Trade elasticity: key parameter in international trade models

- Key parameter to calculate the welfare impact of trade liberalization (or conversely cost of returning to autarky).
- Welfare gain from trade function of the trade elasticity to variable trade costs (Arkolakis, Costinot & Rodriguez-Clare 2012).
  - Dispersion of elasticities across sectors matters for aggregate welfare changes (Ossa 2015; Giri, Yi & Yilmazkuday 2020).
  - We estimate product-level elasticities based on trade policy (i.e. tariffs).

Our contribution

1. Trade policy based + product level + large country coverage (including poor and developing countries).
2. Show bias in estimated gains from trade from considering average rather than heterogeneous trade elasticities.
3. Show that this bias varies systematically with development level of importing country.

Empirical Strategy

Estimate structural gravity for each of the 5,052 HS6 product categories \( k \):

\[
\text{Import}_{ji,t} = \beta_0 + \beta_1 + \beta_2 \ln (1 + \tau_{j,i}) + \chi Z_{j,i} + \epsilon_{j,i,t} \quad \forall k \in K
\]

- Where
  - \( \tau_{j,i} \) is the applied bilateral tariff by country \( j \) on imports from \( i \) at time \( t \).
  - Imports as FOB values \( \text{tariff elasticity} \ \beta_k = -\sigma \rightarrow \epsilon = 1 - \sigma \).
  - \( Z_{j,i} \) controls for bilateral specific geographic related trade costs (log of distance, common colony, common border, common language).
  - Disclaimer: We assume to live in a CES world with exporter specific pass-through.

Data

- **BACI** database on worldwide exports: bilateral flows, in current US Dollars, over the period 1996-2016 at the HS6 level.
- Gravity control variables introduced in the estimations (such as distance and common colony) from CEPII gravity database.
- Balanced panel: 189 exporters to 152 destinations, 5,052 HS6 categories, each year. Fill-in the relevant zero-trade.

Results: Empirical distribution of trade elasticities

Welfare gains from trade: heterogeneous vs average elasticity

- We use the metric proposed by Arkolakis, Costinot & Rodriguez-Clare (2012), i.e. welfare gain from trade as the negative of move to autarky

\[
\hat{W}_T = 1 - \prod_{s} (\lambda_{s}^j)^{\eta_s - \epsilon_s}.
\]

- Elasticities computed at the TIVA sector level \( \sigma \) to calculate welfare gain with heterogeneous elasticity:
  - \( \lambda_{s}^j \) total expenditure on sector \( s \) devoted to home production in country \( j \)
  - \( \eta_s \) consumption share of country \( j \) in sector \( s \)
- Weighted average trade elasticity across sector to infer the welfare gain from trade in the case of homogeneous elasticity.

Bias in welfare-change evaluation: by countries’ income level

The bias in welfare-change evaluation \( \hat{W}_{\text{Hetero}} / \hat{W}_{\text{Homo}} \) (vertical axis) is larger for low-income countries.

Bias in welfare-change evaluation: heter. vs. homog. elasticities

The bias in welfare-change evaluation \( \hat{W}_{\text{Hetero}} / \hat{W}_{\text{Homo}} \) (vertical axis) increases in the country’s correlation between domestic-expenditure share \( \lambda_{s}^j \) and trade elasticity \( \epsilon_s \) (horizontal axis).

Dep var: \( \hat{W} / \text{The bias} / \hat{W} / \text{Homing}

<table>
<thead>
<tr>
<th>Developing country (dummy)</th>
<th>0.312</th>
<th>0.330</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corr(( \lambda_{s}^j ) ( \epsilon_s ))</td>
<td>0.476 (0.054)</td>
<td>0.232 (0.093)</td>
</tr>
<tr>
<td>Corr(( \lambda_{s}^j ) ( \epsilon_s )) \times Developing country (dummy)</td>
<td>0.820 0.446 0.829</td>
<td></td>
</tr>
</tbody>
</table>

Observations: 62 62 62

Notes: The dependent variable is the ratio of the welfare change calculated using heterogeneous elasticities (\( \hat{W}_{\text{Hetero}} \)) and a homogeneous elasticity (\( \hat{W}_{\text{Homo}} \)) elasticity based on the weighted average of \( \epsilon_s \) across sectors. The weights are the sectoral export shares.

Conclusion

1. We provide and make publicly available estimates of trade elasticities at the product level.
2. Shed light on the wide range of trade elasticities around the value that is generally used to calibrate empirical exercises.
3. Illustrate the impact of heterogeneous trade elasticities on the estimation of the welfare gains for countries at different levels of development.

- Using homogeneous trade elasticities produces a downward bias in the estimation of the welfare gains for developing countries; in particular for those with high import penetration in less-elastic sectors.

Dataset and last version of the paper available at: https://sites.google.com/site/orefciegianluca/home