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International Standards & International Trade: Empirical Evidence from ISO 9000 Diffusion

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Motivation

- Substantial decreases in trade barriers over the last few decades have led to standards and technical trade barriers (TTBs) becoming increasingly important determinants of international trade flows
- Yet, we lack sufficient empirical evidence concerning the relationship between standards and trade
- Three challenges in particular have held back empirical research on these issues
 - Measurability of standardization
 - Varied effects: difficulty to identify particular channels via which standards impact trade
 - Endogeneity of standardization processes

ISO 9000

- The most successful international standard implanted by the International Organization for Standardization
 - 777 thousand certificates in 160+ nations by 2005
 - Used in the EU's Single Market regulations (CE Marking)
- Measurability: diffusion of certificates to measure the degree to which the standard penetrates each nation
 - As opposed to customary inventory approach to measuring technical standards
- Endogeneity
 - Fixed-effects estimation
 - Country-and-time specific effects to capture multilateral-resistance terms
 - Instrumental variable (IV) technique using ISO 14000
- Varied effects: some identification feasible
 - Home-Nation and Host-Nation standardization & the interaction of Home-Host

Varied Trade Effects of Standardization

- “(...) through world-wide acceptance and use, the ISO 9000 family of standards will provide an effective means for (...) providing confidence to people and organizations that products (...) will meet their expectations thereby enhancing trade (...)” (ISO, 2005: p. 4)
1. Enhanced-competitiveness effect (home-nation standardization)
 - Internal efficiency gains and quality signaling elements that reduce information & search costs
 2. Combined Information and compliance-cost effects (host-nation standardization)
 3. Common-language effect (interaction of host-nation and home-nation standardization)
 - Provides a cross-organizational procedural language that is particularly helpful in X-border b-2-b dealings
 - Switch from long-term relationships based on trust to market relationships

Data & Modeling

- Panel Data: Country-Pairs from 91 Nations (1995, 2000, 2005)
 - 7346 country-pairs with usable data
 - ISO variable is constructed in relation to a nation's population
- Gravity Equation for Exports:

$$\begin{aligned} \ln Exp_{ijt} = & \alpha + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 POP_{it} + \beta_4 POP_{jt} + \gamma \ln Distance_{ij} + \\ & + \delta_1 \ln(ISO9000_{it}) + \delta_2 \ln(ISO9000_{jt}) + \delta_3 \ln(ISO9000_{it}) \ln(ISO9000_{jt}) + \\ & + \phi_1 \ln Infr_{it} + \phi_2 \ln Infr_{jt} + \lambda_t + \varepsilon_{ijt}, \end{aligned}$$

OLS Results

Independent variables	(1)	(2)	(3)	(4)
<u>Base gravity:</u>				
<i>Home-Nation GDP_{it}</i>	0.82*** (0.03)	0.68*** (0.04)	1.79*** (0.16)	
<i>Host-Nation GDP_{jt}</i>	0.81*** (0.03)	0.77*** (0.05)	1.82*** (0.13)	
<i>Home-Nation POP_{it}</i>	0.36*** (0.03)	0.45*** (0.04)	-1.48*** (0.29)	
<i>Host-Nation POP_{jt}</i>	0.13*** (0.03)	0.11** (0.05)	-0.89*** (0.29)	
<i>Dist_{ijt}</i>	-1.29*** (0.02)	-1.12*** (0.04)		-1.71*** (0.03)
<u>ISO 9000:</u>				
<i>Home-Nation ISO9000_{it}</i>	0.21*** (0.02)	0.27*** (0.03)	0.07*** (0.01)	
<i>Host-Nation ISO9000_{jt}</i>	0.03* (0.02)	0.06** (0.03)	0.01 (0.01)	
<i>ISO9000_{it} * ISO9000_{jt}</i>	0.01*** (0.002)	0.01*** (0.003)	0.001 (0.002)	0.001 (0.003)
<u>Other controls:</u>				
...	
Year dummy	Yes	Yes	Yes	Yes
Country-pair fixed effects	-	-	Yes	-
Multilateral resistance terms	-	-	-	Yes
Observations	17085	6038	16285	17546

IV Results

Independent variables	(1)	(2)	(3)	(4)
<u>Base gravity:</u>				
<i>Home-Nation GDP_{it}</i>	0.79*** (0.07)	0.76* (0.45)	2.38*** (0.41)	
<i>Host-Nation GDP_{jt}</i>	0.94*** (0.06)	1.37*** (0.32)	1.14*** (0.40)	
<i>Home-Nation POP_{it}</i>	0.38*** (0.06)	0.36 (0.46)	-1.35** (0.59)	
<i>Host-Nation POP_{jt}</i>	0.01 (0.06)	-0.51 (0.33)	0.37 (0.79)	
<i>Dist_{ijt}</i>	-1.26*** (0.02)	-1.14*** (0.04)		-1.69*** (0.03)
<u>ISO 9000:</u>				
<i>Home-Nation ISO9000_{it}</i>	0.20*** (0.07)	0.17 (0.41)	-0.32 (0.23)	
<i>Host-Nation ISO9000_{jt}</i>	-0.15*** (0.05)	-0.45* (0.26)	0.29 (0.18)	
<i>ISO9000_{it} * ISO9000_{jt}</i>	0.03*** (0.004)	0.02*** (0.01)	0.02** (0.01)	0.01* (0.01)
<u>Other controls:</u>				
...	
Year dummy	Yes	Yes	Yes	Yes
Country-pair fixed effects	-	-	Yes	-
Multilateral resistance terms	-	-	-	Yes
Observations	16771	6038	15917	17223

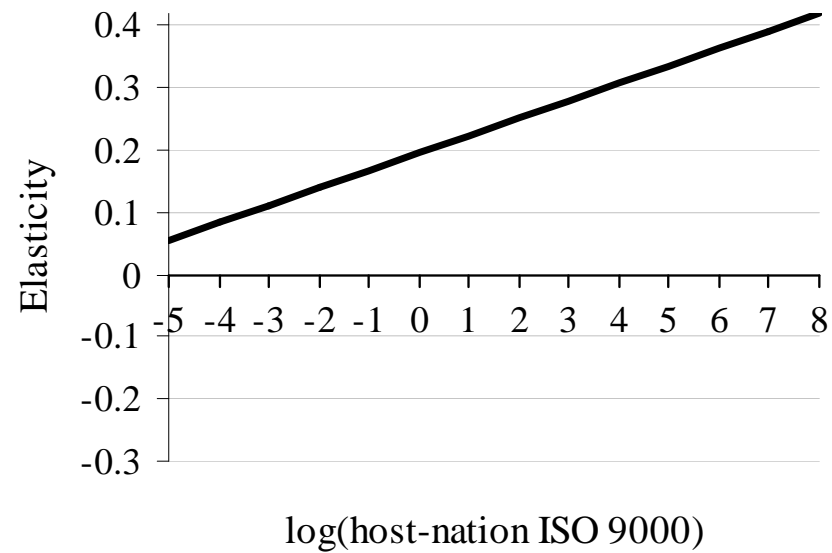
Main ISO Results

- Home-nation standardization has a positive effect
 - Quality signalling and/or internal efficiencies confirmed in OLS
 - Less Robust in IV estimations
- Host-nation standardization: where previous literature yields mixed results
 - Information effect dominates the Compliance-cost effect in the OLS estimations
 - Compliance-cost effect dominates information effect in IV estimations
- Home-Host-ISO Interaction has a positive effect
 - The common-language effect is the most robust channel

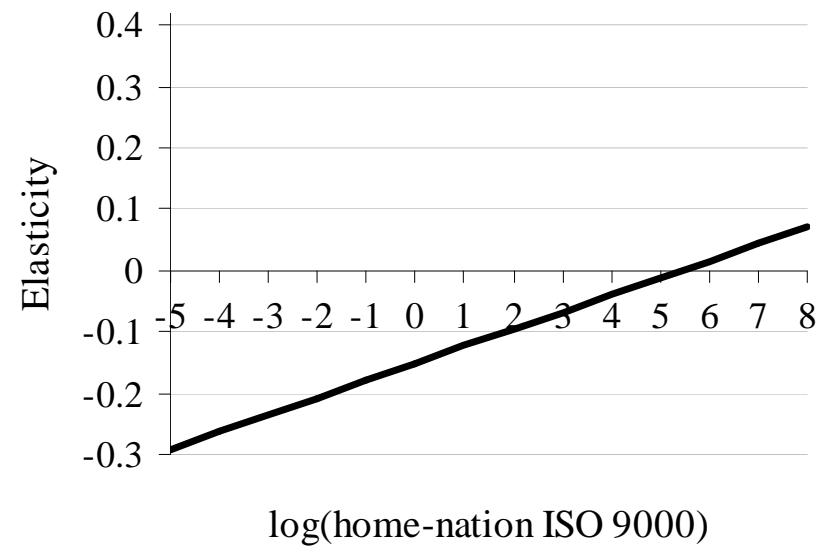
Main ISO Results

Elasticity of exports

a) with respect to home-nation adoption



b) with respect to host-nation adoption



Nations beyond the threshold: 28 of 36 are European, No Developing Nations & No US

Country/ Region	ISO 9000	Country/ Region	ISO 9000	Country/ Region	ISO 9000
Italy	1672.65	Germany	482.81	Finland	365.03
Switzerland	1669.20	Belgium	459.12	Estonia	364.01
Hungary	1533.15	Japan	420.75	France	356.50
Singapore	1447.10	Austria	409.19	Luxembourg	324.06
Czech Republic	1245.25	Canada	386.98	Norway	305.19
Israel	1106.07	Slovak Rep	380.73	Greece	293.23
Spain	1093.27	Netherlands	561.34	Korea	290.59
Slovenia	1057.24	Portugal	551.78	Bulgaria	286.95
Australia	829.57	Sweden	525.82	Croatia	286.72
UK	757.36	New Zealand	525.17	Romania	281.87
Malta	750.93	Hong Kong	506.37	Poland	254.65
Cyprus	700.71	Ireland	494.34	Latvia	244.29

Conclusion & Policy Implications

- ISO 9000 is a common language
 - Lowers information and communication difficulties between firms, thus allowing more efficient organization of cross-national trade
 - Particularly intensifies trade among a group of ISO-rich nations
- ISO 9000 is de facto trade barrier for countries that lag behind in terms of adoption rate
 - Compliance cost is a problem for the US and developing nations
- ISO 9000 involves characteristics consistent with an EU-based standardization union
 - A 'Fortress Europe' as worldwide diffusion of ISO enhances intra-union trade and union exports, while reducing imports from outside the union
 - Few non-European nations (8) belong to this ISO-rich club