from the RASFF database as external instruments. We generate our variables for non-compliance with EU product standards analogously to the U.S. ones.

[21] Note that we will report below robustness checks including further fixed effects controlling for time-varying country dummies (multilateral resistance term) and time-varying aggregated sector dummies.

EU notifications constitute a valid instrument for U.S. import refusals, since U.S. FDA agents are reported to also use external information to identify high-risk products to guide their inspections. It is reassuring for our empirical strategy that Baylis et al. (2009) show that EU import refusals are indeed one important determinant of U.S. import refusals. Furthermore, EU notifications in a certain exporting country-product-group should not be correlated with U.S. import demand in the same country-product-group. EU notifications are collected from individual EU member states with heterogeneous import demand structures. More generally, the United States and the European Union are quite different with respect to their overall openness to trade, their major trading partners and their import demand structure. Hence, EU refusals and notifications are plausibly exogenous to U.S. import demand and constitute a valid instrument in our context.

5. Empirical Results

5.1. Baseline Results

We now turn to our main results. Tables 1 and 2 present the estimates for a number of baseline regressions. In Table 1, we use the dummy refusal and in Table 2 the refusal intensity log(1+refusals) as our measures for non-compliance with U.S. product standards.

[Table 1 about here]

In both tables, we benchmark our preferred dynamic panel model in Column (4) with pooled OLS and simple fixed effects estimates in Columns (1) and (2), respectively. Compared to Column (4), Column (3) takes the allegedly wrong assumption of refusals being exogenous. Our preferred specification in Column (4) is based on the two-step Arellano-Bond estimator with the dependent variable entering with its first and second lag. These lagged dependent variables are instrumented with their first through third lags. Furthermore, for our refusal indicator variable, we also use its first through third lag as internal instruments. To avoid weak instrument problems, we reduce the number of instruments by collapsing the instrument matrix (Roodman, 2009). All our main results are robust to the exact lag length of our instruments (as shown in the Online Appendix 5 and 6).

[Table 2 about here]

There are two main findings from Tables 1 and 2. First, the disaggregated U.S. import flows exhibit substantial persistence over time. Our estimates show that the first and the second lag of the dependent variable enter our regression significantly. This corroborates our decision to use a dynamic panel estimator. Furthermore, the null hypothesis of the validity of the overidentifying restrictions is rejected neither for the Sargan- nor the Hansen-test in any main regression, indicating that our preferred specification is well-specified.

Second, import refusals are indeed endogenous to import flows. When we control for lagged import flows and country-product-group fixed effects using the Arellano-Bond estimator in Column (3), the positive and significant impact of refusals on import flows of the simple OLS in Column (1) disappears. Once we additionally instrument our import refusals indicator with lagged refusals, the point coefficients become negative and significantly different from zero at the 5% level (see Column (4) of Table 1 and 2). These results demonstrate that the endogeneity of trade barriers leads to a strong upward bias in the estimated coefficient and an underestimation of trade costs, if the empirical strategy does not address these endogeneity issues. Trefler (1993) finds that accounting for endogeneity of non-tariff barriers to trade (NTBs), the estimated negative impact of NTBs on U.S. imports is ten times larger than in estimations not addressing the endogeneity issue. Similar to our paper, Essaji (2008) shows that the effects of U.S. technical regulations on U.S. imports are significantly negative when accounting for endogeneity of technical regulations to import flows. In the case of not addressing the endogeneity issues, he reports positive effects of technical regulations on imports.

5.2. Developing vs. Developed Countries

In this section, we go beyond the overall impact of import refusals and present a more nuanced picture by distinguishing between different product-groups, types of refusals and - in particular - country groups.

We report our preferred specification of Table 2, Column (4), in the first column of Table 3 for comparability. We refer to this estimation as our baseline estimation. Column (2) allows the slope coefficient for import refusals to vary by product-group. We distinguish between food-products and non-food products. The point coefficients for both product-groups are negative, but (due to the large standard error for non-food products) only the coefficient for food-products is significantly different from zero.

[Table 3 about here]

We continue with an important part of our analysis. In Columns (3) and (4) of Table 3, we investigate, whether there is a differential effect of import refusals between developed and developing countries for food and non-food products. Thereby, we distinguish between OECD and non-OECD countries. While the first group of countries includes all industrialized countries with a very high standard of living, the second group encompasses developing and emerging markets with on average a lower GDP per capita.[22] Note that we apply the same specification as in Column (2) once to OECD countries and once to non-OECD countries in Columns (3) and (4), respectively. This sample split reveals that the negative impact of refusals on imports is driven by poorer countries. Similarly to the baseline, the point coefficients for food and non-food products are negative for non-OECD countries and in the same ballpark, but only the former coefficient is also significantly different from zero.

Furthermore, we offer results for the type of refusals in Table 4. We group refusals according to the type of non-compliance into refusals due to adulteration and refusals due to misbranding and allow the slope coefficient for refusals to vary by refusal type. For all countries, both point coefficients are negative and not significant. For non-OECD countries, we find negative point coefficients of roughly similar size, with the coefficient on adulteration being significant at the 5% level.

[Table 4 about here]

[22] Note that we employ the "classical" definition of OECD countries from the beginning of the 1990s (before emerging markets like Mexico and Chile joined), since it provides a sharper distinction between rich and poor countries. None of our main results hinges on the exact definition.

5.3. Is there Evidence for Protectionism?

To recap our empirical results thus far: We find that import refusals negatively affect disaggregated trade flows to the United States, in particular for non-OECD countries. But our empirical analyses have not offered any indication for hidden protectionism yet.

We will argue in this section that the type of inspection can shed some light on hidden protectionism. Remember that an imported product can be refused entry, if it simply "appears to violate" U.S. product standards. Hence, there is considerable leeway for the FDA to enforce these standards, opening the door for less honorable motives than pure health or product quality concerns. It is reasonable to assume that this leeway is most pronounced, if a refusal is not based on any laboratory tests but solely on the judgment of an FDA officer. We will proceed in two steps in this section. First, we will distinguish between refusals with and without any product sample analysis. Second, we are interested in examining to what extent the negative trade effect of the inspection type varies over time.

Table 5 presents the results for different types of inspection that lead to import refusals. The results in Column (2) indicate that those refusals that are not based on any product sample analysis are driving the negative effect of (the total number of) refusals on imports for the overall sample. Even worse, when comparing the results in Column (3) and (4), it becomes evident that non-OECD countries suffer from this discretionary room for refusal decisions. To be clear, many of these refusal decisions might be well-grounded, for instance if a product is obviously rotten. But the room for discriminatory action is considerable in this category and it is worrisome that developing countries are suffering from these potentially arbitrary refusals.[23] It is exactly this type of non-tariff barrier to trade that might fly under the radar, since it is hard to identify and measure.

[Table 5 about here]

[23] Various cases of discriminatory action of U.S. authorities against imports from developing countries are documented in the literature. For instance, U.S. authorities have banned Mexican Hass Avocados from entering the U.S. market for 79 years due to pest concerns, though officials from the U.S. Department of Agriculture have repeatedly certified Mexican growing areas as pest free during that time period (Lamb, 2006).

Finally, we show in Table 6 how the results for both types of inspection for OECD and non-OECD countries vary over time. For comparability, Columns (1) and (4) report the baseline results for both country groups for refusals based on product sample analyses and refusals without such analyses. More importantly, we provide in Columns (2) and (3) as well as (5) and (6) a sample split along the time dimension, whereby the first period from 2005 to 2009 presents the first sample where all endogenous variables can be instrumented. The second period from 2008 to 2012 encompasses the Subprime Crisis and its aftermath in the United States.[24] Hence, both sample periods are directly comparable in sample size but differ in a crucial dimension. The average unemployment rate in the United States rose from 5.87 to 8.34%.

[Table 6 about here]

The results of Table 6 are striking. Non-OECD countries generally suffer from import refusals without any product sample analysis and they suffer all the more when unemployment rates in the U.S. are at historical highs. In stark contrast, import refusals do not have any statistically significant impact on export flows for OECD countries to the United States during any time period. In addition, Graph 5 offers another interesting insight. The share of FDA-inspections based on a product sample analysis (out of all FDA-inspections with and without product sample analysis) has decreased over the last few years, even though the total FDA budget for field activities (i.e., product inspections) and the number of FDA-officers in the field have increased. In our view, the regression results are consistent with (but do not prove) the hypothesis that non-compliance with U.S. product standards is hidden protectionism in disguise at the cost of poor countries.

5.4. The Costs of Non-Compliance with U.S. Product Standards

The size of the negative effects of U.S. import refusals on U.S. imports is substantial. An increase of the refusal intensity by 10% reduces U.S. imports in a certain country-product-

[24] While we feel that these two subsamples are best suited for such a comparison due to sample size and efficiency reasons, the results on the type of inspection hold more generally for 5-year rolling windows for OECD and non-OECD countries (see Online Appendix Tables 7 and 8).

group by 3.2% (see Table 2, Column 4).[25] Trefler (1993) and Essaji (2008) also report large economic effects of U.S. non-tariff barriers to trade. For instance, Trefler (1993) found that NTBs in the manufacturing sector reduced manufacturing imports to the United States by 24% in 1983.

In our paper, the negative trade effects of import refusals are confined to emerging and developing countries. It seems intuitive that it is more difficult for poorer countries to comply with product standards in the United States. At the same time, it is important to note that our empirical exercise allows us to quantify the costs of non-compliance with U.S. product standards for poorer countries in the short- and long-term. An increase in the number of refusals by one standard deviation decreases imports to the United States from non-OECD countries by about real USD 385 million (in 2005 terms) per country and product-group (based on Column (4) of Table A5, which presents the preferred specification of Table 2 for non-OECD countries). Since for non-OECD countries on average about 15 product-groups underlie the identification of this effect, the short-run costs of non-compliance amount to around USD 6 billion per exporting country. Turning to the long-run effects, we find that developing countries lose over USD 11 billion in export flows to the United States.

Our empirical results confirm and qualify that product standards represent a challenge in particular to developing countries (Essaji, 2008). The fixed costs to enter a foreign market are higher for producers in developing countries and their production costs are more sensitive to a tightening of product standards.[26,27] Poorer countries often lack the public infrastructure, investment sources and human capital to meet the product standards and conformity assessment requirements of a developed importing country. Hence, product standards negatively affect import flows especially for developing countries (Henson and Loader, 2001; Disdier et al., 2008; Essaji, 2008).[28]

[25] Note that an alternative measure for the intensity of import refusals, namely log(refusals), would reduce our main sample from about 23,000 to just over 7,000 observations. For this reduced sample and this alternative measure, our estimates on the implied trade costs are still in the same ballpark.

[26] For instance, Maskus et al. (1999), Jaffe and Henson (2005) and Jaud and Kukenova (2011).

[27] The literature stresses the costs incurred to meet the precise technical regulation (product re-design) and costs for verifying that regulations are met (conformity assessment). Maskus et al. (1999) claim that conformity assessment costs pose by far the larger technical barrier to trade for exporting firms in developing countries. They also state that the recognition of conformity assessment certificates leaves room for protectionism.

[28] For the shrimp industry in Bangladesh and Nicaragua, Jaffe and Henson (2005), Cato et al. (2000) and Cato and Lima dos Santos (2003) provide numerical examples for the sizable adjustment costs developing country exporters face due to non-compliance with U.S. product standards.

Returning to the key results of Table 6, we compare the negative trade effects for non-OECD countries' import refusals without a product sample analysis before and after the Subprime Crisis. For a change of one standard deviation in refusals, the negative short-term and long-term costs for non-OECD countries rise by more than four times, from 1.8 billion to 8.9 billion and 3.6 billion to 16.1 billion, respectively. Note that this jump in trade costs is driven by a doubling in the point coefficient and an increase in variation of import refusals in the later period.

5.5. Further Results

We conclude the discussion of our empirical results with some further robustness checks and an excursus on European Union member states. In Column (1) of Table A6 in the Appendix, we start by reporting our baseline results for all countries for comparability. In Column (2), we add EU refusals and other notifications within the same country-product-group as additional external instruments (on top of the internal instruments of the GMM estimator).[29] This specification is based on 78 food and animal feed product-groups for which we can construct the external instruments. The results in Column (2) indicate that our main results are robust to using additional external instruments for U.S. import refusals with the coefficients being significant and in the same ballpark as our benchmark results.

Turning to Columns (3) and (4) of Table A6, we check whether our main results are robust to the inclusion of further fixed effects. Note that these two specifications are based on those countries that export at least 20 (out of 93) product-groups to the United States. This restriction is necessary, because more cross-sectional variation within countries is required for these more demanding specifications. Column (3) adds sector-year fixed effects to the baseline specification in Column (1).[30] This specification is further extended by country-time fixed effects, whereby we consider two-year periods in each case. Column (4) of Table A6 presents the results for the most demanding specification, where time-, country-product-, sector-year and country-time-fixed effects are included at the same time. Hence, in the order of fixed effects, this specification controls for macroeconomic shocks in the United States, any time-invariant country-specific product characteristics, any time-varying global

[29] We use the first and the second lag of the intensity of EU notifications to instrument for the first lag of our refusal intensity measure.

[30] We define 5 aggregated sectors for our 93 product-groups: fish products, fruits and vegetables, other food products and animal feed, pharmaceuticals and cosmetics and other manufacturing products.

factors at a more aggregated product-level and any time-varying characteristics at the country of origin. We perform the same set of specifications for the main results for non-OECD countries, including the baseline results as well as the specifications for refusals with and without product sample analyses (as reported in Tables A7 and A8 in the Appendix). It is reassuring that all our main results are insensitive to these alternative specifications, with the point estimates being in the same ballpark and significant at the 5% level.

Finally, we provide further empirical results in light of the ongoing negotiations on a free trade agreement between the United States and the European Union. Since the reduction in and harmonization of product standards is a central part of these negotiations, it seems worthwhile to have a closer look at the effects of U.S. import refusals on European Union member countries (as opposed to non-European member countries). We estimate the main specifications in Columns (4) of Tables 2, 3, 4 and 5 for the 27 EU member states. Any negative and significant effects for EU member countries could be interpreted as evidence for potential gains from reforms in product standards between the United States and the European Union. The results presented in Table A9 do not give any such indication.

6. Conclusions

This paper assesses the impact of U.S. import refusals on U.S. sectoral import flows for a rich data set of 93 product-groups for over 160 trading partners from 2002 to 2012. Our estimates show that non-compliance with U.S. product standards can exhibit substantial trade costs. This trade reducing effect of enforced product standards is driven by non-OECD countries, whereby our empirical results indicate that a one standard deviation increase in refusals reduces short- and long-run exports from developing countries by USD 6 to 11 billion. Hence, non-compliance with product standards can be very costly for poorer countries and might hinder their economic development.

Furthermore, we find striking evidence that the intensity of FDA inspections and import refusals as well as the negative effect of import refusals on U.S. imports have increased in the aftermath of the Subprime Crisis. During this time period, the unemployment rates in the United States have also markedly increased, suggesting that there is a business cycle element to the non-compliance of imports with U.S. product standards.

Most importantly, we find that the sharp increase in import refusals is driven by those refusals that are not based on any product sample analysis. It is exactly this sort of inspection that offers most leeway for FDA officers. In many instances these refusals are for sure warranted, but it is puzzling that these types of refusals are counter-cyclical, suggesting that the FDA, like any other U.S. agency, might not be immune to political pressures. We conclude that our empirical results are consistent with (but do not prove) the existence of counter-cyclical, hidden protectionism due to non-tariff barriers to trade in the United States. Hence, this paper corroborates worries raised by Baldwin and Evenett (2009) about a rise of murky protectionism.

References

Anders, Sven and Julie Caswell (2009), "Standards as Barriers versus Standards as Catalysts: Assessing the Impact of HACCP Implementation on U.S. Seafood Imports," *American Journal of Agricultural Economics*, Vol. 91, pp. 310–321.

Arellano, Manuel and Stephen Bond (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, Vol. 58, pp. 277-297.

Baldwin, Robert (1970), "Nontariff Distortions of International Trade," The Brookings Institution, Washington DC.

Baldwin, Richard (2000), "Regulatory Protectionism, Developing Nations, and a Two-Tier World Trade System," in: Brookings Trade Forum, S. Collins and D. Rodrik (eds.), The Brookings Institution, Washington DC, pp. 237-293.

Baldwin, Richard and Simon Evenett (2009), "The Collapse of Global Trade, Murky Protectionism, and the Crisis: Recommendations for the G20," A VoxEU.org Publication.

Baylis, Kathy, Andrea Martens and Lia Nogueira (2009), "What Drives Import Refusals?" *American Journal of Agricultural Economics*, Vol. 91, pp. 1477-1483.

Baylis, Kathy, Lia Nogueira and Kathryn Pace (2010), "Food Import Refusals: Evidence from the European Union", *American Journal of Agricultural Economics,* Vol. 93, pp. 566–572.

Boffa, Mauro and Marcelo Olarreaga (2012), "Protectionism During the Crisis: Tit-for-Tat or Chicken-Games?" *Economics Letters*, Vol. 117, pp. 746-749.

Bown, Chad and Meredith Crowley (2013), "Import Protection, Business Cycles, and Exchange Rates: Evidence from the Great Recession", *Journal of International Economics,* Vol. 90, pp. 50–64.

Buzby, Jean, Laurian Unnevehr and Donna Roberts (2008), "Food Safety and Imports: An Analysis of FDA Food-related Import Refusal Report," Economic Information Bulletin, EIB-39, U.S. Department of Agriculture.

Cato, James and Carlos Lima dos Santos (2000), "Costs to Upgrade the Bangladesh Frozen Shrimp Processing Sector to Adequate Technical and Safety Standards and to Maintain a HACCP Program," in L. Unnevehr (ed.): "HACCP: New Studies of Costs and Benefits," St. Paul: Eagen Press.

Cato, James, Steven Orwell and Agnes Coze (2003), "Nicaragua's Shrimp Subsector: Developing a Production Capacity and Export Market during Rapidly Changing Worldwide Safety and Quality Regulations," World Bank, Agriculture and Rural Development Discussion Paper No. 47844.

Crivelli, Pramina and Jasmin Gröschl (2012), "The Impact of Sanitary and Phytosanitary Measures on Market Entry and Trade Flows," *Ifo Working Paper No. 136, August 2012.*

Disdier, Anne-Célia, Lionel Fontagné, and Mondher Mimouni (2008), "The Impact of Regulations on Agricultural Trade: Evidence from SPS and TBT Agreements*," American Journal of Agricultural Economics,* Vol. 90, pp. 336-350.

Engel, Eduardo (1999), "Poisoned Grapes, Mad Cows and Protectionism," NBER Working Paper No. 6959.

Essaji, Azim (2008), "Technical Regulations and Specialization in International Trade," *Journal of International Economics*, No. 76, pp. 166-176.

Essaji, Azim (2010), "Trade Liberalization, Standards and Protection," *The B.E. Journal of Economic Analysis & Policy* (Topics), Vol. 10, Article 55.

FDA (2010), "Ensuring the Safety of Imported Products: Question and Answer with David Elder. FDA Consumer Updates," U.S. Food and Drug Administration.

FDA (2011a), "Federal Food, Drug, and Cosmetic (FD&C) Act," U.S. Food and Drug Administration.

FDA (2011b), "Pathway to Global Product Safety and Quality. A Special Report," U.S. Food and Drug Administration.

Fischer, Ronald and Pablo Serra (2000), "Standards and Protection," *Journal of International Economics*, Vol. 52, pp. 377-400.

Fontagne, Lionel, Gianluca Orefice, Roberta Piermartini and Nadia Rocha (2013), "Product Standards and Margins of Trade: Firm Level Evidence," *CEPII Working Paper No. 2013-06.*

Hawthorne, Fran (2005), "Inside the FDA, The Business and Politics Behind the Drugs We Take and the Food We Eat," John Wiley & Sons, New Jersey.

Henson, Spencer and Rupert Loader (2011), "Barriers to Agricultural Exports from Developing Countries: The Role of Sanitary and Phytosanitary Requirements," *World Development,* Vol. 29, pp. 85-102.

Jaffee, Steven and Spencer Henson (2005), "Agro-Food Exports from Developing Countries: The Challenges posed by Standards," Global agricultural trade and developing countries, Ataman Aksoy and John Beghin (eds.), Washington D.C., World Bank, pp. 91-114.

Jaud, Melise and Madina Kukenova (2011), "Financial Development and Survival of African Agri-food Exports," World Bank Policy Research Working Paper 5649.

Jouanjean, Marie-Agnes, Jean-Christophe Maur and Ben Shepherd (2012), "Reputation Matters - Spillover Effects in the Enforcement of US SPS Measures," World Bank Policy Research Working Paper 5935.

Jouanjean, Marie-Agnes (2012), "Is Fresh Fruits and Vegetables Market Access for Sale in the U.S.? The Ins and Outs of U.S. FF&V Market Access Regulation," mimeo, February 2012.

Josling, Tim, Donna Roberts, and David Orden (2004), "Food Regulation and Trade: Toward a Safe and Open Global System," Washington, DC: Institute for International Economics.

Kee, Hiau Looi, Cristina Neagu and Alessandro Nicita (2013), "Is Protectionism on the Rise? Assessing National Trade Policies During the Crisis of 2008," *Review of Economics and Statistics*, Vol. 95, pp. 342-345.

Lamb, Rusell (2006), "Rent Seeking in U.S. – Mexican Avocado Trade", *Cato Journal*, Vol. 26, pp. 159 – 177.

Liu, Chenglin (2010), "The Obstacles of Outsourcing Imported Food Safety to China," *Cornell International Law Journal*, Vol. 43, pp. 249-305.

Luechinger, Simon and Christoph Moser (2014), "The Value of the Revolving Door: Political Appointees and the Stock Market," *Journal of Public Economics*, Vol. 119, pp. 93-107.

Maertens, Miet and Johan Swinnen (2008), “Trade, Standards, and Poverty: Evidence from Senegal”, *World Development*, Vol. 37, pp. 161-187.

Marette, Stephan and John Beghin (2010), “Are Standards Always Protectionist?” *Review of International Economics*, Vol. 18, pp. 179-192.

Maskus, Keith, Tsunehiro Otsuki and John Wilson (1999), “Quantifying the Impact of Technical Barriers to Trade - A Framework for Analysis,” World Bank Policy Research Working Paper 2512.

Moenius, Johannes (2004), “Information versus Product Adaptation: The Role of Standards in Trade,” Working Paper, Evanston, Illinois, United States, Kellogg School of Management, Northwestern University.

Otsuki, Tsunehiro, John Wilson and Mirvat Sewadeh (2001), “What Price Precaution? European Harmonisation of Aflatoxin Regulations and African Groundnut Exports,” *European Review of Agricultural Economics*, Vol. 28, pp. 263-283.

Roodman (2009), “How to Do xtabond2: An Introduction to Difference and System GMM in Stata,” The Stata Journal, Vol. 9, pp. 86-136.

Rose, Andrew (2013), “The March of an Economic Idea? Protectionism Isn’t Countercyclic (anymore),” *Economic Policy*, Vol. 28, pp. 569-612.

Sturm, Daniel (2006), “Product Standards, Trade Disputes, and Protectionism,” *Canadian Journal of Economics*, Vol. 39, pp. 564-581.

Trefler, Daniel (1993), “Trade Liberalization and the Theory of Endogenous Protection: An Econometric Study of U.S. Import Policy,” *Journal of Political Economy*, Vol. 101, pp. 138-160.

Watson, William and Sallie James (2013), “Regulatory Protectionism: A Hidden Threat to Free Trade,” Policy Analysis No. 723, Cato Institute.

Tables and Graphs

Table 1: U.S. Imports and Refusals Dummy – Different Estimators

Variables	*OLS*	*Fixed effects*	*Arellano-Bond*	*Arellano-Bond*
	(1)	*(2)*	*(3)*	*(4)*
Log Imports (t-1)	0.739**	0.410**	0.443**	0.470**
	(0.01)	(0.01)	(0.04)	(0.05)
Log Imports (t-2)	0.233**	0.030*	0.061**	0.070**
	(0.01)	(0.01)	(0.02)	(0.02)
Dummy refusal (t-1)	0.047**	0.023°	-0.005	-0.850*
	(0.01)	(0.01)	(0.01)	(0.42)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	No	Yes	Yes	Yes
Refusals endogenous	No	No	No	Yes
AR(1)			0.000	0.000
AR(2)			0.712	0.745
Sargan-test			0.231	0.794
Hansen-test			0.605	0.883
Number of instruments			13	15
Number of groups			3304	3304
Number of countries	166	166	164	164
Number of observations	26858	26858	23242	23242

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable dummy refusal takes the value of one, if in a given product-group k from country i at least one refusal incidence is recorded in year t. Robust standard errors are reported in parentheses. The estimates in Column (1) and (2) are based on pooled OLS and (country-product) fixed effects, with standard errors being clustered at the country-level. Columns (3) and (4) employ a two-step Arellano-Bond estimator with robust standard errors. The lagged dependent variable is instrumented with the first through third lag. In Column (3), we define dummy refusal as exogenous. In Column (4), we allow the dummy refusal to be endogenous and instrument it with its first through third lag. The instrument matrix is collapsed. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table 2: U.S. Imports and Refusals – Different Estimators

Variables	*OLS*	*Fixed effects*	*Arellano-Bond*	*Arellano-Bond*
	(1)	*(2)*	*(3)*	*(4)*
Log Imports (t-1)	0.737**	0.410**	0.443**	0.448**
	(0.01)	(0.01)	(0.04)	(0.04)
Log Imports (t-2)	0.231**	0.030*	0.061**	0.064**
	(0.01)	(0.01)	(0.02)	(0.02)
Refusals (t-1)	0.035**	0.011	-0.004	-0.323*
	(0.00)	(0.01)	(0.01)	(0.13)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	No	Yes	Yes	Yes
Refusals endogenous	No	No	No	Yes
AR(1)			0.000	0.000
AR(2)			0.713	0.629
Sargan-test			0.230	0.656
Hansen-test			0.605	0.869
Number of instruments			13	15
Number of groups			3304	3304
Number of countries	166	166	164	164
Number of observations	26858	26858	23242	23242

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). Robust standard errors are reported in parentheses. The estimates in Column (1) and (2) are based on pooled OLS and (country-product) fixed effects, with standard errors being clustered at the country-level. Columns (3) and (4) employ a two-step Arellano-Bond estimator with robust standard errors. The lagged dependent variable is instrumented with the first through third lag. In Column (3), we define the variable refusals as exogenous. In Column (4), we allow the variable refusals to be endogenous and instrument it with its first through third lag. The instrument matrix is collapsed. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table 3: U.S. Imports and Refusals – Food vs. Non-Food Products

Variables	*Baseline*	*All countries*	*OECD-countries*	*Non-OECD-countries*
	(1)	***(2)***	***(3)***	***(4)***
Log Imports (t-1)	0.448**	0.460**	0.480**	0.404**
	(0.04)	(0.04)	(0.09)	(0.05)
Log Imports (t-2)	0.064**	0.066**	0.019	0.073**
	(0.02)	(0.02)	(0.03)	(0.02)
Refusals (t-1)	-0.323*			
	(0.13)			
Refusals (non-Food) (t-1)		-0.449	0.159	-0.760
		(0.74)	(0.35)	(0.61)
Refusals (Food) (t-1)		-0.256*	-0.026	-0.457*
		(0.11)	(0.10)	(0.21)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.629	0.575	0.745	0.349
Sargan-test	0.656	0.653	0.775	0.902
Hansen-test	0.869	0.661	0.953	0.937
Number of instruments	15	18	18	18
Number of groups	3304	3304	929	2375
Number of countries	164	164	23	141
Number of observations	23242	23242	6980	16262

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1), we report the baseline estimates for all refusals from Table 2, Column (4), for comparability. Column (2) allows for different slope coefficients for refusals for food and non-food product-groups. Columns (3) and (4) report the same specification for OECD-countries and non-OECD-countries, separately. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table 4: U.S. Imports and Refusals – Type of Refusal

Variables	*Baseline*	*All countries*	*OECD-countries*	*Non-OECD-countries*
	(1)	***(2)***	***(3)***	***(4)***
Log Imports (t-1)	0.448**	0.454**	0.525**	0.409**
	(0.04)	(0.04)	(0.10)	(0.05)
Log Imports (t-2)	0.064**	0.063**	0.029	0.070**
	(0.02)	(0.02)	(0.03)	(0.02)
Refusals (t-1)	-0.323*			
	(0.13)			
Refusals (Misbranding) (t-1)		-0.324	0.144	-0.468
		(0.30)	(0.55)	(0.33)
Refusals (Adulteration) (t-1)		-0.190	-0.086	-0.341*
		(0.12)	(0.32)	(0.15)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.629	0.552	0.769	0.368
Sargan-test	0.656	0.573	0.763	0.371
Hansen-test	0.869	0.561	0.972	0.398
Number of instruments	15	18	18	18
Number of groups	3304	3304	929	2375
Number of countries	164	164	23	141
Number of observations	23242	23242	6980	16262

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1), we report the baseline estimates for all refusals from Table 2, Column (4), for comparability. Column (2) allows for different slope coefficients for refusal types adulteration and misbranding. Columns (3) and (4) report the same specification for OECD-countries and non-OECD-countries, separately. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table 5: U.S. Imports and Refusals – Type of Inspection

Variables	*Baseline*	*All countries*	*OECD-countries*	*Non-OECD-countries*
	(1)	*(2)*	*(3)*	*(4)*
Log Imports (t-1)	0.448**	0.460**	0.522**	0.425**
	(0.04)	(0.04)	(0.11)	(0.05)
Log Imports (t-2)	0.064**	0.065**	0.029	0.072**
	(0.02)	(0.02)	(0.03)	(0.02)
Refusals (t-1)	-0.323*			
	(0.13)			
Refusals (Sample) (t-1)		0.349	-0.170	0.427
		(0.23)	(0.35)	(0.28)
Refusals (no Sample) (t-1)		-0.310*	0.082	-0.546**
		(0.12)	(0.14)	(0.19)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.629	0.463	0.708	0.230
Sargan-test	0.656	0.641	0.683	0.812
Hansen-test	0.869	0.651	0.924	0.819
Number of instruments	15	18	18	18
Number of groups	3304	3304	929	2375
Number of countries	164	164	23	141
Number of observations	23242	23242	6980	16262

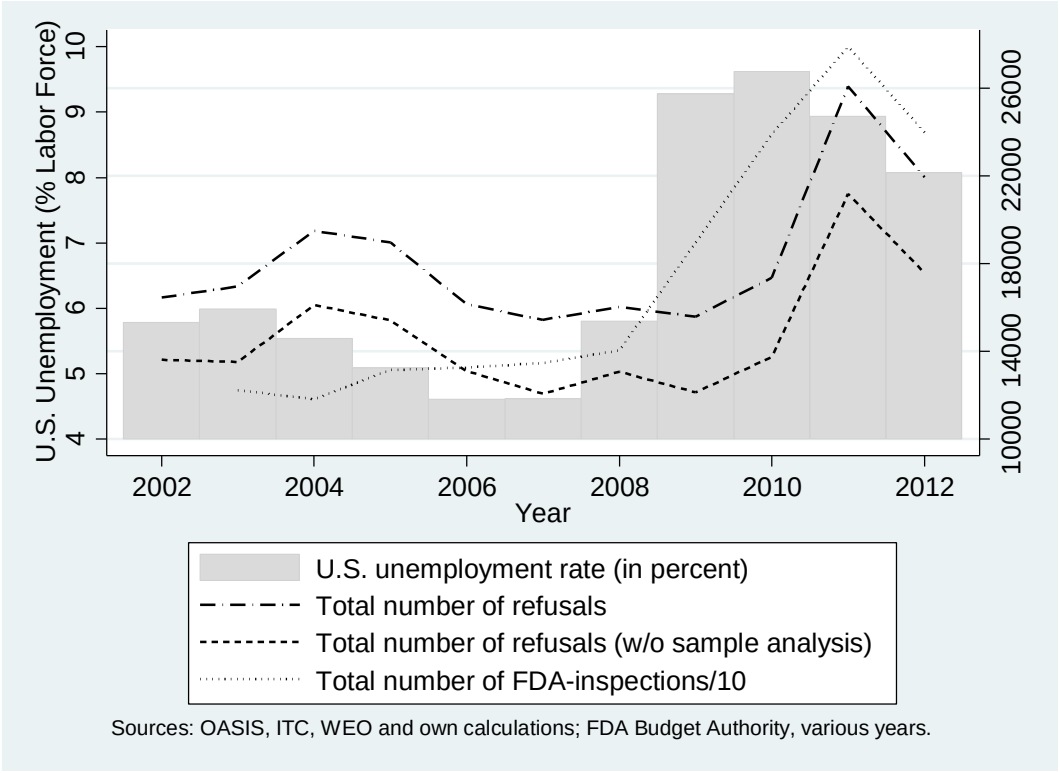
Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1), we report the baseline estimates for all refusals from Table 2, Column (4), for comparability. Column (2) allows for different slope coefficients for the type of inspection leading to a given refusal. We distinguish between refusals without any product sample analysis and refusals after an FDA or private product sample analysis has been provided. Columns (3) and (4) report the same specification for OECD-countries and non-OECD-countries, separately. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table 6: U.S. Imports and Refusals – Evidence for Hidden Protectionism?

Variables	*OECD-countries*			*Non-OECD-countries*		
	Baseline	***2005-2009***	***2008-2012***	***Baseline***	***2005-2009***	***2008-2012***
	(1)	***(2)***	***(3)***	***(4)***	***(4)***	***(4)***
Log Imports (t-1)	0.522**	0.439**	0.445**	0.425**	0.449**	0.385**
	(0.11)	(0.13)	(0.13)	(0.05)	(0.06)	(0.07)
Log Imports (t-2)	0.029	0.030	-0.017	0.072**	0.062**	0.064**
	(0.03)	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)
Refusals (Sample) (t-1)	-0.170	-0.087	-0.383	0.427	0.198	0.354
	(0.35)	(0.21)	(0.53)	(0.28)	(0.18)	(0.26)
Refusals (no Sample) (t-1)	0.082	0.001	-0.086	-0.546**	-0.220°	-0.549*
	(0.15)	(0.17)	(0.17)	(0.19)	(0.13)	(0.26)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.708	0.586	0.503	0.230	0.377	0.225
Sargan-test	0.683	0.558	0.015	0.812	0.191	0.863
Hansen-test	0.924	0.288	0.797	0.819	0.489	0.923
Number of instruments	18	15	15	18	15	15
Number of groups	929	914	908	2375	2256	2281
Number of countries	23	23	23	141	141	141
Number of observations	6980	4358	4371	16262	10099	10272

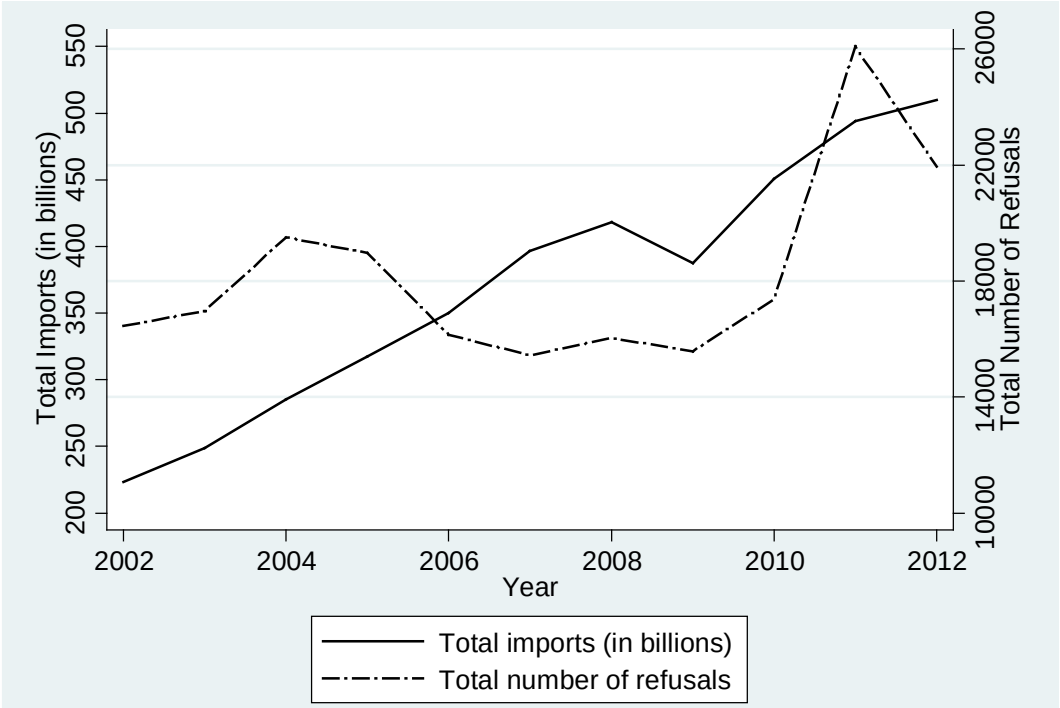
Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1) and Column (4), we report the estimates for the whole time period from Table 5, Columns (3) and (4) for comparability. Columns (2) and (3) and Columns (5) and (6) split the OECD and non-OECD sample into two time periods of comparable size, whereby the later sample period encompasses the Subprime Crisis and rising unemployment rates in the United States. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Graph 1: U.S. Unemployment Rate and Hidden Protectionism?



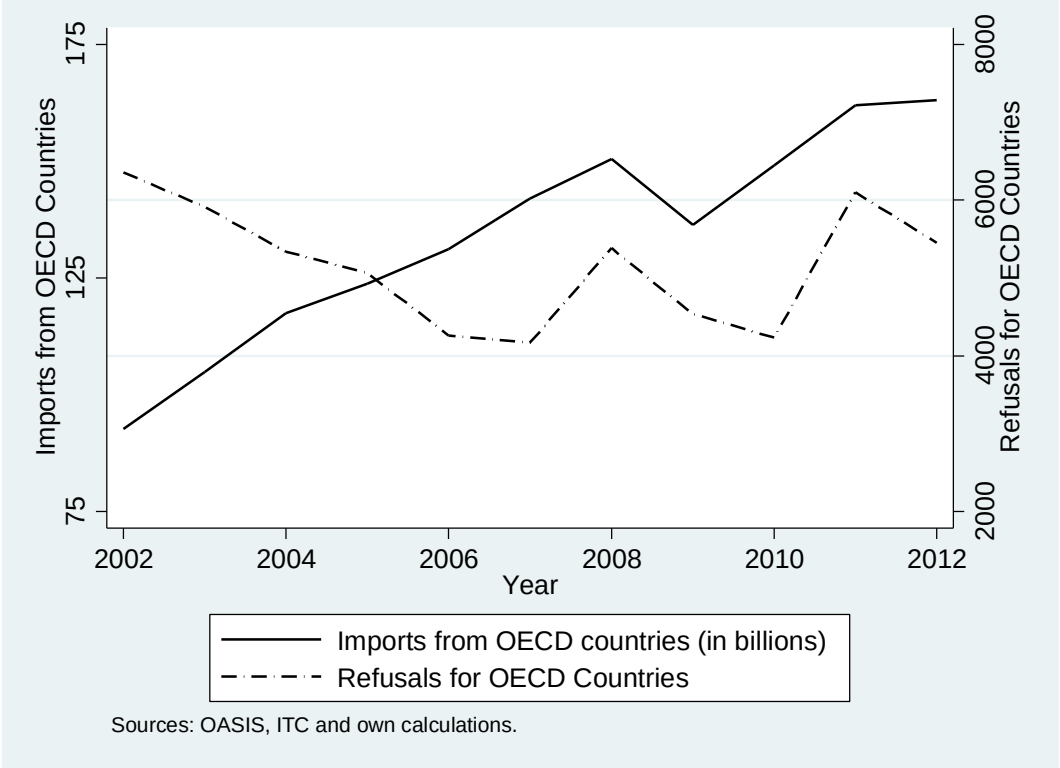
Sources: OASIS, ITC, WEO and own calculations; FDA Budget Authority, various years.

Graph 2: Total U.S. Imports and Refusals of FDA Regulated Products



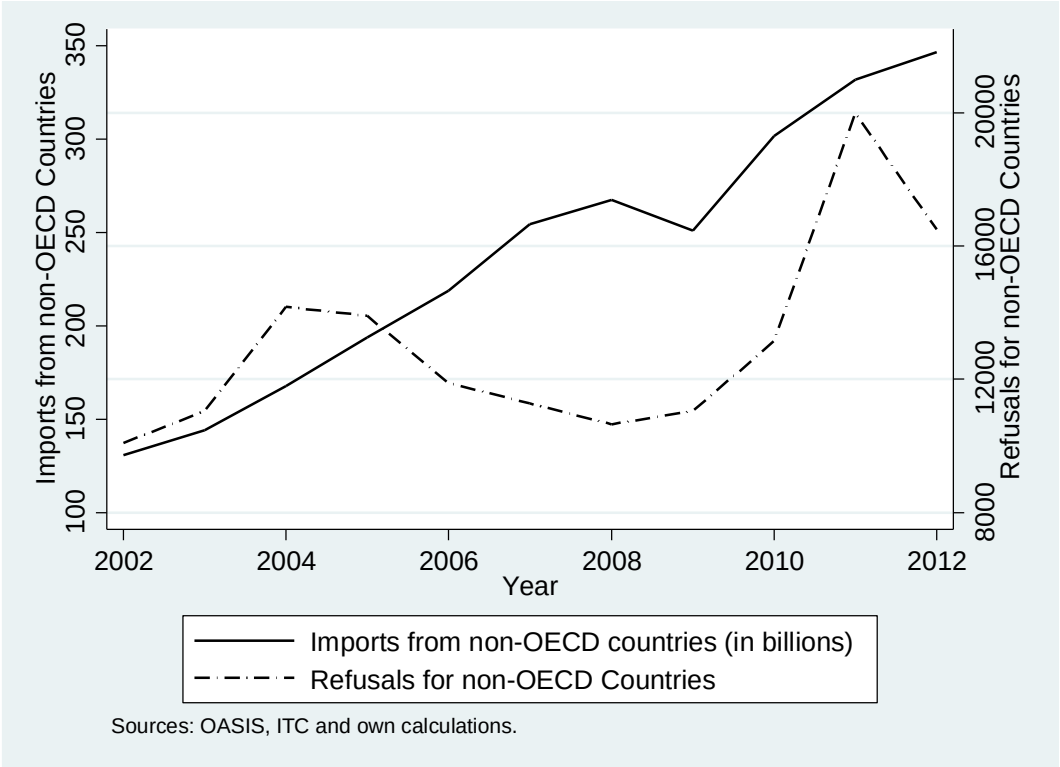
Sources: OASIS, ITC and own calculations.

Graph 3: U.S. Imports and Refusals for OECD Countries



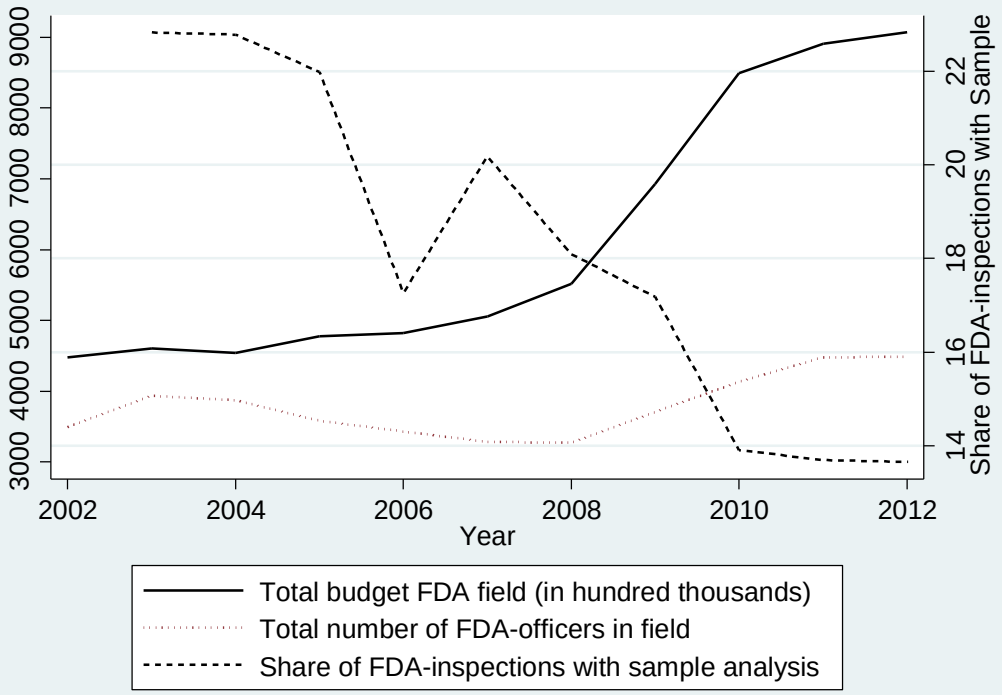
Sources: OASIS, ITC and own calculations.

Graph 4: U.S. Imports and Refusals for non-OECD Countries



Sources: OASIS, ITC and own calculations.

Graph 5: FDA-budget for Field Activities, FDA-officers in the Field and FDA-inspections with Product Sample Analysis



Sources: FDA Budget Authority, various years and own calculations.

Appendix

Table A1: Number of U.S. Import Refusals per Matched Product-group 2002 – 2012 (Top Ten out of 93 Product-groups)

Product-group Number	*Description*	*Number of Import Refusals*
84	Other medicaments, except antibiotics and hormones	32623
90	Medical instruments, machines and other medical devices	27889
74	Skin care and make up	8197
36	Bread and pastry, pudding, other baker ware	7998
2	Fish, dried, salted, smoked or in brine	7467
46	Sugar confectionary without cacao	6781
3	Crustaceans, fresh, chilled, frozen, dried, smoked or in brine	6323
60	Sauces, mixed dressings and condiments	5986
8	Fruits used as vegetables, fresh or chilled	5352
1	Fish, fresh, chilled or frozen	5247

Table A2: Reasons of U.S. Import Refusals (Top Ten Reasons from 2002 - 2011)

FDA Reason Code	*FDA Reason Description*	*Number of Import Refusals*
NOT LISTED	It appears the drug or device is not included in a list required by Section 510(j), or a notice or other information respecting it was not provided as required by section 510(j) or 510(k).	27113
UNAPPROVED	The article appears to be a new drug without an approved new drug application.	26699
FILTHY	The article appears to consist in whole or in part of a filthy, putrid, or decomposed substance or be otherwise unfit for food.	18743
NUTRIT LBL	The article appears to be misbranded in that the label or labeling fails to bear the required nutrition information.	16119
NO PROCESS	It appears that the manufacturer has not filed information on its scheduled process as required by 21 CFR 108.25(c)(2) or 108.35(c)(2).	14637
UNSAFE COL	The article appears to be a color additive for the purposes of coloring only in or on drugs or devices, and is unsafe within the meaning of Section 721(a).	12500
SALMONELLA	The article appears to contain Salmonella, a poisonous and deleterious substance which may render it injurious to health.	11073
NEEDS FCE	It appears the manufacturer is not registered as a low acid canned food or acidified food manufacturer pursuant to 21 CFR 108.25(c)(1) or 108.35(c)(1).	10015
LIST INGRE	It appears the food is fabricated from two or more ingredients and the label does not list the common or usual name of each ingredient.	9857
PESTICIDES	The article is subject to refusal of admission pursuant to section 801(a)(3) in that it appears to be adulterated because it contains a pesticide chemical, which is in violation of section 402(a)(2)(B).	9510

Table A3: Share of FDA Regulated Products in Total Exports to the U.S. for OECD Countries (Year 2012)

Country	*Total exports to the US (in Mill. USD)*	*Total exports of FDA products (in Mill. USD)*	*Share of FDA products in total exports*	*Share of FDA food products in total exports*	*Share of FDA non-food products in total exports*
Canada	328719.27	34057.84	10.36%	5.88%	4.48%
Germany	110612.00	23195.66	20.97%	1.40%	19.57%
Ireland	33436.44	19309.24	57.75%	2.47%	55.28%
Japan	150401.18	13811.87	9.18%	0.51%	8.67%
Switzerland	25955.55	12031.50	46.35%	3.38%	42.97%
France	42339.07	11962.74	28.25%	9.90%	18.36%
United Kingdom	55975.68	10941.81	19.55%	4.24%	15.31%
Italy	38145.46	8789.33	23.04%	10.12%	12.92%
Netherlands	22937.61	5115.52	22.30%	8.80%	13.51%
Denmark	6894.37	4065.58	58.97%	3.32%	55.65%
Belgium	17701.04	3408.08	19.25%	3.51%	15.75%
Spain	12221.53	2940.42	24.06%	11.97%	12.09%
Austria	9695.12	2751.44	28.38%	6.58%	21.79%
Sweden	10490.75	2572.59	24.52%	4.97%	19.55%
Australia	9851.58	2474.72	25.12%	11.65%	13.47%
New Zealand	3623.29	1620.19	44.72%	29.65%	15.06%
Finland	5317.83	1185.18	22.29%	1.35%	20.94%
Norway	6754.39	880.99	13.04%	5.14%	7.90%
Turkey	6605.28	833.31	12.62%	9.33%	3.29%
Greece	1051.89	382.30	36.34%	25.79%	10.55%
Portugal	2706.28	300.29	11.10%	4.64%	6.45%
Iceland	299.94	214.86	71.63%	51.82%	19.81%
Luxembourg	579.99	151.79	2.87%	0.02%	2.86%

Table A4: Share of FDA Regulated Products in Total Exports to the U.S. for non-OECD Countries (Year 2012, Top 10 by Region)

Country Group	Country	*Total exports to the US (in Mill. USD)*	*Total exports of FDA products (in Mill. USD)*	*Share of FDA products in total exports*	*Share of FDA food products in total exports*	*Share of FDA non-food products in total exports*
Africa	Cote d`Ivoire	1138.81	778.28	68.34%	68.20%	0.14%
	South Africa	8861.26	404.37	4.56%	3.23%	1.34%
	Ghana	304.87	199.83	65.55%	65.08%	0.47%
	Morocco	995.25	169.41	17.02%	14.83%	2.19%
	Tunisia	759.33	140.18	18.46%	15.74%	2.72%
	Kenya	404.57	110.90	27.41%	26.17%	1.24%
	Egypt	3104.64	109.71	3.53%	2.39%	1.14%
	Ethiopia	189.43	101.39	53.52%	53.34%	0.18%
	Nigeria	19523.41	83.25	0.43%	0.41%	0.02%
	Malawi	69.30	63.11	91.07%	91.03%	0.04%
Asia and Oceania	China	444469.15	161000.61	36.22%	1.52%	34.70%
	Thailand	27051.56	13972.76	51.65%	14.68%	36.97%
	Japan	150401.18	13811.87	9.18%	0.51%	8.67%
	India	41910.57	12166.13	29.03%	5.30%	23.73%
	Malaysia	26651.97	11074.61	41.55%	7.04%	34.51%
	Korea	60979.15	9630.99	15.79%	0.92%	14.87%
	Taiwan	40215.10	9037.19	22.47%	1.06%	21.41%
	Israel	22344.66	7628.57	34.14%	1.23%	32.91%
	Singapore	20455.01	5018.75	24.54%	0.60%	23.94%
	Indonesia	18839.70	3749.06	19.90%	13.70%	6.20%
Americas	Mexico	280024.55	71343.35	25.48%	5.81%	19.67%
	Canada	328719.27	34057.84	10.36%	5.88%	4.48%
	Brazil	33227.22	4155.34	12.51%	10.62%	1.89%
	Chile	10096.59	4101.42	40.62%	39.74%	0.88%
	Costa Rica	12303.03	2873.76	23.36%	13.87%	9.49%
	Guatemala	4843.69	2200.18	45.42%	44.69%	0.74%
	Argentina	4577.60	1975.51	43.16%	39.11%	4.04%
	Dom. Rep.	4481.03	1920.90	42.87%	20.96%	21.91%
	Colombia	25224.60	1867.75	7.40%	6.72%	0.68%
	Ecuador	9896.24	1788.58	18.07%	17.93%	0.15%

Table A5: U.S. Imports and Refusals – Different Estimators, Non-OECD Countries

Variables	*OLS*	*Fixed effects*	*Arellano-Bond*	*Arellano-Bond*
	(1)	***(2)***	***(3)***	***(4)***
Log Imports (t-1)	0.725**	0.396**	0.412**	0.400**
	(0.01)	(0.02)	(0.05)	(0.05)
Log Imports (t-2)	0.240**	0.040**	0.068**	0.072**
	(0.01)	(0.01)	(0.02)	(0.02)
Refusals (t-1)	0.039**	0.006	-0.005	-0.514**
	(0.00)	(0.01)	(0.01)	(0.19)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	No	Yes	Yes	Yes
Refusals endogenous	No	No	No	Yes
AR(1)			0.000	0.000
AR(2)			0.525	0.427
Sargan-test			0.341	0.822
Hansen-test			0.648	0.915
Number of instruments			13	15
Number of groups			2375	2375
Number of countries	143	143	141	141
Number of observations	18898	18898	16262	16262

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). Robust standard errors are reported in parentheses. The estimates in Column (1) and (2) are based on pooled OLS and (country-product) fixed effects, with standard errors being clustered at the country-level. Columns (3) and (4) employ a two-step Arellano-Bond estimator with robust standard errors. The lagged dependent variable is instrumented with the first through third lag. In Column (3), we define the variable refusals as exogenous. In Column (4), we allow the variable refusals to be endogenous and instrument it with its first through third lag. The instrument matrix is collapsed. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table A6: U.S. Imports and Refusals – Further Fixed Effects

Variables	*Baseline*	*External Instrument*	*Further Fixed Effects I*	*Further Fixed Effects II*
	(1)	***(2)***	***(3)***	***(4)***
Log Imports (t-1)	0.448**	0.490**	0.399**	0.365**
	(0.04)	(0.05)	(0.06)	(0.06)
Log Imports (t-2)	0.064**	0.065**	0.048*	0.038°
	(0.02)	(0.02)	(0.02)	(0.02)
Refusals (t-1)	-0.323*	-0.235*	-0.359*	-0.362*
	(0.13)	(0.10)	(0.14)	(0.16)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes
Sector-year FE	No	No	Yes	Yes
Country-time FE	No	No	No	Yes
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.629	0.558	0.673	0.564
Sargan-test	0.656	0.844	0.758	0.626
Hansen-test	0.869	0.936	0.781	0.716
Number of instruments	15	17	47	239
Number of groups	3304	2588	2761	2761
Number of countries	164	149	65	65
Number of observations	23242	18109	19987	19987

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1), we report the baseline results from Table 2, Column (4), for comparability. Column (2) reports the results for the baseline specification, where we additionally use EU refusals as external instruments (which are available for 78 out 93 product-groups). Columns (3) and (4) allow for further fixed effects. Since these specifications require more cross-sectional variation within countries, we restrict the sample to countries with export flows to the United States in at least 20 product-groups. Column (3) extends the baseline with sector-year fixed effects, where all product-groups are classified into five more aggregated sectors. Column (4) also includes these sector-year fixed effects and additionally country-time fixed effects, with time being defined as two-year spells. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table A7: U.S. Imports and Refusals – Further Fixed Effects, Non-OECD Countries

Variables	*Baseline*	*External Instrument*	*Further Fixed Effects I*	*Further Fixed Effects II*
	(1)	*(2)*	*(3)*	*(4)*
Log Imports (t-1)	0.400**	0.467**	0.328**	0.309**
	(0.05)	(0.05)	(0.07)	(0.08)
Log Imports (t-2)	0.072**	0.079**	0.054*	0.046°
	(0.15)	(0.02)	(0.03)	(0.03)
Refusals (t-1)	-0.514**	-0.435**	-0.547**	-0.512*
	(0.19)	(0.16)	(0.20)	(0.22)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes
Sector-year FE	No	No	Yes	Yes
Country-time FE	No	No	No	Yes
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.427	0.859	0.446	0.366
Sargan-test	0.822	0.651	0.864	0.794
Hansen-test	0.915	0.834	0.854	0.799
Number of instruments	15	17	47	179
Number of groups	2375	1899	1858	1858
Number of countries	141	127	45	45
Number of observations	16262	12974	13186	13186

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1), we report the baseline results from Table 4, Column (1), for comparability. Column (2) reports the results for the baseline specification, where we additionally use EU refusals as external instruments (which are available for 78 out 93 product-groups). Columns (3) and (4) allow for further fixed effects. Since these specifications require more cross-sectional variation within countries, we restrict the sample to countries with export flows to the United States in at least 20 product-groups. Column (3) extends the baseline with sector-year fixed effects, where all product-groups are classified into five more aggregated sectors. Column (4) also includes these sector-year fixed effects and additionally country-time fixed effects, with time being defined as two-year spells. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table A8: U.S. Imports and Refusals – Further Fixed Effects, Non-OECD Countries, Evidence for Hidden Protectionism?

Variables	*Baseline*	*External Instrument*	*Further Fixed Effects I*	*Further Fixed Effects II*
	(1)	*(2)*	*(3)*	*(4)*
Log Imports (t-1)	0.425**	0.488**	0.357**	0.344**
	(0.05)	(0.06)	(0.07)	(0.07)
Log Imports (t-2)	0.072**	0.073**	0.053*	0.048°
	(0.15)	(0.03)	(0.03)	(0.03)
Refusals (Sample) (t-1)	0.427	0.746°	0.236	0.224
	(0.28)	(0.39)	(0.25)	(0.24)
Refusals (no Sample) (t-1)	-0.546**	-0.668**	-0.507**	-0.437*
	(0.19)	(0.22)	(0.18)	(0.19)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes
Sector-year FE	No	No	Yes	Yes
Country-time FE	No	No	No	Yes
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.230	0.547	0.289	0.256
Sargan-test	0.812	0.944	0.820	0.785
Hansen-test	0.819	0.977	0.776	0.743
Number of instruments	18	20	50	182
Number of groups	2375	1899	1858	1858
Number of countries	141	127	45	45
Number of observations	16262	12974	13186	13186

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1), we report the baseline results from Table 4, Column (1), for comparability. Column (2) reports the results for the baseline specification, where we additionally use EU refusals as external instruments (which are available for 78 out 93 product-groups). Columns (3) and (4) allow for further fixed effects. Since these specifications require more cross-sectional variation within countries, we restrict the sample to countries with export flows to the United States in at least 20 product-groups. Column (3) extends the baseline with sector-year fixed effects, where all product-groups are classified into five more aggregated sectors. Column (4) also includes these sector-year fixed effects and additionally country-time fixed effects, with time being defined as two-year spells. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.

Table A9: U.S. Imports and Refusals – European Union (EU 27)

Variables	*Baseline*	*Food vs. non-Food*	*Refusal Type I*	*Refusal Type II*
	(1)	*(2)*	*(3)*	*(4)*
Log Imports (t-1)	0.453**	0.491**	0.484**	0.412**
	(0.11)	(0.09)	(0.11)	(0.13)
Log Imports (t-2)	0.038	0.047	0.061	0.015
	(0.03)	(0.03)	(0.04)	(0.04)
Refusals (t-1)	-0.125			
	(0.33)			
Refusals (non-Food) (t-1)		0.564		
		(0.57)		
Refusals (Food) (t-1)		0.041		
		(0.17)		
Refusals (Misbranding) (t-1)			0.714	
			(0.96)	
Refusals (Adulteration) (t-1)			-0.276	
			(0.36)	
Refusals (Sample) (t-1)				1.216°
				(0.66)
Refusals (no Sample) (t-1)				-0.317
				(0.48)
Time FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
Refusals endogenous	Yes	Yes	Yes	Yes
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.748	0.964	0.512	0.737
Sargan-test	0.056	0.288	0.547	0.669
Hansen-test	0.580	0.824	0.880	0.948
Number of instruments	15	18	18	18
Number of groups	696	696	696	696
Number of countries	27	27	27	27
Number of observations	5055	5055	5055	5055

Notes: Dependent variable: Log imports of 93 product-groups to the United States from 2002-2012. The variable refusals refers to the total number of refusals in a given product-group k from country i in year t and enters as the log(1+refusals). All estimations are based on the two-step Arellano-Bond estimator with robust standard errors reported in parentheses. The lagged dependent variable is instrumented with the first through third lag. The variable refusals is allowed to be endogenous and is instrumented with its first through third lag. The instrument matrix is collapsed. In Column (1), we report the baseline results from Table 4, Column (1), for comparability. Column (2) allows for different slope coefficients for refusals between food and non-food product-groups imported from EU27-countries. Column (3) allows for different slope coefficients for refusal types adulteration and misbranding. Finally, Column (4) distinguishes between refusals without any product sample analysis and refusals after an FDA or private product sample analysis has been provided. **, * and ° denotes significant at the 1%, 5% and 10% level, respectively.