Quantifying the Impacts of Standards on Trade

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Some problems with quantification

- What do we mean by standards?
- Their theoretical roles in trade are subtle and ambiguous.
- Standards may affect supply (costs), demand, or both.
- Effects depend on numerous parameters.
- Specific (and multiple) standards are aimed at particular product or process characteristics.
- Details are required on processes firms use to comply.
- Aggregation biases could be extreme.

Should we give up? No, because:

- The basic questions are too interesting and important.
- Failing to quantify these impacts leaves the floor open to assertion and anecdotes.
- The research process itself refines our thinking about identification.
- What follows is a highly selective review.

Approach 0: describe the problems

- Roberts, Josling, and Orden, ERS Technical Bulletin no. 1876, 1999.
  - Classification of TBTs by policy, scope, goals.
  - Basic partial equilibrium modeling framework.
- Maskus and Wilson, 2001 UM Press book.
  - Analytical and practical difficulties.
  - Overview of potential approaches.
- Josling, Roberts, and Orden 2004 IIE book.

Approach 1: Surveys

- OECD (1999) 55 firms in telecom, dairy products, auto parts – US, Japan, Germany.
- USITC (1998) multinational firms in IT sector.
- World Bank (2004) TBT survey in developing countries.
- Advantages: rich detail, directed questions.
- Disadvantages: qualitative answers, self-interested responses, lack of comparability.

Approach 2.1: Partial equilibrium simulations of specific standards

- Advantages:
  - Limited aggregation needs.
  - Focus on particular TR may permit isolation of its market effect: supply or demand shift.
  - Permits experimentation with market structure, eg product heterogeneity.
  - Welfare calculations are possible.
- Disadvantages:
  - Results are sensitive to elasticities, initial market shares (base period).
  - Impacts interact with other policies and market variables.
  - Does not capture interindustry or general equilibrium effects.

Example: Yue, Beghin, and Jensen (ISU Working Paper 2005)

- Application to Japanese TRs on apple imports. They introduce:
  - Product heterogeneity in quality.
  - Home bias in preferences.
  - Formal border measures and internal trade costs.
  - Ad hoc increase in risks to Japanese farmers.
- Points worth noting:
  - Tariff-equivalent price wedges depend on home bias, substitution elasticity s , market shares, other costs.
  - Welfare gains to Japan from reducing severity of TR fall by factor of 35 as s rises from 5 to 30.
  - Increased risk would reduce Japanese expected welfare.

Approach 2.2: General equilibrium simulations of multiple standards

- Advantages:
  - Permits theoretically consistent treatment of interindustry effects.
  - Captures creation and diversion impacts with multiple countries/regions.
  - Experimentation with technologies and market structures.
  - Captures policy interactions.
  - Fuller welfare representations.
- Disadvantages:
  - More data requirements reduce realism of how standards operate.
  - Results are sensitive to key parameters.

Example: Nielsen and Anderson (2001 UM Press book).

- Apply GTAP to exogenous adoption of GMOs in specific crops.
- GMOs raise productivity (lower costs) 5% in Hicks-neutral fashion.
- Adoption in “front runner” regions, not EU.
- Base case: no EU trade restrictions (EU gains $2.0 b EV).
- Case 2: EU bans imports from adopters (EU loses $4.3 b EV).
- Case 3: Exogenous EU consumer preference for home crops of 25% applied to all imports (information problem; EU gains $0.7 b EV).

Approach 3: Estimate trade effects with gravity equations

- Advantages:
  - Based loosely on trade theory.
  - Massive amounts of trade data for identification.
  - Data can reveal whether standards are pro-trade or anti-trade.
- Disadvantages:
  - Measuring standards: counts, linkages, aggregation.
  - Coefficients are difficult to interpret if gravity equation is not fully controlled.
  - Tendency to apply coefficients to large changes in standards can generate misleadingly large estimates.
  - Endogeneity of standards generally not controlled for.

Example 1: Moenius (working paper 2003)

- Bilaterally shared standards raise trade.
- National standards raise imports in manufactured goods but reduce imports in non-manufacturing.

Example 2: Chen and Mattoo (World Bank, 2004)

- Careful model and flexible econometrics.
- MRAs, harmonization are country-sector dummy variables.
- In EU, harmonization raises intra-EU trade 32% but reduces developing-country exports to EU 16%.
- MRAs without rules of origin raise intra-EU trade and developing- country exports to EU.
- MRAs with rules of origin reduce imports from non-members 38%.

Example 3: Otsuki, Wilson and Sewadeh (ERAE 2001)

- Substantial estimated impact of EU changes in aflatoxin standards on SSA groundnut and cereals exports.
- $670 million in lost exports per year, about 60-65 percent of revenues.
- Virtually no gain in expected health benefits (maybe 2 fewer cancer deaths).
- Are estimated trade impacts reasonable?

Others worth reading

- Essaji (U of Toronto dissertation, 2005).
  - Estimates coefficient of interaction of “capacity to meet standards” and “standards intensity” in gravity model. Serious endogeneity problems.
- Debaere (U Texas working paper 2005).
  - Theory-consistent estimation of EU demand for shrimp.
  - Finds significant price and trade diversion impacts of EU tariffs and anti-biotic TRs on imported shrimp.

Approach 4: Cost estimation

- Can we estimate impacts of meeting international standards on parametric costs?
- Maskus, Otsuki, Wilson (World Bank, 2005) attempt this.
- Nature of survey: firm-specific questions.
- Aggregation of lagged investment costs in compliance as quasi-fixed factor.

Elasticity of Variable Cost with respect to Standards and Scale

Elasticity with respect to	Elasticity evaluated at	Model I	Model II	Model III	Model IV
Standards	25 percentile	na	0.055 (1.473)	0.207*** (4.320)	0.142* (1.894)
	mean	0.055* (1.760)	0.058* (1.765)	0.270*** (6.188)	0.132*** (2.619)
	75 percentile	na	0.056 (1.436)	0.325*** (6.177)	0.146*** (2.882)
Scale	25 percentile	0.893*** (21.031)	0.998*** (12.927)	0.851*** (7.785)	0.876*** (13.705)
	mean	0.914*** (23.734)	1.112*** (11.217)	1.068*** (7.404)	1.086*** (17.460)
	75 percentile	0.939*** (19.446)	1.242*** (9.609)	1.296*** (6.945)	1.255*** (14.515)

Note: Numbers in parentheses denote asymptotic t-values.

Estimated Impact on Mean Dollar Variable Costs of One-Percent Increase in Mean Setup Costs

	Model I	Model II	Model III	Model IV
One-percent Increase in Mean Setup Costs	$4,250	$4,250	$4,250	$1,620
Mean Impact on Variable Costs	$4,998	$5,270	$24,535	$12,904

Some major issues left to explore in standards and trade

- Disentangling price and quality effects in trade.
- Endogeneity of standards to trade flows (we may understate effects).
- Endogeneity of substitution elasticities to standards.
- Standards-induced innovation in trade.
- Role of MNEs and standards in promoting exports.
- Where in supply chain do standards matter the most for trade and FDI?
- Relationships between standards and IPRs in trade.