Quantifying the Impacts of Standards on Trade

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ERS/Farm Foundation EU Workshop
November 3, 2005
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

  - Classification of TBTs by policy, scope, goals.
  - Basic partial equilibrium modeling framework.
  - Analytical and practical difficulties.
  - Overview of potential approaches.
Approach 1: Surveys


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.

- 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:**
  - 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?
- 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

<table>
<thead>
<tr>
<th>Elasticity with respect to</th>
<th>Elasticity evaluated at</th>
<th>Model I</th>
<th>Model II</th>
<th>Model III</th>
<th>Model IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards</td>
<td>25 percentile</td>
<td>na</td>
<td>0.055***</td>
<td>0.207***</td>
<td>0.142***</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(1.473)</td>
<td>(4.320)</td>
<td>(1.894)</td>
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<tr>
<td></td>
<td>mean</td>
<td>0.055*</td>
<td>0.058*</td>
<td>0.270***</td>
<td>0.132***</td>
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<tr>
<td></td>
<td></td>
<td>(1.760)</td>
<td>(1.765)</td>
<td>(6.188)</td>
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<tr>
<td></td>
<td>75 percentile</td>
<td>na</td>
<td>0.056</td>
<td>0.325***</td>
<td>0.146***</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(1.436)</td>
<td>(6.177)</td>
<td>(2.882)</td>
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<tr>
<td>Scale</td>
<td>25 percentile</td>
<td>0.893***</td>
<td>0.998***</td>
<td>0.851***</td>
<td>0.876***</td>
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<tr>
<td></td>
<td></td>
<td>(21.031)</td>
<td>(12.927)</td>
<td>(7.785)</td>
<td>(13.705)</td>
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<tr>
<td></td>
<td>mean</td>
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<td>1.112***</td>
<td>1.068***</td>
<td>1.086***</td>
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<td>(23.734)</td>
<td>(11.217)</td>
<td>(7.404)</td>
<td>(17.460)</td>
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<td></td>
<td>75 percentile</td>
<td>0.939***</td>
<td>1.242***</td>
<td>1.296***</td>
<td>1.255***</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses denote asymptotic t-values.
Estimated Impact on Mean Dollar Variable Costs of One-Percent Increase in Mean Setup Costs

<table>
<thead>
<tr>
<th></th>
<th>Model I</th>
<th>Model II</th>
<th>Model III</th>
<th>Model IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-percent Increase in Mean Setup Costs</td>
<td>$4,250</td>
<td>$4,250</td>
<td>$4,250</td>
<td>$1,620</td>
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<tr>
<td>Mean Impact on Variable Costs</td>
<td>$4,998</td>
<td>$5,270</td>
<td>$24,535</td>
<td>$12,904</td>
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</table>
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.