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The effect of product standards on agricultural exports ☆

Esteban Ferro [a,*], Tsunehiro Otsuki [b], John S. Wilson [c]

[a] DEC-TI The World Bank Group, 1818 H St. NW, Mailstop: MC3-303, Washington, DC 20433, United States
[b] Osaka School of International Public Policy, Osaka University, Japan
[c] The Center for Global Enterprise, New York, United States

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ABSTRACT

We introduce a standards restrictiveness index to analyze the impact that food safety standards have on international exports of agricultural products. Our new measure of standards restrictiveness is created using maximum residue levels of pesticides for 61 importing countries and 66 different products. The index accounts for both the number of pesticides regulated for each product and the allowable level for those pesticides by each importer. The findings suggest that more restrictive standards are associated, on average, with a lower probability of observing trade. However, after controlling for sample selection and the proportion of exporting firms in a gravity model, the analysis finds that the effect of standards on trade intensity in most cases is indistinguishable from zero. This is consistent with the assumption that meeting stringent standards increases primarily the fixed cost to export to a destination. Once a firm adjusts its production to comply with the standards of a foreign market, those standards do not impact the intensity of exports to that market. Finally, our results suggest that exports from developing countries are particularly constrained by stricter standards.

Introduction

The continual decline of tariffs as a result of multilateral trade negotiations and the proliferation of regional trade agreements have increased the relative importance of non-tariff measures (NTMs). Import conditions for food products defined by public and private standards continue to differ between countries despite international coordination and the development of multilateral regulations and common conformity assessments by international institutions. Typically, standards prescribe requirements for product characteristics, production processes and/or conformity assessment and are used to address information problems, market failure externalities, or societal concerns. In the context of agricultural trade, standards aim to ensure food safety and animal and plant health, but also extend to other quality and technical aspects of food products. Mandatory and voluntary requirements for imports are formulated by both governments and the private sector. In this paper we analyze the impact of agricultural regulatory/mandatory standards imposed by importing countries on products entering those markets.

According to WTO rules, countries are allowed to adopt regulations under the Sanitary and Phyto-Sanitary (SPS) and Technical Barriers to Trade (TBT) agreements in order to protect human, animal and plant health as well as environment, wildlife and human safety. TBTs commonly used in agricultural products are those that restrict the maximum levels of residues from pesticides. A pesticide residue is a very small trace of pesticide that sometimes remains on the treated crop. A maximum residue level (MRL) is the maximum amount of residue legally permitted on food. Once pesticides are demonstrated to be safe for consumers, MRLs are set by independent scientists, based on rigorous evaluation of each pesticide legally authorized. They act as an indicator of the correct use of pesticides and ensure compliance with legal requirements for low residues on unprocessed food. MRLs ensure that imported and exported food is safe to eat. In the EU, the default limit is 0.01 part per million (ppm), which means that for 100 metric tons of agricultural products, the agricultural chemical residuals cannot

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* Corresponding author.
E-mail addresses: eferro@worldbank.org (E. Ferro), otsuki@osipp.osaka-u.ac.jp (T. Otsuki), jwilson@thecge.net (J.S. Wilson).

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exceed 1 g. Countries choose the products they regulate, the pesticides they regulate for each product, and the MRL for a given product–pesticide pair.

Higher income countries are generally known for having stricter standards, particularly higher SPS standards. This normally occurs because higher income countries also have higher degrees of societal awareness and concerns about the standards of food they consume. There is evidence in the literature that wealthier households typically consume goods of higher quality.[1] Thus, standards tend to be more restrictive and demanding as a country's income rises. Fig. 1 confirms this statement with our data. It shows that the average number of standards per product increases with the GDP per capita of the importer.

There are two broad types of concerns regarding standards. Firstly, standards, especially regulatory standards, are sometimes more prescriptive or restrictive than they need to be to achieve the health and safety goals desired by the community. This limits the type and design of products that can be marketed and reduces incentives for innovation. Secondly, differing requirements between countries can result in substantial additional costs for producers and the exclusion of foreign firms from markets. Alternatively, there are potential opportunities provided by the evolving standards environment and the likelihood that certain developing countries can utilize such opportunities to their competitive advantage. From this perspective, many of the emerging public and private standards are viewed as a necessary bridge between increasingly demanding consumer requirements and the participation of distant (and international) suppliers. Many of these standards provide a common language within the supply chain and promote the confidence for consumers in food product safety. Jaffe and Henson (2004) suggest that compliance with food safety and agricultural health standards may well provide a powerful incentive for the modernization of developing country export supply chains and give greater clarity to the necessary and appropriate management functions of government. We take an agnostic approach and estimate the net effect (i.e., trade cost and demand enhancing effect) of standards on trade.[2]

The increase of SPS notifications has been highlighted in the latest WTO Committee overview of the SPS Agreement. The Committee reported that as of October 2011, the WTO had been notified of 10,366 regular and emergency SPS measures since January 1995 when the WTO was set up, with another 2980 additions, alterations or corrections to existing notifications. The US submitted over a quarter of the total of regular notifications since 1995 (2192), followed by Brazil (775), China (592) and Canada (567). Developing countries (including least-developed countries) now submit more notifications than developed countries. They broke through the 50% share in 2008 and now contribute about two thirds of notifications each year. Furthermore, the volume is rising. The latest update of the WTO Secretariat report says 2010 saw the largest number of notifications in a single year so far, at 1436.

Our study contributes to the literature in a number of aspects. First, we have created a time-series database of MRL import restrictiveness measures for 61 importing countries. To our best knowledge this is the first database of this type. Second, we introduce a measure of restrictiveness that takes into account all published MRLs for each importer–product pair in a given year. The closest measure in the existing literature is Li and Beghin (2014) which measure the deviation of MRLs for each importer–product–pesticide with respect to the CODEX standard. However, as shown in the next section, CODEX only regulates a limited

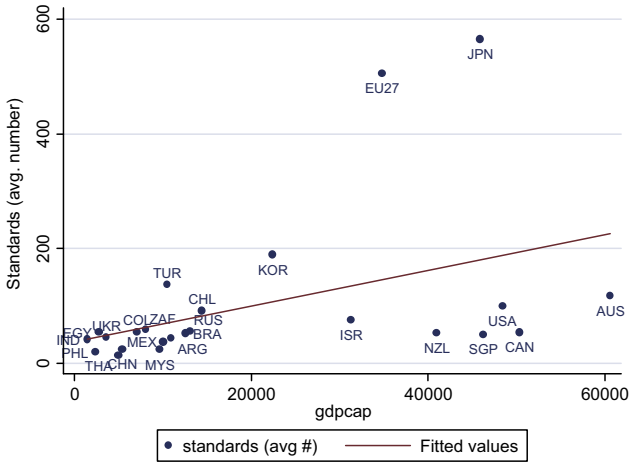

Fig. 1. Importers' income and standards.

number of product–pesticides pairs compared to individual countries, thus Li and Beghin (2014) miss an important portion of the heterogeneity in regulations. Third, our analysis includes 66 products and close to 1500 pesticides being regulated by one or more countries. This is in contrast to existing studies in the literature which analyze the effects of standards on one product, one pesticide, or one product–pesticide pair or at best, few selected products–pesticides pairs.[3] Drogué and DeMaria (2012) developed an index of (dis)similarity between importer and exporter countries without limiting their focus to those specified by CODEX, but they only considered standards effects on apples and pears. Moreover, their index is time-invariant, resulting in its confluence with importer–exporter fixed effects.

Our results robustly show that product standards on average negatively affect firms' decisions to export to a given destination market. The evidence in this paper is consistent with the Helpman et al. (2008; henceforth HMR) model where firms face a fixed cost to export. Firms need to comply with importers' standards which impose a fixed cost to firms that need to adjust their production processes in order to meet those foreign standards. Our results of the impact of standards on the intensive margin are less robust, and in most specifications the effect is indistinguishable from zero.

Data

In an effort to measure standards restrictiveness we have collected import markets' maximum residual limits of pesticides. Our source for this data is Agrobase-Logigram's Homologa database. Agrobase-Logigram collects monthly changes in allowable pesticides for approximately 61 importing countries. They obtain their information directly from each country's pertinent ministry and standardize it in terms of language, unit, and format.

Using this dataset we matched 243 agricultural products to their corresponding harmonized system (HS) codes at the six digit

[1] See for example Bils and Klenow (2001), Hallak (2006), and Broda and Romalis (2009).

[2] Xiong and Beghin (2014) disentangle these two effects. In this study we only look at the net effect of standards on trade.

[3] Otsuki et al. (2001) measure the impact of the EU's aflatoxin standards of cereals, dried fruits and nuts on imports from Africa. Wilson et al. (2003) used the gravity model to examine the impact of Tetracycline standard in beef. Sun et al. (2005) analyze Japan's Chlorpyrifos standard on China's vegetables export to Japan. Most recently, Chen and Findlay (2008) examines the impact of Chlorpyrifos MRLs standards on China's export of vegetables and the impact of Oxytetracycline MRLs on aquatic products. More recently Xiong and Beghin (2010) re-estimate Otsuki et al. (2001) with ex post data. Winchester et al. (2012) developed bilateral deviations measures of food safety regulations for importer–exporter–product–pesticide groups but their data was highly aggregated and with no time series. And Drogué and DeMaria (2012) analyze the impact of MRLs on apple and pear trade.