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US Phytosanitary Restrictions: The Forgotten Non-Tariff Barrier

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US Phytosanitary Restrictions: The Forgotten Non-Tariff Barrier

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Abstract: We provide new evidence that the US phytosanitary regime is associated with a restrictive market access environment for fruit and vegetable products. One chief reason seems to be that the US regime uses a positive list approach, under which only authorized countries can export. For most products, only a portion of global production is authorized for export to the US. Even among authorized countries, only a small proportion actually export. As a result, the number of countries exporting fresh fruit and vegetables to the US is far lower than in comparator countries like the EU and Canada, but is on a par with markets known to be restrictive in this area, such as Australia and Japan. Using a dataset of fruit and vegetable market access and political contributions, we also provide evidence showing that domestic political economy considerations may influence the decision to grant market access to foreign producers.

JEL Codes: F13; F15; O24.

Keywords: Product standards; SPS measures; Non-tariff barriers; Market access; Developing countries.

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1 Introduction

Sanitary and phytosanitary measures (SPS) present significant obstacles to agricultural exporters, particularly to small producers in developing countries. Although standards in importing markets like the European Union and the United States can act as catalysts for production and supply chain upgrading in poorer countries (Maertens and Swinnen, 2009), the adaptation costs involved, including notably large fixed costs, can be substantial and may exceed the capacity of some producers (Henson & Jaffee, 2004).

Producers are increasingly facing the challenges posed by standards in importing markets, particularly SPS measures. Market access issues posed by standards are clearly acknowledged in the WTO framework, in particular the SPS Agreement and the Agreement on Technical Barriers to Trade, but negotiations on agricultural market access keep focusing on tariffs and more traditional non-tariff barriers such as subsidies. Not unlike policy, analysis is also lagging behind the market realities: data constraints have made it difficult for researchers to shed more than partial light on the mechanisms at work in the SPS area, and the effects they have on developing country exporters. SPS measures are complex, often product-firm-and-process-specific and non-transparent. They remain difficult to grasp for non-specialists, including trade policymakers and analysts.

Unlike traditional instruments of trade policy, SPS measures are not usually designed to restrict trade. Rather, they aim to meet legitimate health and plant protection objectives, which complicates the task of disentangling acceptable regulatory stances from possibly protectionist ones. To date, the main concern in this regard has been on human health impacts (e.g. Otsuki, Sewadeh and Wilson, 2001), probably because they resonate more in

public policy debates than does the protection of plants from pests and pathogens.[2] Plant pest outbreaks have a direct impact on the environment and on producers' income, whom in developed economies, only represent up to 1 or 2% of the population. Food safety outbreaks are direct threats to consumers' well-being and even sometimes to their lives, but pest outbreaks have a much more indirect effect. . Yet each objective -- the protection of health and of plants -- requires a different set of measures, and both potentially have trade impacts. For instance, a survey of Guatemalan exporters[3] of non-traditional agricultural exports[4] showed that they were much more afraid of pest outbreaks resulting in import bans in the US than of import refusals from the Food and Drug Administration (FDA) based on food safety parameters. This is the focus of this paper: SPS measures designed to preserve plant health by preventing the spread of pests -- so-called phytosanitary measures -- and more specifically the mechanisms that can give rise to market access restrictions in the US.

A further issue is that, unlike traditional trade measures like tariffs, SPS measures are implemented very differently, and in ad hoc ways, across destination markets, even in cases where regulatory objectives might actually be quite close. Exporters with limited supply capacity and ability to explore different markets have to make choices about which market they should target. Differences across markets regarding conditions of access are relatively difficult to assess, resulting in uncertainty for prospective entrants. Reliance on a small number of geographical destinations also places producers at particular risk of adverse demand shocks. It is to be expected that differences in enforcement, and beyond that differences in enforcement capacity, translate also into differences in market assess costs,

[2] In the remainder of the text we will use the term "pest" to include both pests and pathogens, unless otherwise specified.
[3] Conducted by Jouanjean in November – December 2009
[4] As opposed to traditional exports such as bananas and sugar. This expression is often used to talk about new high value agricultural exports, mostly horticultural products.

some of which are fixed sunk costs. This is the beach head effect posited by Baldwin (1988). Recent attempts in the empirical literature to draw measurable comparisons across markets confirm this suspicion (see e.g. Kee, Nicita and Olarreaga, 2009).

In this paper, we focus on the US system of phytosanitary measures, the compliance with which determines the right to export to the US from a given geographic origin. This system is complex, and this can have profound implications for developing country exporters, as the outcome is often that market access is precluded altogether. For many exporters, these phytosanitary requirements are a prohibitive non-tariff barrier. Most relevant is the "positive list" approach used by the US, in which only those countries that have been specifically approved by US authorities are able to export fresh fruits and vegetables (FF&V) to the US. This system is potentially highly restrictive, as it prohibits entry for any product that has not been pre-approved, and requires producers to navigate a costly and complex web of regulations and standards before accessing the market. There is also ample scope for domestic producer lobbies to be involved in the regulatory approval process and potentially "game the system" to the detriment of developing country exporters. As a result of these characteristics, we find that market access in the US is considerably more restricted than in comparable markets like the EU or Canada: the number of countries authorized to export FF&V to the US is usually a small fraction of the world's total producers or exporters.

Numerous case studies have already provided persuasive anecdotal evidence of the restrictive nature of the US FF&V import regime for certain products. Two long-running disputed cases about access to the US market have been extensively discussed in the literature: Mexican Hass avocadoes (Roberts and Orden, 1997; Lamb, 2006; Romano, 1998; Orden, Narrod and Glauber, 2001; Carman, Lee and Sexton, 2006; Peterson and Orden,

2008a; and Peterson and Orden, 2008b), and Argentinian citrus fruits (McLean, 2004; Stewart and Schenewerk, 2004; Cororaton, Orden and Peterson, 2011; and Thornsbury and Romano, 2007). The well-documented analysis provided by this body of studies suggests that there has been capture of the regulatory process by special interest groups. One effective strategy used by US producers' associations highlighted in these case studies is the systematic questioning of the reliability of USDA's scientific conclusions. Doing so successfully raised entry costs of rival potential exporters (a predatory tactic first theorized by Salop and Scheffman, 1983) and delayed the process of market access in some instances by several years.

Recent empirical work has sought to assess the impact of US SPS measures. Karov, Roberts, Grant & Peterson (2009) construct a database of US SPS measures affecting FF&V imports, but find mixed results for the impacts of treatments and the granting of new market access on trade flows. Jouanjean, Maur & Shepherd (2012), by contrast, consistently find that import refusals on sanitary grounds are a significant determinant of export flows, and that they have significant spillover effects beyond the individual shipments in question. Together, these studies highlight the fact that many developing countries have difficulty complying with US SPS measures, and thus have difficulty exporting FF&V consistently to the US.

In this paper we argue that in practice, if not *de jure*, US phytosanitary measures amount to a prohibitive non-tariff barrier for many developing countries, in the sense that they are not authorized to export certain products at all to the US. However, the regulatory regime lying behind these measures is poorly understood and information about it is very diffuse. We present a summarized picture of the US regime in Section 2. In Section 3, we attempt to solve part of the information gap by building a dataset of US FF&V market access for the

period 1994-2011.We use the dataset to show that the US tends to import from a narrower range of countries than would be expected based on experience in other major markets. In Section 4, we turn from the impacts of the US phytosanitary regime to one of its possible determinants: domestic political economy. There is suggestive evidence that the US authorities authorize fewer countries to export in organized sectors (those that make political contributions, or where production is heavily concentrated) than in unorganized ones. The last section of the paper concludes.

2 The US Market Access Regime for FF&V: An Overview

Border measures like tariffs are only part of the regulatory thicket that potential exporters of FF&V need to negotiate their way through in order to access a foreign market. The US is no exception to that rule. However, its system stands out as potentially particularly restrictive compared with that of other countries due to three factors: its complexity, which leaves considerable room for the operation of political economy forces; the fact that it uses a positive list approach, i.e. countries must be authorized by the US before their firms can start exporting to that market; and the relative lack of genuine additional market access accorded by reforms following the WTO SPS Agreement. This section examines the US system from a market access point of view, as a way of setting the scene for the empirical analysis in the remainder of the paper.[5]

Although the focus of this paper is on market access, it is important to remember that the US phytosanitary system was designed with legitimate plant protection objectives in mind. The public policy of plant protection is somewhat different from the more well-known area of food safety standards. It has a strong public good aspect, as a failure to implement proper

[5] It is beyond the scope of this paper to examine the interesting legal question of whether or not the US system complies with the SPS Agreement, and other relevant WTO obligations.

protection can lead to the spread of pests throughout the national area. The key factor is risk management. Risk varies widely across exporting countries, due to climactic and environmental conditions, which means that some specificity in approach is required. The level of domestic production in the US is also relevant, because it determines the extent of a potential quarantine pest to cause damage to US crops. To be clear, the purpose of this paper is not to suggest that the US plant protection regime should be "rolled back" on market access grounds, but simply to highlight some of the trade-related costs that come with the regime in its current form—and to show that alternatives, such as a negative list approach, may achieve a similar level of protection without the same level of restrictiveness in market access.

2.1 The General Regime

Within the US Department of Agriculture (USDA), the Animal and Plant Health Inspection Service (APHIS) and its Plant Protection and Quarantine (PPQ) program is in charge of protecting US agriculture and plants against the entry of foreign pests and diseases. As such, APHIS administers and regulates – including prohibiting – market access for FF&V imports. APHIS has the responsibility to prohibit entry into the US of food and agricultural products that contain pests or diseases that may affect domestic animals and plants.

The US uses a "positive list" approach to the regulation of FF&V imports: all products from all countries are prohibited entry into the US unless explicitly allowed by a regulation. By contrast the European Union uses a "negative list" approach: the EU forbids imports of selected products from specific countries based on identified phytosanitary issues (European Commission, 2006). For some other countries, the EU requires phytosanitary certificates issued by a National Plant Pest Organization (NPPO) declaring the imported product to be

free of quarantine pests. The EU protection system relies mostly on plant-health checks that are a complete examination or an examination of samples before entry into the EU. Less stringent checks are implemented when guarantees are provided. The main difference is therefore that imports of FF&V in the EU do not need to go through a pre-approval process, as they must in the US. As a result of this important difference in approach, there is clear potential for the US regime to be more restrictive in practice—a possibility that we explore in Section 3.

A first reform to improve the system took place in 1992,[6] when new rules came into force mandating the recording of every new eligible FF&V production directly in the regulation. The underlying rationale was to improve transparency such that the regulation prohibited any importation into the US unless entry eligibility was explicitly mentioned in it. However, it rapidly appeared that this new approach did not work out well with the rising number of requests for FF&V market access to the US. Over time, the regulation became increasingly complex and marred by many redundancies. Also, rulemaking revealed out to be particularly burdensome and the whole process could take 18 months to three years on average.[7] Some export requests took considerably longer than the average. For example a Chinese request to export fragrant pears to the US took twelve years. According to Karp (2006), Chinese officials issued a first request in 1993 and the USDA only granted approval in December 2005 after repeated visits by Department of Agriculture scientists and revisions of mandated measures. In general, various exporters have highlighted the particularly long process behind obtaining market access to the US. Even the EU has signaled to the WTO SPS Committee that

[6] Federal Register/ Vol. 72, No. 137 / Wednesday, July 18, 2007 / Rules and Regulations

[7] Federal Register/Vol. 71, No. 81 / Thursday, April 26, 2006 / Proposed Rules.

it has experienced very lengthy decision-making procedures when trying to export some plant products to the US.[8]

A second reform, known as "Q56", was adopted in 2007.[9] Its objective was to avoid the burdensome rulemaking procedure and replace it with a notice-based approach for those products for which relatively straightforward and established phytosanitary measures are sufficient for entry into the US.[10]New market access using notices have been rapidly granted under the AGOA initiative to African countries in 2008 for the following products: baby corn and baby carrots from Kenya, asparagus from Senegal, eggplant, okra and pepper from Ghana. Since then, other countries such as Mexico, Chile, Panama, Malaysia, and Vietnam have secured new market access following this new process.However, very few new accesses have been granted since 2012 (see table 1)

2.2 Negotiating Market Access

The US decision to accept imports of a new product from a specific country relies on a risk-based approach. A request of eligibility for entry of a new FF&V must first be submitted to APHIS by the exporting country's NPPO. Then, as is required by the WTO SPS Agreement and in order to base the final decision on a scientific justification, APHIS PPQ conducts a Pest Risk Analysis (PRA), which can take two or three years on average (Miller, 2006). An "appropriate level of protection" is defined according to this PRA. The objective of the procedure is to identify if any mitigation measures are necessary, applicable, and efficient enough to minimize the risk of entry of any quarantine pests into the US.

[8] WTO Committee on Sanitary and Phytosanitary Measures. 2011. Specific Trade Concerns, Issues not Considered in 2010, G/SPS/GEN/204/Rev.11/Add.2, 1 March 2011.
[9] See for instance:
http://www.aphis.usda.gov/publications/plant_health/content/printable_version/faq_q56reg.pdf
[10] After a Pest Risk Analysis is conducted (see section below).

Many factors contribute to the burdensome nature of the eligibility determination process. According to Miller (2006), countries do not always provide complete lists of pests, as required by the early stages of the process. As a result, APHIS agents must undertake their own research, which is one cause of delay,[11] and sometimes of disagreements with the applicant country.

If any pest meets the criteria determining it as a "quarantine pest" within the meaning of the relevant US regulations, APHIS PPQ follows up with a Pest Risk Management (PRM) analysis. The objective of the PRM is to define if any mitigation measures exist, their level of efficiency and feasibility, as well as any impact if the pest were to be accidentally introduced into the US. Under this approach, the APHIS PPQ proposes a mitigation plan to the applicant country. However, if there is no satisfactory solution and/or guarantees that the country will properly follow the mitigation plan, access to the US market is denied.

Following the WTO SPS Agreement, APHIS should determine the measure providing the necessary protection with the minimum negative impact on trade. Mitigation measures proposed by APHIS can in some cases be complex and burdensome. The most common measure is the requirement of specific treatments. Those treatments have to be applied before the product is exported, or sometimes at the port of entry if the necessary facilities exist. Another method is recourse to the "systems approach" that we discuss in the next section. At the end of the PRA process, if an efficient mitigation procedure has been identified or if the PRA shows that no mitigation measures are necessary, APHIS initiates the rulemaking process for registration of the proposed FF&V in the regulation.

[11] In one description (Ghana's experience, see below fn 12) it is indeed suggested that APHIS had a backlog of PRA of 2 to 3 years.

To conduct a Pest Risk Analysis is costly and requires high-level expertise and resources and some developing country officials have highlighted the difficulty of effectively and efficiently implementing a PRA.[12]

The reliability and accuracy of PRA and mitigation measures is potentially open to contestation by domestic interests: Cororaton et al. (2011) mention that discussions between the US and Argentina for citrus focused on these two concerns. Thornsbury et al. (2007) furthermore state that scientific debate is likely to be more contentious and sustained in cases where the political stakes are greater.

The main conclusion from this overview is that despite two reforms, the US regime remains based on a positive list approach which in practice is restrictive in view of the time consuming and potentially costly nature of the admission process for prospective exporters. We complete this review in the following section with a discussion of two measures to facilitate market access: the systems approach and cooperation agreements.

2.3 The Systems Approach

The systems approach, which is intended to facilitate market access particularly following passage of the SPS Agreement, offers an alternative to traditional risk mitigation measures. By combining various risk management measures, the systems approach can enable market access when traditional single treatments would not provide the required level of protection from quarantine pests. The term was first used to describe the approach used to reduce pest risks associated with the importation of avocados from Mexico but the practice in the US

[12] See for instance the experience of Ghana presented at the International Plant Health Risk Analysis Workshop, IPPC, 2005. https://www.ippc.int/core-activities/capacity-development/working-groups/international-plant-health-risk-analysis-workshop24-28-october-2005-niagara-falls-canada

goes back to the 1960s, first applied in 1967 to allow access to Unshu oranges from Japan and Korea (National Plant Board, 2002).

According to the FAO's International Standard for Phytosanitory Measures (2002) a systems approach is "the integration of different pest risk management measures, at least two of which act independently, and which cumulatively achieve the appropriate level of phytosanitary protection". In addition to the traditional post-harvest measures, processes incorporated into the systems approach include insect trapping and control, growing and packing requirements, and geographical limitations. The concept behind the systems approach is that several methods while individually not mitigating the risk of introduction of a pest to a sufficiently low level of probability[13] will do so additively. A systems approach can also be used to achieve maximum levels of risk reduction (i.e. a second best to an ideal of 100% elimination that is not achievable by known or acceptable means save for outright prohibition) for phytosanitory risks that are judged particularly serious, such as certain plant pathogens (National Plant Board, 2002).

An example of a systems approach is the one applied to Mexico's avocados (CFR 319.56-30): they must meet a nine requirement list that includes trapping, orchard certification, limited production area (Michoacan), trace-back labeling, pre-harvest orchard surveys for all pests, orchard sanitation, post-harvest safeguards, fruit cutting and inspection at the packinghouse, port-of-arrival inspection, and preclearance activities.[14] The basic motivation behind the implementation of the systems approach is to combine mitigation measures and risk-based controls.

[13] The standard in the US for pests is the so-called Probit-9 security, requiring that 99.9968% of pests to be killed by the treatment.

[14] More generally see National Plant Board (2002) for a thorough description of the systems approach. See also Stewart and Schenewerk (2004) for a discussion of the systems approach for citrus from Argentina.

According to Stewart and Schenewerk (2004), the use of the systems approach is not popular with US domestic industry, which disputes its scientific relevance and capacity to protect against foreign pest invasion. They further contend that APHIS's use of a systems approach does not allow an opportunity for domestic producers to participate in the evaluation of the planned measures (including whether they are scientifically based), and that there is no system of compensation to domestic producers in case of faulty risk assessment.

2.4 Cooperation Agreements and the Commodity Pre-Clearance Program (CPP)

Preclearance consists of ensuring that exports meet the criteria for admission to the US market before shipment. Therefore, screening and treatment of FF&V exports are performed by APHIS agents in the exporting country. Like the systems approach, preclearance of commodities in the country of origin has been in use, albeit on a limited basis, for some time. Preclearance is both seen as a means to mitigate pest risks in countries that lack the technical capacity to have eradication programs (National Plant Board, 2002) but also to speed up the export process, as problems can be tackled at the source.

Before any preclearance program can be implemented, APHIS and the exporter (the foreign government or producer) must agree to a "Cooperative Service Agreement", renewed every year, establishing the terms and conditions that must be met prior to the implementation of a CPP. The preclearance program operates on the basis of full recovery of APHIS's costs. The country of origin or the private export group is required to provide funds in advance (annually) under a trust fund agreement (USDA, 2002).

Like the systems approach, preclearance programs are presented as a facilitating measure, and indeed they can be voluntary. For instance, Jamaica initiated a preclearance program in

1984. From 1984-1995, the program was co-sponsored by the Ministry of Agriculture and Fisheries in conjunction with the United States Agency for International Development (USAID). Then, the Jamaica Exporters' Association (JEA) took over for the period 1995-2001, and since April 2001, the Ministry has independently funded the program. In 2011, Jamaica had a list of 52 horticultural commodities with a preclearance program. In 2004 APHIS had voluntary preclearance programs in place in 16 countries.[15] However, preclearance programs and consequently trust fund agreements are also mandated for certain exports.

Implementing a preclearance program is a complex procedure, which is closely monitored by APHIS from the official exporting country proposal stage onwards (USDA, 2002). Preclearance includes notably the construction of a dedicated treatment facility that must operate according to APHIS specifications, and requirements regarding the location and accessibility of the facility. However, the mere existence of costs is not sufficient to conclude that this approach contravenes the WTO SPS Agreement, according to which such measures should be the least trade restrictive measure assuring the required level of plant safety.

If preclearance can be described as a way to create and facilitate trade, the corollary is that countries' capacity to enter and implement a cooperation agreement with APHIS for preclearance becomes a determinant of market access to the US. Capacity is a crucial issue, however, as many exporters of agricultural products are developing countries, which suffer from budget constraints and sometimes a lack of support by the government to the

[15] USDA APHIS (2004). No more up to date voluntary list is available. The list can be accessed at: http://www.flegenheimer.com/documents/aphis.pdf (last accessed 4/26/2014).

development of agricultural exports. Both factors can be an impediment to the implementation of preclearance measures.[1617]

In conclusion, measures such as the systems approach and cooperation agreements/pre-clearance, while offering in limited instances alternative options to exporters to access the US market, do not appear to really ease to a significant extent the burden on countries seeking this access. SPS facilitation measures still impose significant implementation delays, added costs and constraints on exporters, and thus it looks doubtful that such measures are designed to truly facilitate trade across the board. In the absence of exact information on the use of the systems approach and preclearance, it is difficult to assess the added market access provided by these measures and come to a clear conclusion. However, in the light of the evidence presented in the remainder of this paper, we see that additional access to the US market to new suppliers is actually limited. Facilitation measures seem driven by an extremely cautious opening of the US market in response to increased consumer demand for FF&V variety rather than unmitigated liberalization.

These measures also reveal two important traits of the promoters of the actual system: the opposition by domestic producers to measures that offer flexibility; and a conception of flexibility by the agencies that equates to indeed offering less rigid options but at greater compliance cost for foreign exporters.

[16] In the Philippines, an article from the press assesses the running cost (i.e. not including establishment of the treatment facility) of inspection for Mangoes, including the presence of three APHIS inspectors, is quoted to amount to over $142,000 for a period of 5 months in 2007: http://www.gmanews.tv/story/32476/US-importers-look-to-less-costly-RP-mangoes

[17] In Haiti In the early 1990s, Haitian mangoes exporters formed a national association of mango producers. One of the main functions of the association is to coordinate and raise funds for the hot water bath treatment required by APHIS.

3 Impacts of the US Market Access Regime

This section presents empirical evidence on the impacts of the US market access regime for FF&V, as described in the previous section. It first presents a new database on market access, which forms the basis of the analysis. It then examines US market access and global production, and finally puts results in comparative perspective, by looking at market access in other main global players in agricultural trade. The analysis is based on descriptive statistics, not a full econometric analysis, and is therefore subject to the usual caveat regarding intervening causes.

3.1 A Database on US Market Access for FF&V between 1994 and 2011

Beyond case-study evidence (including some persuasive contributions noted earlier), there is little systematic evidence available on the overall scope of US SPS measures and how they determine market access conditions. To remedy part of this information gap, we construct a database of access to the US market for the period 1994-2011 for FF&V. This database lists which countries are actually exporting to the US and which are authorized to export to the US market. As mentioned earlier, the US uses a positive list approach for phytosanitary protection when granting market access to its territory: by law, foreign FF&V are not allowed to enter the US market unless they have been expressly authorized.

Identifying which products have been cleared to enter the US is actually a surprisingly complex task. As noted earlier, all new market access since 1992 requires an individual regulation or a notice-based process. As a result, all new market access appears in the Federal Register as well as in the Code of Federal Regulation. However, products that were granted permits to export to the US before 1992 were not always listed in the CFR. APHIS, the agency administering access to the US market for FF&V, tried to amend the regulation so

as to add the missing products. However, it still refers to the list as "partial" in the last 2007 reform, preventing us from directly using this list for the construction of a market access panel database. We address this deficiency by using information available in the Fresh Fruits and Vegetables Import Manual FAVIR Database, which allows searching for currently authorized fruits and vegetables by commodity or country, and provides information on general requirements for their importation.[18]

We use Jouanjean's (2012) backward-looking method using the information available in the FAVIR database in 2011 as our baseline. We can then go back in time and remove products according to the date on which they became eligible according to Federal Registers. The U.S Government Printing Office (GPO) makes all Federal Registers and Codes of Federal Regulation since 1994 accessible and searchable on-line.[19] We were therefore able to gather all APHIS-related notices: availability of a PRA, proposed and final rules for the importation of fruits and vegetables (grouped or standalone), and other amendments relative to products already eligible (changes in pest free areas, treatment, or areas of accessibility in the US). We also include in the database products that had once been granted access to the US market but which were subsequently removed. Those products do not appear in the 2011 FAVIR database. Lemons and other citrus from Argentina are an example. However, such situations are unusual.

Another issue is that neither the FAVIR database nor the Federal Register notices mention any product codes. Both instead refer to the product's scientific definition. Thus, in order to compare this database with UN-COMTRADE trade flows, we manually recoded all products according the HS 6-digit scheme.

[18] http://www.aphis.usda.gov/favir/info.shtml. Last accessed: June 22nd 2011.
[19] http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR

We limit our analysis to US continental market access. Many products that are not allowed into the continental US are actually allowed into US territories, and vice versa. Access to US territories represents very small trade flows but a non-negligible amount of commodity-country market access, and because of their geographical situation, they represent very different environments. We therefore exclude US territories from this analysis.

The result of this data collection effort is a panel database of US market access for FF&V. It covers 57 products at the HS 6-digit level for 194 countries, for the period 1994-2011, for a total of 69,225 observations.

3.2 US Market Access and Global Production

We first proceed to counting eligibility to enter the US market in order to assess how open or closed the US market for FF&V is. Using data supplied by the USDA Economic Research Service, we list for key categories of FF&V the number of exporters eligible to enter the US market, and compare this with the actual number of exporters entering the US for the year 2009. We also offer a comparison with the number of exporters to Europe (Tables 1 and 2).

First, the number of countries eligible to enter the US market is often only a fraction of the world's production and export supply, although in a few cases (garlic, mushrooms, onions, grapes, and strawberries) nearly all of the world's exporters have access to the US. On the other hand, there are several instances where less than a third of the world's exporters in volume are allowed entry into the US (artichokes, pumpkins and squash, sweet potatoes, apricots, cherries, dates, figs, and peaches). Only 1% of the world's exporters of figs and dates can ship to the US.

Tables 1 and 2 also take product level COMTRADE data and match it to market access eligibility from our database.[20] They show that the number of active exporters is generally lower than the number of eligible countries. This is to be expected to some extent because all eligible countries may not be able to export to the US in a given year, depending on many factors such as prices, production, and demand in other markets. However, in numerous instances the number of actual exporters to the US is much lower than the theoretical number of potential exporters: for instance only three countries export cauliflower to the US, four export spinach, four export strawberries, and four export avocados. This is despite the fact that the US market is theoretically open to a large portion of the world's exports for these products. For avocado, one of the reasons is that, although a fairly large number of exporters seems to have access to the US market, this access is restricted to specific varieties of avocado and very few countries can export the most consumed Haas variety. Moreover exports take place under stringent conditions and complex systems approaches, as previously mentioned for Mexico. It is important to note that this table makes the distinction between access to US territories and access to the continental US market.

We can infer that two levels of potential market access restrictions are at play from the above information. First, market access eligibility is available only to a small portion of the world's exporters. Second, actual market access is not even fulfilled by all those exporters that are eligible to export in the first place, suggesting possible further difficulties in complying with US requirements once market access eligibility is granted. Of course, the gap between actual and potential exporters could be explained by other factors, such as trade costs.

[20] We use HS6 data which is not perfectly matched to FAOSTAT data. Note for instance that some HS6 codes include dried fruits, which explains why we count respectively 14 and 16 countries exporting to the US when only 4 and 2 are allowed for the fresh fruit.

3.3 US FF&V Market Access in Comparative Perspective

If the restrictiveness of the US FF&V market access system in fact inhibits countries from exporting, we would expect to see fewer exporters to the US than to comparator markets with less restrictive systems, such as the EU with its negative list approach.

Using UN-COMTRADE trade flows at the HS 6 digit level, we compare the evolution of the number of active suppliers (measured at the country-level) of FF&V in the world, to the number of active foreign exporters to the US, a simple measure of whether access to the US market has followed similar patterns to that of the rest of the world over recent years.

Figure 1 presents a simple average of the total number of suppliers per product across the products that are covered by the regulation governing access eligibility and listed in our market access database. Overall market access has increased significantly over the period, but there is a wide discrepancy of evolution between US market access and the rest of the world: while the average number of suppliers to the world has nearly doubled over the period, the average number of FF&V suppliers to the US has on the other hand risen very slowly, even stagnating in the second half of the sample period. This comes somewhat as a surprise, since the US reformed its admissibility system twice during this timeframe, and imports of FF&V to the country increased robustly over the period (see e.g. Johnson, 2010).

There are two possible explanations for this observation. Either the US market was already more open to FF&V imports than other countries to begin with, or on the contrary, access to the US market for FF&V remains relatively more restricted or less accessible to new exporters. There are reasons to doubt the first explanation by simply looking at the number of exporters to the US, which at about 10 on average seems low by any standard, and is far

below the more than 110 countries on average exporting any FF&V across the world, which we take as approximating the maximum theoretical number of foreign suppliers to the US.

Although these findings are indicative of significant market access difficulties in the US, the possibility remains that this issue is not unique to that market, and that a similar situation prevails in the other main agricultural importers. Strict standards and regulations are after all common to most developed country markets, and the exactitude of US requirements is not the only source of complaints from prospective exporters.

A further comparison with the number of actual exporters to the EU 15 reveals that save for a handful of exceptions, exports to the EU 15 attract a far larger number of exporters than do exports to the US (Figure 1 and Tables 1&2). The difference is sometimes enormous such as carrot exports, where 35 countries supply the EU 15[21] but only 6 do so to the US. The comparison with the EU is especially interesting as the EU 15 market is relatively similar in size, income, and presumably consumer and producer preferences regarding the appropriate (high) level of health and plant standards. However, there are also important differences that could act as intervening causes. Areas in which the US and EU 15 differ markedly include domestic production of fruits and vegetables, geographical access, historical ties with other producing countries, and of course SPS systems. It would seem reasonable to assume that the US having more areas of production of warm climate fruits and vegetables would have more domestic competition for imports. Although this is indeed a relevant factor, we see that even when US imports are equal to or significantly larger than EU ones in value, the number of suppliers is smaller: tomatoes, cucumbers, cranberries, and blueberries offer relatively striking examples (Tables 1 & 2). Even though it is true that the US market is

[21] Excluding intra-EU trade.

further away from potential suppliers than the EU, geographical distance seems unlikely to be the sole relevant factor behind these significant differences in market penetration.

Furthermore, since we are also looking at a trend over a time period of nearly two decades in figure 1, we have here a simple way to control for those factors not related to the SPS-regime that would affect the levels of access to each respective market (such as geographic distance, production conditions, common language and historical trading relations) that do not vary significantly over time.[22] Thus *prima facie* evidence suggests strongly that the difference in SPS systems, and in particular between the negative list approach favored by Europe and the positive one used by the US, is probably a key factor.

To extend the comparative exercise, we next look at the number of suppliers to the US market and to three other OECD countries: Canada, Australia, and Japan (Table 4. Two of these countries have much smaller market sizes compared to the US and Europe; Japan has an intermediate market size. We also know that two of these countries, Japan and Australia, have the reputation of being restrictive where agricultural products are concerned, at least in the case of SPS measures for Australia. The table seems to confirm this view: the number of exporters to Australia and Japan is often significantly lower and nearly systematically lower than comparable numbers for the US. Although Australia is a smaller market – and also geographically distant – and so less likely to attract a large number of exporters, Japan is a large and rich market, so more exporters are expected. This may be indicative that market access to the US, although complex, is not the most restrictive out there.

[22] While production conditions do indeed vary over time, some fundamental endowments such as historical climate, land characteristics remain stable. Climate conditions have probably changed over the period but likely in many different ways for the various products we examine so that we can consider it not affecting the difference between the two trends.

More telling, however, is the comparison with Canada, which is closely related to the US in terms of preferences and geographical access. Despite the many similarities between the two markets, the number of exporters to Canada is much higher than to the US, notwithstanding the former's smaller market size. Arguably, Canadian agricultural production is unlikely to compete with imports in some of these sectors. Nonetheless, the number of exporters to Canada is often comparable to the number serving the EU market, which may be indicative of an SPS regime that achieves similar objectives.

Finally, we seek to investigate how newly granted market access shapes the distribution of imports across origins. In order to do so we measure how new 'entrants' (defined here as country of origin; entrants are actually firms that are exporting to the US) fare in terms of the share of total exports to the US. For this we calculate the concentration of shares of total exports using the Hirschman Herfindahl Index (HHI) a widely accepted and simple measure of concentration: the lower the HHI index the lower the concentration.[23] The evolution of the average HHI across all FF&V for exporters to the US and the EU is presented in figure 2. The figure is interesting in several respects. We first see a decrease of the average HHI index in the US. This is not really a surprise since we know that market access has been granted to more countries over the period and more exporters would mean that exports to the US are distributed over a larger number and thus likely to translate into less concentration of import market shares. We see also that the decrease in the HHI (lesser concentration of exports) is more important for the US than for Europe. However, the US was starting from a much lower base and still its HHI index shows only a modest improvement, from about 0.65 to 0.58 (in 2002, the HHI actually increases again).The gap compared to Europe is still very

[23] We calculate $HHI = \sum(X_i/X_w)^2$ where X_i and X_w are country *j*'s export and total exports to the US respectively.

significant, with Europe having an average HHI of 0.29 in the lowest year. To give an order of comparison, if two exporters have equal market share of 50% of exports, the HHI would be 0.5. A HHI of 0.6 means that one of the exporters has at least a market share of 72%, which in the absolute is very high. The conclusion is that since the index for the US does not fall that much, and remains at a very high level, exporters with already a large share of exports to the US do not lose that much market share to new entrants. This suggests niche entry and may also suggest that the SPS system is so strict that it allows only marginal varieties. For instance, Haiti a leading producer of mangoes has only one variety (called Madame Francisque) accepted into the US, among many varieties produced there.

4 Does Lobbying Play a Role in Determining FF&V Market Access?

The previous section provided suggestive evidence that the US market access regime for FF&V is relatively restrictive, both in terms of the proportion of global production that is authorized to enter the country, and in relation to comparator markets. In theory at least, the US system is set up for public good reasons: the prevention of damage from quarantine pests. However, the complexity of the eligibility system means that it is possible for political economy considerations to play a role at various stages in the process, as demonstrated by case studies such as Hass avocadoes and Argentinean citrus. Using the FF&V market access database described in the previous section and data on political economy variables, this section presents some suggestive evidence to the effect that lobbying is indeed a factor in the determination of the grant of market access. The US FF&V market access system appears to be about protectionism, as well as protection.

A first piece of evidence comes from data on political contributions as an indicator of lobbying behavior. Grossman and Helpman (1984) show that protection rates should be higher in organized industries—i.e., those with lobbies—than in unorganized ones. Empirical tests of the Grossman and Helpman (1984) model such as Goldberg and Maggi (1999), and Gawande and Hoekman (2006) in the agricultural context, use sectoral political contributions as a proxy for the existence of a lobby: sectors with positive contributions are considered to be organized, and those with zero contributions are considered to be unorganized. We adopt that approach here, using data on political contributions from Political Action Committees (PAC) database made available by the U.S. Federal Action Commission (FEC). The database lists each committee registered with the Federal Election Commission and their spending. Data from 2007 were downloaded from the FEC website. Among committees specifically relating to agriculture and in particular to the FF&V sector, we can identify two types of organizations. The first relates to farm bureaus, cooperatives or lobby groups on FF&V at large. We do not have the necessary information to know whether those lobbies were directing their action towards any specific product at the HS 6-digit scale. Therefore, information on those PACs can only be used in empirical analysis at more aggregated levels. The second type of lobby is much more specific and relates to a restricted set of HS 6-digit products or even sometimes to one single product line. Only this set of PACs is considered in this analysis. The data are mapped to the HS 6 digit product lines in the market access database.

Given that the US adopts a positive list approach to FF&V market access, it would be evidence of political economy effects at play if the number of approved countries were to be lower in organized sectors than in unorganized ones. Indeed, that is exactly what we find in the data. Table 5 shows descriptive statistics for organized and unorganized sectors in 2007.

We find that, on average, only about half as many countries are approved exporters to the US in organized sectors compared with unorganized sectors. The difference between the two means is statistically significant at the 1% level, based on a t-test. To show that the difference in means is not solely a function of skewness in the distributions, we also compare medians: for organized sectors, the median number of authorized exporters is 22, whereas for unorganized sectors it is 46. The difference of medians is again statistically significant at the 5% level. The range for organized sectors is also much narrower, with a maximum of only 76 countries compared with 225 for unorganized sectors. All of these descriptive statistics support the view that political economy plays a role in the determination of market access for FF&V in the US.

The political economy literature outside the Grossman and Helpman (1984) framework identifies other variables that can be indicators of lobbying activity. One possibility is the concentration of production across firms (farms), on the theory that a higher degree of concentration is more likely to give birth to lobbying activity because it is easier for a small number of large operators to overcome the transaction costs involved in establishing a lobby. Based on this approach, we would expect to see a negative correlation between farm-level production concentration (sourced from the US Census Bureau)[24] and the number of countries with market access to the US in FF&V sectors. Figure 3 shows that this is exactly what the data suggest: the line of best fit is downward sloping, and the negative correlation is statistically significant at the 10% level.

[24] https://www.census.gov/

5 Conclusion and Policy Implications

This paper has shown that US phytosanitary measures that are primarily designed to protect plants from pests represent a significant market access barrier in the FF&V sector, particularly for developing countries where the human, technical, and financial resources needed for compliance may be lacking. US market access is restricted in terms of the number of countries authorized to export FF&V: the evolution over time of new entry into the US market has been slow, and far fewer countries are allowed to export FF&V to the US than to comparable third markets, such as the EU, or even Canada. Although traditional trade policies and geographical factors also play some role in the number of exporters actively engaged with different markets, the preliminary evidence suggests that phytosanitary measures also play an important role. In particular, the "positive list" approach applied by the US—which bans all FF&V imports except from explicitly authorized countries—amounts to a costly and often prohibitive non-tariff barrier for many developing country exporters.

One important caveat to our results is that we do not observe the "chilling effect" of the US regime, namely the way in which it discourages potential exporters from even applying for market access. Similarly, we do not observe applications that were made but which failed. We only observe the final outcome, which is the number of countries that have market access as of a particular date. With those constraints in mind, the data nonetheless show a significant market access problem in the sectors covered by US phytosanitary measures.

We have also shown that one potential explanation for the restrictiveness of the US regime in practice is the considerable space it leaves for the intrusion of domestic political economy considerations into what should be a process driven primarily by science. There is

considerable anecdotal evidence on this point already, such as the role of US producers in restricting market access for Mexican avocadoes and Argentinean citrus. This paper has provided suggestive, but systematic, evidence that market access tends to be more restricted in sectors that make political contributions as opposed to those that do not. It has also demonstrated a negative correlation between domestic production concentration at the farm-level, and the number of foreign producing countries granted access by US authorities. Both pieces of evidence tend to suggest that organized sectors may be using the phytosanitary regime as a way of insulating themselves from foreign competition—an outcome that is quite contrary to the spirit of the SPS Agreement.

Although the policy debate on SPS measures has primarily focused on those instruments designed to protect human health, the present paper suggests that the discussion needs to be broadened to include phytosanitary measures as well. Indeed, developing country exporters often indicate that plant protection issues represent more of a barrier to their exports than food safety concerns. Future research could usefully explore this issue, focusing in particular on the strategies successful developing country exporters have adopted to deal with phytosanitary concerns in developed country markets, including the US.

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Table 1: New market access according to the new notice-based approach

Year	Country	Product	Notice of decision to issue permits	
2007	Ghana	Eggplant	72 FR 59239 - Notice of Decision To Issue Permits for the Importation of Eggplant and Okra From Ghana	Federal Register. Notices. Notice. Friday, October 19, 2007.
		Okra	72 FR 59239 - Notice of Decision To Issue Permits for the Importation of Eggplant and Okra From Ghana	
	Kenya	Baby Corn	72 FR 59239 - Notice of Decision To Issue Permits for the Importation of Husked, Silk-Free Baby Corn From Kenya	
		Baby Carrots	72 FR 59240 - Notice of Decision To Issue Permits for the Importation of Peeled Baby Carrots From Kenya	
	South Africa	Blackcurrants	72 FR 59241 - Notice of Decision To Issue Permits for the Importation of Ribes Species Fruits From South Africa	
2008	Panama	Rocket	73 FR 839 - Notice of Decision To Issue Permits for the Importation of Arugula Leaves With Stems From Panama	Federal Register. Notices. Notice. Friday, January 4, 2008.
	Autralia	Cherries	73 FR 5495 - Notice of Decision to Issue Permits for the Importation of Sweet Cherries From Australia	Federal Register. Notices. Notice. Wednesday, January 30, 2008.
	South Korea	Dropwoth leaves	73 FR 14956 - Notice of Decision To Issue Permits for the Importation of Dropwort Leaves With Stems from South Korea	Federal Register. Notices. Notice. Thursday, March 20, 2008.
	Vietnam	Pitaya	73 FR 44216 - Notice of Decision To Issue Permits for the Importation of Dragon Fruit From Vietnam	Federal Register. Notices. Notice. Wednesday, July 30, 2008.
	Mexico	Guavas	73 FR 60673 - Notice of Decision To Issue Permits for the Importation of Guavas From Mexico	Federal Register. Notices. Notice. Tuesday, October 14, 2008.
	Senegal	Asparagus	73 FR 77594 - Notice of Decision to Issue Permits for the Importation of Fresh White Asparagus From Senegal	Federal Register. Notices. Notice. Friday, December 19, 2008.
2010	Chile	Pomegranate	75 FR 26707 - Notice of Decision to Issue Permits for the Importation of Fresh Pomegranates and Baby Kiwi From Chile	Federal Register. Notices. Notice. Wednesday, May 12, 2010.
		Baby Kiwi	75 FR 26707 - Notice of Decision to Issue Permits for the Importation of Fresh Pomegranates and Baby Kiwi From Chile	
	Israel	squash flower	75 FR 29309 - Notice of Decision to Issue Permits for the Importation of Fresh Male Summer Squash Flowers From Israel	Federal Register. Notices. Notice. Tuesday, May 25, 2010.
	Panama	Coriander	75 FR 34687 - Notice of Decision to Issue Permits for the Importation of Fresh False Coriander From Panama	Federal Register. Notices. Notice. Friday, June 18, 2010.
	Pakistan	Mango	75 FR 52712 - Notice of Decision To Issue Permits for the Importation of Fresh Mango Fruit From Pakistan	Federal Register. Notices. Notice. Friday, August 27, 2010.
	Mexico	Sweet lime	75 FR 56981 - Notice of Decision To Issue Permits for the Importation of Sweet Limes From Mexico	Federal Register. Notices. Notice. Friday, September 17, 2010.
	United Kingdom	Wall rocket leaves	75 FR 71415 - Notice of Decision To Issue Permits for the Importation of Wall Rocket Leaves From the United Kingdom	Federal Register. Notices. Notice. Tuesday, November 23, 2010.
2011	Jordan	Strawberries	76 FR 8997 - Notice of Decision To Issue Permits for the Importation of Fresh Strawberries From Jordan	Federal Register. Notices. Notice. Wednesday, February 16, 2011.
	Chile	Fig	76 FR 18511 - Notice of Decision To Issue Permits for the Importation of Fresh Figs From Chile	Federal Register. Notices. Notice. Monday, April 4, 2011.
	Malaysia	Rambutan	76 FR 21854 - Notice of Decision To Authorize the Importation of Fresh Rambutan Fruit From Malaysia and Vietnam	Federal Register. Notices. Notice. Tuesday, April 19, 2011.
	Vietnam	Rambutan	76 FR 21854 - Notice of Decision To Authorize the Importation of Fresh Rambutan Fruit From Malaysia and Vietnam	
2012	Colombia	Arugula	77 FR 29588 - Notice of Decision To Issue Permits for the Importation of Fresh Celery, Arugula, and Spinach From Colombia	Federal Register. Notices. Notice. Friday, May 18, 2012.
		Celery	77 FR 29588 - Notice of Decision To Issue Permits for the Importation of Fresh Celery, Arugula, and Spinach From Colombia	Federal Register. Notices. Notice. Friday, May 18, 2012.
		Spinach	77 FR 29588 - Notice of Decision To Issue Permits for the Importation of Fresh Celery, Arugula, and Spinach From Colombia	Federal Register. Notices. Notice. Friday, May 18, 2012.
2013	Egypt	Strawberry	78 FR 13304 - Notice of Decision To Issue Permits for the Importation of Strawberry Fruit From Egypt	Federal Register. Notices. Notice. Wednesday, February 27, 2013.

Table 1: Exports of fresh vegetables eligible for importation into the United States.

	Countries eligible to export to the United States		Eligible production and exports as % of world total volume 1/		Number of eligible countries within top 10		2009 Exports to European Union and United States: 5/				
Commodity	Total number of countries 2/	Number of low- and middle-income countries 3/	Production 4/	Exports 4/	Producers 4/	Exporters 4/	No. of exporters to EU	EU imports in '000 USD	No. of exporters to US	US imports in '000 USD	HS Code
Artichokes	32	24	26	24	4	2	nd	nd	nd	nd	70910
Asparagus	38	23	6	70	3	3	30	161,066	10	500,923	70920
Bell pepper	37	19	17	78	4	5	75	407,926	21	993,246	70960
Broccoli and cauliflower	51	23	12	56	4	8	27	2,963	3	10,569	70410
Brussels sprouts	51	23	nd	nd	nd	nd	10	2,201	3	7,396	70420
Cabbage and other brassicas	55	23	13	46	2	7	39	20,899	10	169,220	70490
Carrot	54	26	23	45	3	4	35	37,973	6	56,679	70610
Celery	23	13	nd	nd	nd	nd	15	2,873	4	17,940	70940
Cucumber	53	19	8	75	2	5	27	35,489	8	393,502	70700
Eggplant	39	20	2	60	1	4	48	16,334	10	70,734	70930
Escarole	7	3	nd	nd	nd	nd	16	4,045	8	2,879	70529
Garlic	101	56	93	97	6	9	22	161,975	13	138,808	70320
Green bean	47	24	17	57	4	5	54	422,337	15	89,021	70820
Lettuce	51	23	15	67	3	5	19	8,857	5	79,118	70511
Mushroom	126	70	98	98	9	9	16	267	14	107,485	70951
Mustard greens	30	15	nd	nd	nd	nd	nd	nd	nd	nd	nd
Okra	42	23	3	nd	1	nd	98	298,303	31	470,404	70990
Onion	98	56	68	98	9	9	29	100,292	15	9,713	71220
Potato	9	4	0	0	0	1	15	851	9	1,661	71010
Pumpkin and squash	8	3	5	28	0	2	see okra				
Radish	30	17	nd	nd	nd	nd	36	6,261	18	21,692	70690
Spinach	37	17	7	0	3	3	25	3,343	4	10,708	70970
Sweet corn	47	27	nd	nd	3	1	18	11,856	13	25,918	71040
Sweet potato	25	8	2	15	1	2	37	53,945	12	9,486	71420
Tomato	36	15	11	47	1	2	44	572,364	12	1,879,534	70200
Turnip greens	21	13	nd	nd	nd	nd	see carrots				

nd=no data. 1/ Represents an upper bound since FAO reports production and statistics for nations as a whole, though in some cases only specific regions of a country may be eligible to export to the United States. 2/ Countries eligible to export each commodity to the United States as of June 2010 according to USDA Animal and Plant Health Inspection Service regulations. 3/ According to country classification developed by World Bank for 2010. 4/ World production and export data for 2007 from the United Nations Food and Agriculture Organization, FAOSTAT. 5/ based on HS classification.
Sources: Based on a table produced by the USDA, Economic Research Service, http://www.ers.usda.gov/Data/FruitVegPhyto/ and COMTRADE data

Table 2: Exports of fresh fruits eligible for importation into the United States

	Countries eligible to export to the United States		Eligible country production and exports as a percent of world total volume 1/		Number of eligible countries within top ten		2010 Exports to European Union and United States: 5/					
Commodity	Total number 2/	Low- and middle-income countries 3/	Production 4/	Exports 4/	Producers 4/	Exporters 4/	No. of exporters to EU	EU imports in '000 USD	No. of exporters to US	US imports in '000 USD	HS Code	notes
Apples	17	11	15	44	3	4	32	730,134	9	212,700	80810	
Apricots	10	6	5	5	1	0	20	37,300	5	5,256	80910	
Avocado	29	11	52	75	3	5	33	403,682	4	616,536	80440	6/
Bananas	75	48	31	73	4	6	47	3,673,086	24	2,126,108	80300	6/
Cantaloupe and Honeydew	44	19	18	88	3	8	42	320,608	13	286,730	80719	
Cherries	6	3	5	19	0	0	20	174,699	9	82,987	80920	
Cranberries and Blueberries	39	24	nd	nd	nd	nd	28	122,987	12	453,966	81040	
Dates	2	1	0	1	0	0	42	187,357	16	18,503	80410	6/
Figs	4	1	1	1	0	1	31	144,278	14	14,742	80420	6/
Grapefruit	43	23	39	45	2	2	33	334,438	6	2,307	80540	6/
Grapes	54	28	74	90	7	8	34	1,329,021	10	1,464,390	80610	
Kiwi	12	3	95	82	7	5	17	282,393	8	71,672	81050	
Lemons and Limes	59	31	40	69	4	6	51	536,753	18	235,420	80550	
Mango	27	16	61	82	5	9	62	359,254	22	345,355	80450	8/
Olives	2	1	0	0	0	0	10	364	6	40,929	71120	7/
Oranges	45	25	30	70	2	6	45	740,952	16	119,182	80510	6/
Papayas	32	20	37	71	3	5	43	68,911	11	98,568	80720	6/
Peaches	15	8	7	13	1	3	23	69,257	4	85,256	80930	6/
Pears	14	8	9	39	2	3	26	351,206	8	96,323	80820	9/
Pineapple	72	50	65	76	6	7	43	746,987	21	585,167	80430	6/
Plums	15	11	8	36	1	3	25	124,162	10	49,392	80940	
Raspberries and Blackberries	20	11	nd	nd	nd	nd	25	263,497	21	79,868	81120	
Strawberries	91	47	83	94	7	8	23	89,784	4	225,506	81010	
Tangerines	43	23	21	62	3	4	34	393,824	11	252,103	80520	
Watermelons	11	5	5	37	2	2	35	84,484	8	268,153	80711	

nd=no data. 1/ Represents an upper bound since FAO reports production and statistics for nations as a whole, though in some cases only specific regions of a country may be eligible to export to the United States. 2/ Countries eligible to export each commodity to the United States as of June 2010 according to USDA Animal and Plant Health Inspection Service regulations. 3/ According to country classification developed by World Bank for 2010. 4/ World production and export data for 2007 from the United Nations Food and Agriculture Organization, FAOSTAT. 5/ based on HS classification 6 digit. 6/ fresh and dried. 7/ incl. provisionally preserved. 8/ incl. guava and mangosteen. 9/ incl. quince.
Sources: Based on a table produced by the USDA, Economic Research Service, http://www.ers.usda.gov/Data/FruitVegPhyto/ and COMTRADE data

Table 3:

		Australia		Canada		European Union		Japan		United States		
HS Code	**Product Description**	No.	Value in 1000 USD	No.	Value in 1000 USD	No.	Value in 1000 USD	No.	Value in 1000 USD	No.	Value in 1000 USD	
80300	Bananas, including plantains, fresh	10	757	53	354,614	47	3,673,086	10	844,749	24	2,126,108	
80610	Fresh grapes	1	19,156	27	391,660	34	1,329,021	5	28,371	10	1,464,390	
70200	Tomatoes, fresh or chilled.	1	4,272	34	302,014	44	572,364	5	11,900	12	1,879,534	
70960	Fruits of the genus Capsicum or of	1	7,369	51	215,793	75	407,926	5	111,045	21	993,246	
80430	Pineapples	4	673	34	97,402	43	746,987	9	101,403	21	585,167	
80440	Avocados	1	34,223	30	80,209	33	403,682	4	120,702	4	616,536	
80510	Oranges	4	21,775	36	174,293	45	740,952	6	125,778	16	119,182	
80810	Apples			21	184,223	32	730,134	1	340	9	212,700	
71080	Other vegetables	24	16,092	43	42,878	57	354,339	32	259,753	44	465,368	
70990	Other vegetables	6	685	71	146,848	98	298,303	18	116,383	31	470,404	
80550	Lemons and limes	5	10,609	50	69,240	51	536,753	5	86,402	18	235,420	
80620	Grapes, dried	14	41,641	25	72,143	33	682,670	11	73,828	20	37,570	
80520	Mandarins (incl. tangerines and Satsuma)	4	3,470	36	166,036	34	393,824	6	16,421	11	252,103	
80450	Guavas, mangoes and mangosteens	12	2,230	51	62,879	62	359,254	13	47,130	22	345,355	
70920	Asparagus	9	8,386	33	73,860	30	161,066	15	74,951	10	500,923	
71140	Cucumbers and gherkins	4	1,698	7	1,089	10	29,123	7	15,554	8	6,252	
71332	Small red (Adzuki) beans (Phaseolus)	5	1,305	15	2,022	24	3,288	8	26,215	19	9,743	
71390	Other dried, shelled leguminous vegetables	14	655	38	5,298	49	7,307	6	470	20	26,170	
71010	Potatoes	7	312	10	1,159	15	851	7	23,337	9	1,661	
70110	Seed			2	3,000	10	544			2	22,890	
70890	Other leguminous vegetables	2	31	19	2,956	43	8,346	2	2,948	12	10,596	
71232	Wood ears (Auricularia spp.)	3	286	10	281	11	4,618	3	19,256	1	358	
71231	Mushrooms of the genus Agaricus	7	412	19	2,362	16	8,363	3	193	17	11,755	
71350	Broad beans (Vicia faba var. major)	2	9	19	363	30	10,282	9	7,404	16	3,865	
70529	Other fresh of chilled chicory			20	5,054	16	4,045	3	6,769	8	2,879	

15 most imported products

15 least imported products

70420	Brussels sprouts			11	8,071	10	2,201	4	108	3	7,396
80590	Other fresh or dried citrus fruit	4	96	33	1,470	33	6,778	2	8	11	1,977
70521	Witloof chicory (Cichorium intybus			5	1,338	3	46	3	2,258	8	5,108
81060	Durians	2	55	4	1,294	3	2,541	1	495	1	2,323
71151	Mushrooms of the genus Agaricus			3	27	1	1,498	1	2,496	1	32
71233	Jelly fungi (Tremella spp.)	2	53	3	300	7	749	1	696	1	47

Table 5: Descriptive statistics for the number of authorized exporters to the US in FF&V sectors, 2007.

	Average	Standard Deviation	Minimum	Maximum
With political contributions	28.667	22.157	2.000	76.000
Without political contributions	58.258	42.275	1.000	225.000

T-Test of equal means: 2.940, prob. = 0.998.

Chi-2 test of equal medians: 6.470, prob. = 0.011.

Figure 1: Total number of countries exporting FF&V to the US, the EU – 15, and the world, averaged by HS 6-digit product.

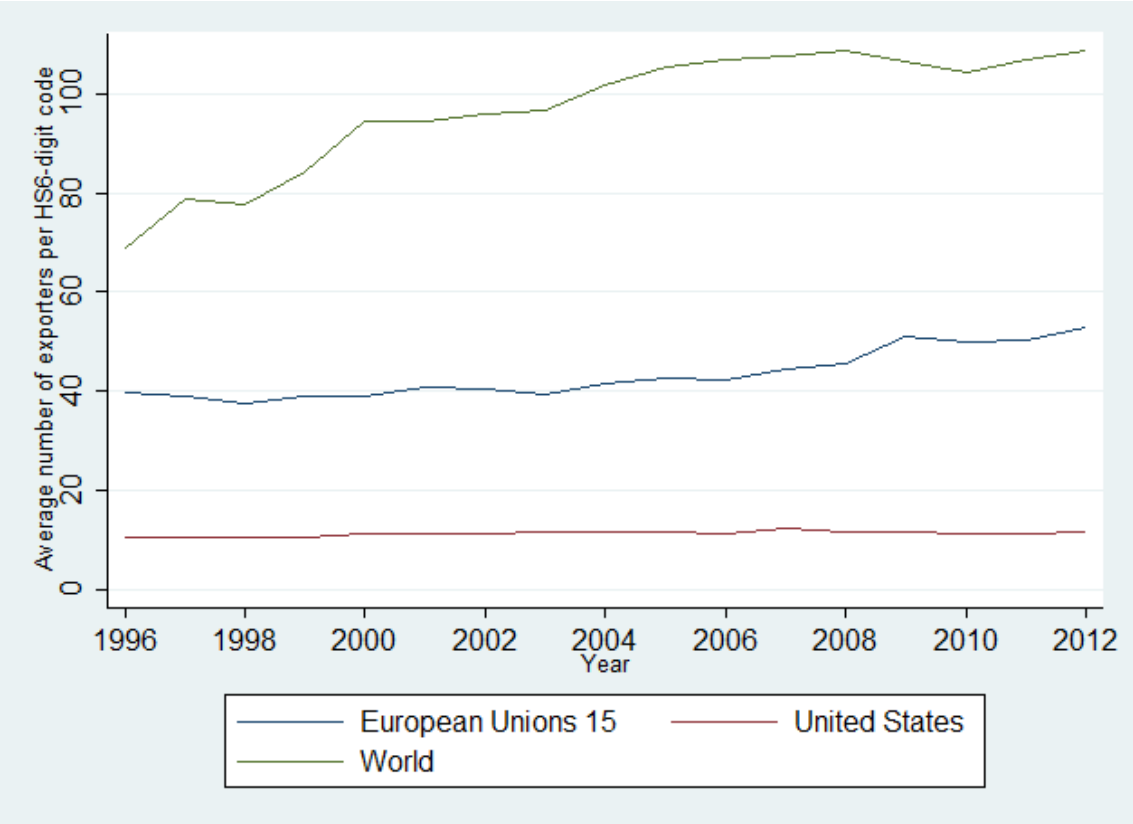

Figure 2. Evolution of average concentration of exporters to the U.S. for all FF&V (1994-2012)

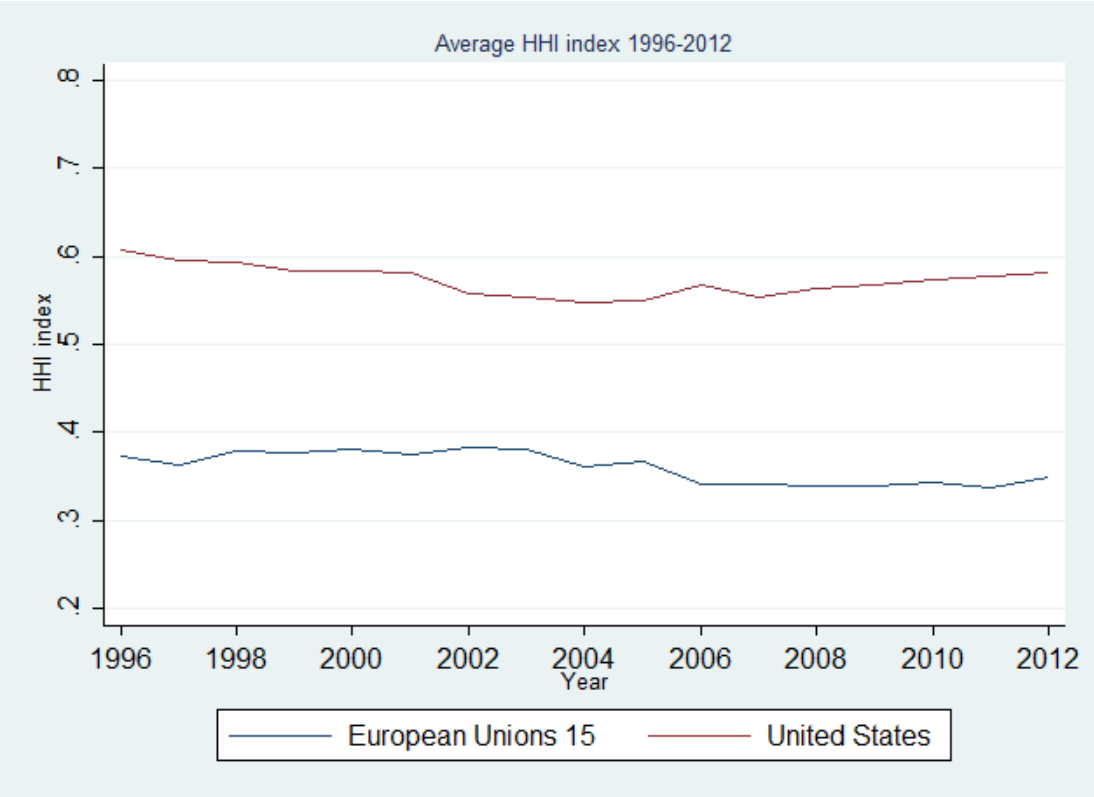

Figure 3: Correlation between market access eligibility and farm-level concentration of production in the US.