ISO 9000 STANDARDS: IMPLICIT BARRIER OR TRADE FACILITATION STRATEGY?

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PRELIMINARY RESULTS: PLEASE DO NOT QUOTE

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The International Organization for Standardization (ISO) 9000 series of standards have long been touted as a facilitating tool in international business transactions. This standard requires that companies have 'established a systematic approach to quality management' and are managing their operations in a manner that ensures customer needs are clearly understood, agreed upon and fulfilled (www.iso.org). Companies that become ISO 9000 certified must develop and document an extensive list of internal operational procedures and are encouraged to make 'data-based' decisions. Through this process organizations become more efficient, and are more capable of responding to the needs of their customers. Further, while 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 a result, ISO 9000 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. It is not surprising then, that many firms use ISO 9000 as a minimum requirement of organizations with whom they are considering doing business. As of December 2007, more than 950,000 companies in 175 countries were ISO 9000 certified (ISO Survey, 2007).

Despite these potential benefits, critics often point to ISO 9000 registration as an exercise in documentation. Moreover, because ISO 9000 is both international and cross-industry in scope, its potential benefits may be limited because the extent to which countries adhere to the demands of this standard remains unclear. For these reasons, some economists maintain that the administrative costs of acquiring ISO 9000 registered status acts as an implicit barrier to trade.

An extensive literature has developed that explores the impact of ISO 9000 standards on business operations. This research has focused largely on firm or country level case-studies regarding the benefits, costs, and motivations of ISO certification. Other studies have examined the impact of product standards and find that country-specific and shared standards are beneficial to international trade (e.g. Swann et al.,1996; Moenius, 2000; Blind and Jungmittag, 2005). *Ex post* empirical econometric analyses examining the impact of ISO 9000 on international trade flows however, is surprisingly limited. Using country-level count data, working papers by Grajeck (2004) and Potoski and Prakash (2008) explore the impact of ISO 9000 on bilateral trade flows. Results indicate that ISO standards can have a positive impact on trade.

However, both sets of authors used a simple count variable (e.g. the number of certified ISO 9000 firms in country *i* or *j*) to estimate the trade flow effect of ISO 9000 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 9000 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 9000? This is the fundamental problem with atheoretical count measures because it does not take into account the proportion of ISO 9000 certified firms in the *total number of firms* in the country.

The objectives of this study are three-fold. First, using the case example of ISO 9000, this study seeks to assess the trade impacts of international business management standards on participating and non-participating country's international trade flows. Secondly, this study examines the

question of whether countries who value the use of international business management standards trade more with other countries who similarly value the use of these management standards. Finally this study attempts to quantify the market access effect of developing country exports to developed countries when developing nations have a relatively high proportion of ISO 9000 certified firms. This study is organized into the following sections: a description of the econometric model, details about the data and data sources, a presentation of the results, and a concluding section with implications for further research.

METHODS AND DATA

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

$$(1) \qquad \ln M_{ijk} = \alpha_k + \beta_1 \ln PR_{ik} + \beta_2 \ln PR_{jk} + \sum_h \beta_h Z_{ij} + \lambda_1 \ln\left(\frac{ISO_{ik}}{F_{ik}}\right) + \lambda_2 \ln\left(\frac{ISO_{jk}}{F_{jk}}\right) + \varepsilon_{ijk}$$

where, M_{ijk} is the value of bilateral imports from country i to country j in industry k, α_k is a comprehensive set of industry-level fixed effects, PR_{ik} (PR_{jk}) is the value of sector k production of country i (j), 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, island countries, free trade agreements, participation in the WTO and currency unions.

The coefficients of particular interest are λ_1 and λ_2; these measure the trade flow impact of an change in the sector-specific proportion of ISO 9000 certified firms in country i or j (ISO_{ik}/F_i and ISO_{jk}/F_j). Alternative specifications of equation (1) will be used to assess objectives two and three. As the gravity equation is a bilateral in nature, additional dummy variables can be

incorporated to indicate the development status of the exporter and importer and a series of interaction terms with ISO_{ik}/F_i and ISO_{jk}/F_j to test for market access effects of developing country exports to developed countries (and other combinations).

Data

This analysis makes use of data drawn from a number of sources. Bilateral trade flows and 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 9000 certified firms by industry and country. 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. In more recent years, releases of the results of this survey have also been disaggregated by industry. It is the 2005 release of these results which is used in this analysis (ISO, 2005). This count data is combined with information regarding the number of establishments or enterprises in a given country, industry and year (Nicita and Olarreaga, 2007) 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.[2] 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 219,700 observations reflecting trade flows between 221 importers and 73 exporters in 2005.

[2] 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.

RESULTS

Three scenarios were examined to assess the impact and the robustness of the impact of ISO Certification on international trade. Scenario 1 examined the impact of percentage of ISO registered firms on aggregate trade. Scenarios 2 and 3 examined this impact when country and industry fixed effects are otherwise accounted for. The results of these scenarios are presented in Table 2. In each of the examined cases, the percentage of ISO certified firms was found to have a significant and positive effect on trade flows.

CONCLUSION

Results of this analysis indicate that ISO certification has a positive and significant impact on international trade. Results of this analysis will be of interest to agribusinesses engaged in international markets and who are currently or are considering becoming ISO 9000 registered. Further, findings will offer insight into the potential adoption and trade implications of recently released international food system-focused standards. ISO 22000 was released in 2005 and combines the requirements of HACCP (food safety quality system) with the ISO 9000 business management system. While, to date, information regarding adoption of this standard is not available, this type of dual-purpose 'integrated' standard is widely thought to be the future of standards evolution. This evidence of a positive impact of ISO standards on trade may serve as an additional factor to motivate adoption of this standard. Future work will examine the impact of country development status on the potential trade facilitation offered by ISO certification.

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Table 1: Concordance of Industry Sectors

Industry Code		ISIC Rev. 2 Code		EA Code	
1	Food products, beverages, tobacco	311	Food products	3	Food products, beverages and tobacco
		313	Beverages		
		314	Tobacco		
2	Textiles and textile products	321	Textiles	4	Textiles and textile products
		322	Wearing apparel, except footwear		
3	Leather and leather products (incl. footwear)	323	Leather products	5	Leather and leather products
		324	Footwear, except rubber or plastic		
4	Wood and wood products (incl. furniture)	331	Wood products, except furniture	6	Wood and wood products
		332	Furniture, except metal		
5	Paper and paper products	341	Paper and products	7	Pulp, paper and paper products
6	Printing and publishing	342	Printing and publishing	8	Publishing companies
				9	Printing companies
7	Industrial and other chemicals	351	Industrial chemicals	12	Chemicals, chemical products & fibers
		352	Other chemicals	13	Pharmaceuticals
8	Manufacture of coke & refined petroleum products	353	Petroleum refineries	10	Manufacture of coke & refined petroleum products
		354	Miscellaneous petroleum and coal products		
9	Rubber and plastic products	355	Rubber products	14	Rubber and plastic products
		356	Plastic products		
10	Non-metallic mineral products (incl. glass, construction materials)	361	Pottery, china, earthenware	15	Non-metallic mineral products
		362	Glass and products	16	Concrete, cement, lime, plaster etc.
		369	Other non-metallic mineral products		
11	Ferrous, non-ferrous, and metal products	371	Iron and steel	17	Basic metal & fabricated metal products
		372	Non-ferrous metals		
		381	Fabricated metal products		
12	Non-electric machinery	382	Machinery, except electrical	18	Machinery and equipment
13	Electric machinery (incl. professional equipment)	383	Machinery, electric	19	Electrical and optical equipment
		385	Professional and scientific equipment		
14	Transport equipment	384	Transport equipment	20	Shipbuilding
				21	Aerospace
				22	Other transport equipment
15	Other manufactured products (incl. nuclear fuel)	390	Other manufactured products	23	Manufacturing not elsewhere classified
				11	Nuclear fuel

Table 2. ISO 9000 Certification Effects on Aggregate Trade, 2005

	Regression Scenarios		
	(1)	**(2)**	**(3)**
$lnGDP_{it}$	0.91**	0.92**	0.97**
	(0.00)	(0.00)	(0.00)
$lnGDP_{jt}$	0.64**	0.26**	0.69**
	(0.00)	(0.00)	(0.00)
$lnDIST_{ij}$	-1.01**	-1.08**	-1.12**
	(0.00)	(0.00)	(0.00)
$Border_{ij}$	1.06**	0.98**	1.12**
	(0.00)	(0.00)	(0.00)
$Lang_{ij}$	0.63**	0.57**	0.71**
	(0.00)	(0.00)	(0.00)
$Landlocked_i$	0.04*	---	0.08
	(0.08)		(0.67)
$Landlocked_j$	-0.26**	---	-0.31**
	(0.00)		(0.00)
$Island_i$	0.31**	---	0.34**
	(0.00)		(0.00)
$Island_j$	0.24**	---	0.29**
	(0.00)		(0.00)
Both in RTA	0.79**	0.81**	0.78**
	(0.00)	(0.00)	(0.00)
Ratio of ISO Certified $Firms_j$	0.25**	0.23**	0.76**
	(0.00)	(0.00)	(0.00)
Country Fixed Effects	No	Yes	No
Industry Fixed Effects	No	No	Yes
Observations	219,790	219,790	219,790
R-squared	0.40	0.42	0.51
Root mean square error	2.69	2.65	2.43

Notes: The dependant variable is the log of nominal imports. P-values are reported below coefficient estimates. Asterisks * and ** denote significance that ten and five percent levels, respectively.