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Trade and the Environment

- Copeland and Taylor (1994): 2-country/continuum of goods, environmental input combined with human capital, demand for standards income elastic

- Antweiler et al. (2001) switched from Ricardian to Hecksher-Ohlin set-up with “dirty” good being capital-intensive

- Empirical analysis: trade has little or no impact on environment (Frankel and Rose, 2005; Chintrakarn and Millimet, 2006; and Managi et al., 2009)

- No analysis of agricultural sector
Modern Ricardian Approach

- Eaton and Kortum (2002): key to solving Ricardian trade model - assume countries get productivity draw


- Applied to agricultural trade by Reimer and Li (2010), Reimer (2014), Heerman *et al.* (2015), and Xu (2015)

- Focus on deriving estimates of parameters of productivity distribution
Ricardo and Agriculture

- Costinot and Donaldson (2012) note it is possible to test predictions of Ricardian model without relying on specific functional form.
- Empirical strategy is to use agronomic data on how inputs (water, soil, and climate) map into output at the “field” level.
- In sample of 17 crops for 55 countries, using field-level productivity data from the GAEZ project of IIASA/FAO, model has significant explanatory power.
- Apply methodology to evaluating integration in US agricultural markets (Costinot and Donaldson, 2016).
Ricardo and the Environment

- Costinot *et al.* (2016) is major effort to evaluate impact of climate change in agricultural markets, i.e., what is effect of change in comparative advantage?
- Use GAEZ data for 1.7 million fields and IPCC climate change forecasts for 10-crop/50-country sample to evaluate adaptation through production and trade
- Central result: global GDP reduced by 0.26 percent, trade adjustment being minor relative to production adjustment
- Results not sensitive to intra-national trade costs
What’s Missing?

- No account taken of: (i) GHG emissions by agriculture and transportation; (ii) domestic/border policies targeted at mitigation of climate change

- Policy choices (taxes/subsidies) will affect supply/demand for crop \( k \) in country \( i \):

\[
Q_i^k = \sum_{f \in F_i} s_i^f A_i^{fk} \left[ \frac{(p_i^k A_i^{fk})^\theta}{\alpha^\theta_i + \sum_{l \in K} (p_i^l A_i^{fl})^\theta} \right]^{(\theta-1)/\theta} = \sum_{j \in I} \tau_{ij} C_{ij}^k
\]

- Scale, composition and technique effects of adaptation to climate change?