



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

## **ISO 22000: A NEW TOOL TO HELP FACILITATE INTERNATIONAL FOOD TRADE?**

Kathryn A. Boys<sup>a</sup>

Jason H. Grant<sup>a</sup>

<sup>a</sup>Dept. of Agricultural & Applied Economics  
Virginia Polytechnic Institute and State University  
Blacksburg, VA

*PRELIMINARY RESULTS: PLEASE DO NOT QUOTE*

*Selected Paper prepared for presentation at the Southern Agricultural Economics Association,  
2014  
SAEA Annual Meeting, Dallas, TX February 1-4, 2014*

*Copyright © 2014 by Kathryn A. Boys and Jason H. Grant. All rights reserved. Readers may  
make verbatim copies of this document for non-commercial purposes by any means,  
provided that this copyright notice appears on all such copies.*

## **INTRODUCTION**

The International Organization for Standardization (ISO) standards have long been touted as a facilitating tool in international business transactions. In 2005 ISO released a new family of standards for Food Safety Management systems. This standard family is intended to be used by firms throughout the food supply chain, regardless of their size, geographic location, and resource constraints. Firms certified to this standard must “demonstrate that they have the ability to control food safety hazards in order to ensure that food is safe at the time of human consumption” (ISO, 2013). Companies that become ISO 22000 certified must develop and document an extensive list of internal operational procedures and are encouraged to make ‘data-based’ decisions. As certification requires companies to be regularly reviewed by third-party auditors, current and potential customers are provided assurance that their suppliers do adhere to their stated internal procedures. As with other ISO business management standards, ISO 22000 certification may offer firms a common business language, reduce inter-firm information asymmetries, and minimize operational costs by mitigating the need for firms to individually audit their suppliers. Adoption of this standard has expanded quickly. As of December 2012, more than 23,000 firms in 142 countries were ISO 22000 certified (ISO, 2013).

While an extensive applied business literature has examined the benefits and costs of implementing various ISO standards, the extent to which these standards facilitate international commerce remains unclear. This is particularly true with ISO 22000, which was released only recently and is relatively narrow in focus (i.e., the agri-food sector) compared with other ISO business standards. The question, however, is important – particularly when considering the case of developing country agrifood exports to developed country markets.

Specifically then, this study has three policy-relevant objectives:

1. To assess the trade facilitation impacts of ISO 22000 on international trade flows;
2. To assess the extent to which countries who value the use of international business management standards trade more with other countries who similarly value the use of these management standards;
3. To quantify the market access effect of developing country exports to developed countries when developing nations have a relatively high proportion of ISO 22000 certified firms.

## **METHODS AND DATA**

The starting point of this analysis is the gravity equation applied to international trade flows:

$$(1) \quad \ln M_{ijkt} = \alpha_{ikt} + \alpha_{jkt} + \sum_h \beta_h Z_{ij} + \lambda_1 \ln \left( \frac{ISO22_{ikt}}{AG_{ikt}} \right) + \lambda_2 \ln \left( \frac{ISO22_{jkt}}{AG_{jkt}} \right) + \varepsilon_{ijkt}$$

where,  $M_{ijkt}$  is the value of bilateral imports from country  $i$  to country  $j$  in food industry  $k$  and year  $t$ ,  $\alpha_{ikt}$  ( $\alpha_{jkt}$ ) is a comprehensive set of time-varying country-and-industry fixed effects to control for multilateral industry prices and production capacities, , and  $Z_{ij}$  is a set of extraneous factors influencing trade including distance, tariff rates and indicator variables for contiguous borders, common languages, landlocked countries, free trade agreements, and participation in the WTO.

It is usual for studies examining the impact of standards on trade to use only a simple count variable (e.g. the number of certified firms in country  $i$  or  $j$ ) to estimate the trade flow effect of certification. Yet count variables in this context are fundamentally flawed. Do the trade increases reported in these studies reflect the fact that larger countries simply have more firms and

therefore more ISO 22000 certifications compared to smaller countries (i.e., an industrial country effect)? Or is the count variable actually picking up improved trade potential due to ISO 22000? This is the fundamental problem with atheoretical count measures because it does not take into account the proportion of ISO 22000 certified firms relative to the total number of firms that could potentially adopt this standard.

Ideally then, in this study we address this common limitation by considering the number of ISO 22000 certified firms relative to the total number of firms engaged in food processing country in each of the considered countries.. Unfortunately, however, national firm count information, let alone agricultural processing sector firm counts, is not available for many of the countries in the sample. As a proxy for this information then, the monetary value of value added to agricultural production will instead be used. As such, in this baseline version of the model (Eqn 1), the coefficients of particular interest are  $\lambda 1$  and  $\lambda 2$  which measure the trade flow impact of an change in the sector-specific proportion of ISO 22000 certified firms in country  $i$  or  $j$  ( $ISO22ik/AGik$  and  $ISO22jk/AGjk$ ).

Alternative specifications of equation (1) are used to assess the second and third objectives. The second objective examines whether those with a commitment to voluntary food safety standards trade more with others who similarly subscribe to such programs. This potential preference by assessed by examining whether nations with above average adoption of ISO 22000, prefer to import from those who also demonstrate above average certification rates.<sup>1</sup> Finally, through the third objective, the question of whether adherence to voluntary food safety standards offers any

---

<sup>1</sup> 1 Specifically, do those with above average ISO 22000 certification ratios ( $ISO22ik/Fik$ ) tend to trade more with exporters who also have above average certification ratios ( $ISO22jk/Fjk$ ).

market access benefit for developing country exporters. This is assessed by incorporating additional dummy variables to indicate the development status of the exporter and importer and a series of interaction terms with  $ISO22ik/Fi$  and  $ISO22jk/Fj$  to test for market access effects of developing country exports to developed countries (and other combinations). Alternative specifications will also examine interactions between proportion of ISO 14000 and ISO 9000 certified firms.

### *Data*

This analysis makes use of data drawn from a number of sources. Bilateral trade flows are derived as described by Nicita and Olarreaga (2007) and the extended version of this dataset made available by the *Centre d'Etudes Prospectives et'Informations Internationales* (CEPII). Trade. Bilateral trade flows are derived from the United Nations Commodity Trade Statistics Database (COMTRADE). Real GDP data (in US dollars) are obtained from two primary sources: the World Bank (WB) Development Indicators database; and the United Nations (UN) National Accounts database. GDP data from the International Monetary Fund's (IMF) *Financial Statistics Yearbook* are used to supplement WB and UN data when it is missing or incomplete.

Distance, contiguity, common language, island status and landlocked country indicators are taken from CEPII's geo-distance dataset (Mayer and Zignago 2006). CEPII uses the great circle formula to calculate the geographic distance between countries, referenced by latitudes and longitudes of the largest urban agglomerations in terms of population. We also document whether trading partners are members of one or more of the same Regional Trade Agreements (RTAs).

To assess the impact of ISO certification on trade, this study makes use of the ISO Survey of Certifications which provides measures of the number of ISO 22000 certified firms by. The ISO Survey is an annual survey sponsored by the ISO Central Secretariat (ISO/CS) of the certification bodies accredited by the International Accreditation Forum (IAF). These surveys have been done since 1993 and through this source the aggregate annual (count) data of the number of ISO certifications in each country are available since this time. This count data is combined with information regarding the monetized value of the value added agriculture sector in a given country and year (World Bank, 2014) to generate the ratio of ISO certified firms.

At the industry level, information regarding the number of ISO certifications classified according to the European Accreditation of Certification (EA) Code. Indicator and trade flow variables, however are aggregated at the industry level using ISIC (Rev. 2). Although, in broad terms, these classification systems are similar in their level of disaggregation, their concordance across industries is imperfect.<sup>2</sup> As such, for this analysis it was required that a new industry a new classification system be developed. This new industry classification system, and the mapping of these industries to those used to disaggregate the ISO certification count data (EA Codes) and the trade flow and indicator variables (ISIC rev. 2) is presented in Table 1. The completed cross-sectional dataset includes 60,000 observations reflecting trade flows between 177 importers and exporters between in 2005-2010.

## RESULTS

---

<sup>2</sup> By way of example, in some instances several EA classified industries (e.g. 'shipbuilding', 'other transportation equipment') map to one ISIC (rev. 2) sector (e.g. Transport equipment). For other industries, multiple ISIC sectors map into one EA sector.

Adoption of the ISO 22000 standard has varied significantly across time. Figure 1 depicts the annual growth in the number of companies globally certified to this standard. As ISO 22000 was first released in 2007, the very high growth rates in the years shortly thereafter are not surprising. The economic downturn is likely to account for the slowed rate of adoption of this standard in 2010 and 2011.

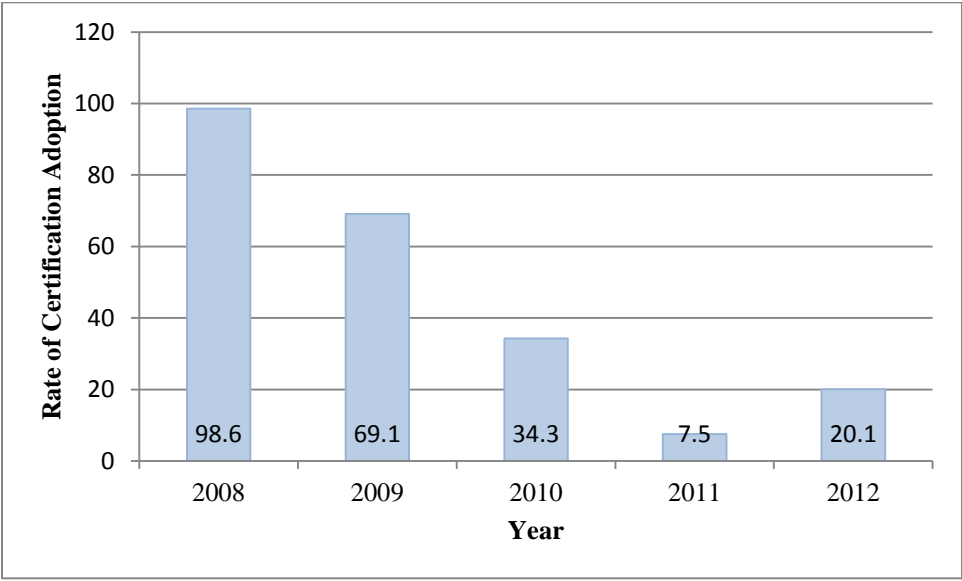


Figure 2 depicts the change in the number of ISO 22000 certifications across major geographic regions. From this Figure it is clear that East Asia and the Pacific, and Europe are far and away, the largest adopter of this program. North America, Central & South America, Africa, and the Middle East all have similar and a relatively low absolute number of firms that are certified. Among this latter group, however, in recent years (2010-2012) North American has seen a 47% increase in the adoption of this standard.



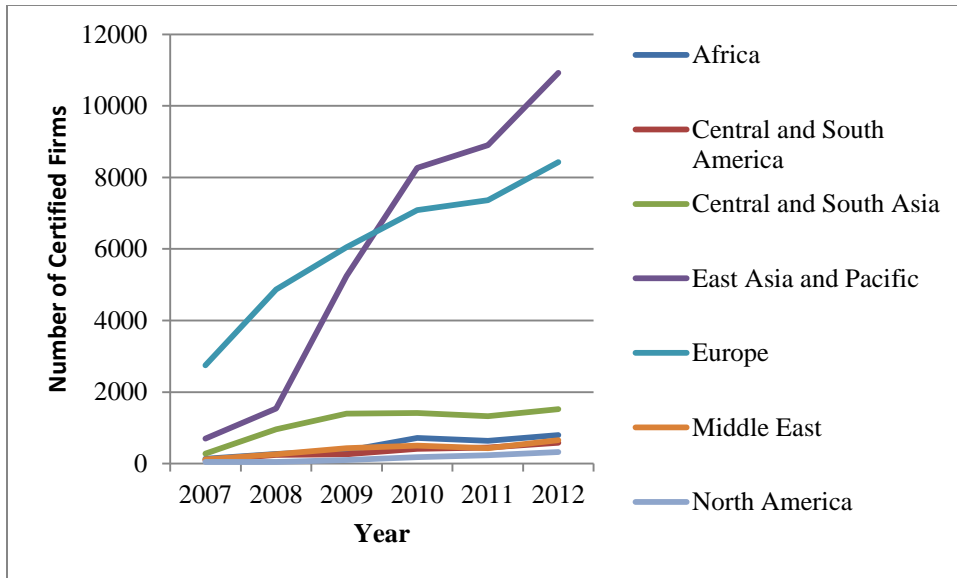


Figure 2. Number of ISO 22000 certifications, disaggregated by region

Given the importance of food safety in some of the least adopting regions, at first blush this result may seem odd. It is worth reemphasizing, however, that lack of adoption of this voluntary standard in no way implies that non-adopting firms are not committed to food safety management. Instead government regulations, or agricultural sectors themselves may have established guidelines which are mandated and are used in place of voluntary private standard such as ISO 22000.

## **REFERENCES**

- Blind, K. 2001. The impact of Innovation and Standards on Trade of Measurement and Testing Products: E
- Blind, K. and A. Jungmittag. 2005. Trade and the impact of innovations and standards: the case of Germany and the UK. *Applied Economics*. 37: 1382-1398.
- Corbett, C. and D. Kirsch. 2001. International Diffusion of ISO 14000 Certification. *Production and Operations Management*. 10(3): 327-342.
- Clougherty, J.A. and M. Grajek. 2009. ISO 9000: New Form of Protectionism or Common Language in International Trade. ESMT Research Working Papers No. ESMT-09-006.

CEPII. n. d. *Databases and Models. Distances*. Retrieved March 22, 2009, from: <http://www.cepii.fr/anglaisgraph/bdd/distances.htm>

Grajek, M. 2004. Diffusion of ISO 9000 Standards and International Trade. CIG Working Papers SP II 2004-16, Wissenschaftszentrum Berlin (WZB), Research Unit: Competition and Innovation (CIG).

ISO, 2013. The ISO Survey of Certifications - 2012. ISO Central Secretariat, Genève, Switzerland.

Moenius, J. 2004. Information Versus Product Adaptation: The Role of Standards in Trade. Available at SSRN: <http://ssrn.com/abstract=608022>

Potoski, M. and A. Prakash. 2008. Signaling Quality and Increasing Trade? Examining the Impact of ISO 9000 Quality Management Systems on Bilateral Trade, 1994-2002. Paper presented at the annual meeting of the ISA's 49th Annual Convention, Bridgman Multiple Divides, Hilton San Francisco, San Francisco, CA, USA

Swann, P., P. Temple, and M. Shurmer. 2006. Standards and trade performance: the UK experience. *Economic Journal*. 106: 1297-313.

King, Andrew and Michael Lenox. 2000. Industry Self-Regulation without sanctions: The Chemical Industry's Responsible Care Program. *Academy of Management Journal* 43(August): 698-716.

Poksinska, B., J. Dahlgard, J. Eklund. 2003. Implementing ISO 14000 in Sweden: Motives, Benefits and Comparisons with ISO 9000. *International Journal of Quality & Reliability Management*. 585-606.

Potoski, Matthew and Aseem Prakash. 2005a. Covenants with Weak Swords: ISO 14000 and Firms' Environmental Performance. *Journal of Policy Analysis and Management*.

Potoski, Matthew and Aseem Prakash. 2005b. Green Clubs and Voluntary Governance: ISO 14001 and Firms' Regulatory Compliance. *American Journal of Political Science*. 49(2): 235-48.

Potoski, M. and A. Prakash. 2004. Regulatory Convergence in Nongovernmental Regimes? Cross-National Adoption of ISO 14001 Certifications. *The Journal of Politics*. 66(3): 885-905.

Prakash, A. and M. Potoski. 2006. Racing to the Bottom? Trade, Environmental Governance, and ISO 14001. *American Journal of Political Science*. 50(2): 350-364.

World Bank. 2013. World Development Indicators 2013. Washington, DC: World Bank. doi: 10.1596/978-0-8213-9824-1. License: Creative Commons Attribution CC BY 3.0