Commodity Trade Matters

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Presentation and Discussion, C. Nedoncelle

Reading group

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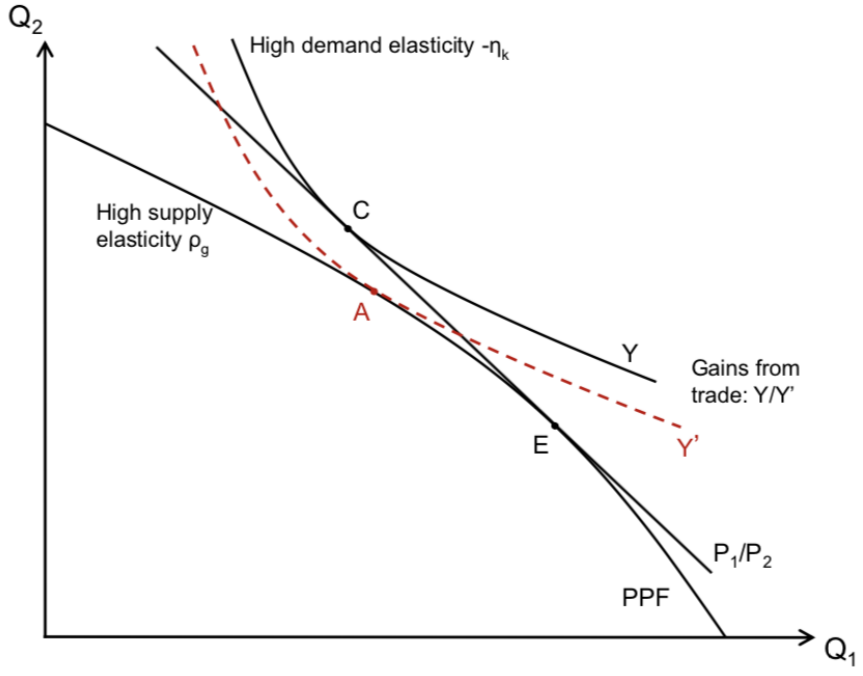
Commodities matter

- Assess the gains from trade in commodities ...
  - but, after all it only accounts for 1/5 of total world trade...
  - hard to imagine how it could increase the low gains from trade
- ... accounting for the specific features of commodities.
  - Commodities are not final goods
  - input-output linkages found in commodity trade with final good sectors
  - Low elasticities of supply and demand ...
- Claim: ignoring these specific features of commodities leads to a wide understatement of the gains from trade.
  - This may be important in these times
  - increases in tariffs,

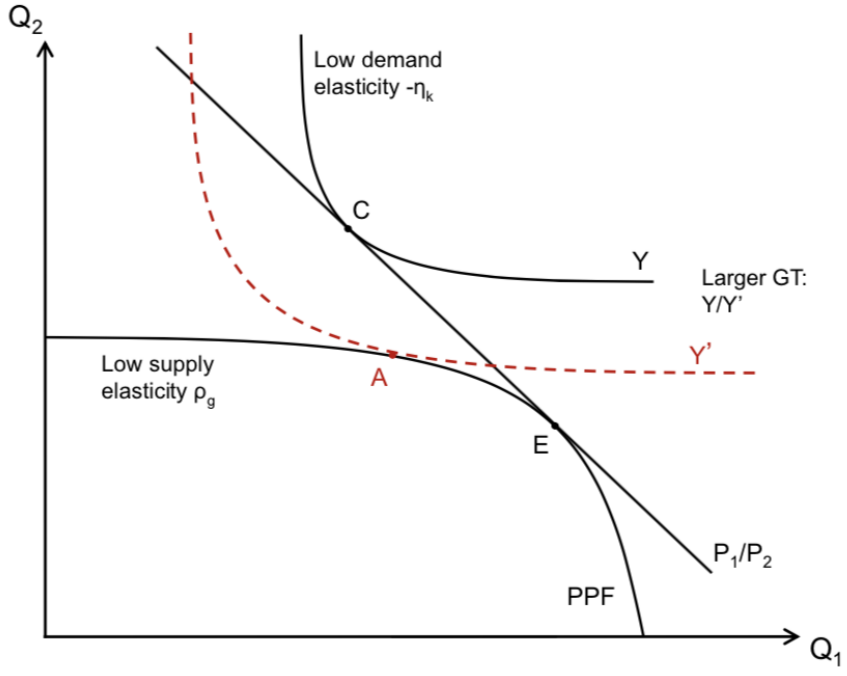
What the paper does

- Rich dataset on trade, production, prices and price elasticities across many commodities
  - stylized facts and specific features on trade in primary commodities
- General-equilibrium model of trade
  - Accounting for the features
- Simulate counterfactuals
  - claim: higher gains from trade

Why elasticities matter



(a) High elasticity of substitution



(b) Low elasticity of substitution

- for the same change in relative price, production and demand adjust more or less.
- (not 100% sure) C and E are close or not depending on specialization

Related Literature

The paper : implications of the specific features of commodities for the quantification of the gains from trade.

- Gains from trade
  - GT with I-O links
    - Antras and Gortari (2017), Caliendo and Parro (2015)
  - GT with many productions factors
    - Galle et al. (2017), Burstein et al. (2018)
  - GT with land and natural resources
    - Costinot and Donaldson (2016), Farrokhi (2018), Sotelo (2017)
  - GT with heterogenous (trade) elasticities across sectors
    - Ossa (2015)
  - GT with climate change
    - Gouel and Laborde (2017)

Related Literature

- Agricultural commodities in trade
  - Lagakos and Waugh (2013), Gollin, Lagakos, and Waugh (2013): labor determinants of exports of agricultural commodities
- Price volatility

Related Literature

The paper : implications of the specific features of commodities for the *quantification* of the gains from trade.

- Calibration methods
  - "exact hat algebra"
  - Dekle et al. (2008), Caliendo and Parro (2015), Caron and Fally (2017)
- Computational General Equilibrium (CGE) modeling literature
  - "trade shares"

Data sources

Production

- Mineral production data (1913- 2015) British Geological Survey (2015)
- Agricultural production (1960-2014) : FAO
- Downstream industries Global Trade Analysis Project, or GTAP

Trade

- BACI - HS6, 1995-2014

Prices

- Various sources:United States Geological Survey Historical Statistics for Mineral and Material Commodities, FAO, World Bank, IMF commodity prices ...

Fact: Commodities face low supply and demand elasticities

meta-analysis of price elasticities in the literature

Table 1: Selected estimates of supply and demand elasticities for commodities

Commodity	Price Elasticity of Demand	Price Elasticity of Supply	Commodity	Price Elasticity of Demand	Price Elasticity of Supply
Alfalfa	-0.107	0.44	Niobium	(-0.295 to -0.3)	
Almonds	(-0.35 to -0.48)	0.19	Palladium	-0.2	
Aluminium	(-0.07 to -0.7)	(0.05 to 1.15)	Peanuts	(0.0 to -0.4)	(0.04 to 0.5)
Bananas	(-0.566 to -0.738)	(0.2 to 0.4)	Petroleum	(-0.034 to -0.44)	
Barley	(-0.11 to -0.435)	(0.11 to 0.45)	Platinum	(-0.28 to -0.7)	
Chromium	(-0.1 to -0.277)		Pulse grains	(-0.339 to -0.71)	0.17
Citrus	(-0.804 to -0.994)		Rice	(0.007 to -0.55)	(0.01 to 0.57)
Coal	(-0.3 to -0.7)	0.057	Roots	(-0.635 to -0.737)	
Cobalt	(-0.029 to -0.5)	(0.21 to 1.0)	Silver	-0.042	
Cocoa	(-0.01 to -0.14)	(0.03 to 0.12)	Sorghum	(-0.06 to -0.49)	(0.16 to 0.53)
Coffee	(-0.07 to -0.54)	(0.02 to 0.55)	Soybeans	(-0.05 to -0.329)	(0.061 to 0.705)
Copper	(-0.035 to -0.42)	(0.06 to 1.2)	Sugar	(-0.01 to -0.643)	(0.055 to 0.21)
Corn	(-0.1 to -0.39)	(0.08 to 0.7)	Sunflower	(-0.083 to -0.15)	(0.15 to 0.41)
Cotton	-0.684	0.497	Tin	(-0.097 to -0.55)	(0.032 to 1.11)
Crude Oil	(-0.003 to -0.08)	(0.0 to 0.289)	Titanium	-0.16	
Gold	-0.411		Tomatoes	(-0.32 to -0.723)	0.27
Iron	-0.086	0.589	Tungsten	(-0.15 to -0.5)	(0.11 to 0.15)
Lead	(-0.111 to -0.22)	(0.109 to 1.84)	Uranium		(1.1 to 11.4)
Manganese	-0.1	> 1.0	Vanadium	(-0.254 to -0.3)	
Mercury	-0.1	1.0	Walnuts	(-0.251 to -0.267)	0.02
Natural Gas	(-0.053 to -0.95)	(0.0 to 0.15)	Wheat	(-0.09 to -1.6)	(0.059 to 0.43)
Nickel	-0.038	(0.133 to 2.03)	Zinc	(-0.064 to -0.47)	(0.085 to 1.75)

Notes: The full lists of estimates and references are provided in Appendix Table 6. The parentheses indicate the ranges of estimates when more than one estimate is available, or when the author only offers an estimate of the range.

Fact: commodities production relies on natural resources

Table 4: Natural resource intensity in the GTAP 8 data

GTAP code	Commodity	Avg. resource intensity	Std. dev.
coa	Mining and agglomeration of coal	0.502	(0.160)
frs	Forestry	0.153	(0.137)
fsh	Fishing	0.448	(0.108)
gas	Extraction of natural gas	0.205	(0.175)
oil	Oil extraction	0.432	(0.133)
omn	Metal ores, mining n.e.c.	0.179	(0.143)
(aggregate)	Agriculture	0.242	(0.125)

Notes: share of land (agriculture) and natural resources (other than agriculture) in production costs by commodity on average; in parentheses: standard deviation across countries.

Departures from otherwise standard trade models

- commodities production relies on natural resources
- concentration of resources in few countries (refer to anecdotal evidence)
- low price elasticity of supply
- low price elasticity of demand

otherwise standard trade model:

- multi-sector Eaton and Kortum (2002) (Ricardian, differences in technologies across countries) framework

Commodities, natural resources, labor and final goods

- Commodities production = natural resources + labor
  - unequal distribution of resources: concentration of commodities production in some countries
- Final good production = commodities + labor
- Final goods and commodities can be traded
- All steps are based upon the existence of a specific factor/input.

Commodities and natural resources

- "Each commodity requires a given natural resource, such as copper deposits for copper production or a certain bundle of climatic and agronomic characteristics for agricultural products."

Towards a low price elasticity of supply

- production of commodities = labor + natural resources, with potentially low elasticities of substitution (ρ_g)

$$C_{ig}^{C} = A_{ig}^{C}\left(\beta_{ig}^{C} r_{ig}^{1-\rho_g} + (1-\beta_{ig}^{C}) w_i^{1-\rho_g}\right)^{1/1-\rho_g}$$

- Low price elasticity of supply because of
  - higher share of natural resources
  - lower elasticity of substitution

Towards a low price elasticity of demand

Cost of production of good k in country i

$$C_{ik}^{F} = A_{ik}^{F} \left(\beta_{ik}^{F} w_i^{1-\eta_k} + \sum_g \beta_{ikg}^{F} (P_{ig}^{C})^{1-\eta_k} \right)^{1/1-\eta_k}$$

With a low elasticity of substitution η_k:

- Commodities are costly to replace if their supply is cut off.

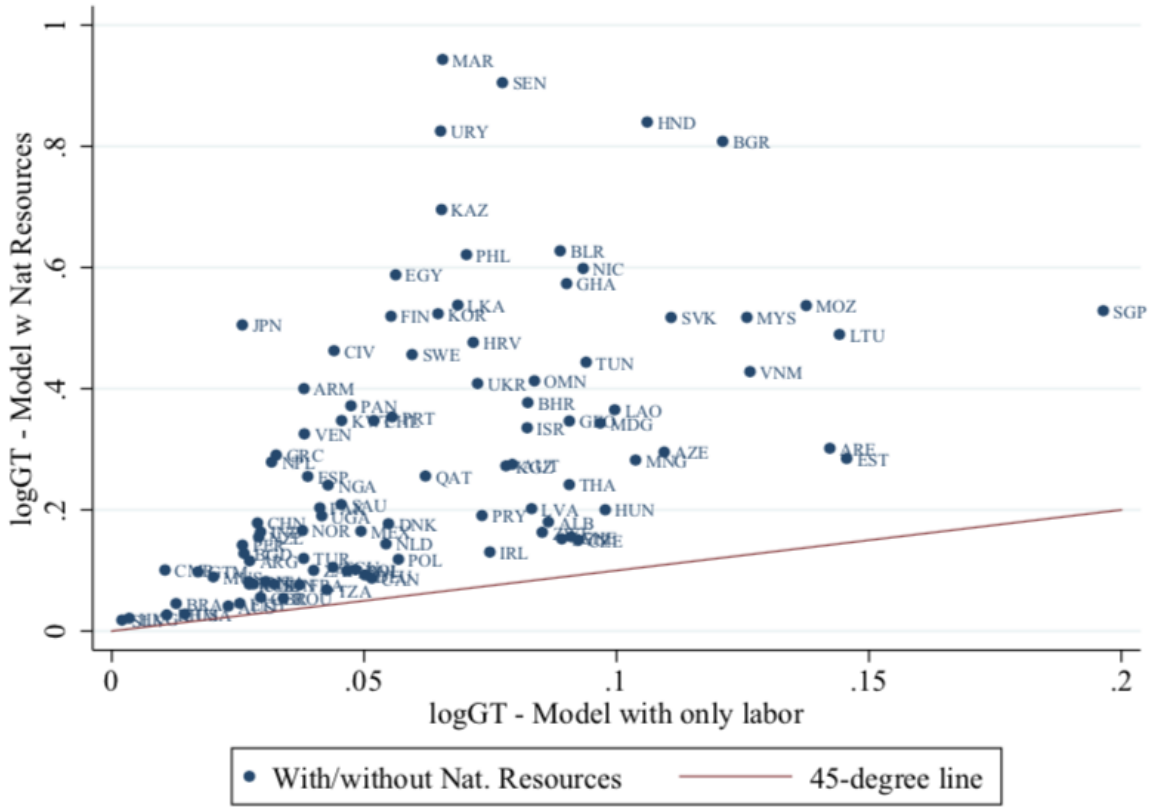
The "Exact hat algebra"

- A small number of aggregate "sufficient statistics" are sufficient to compute the welfare changes associated with trade liberalization experiments (ACRC)
- many other papers: Dekle, Eaton, Kortum (2008) (or for CGE people "calibrated share form")
  - "Rather than estimating such a model in terms of levels, we specify the model in terms of changes from the current equilibrium. This approach allows us to calibrate the model from existing data on production and trade shares. We thereby finesse having to assemble proxies for bilateral resistance (for example, distance, common language, etc.) or inferring parameters of technology."
- $\hat{Z} = Z'/Z$
- how a change in trade costs and other key parameters will affect the equilibrium, without approximations

Calibration

- Commodity production data: prod, demand, import and export shares.
- I-O links: GTAP, USGS
- Natural resources: constant share across countries/within country across commodities.
- Elasticities:
  - Trade: Simonovska and Waugh (2014), $\theta_k = 5$
  - Price elasticities of demand 0.4; price elasticities of supply 0.6
  - Elasticities across industries: $\sigma = 1$, but that is not important.

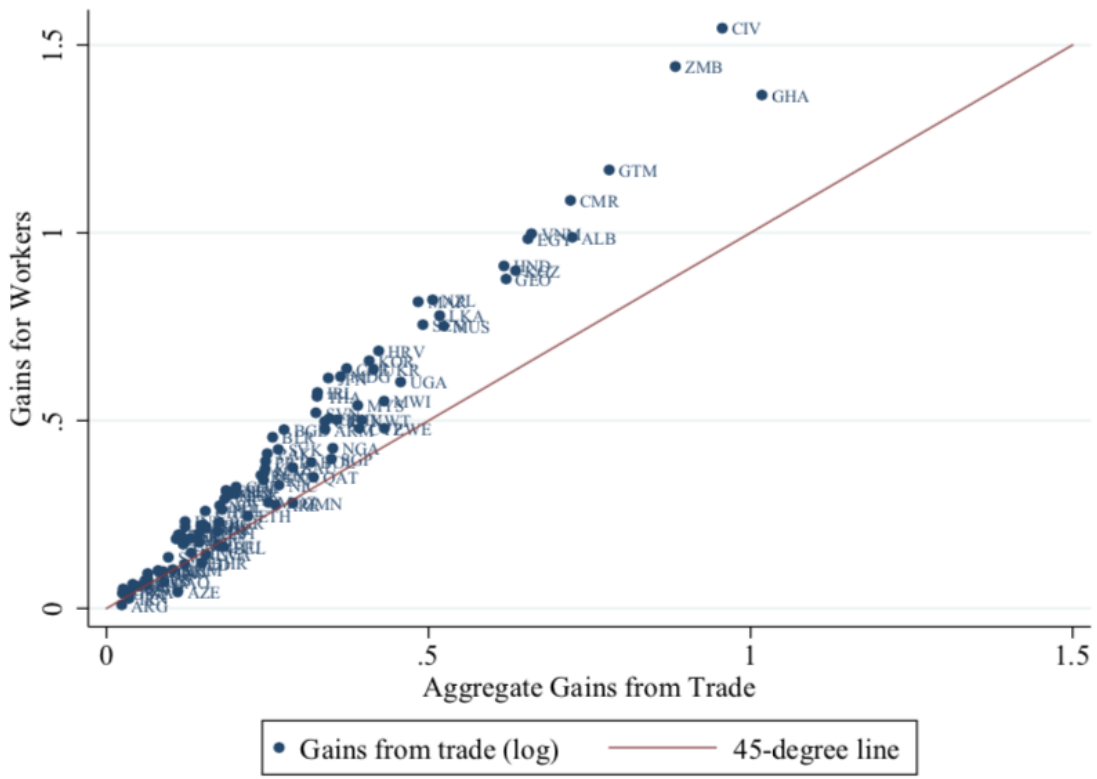
Gains from trade relative to autarky



Aggregate gains from trade relative to model with only labor

Gains from trade relative to autarky: Heterogeneous gains from trade

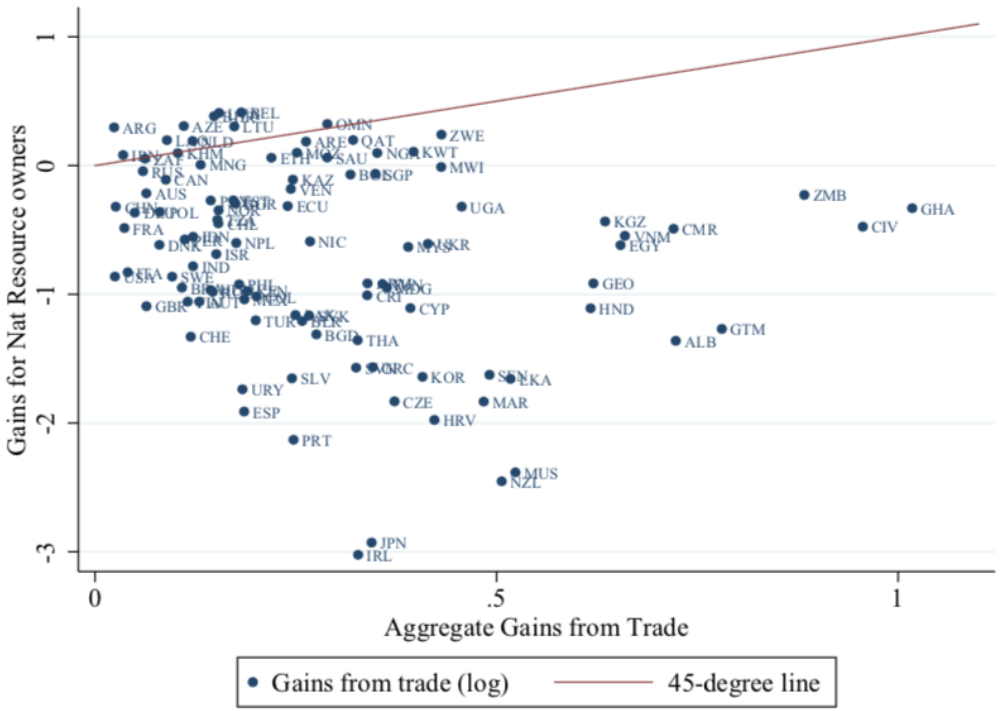
(a) Workers vs aggregate gains from Trade



Gains from trade relative to model with only labor

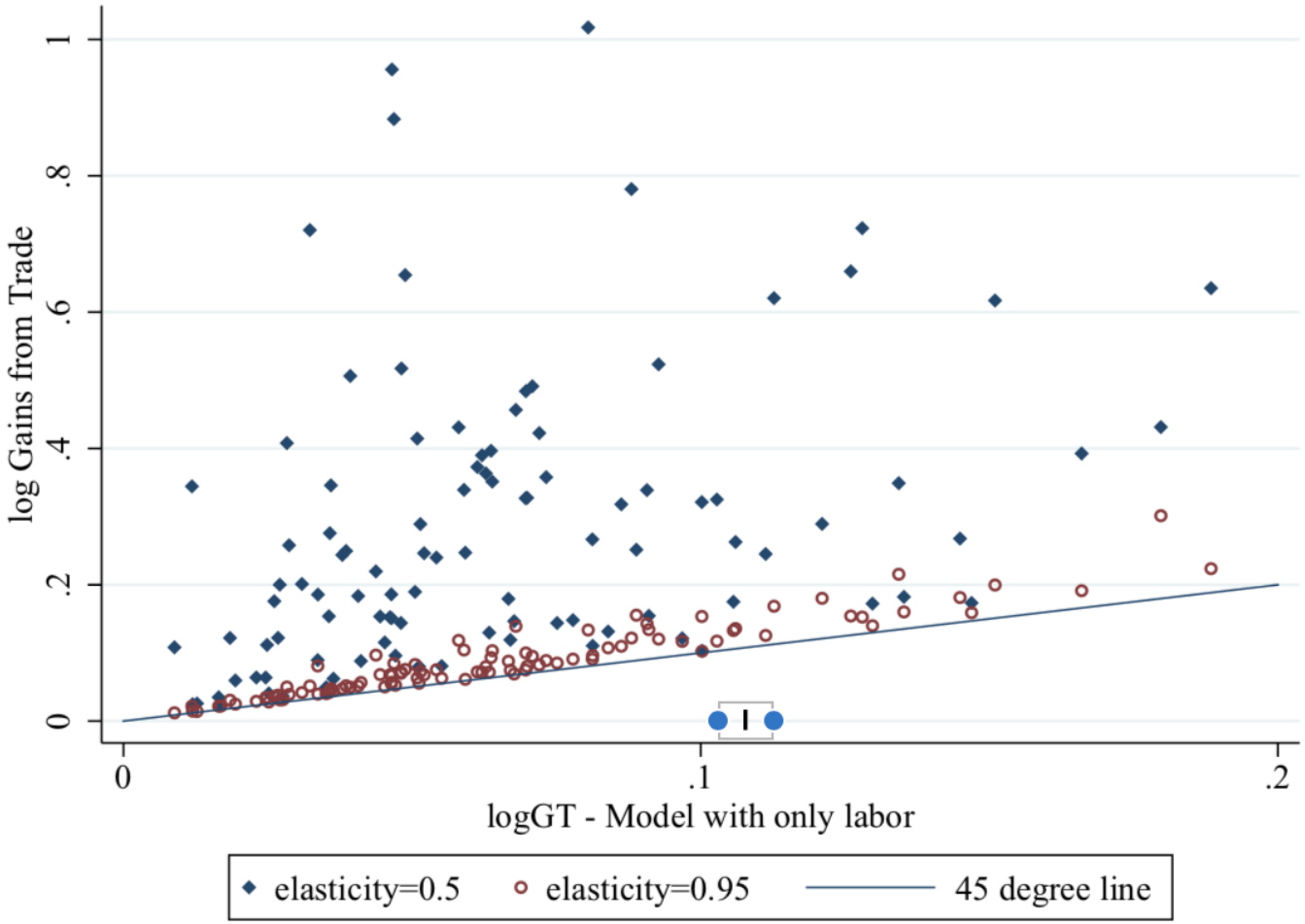
Gains from trade relative to autarky: Heterogeneous gains from trade

(a) Natural Resources owners vs. aggregate gains from Trade



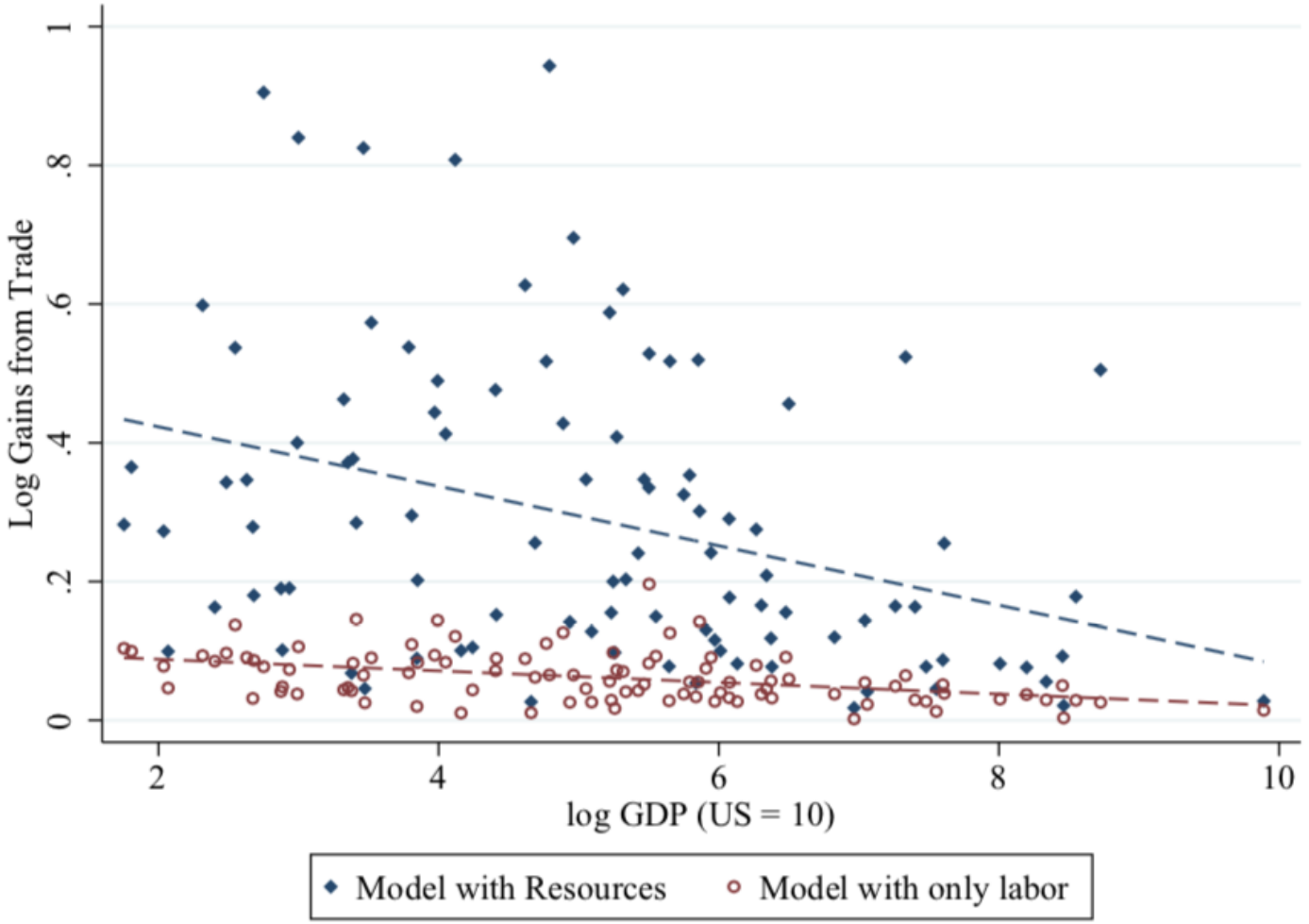
Gains from trade relative to model with only labor

Gains from trade relative to autarky: role of elasticities



Gains from Trade (Aggregate) for Different Elasticities of Substitution

Gains from trade relative to autarky: determinants



Gains from Trade (Aggregate) for Different Elasticities of Substitution

Conclusions

- Importance of commodities in international trade
- specific characteristics of primary commodity markets lead to higher gains from trade
  - low elasticities of demand and supply, high dispersion of production
- dataset + facts confirm the specificities
- model that accounts for these
- Main results:
  - primary commodities have a modest share in world trade
  - commodities are crucial inputs to many production processes
  - lower trade barriers resulting large increase in trade volume relative to GDP

Then?

- Gains from trade are dependent upon trade elasticities
  - Low gains from trade in ACRC (2012)
  - True gains (or true losses in autarky) seem to be the case? (cf brexit)
  - Are elasticities badly estimated?
- what about trade elasticities: short-run ? long-run ?
- other reasons to be skeptical?

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