Imported Inputs, Quality Complementarity, and Skill Demand

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Discussion by Stephen Redding
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Motivation

- Large empirical literature documents firm heterogeneity and performance differences between trading firms
- Much of this literature focuses on differences in productivity and size
- Much of this literature focuses on exporters and non-exporters

Non-Neutral Technology Differences

- A growing theoretical and empirical literature emphasizes non-neutral technology differences across firms
- Recent research emphasizing technology-skill complementarities
  - Burstein and Vogel (2010, 2011), Burstein, Cravino and Vogel (2012), Harrigan and Rechef (2012), Parro (2012)
- Importance of firm importing as well as firm exporting
  - Amiti and Davis (2012), Amiti and Konings (2007), Goldberg, Khandelwal, Pavcnik and Topalova (2010)
- Relationship between output quality and input quality
  - Kugler and Verhoogen (2012)

Model

- Firms supply horizontally differentiated varieties ω
- Production involves a continuum of complementary tasks $i \in [0, 1]$

$$Q_\omega = \left(\int_0^1 \alpha_i q_{iw}^{\frac{\rho-1}{\rho}} di \right)^{\frac{\rho}{\rho-1}}.$$

- Unit cost: quality parameter m_ω and quantity parameter A_ω

$$C(\{q_\omega\}) = \frac{1}{A_\omega} \left(\int_0^1 c(q_{iw}) di + m_\omega \right),$$

- m_ω unit cost of the raw material used to produce variety ω
- A_ω determines number of inputs of *each* input $i \in [0, 1]$ and of the raw material needed to produce one unit of output

$$c(q_{iw}) = a_c + b_c q_{i\omega}^2.$$

- Inputs either produced locally or imported $\{a_H, a_F, b_H, b_F\}$

Implications of Trade

- High quality inputs are relatively cheap in international markets
- Therefore firms use foreign inputs instead of domestic inputs for quality-sensitive tasks
- Substitution effect
  - Lowers the demand for domestic input quality (e.g. skilled labor) and raises output quality
- Complementarity effect
  - Increases the return to quality in the remaining domestic tasks
  - Increases the demand for domestic input quality (e.g. skilled labor) and raises output quality further
- Evidence from Chilean firm-level data from 1992-2005
  - Other things equal, importers use a lower share of skilled workers
  - Importers skill demand increases with the quality of imports

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  - Quality parameter m_ω that enters additively determines the quality of inputs and outputs
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- Which results would generalize with more flexible functional forms and which ones would not generalize?
- What are the minimal characteristics of the production technology needed to generate the key results?
- Can we take these functional forms to the data more structurally?
  - Simulate the model and show that it replicate quantitatively key moments in the data?
  - Estimate the production technology either as parameterized or using more flexible functional forms?

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  - These changes in relative employment are likely to depend on general equilibrium changes in factor prices
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- The model's predictions are for input and output quality and the mapping to skills is based in part on interpretation
  - The assumption that high-skill workers have a comparative advantage in high-quality inputs is natural
  - Could develop a more fully-fledged model of skills as in Costinot and Vogel (2010)
  - Extensive margin distinction of skilled, white-collar and blue-collar workers is relatively coarse
  - Intensive margin of quality uses wage information

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  - Firm capabilities (e.g. Sutton 2012)
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- Dynamics of the acquisition of firm capabilities
  - Where does the quality parameter m_ω come from?
  - The manager or a team of individuals?
  - What enables some firms to improve product quality and start to export and import?
  - Does the acquisition of capabilities involve an active process of forward-looking investment?