Product-Level Trade Elasticities: Worth Weighting For?

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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).
  - ▷ Trade elasticity estimates diverge (aggregation, empirical approach).
- Dispersion of elasticities across sectors matters for aggregate welfare changes (Ossa 2015; Giri, Yi & Yilmazkuday 2020).

$\Rightarrow$ 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.
4. Database publicly available & dedicated page:
   `https://sites.google.com/view/product-level-trade-elasticity`

Empirical Strategy

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

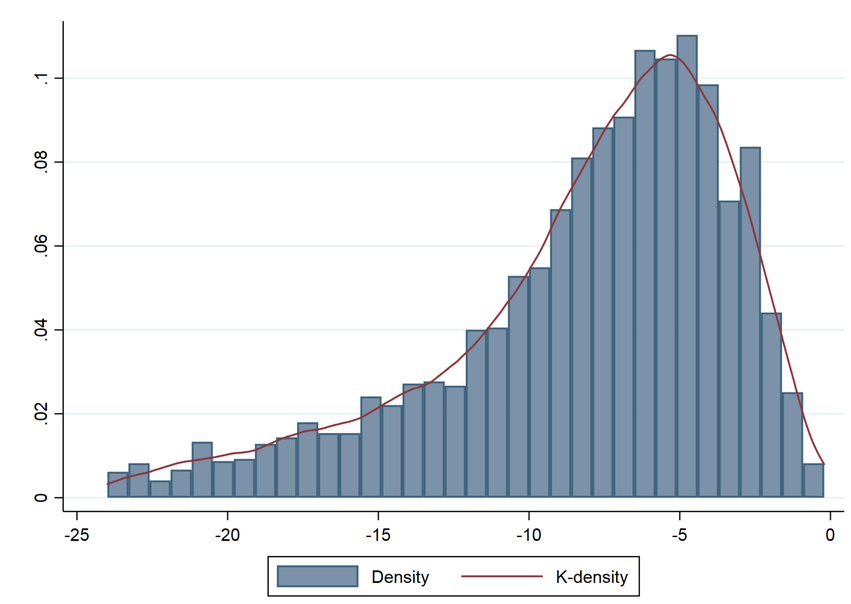
$$Import_{j,i,t} = \theta_{jt} + \theta_{it} + \beta_0 ln\left(1 + \tau_{j,i,t}\right) + \zeta \mathbf{Z}_{j,i} + \epsilon_{j,i,t} \quad \forall k \in K$$

- Where
  - ▷ τ_{ijt} is the applied bilateral tariff by country j on imports from i at time t.
  - ▷ Imports as FOB values $\rightarrow$ tariff elasticity $\beta_0 = -\sigma \rightarrow \varepsilon = 1 - \sigma$.
  - ▷ θ_{it} and θ_{jt} respectively exporter-year and importer-year fixed effects.
  - ▷ $\mathbf{Z}_{j,i}$ 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.
- *MAcMap − HS6* database on applied bilateral tariffs for the years 2001, 2004, 2007, 2010, 2013 and 2016.
- 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



Note: This is the empirical distribution calculated for HS-6 products with $\varepsilon_k < 0$. *Source*: Authors' calculations.

Welfare gains from trade: heterogeneous vs average elasticity

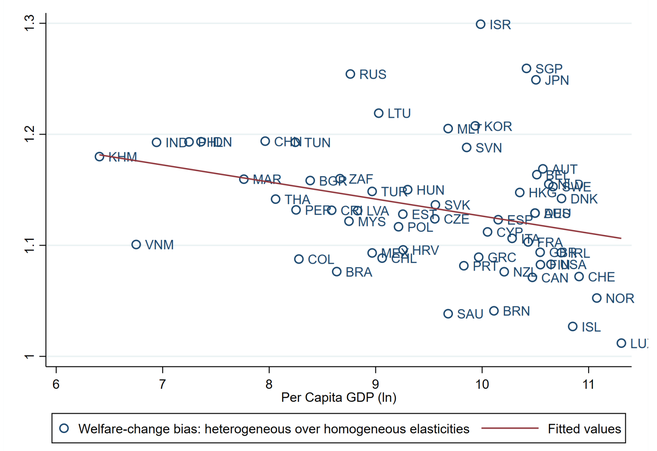
- We use the metric proposed by Arkolakis, Costinot & Rodriguez-Clare (2012), i.e. welfare gain from trade as the negative of move to autarky

$$\widehat{W}_j = 1 - \prod_s^S \left(\lambda_{jj}^s\right)^{-\eta_{js}/\varepsilon_s}$$

- Elasticities computed at the TiVA sector level $\sigma_s$to calculate welfare gain with *heterogeneous* elasticity:
  - ▷ λ_{jj}^s total expenditure on sector s devoted to home production in country j
  - ▷ η_{js} 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 $\widehat{W}^{Hetero}/\widehat{W}^{Homo}$ (vertical axis) is larger for low-income countries.



Notes: The vertical axis refers to the ratio of the welfare change calculated using heterogeneous elasticities ($\widehat{W}^{Hetero}$) and a homogeneous ($\widehat{W}^{Homog}$) elasticity based on the weighted average of ε_k across sectors. The weights are the sectoral export shares.

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

The bias in welfare-change evaluation $\widehat{W}^{Hetero}/\widehat{W}^{Homo}$ (vertical axis) increases in the country's correlation between domestic-expenditure share λ_{jj}^s and trade elasticity ϵ_s(horizontal axis).

Dep var:	$\widehat{W}^{Hetero}/\widehat{W}^{Homog}$		
Developing country (dummy)	0.312		0.330
	(0.019)		(0.026)
Corr(λ_{jj}^s;$\lvert\varepsilon_k\rvert$)		0.476	-0.057
		(0.054)	(0.046)
Corr(λ_{jj}^s;$\lvert\varepsilon_k\rvert$) × Developing country (dummy)			0.232
			(0.093)
Observations	62	62	62
R-squared	0.820	0.446	0.829

Notes: The dependent variable is the ratio in the welfare changes calculated using income-group specific heterogeneous elasticities ($\widehat{W}^{Hetero}$) and a homogeneous elasticity ($\widehat{W}^{Homog}$). We use the World Bank classification of country income levels, and define poor and middle-income countries as "developing", while high-income countries are "developed". Robust standard errors appear in parentheses.

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/view/product-level-trade-elasticity/home`

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