Trade Reforms and Firm Productivity:
Some Evidence from India and China

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“Trade and Productivity”

Google Ngram Viewer

Fraction of books scanned by Google (~5 million) that have the phrase “trade and productivity”
Boundaries of this Talk

• What have we learned?
• Why is more research is needed?

• Topic relates to broad literature studying policies that affect performance of firms in developing countries
  • Trade barriers
  • Credit constraints
  • Entry barriers
  • Tax policy
  • Labor regulations
  • Infrastructure
  • FDI
  • Macroeconomic policy

• I’ll focus narrowly on:
  o Removal of trade barriers
  o Handful of mechanisms
  o Two countries: China and India
Trade and Productivity: Mechanisms

• How does reducing trade costs improve the productivity of firms?

• Across-firm mechanisms
  ○ Selection effects (Chile) (Pavcnik 2003)
  ○ Removing misallocation (China, Mozambique) (Khandelwal et al 2012, Sequeria 2014)

• Within-firm mechanisms
  ○ Competition reduces slack
  ○ Access to larger markets (Argentina, Chile) (Bustos 2011, Garcia and Voigtländer 2014)
  ○ Access to sophisticated buyers (Slovenia, Egypt) (de Loecker 2007, Atkin et al 2014)
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  o Access to intermediate inputs (Indonesia, India, Hungary, China) (Yu 2014, Khandelwal and Topalova 2011, Amiti and Konings 2007, Hungary 2011)

• Given time constraints, I’ll focus on two of these mechanisms
Removing Misallocation
Removing Misallocation

Exiters

Entrants

Firm Productivity
Removing Misallocation

Connectedness

Exiters  Entrants

Firm Productivity
Removing Misallocation

Connectedness vs. Firm Productivity diagram

- Entrants
- Exiters
- Connected, but unproductive
- Unconnected, but productive
Misallocating Institutions

• Why might misallocation occur in protected markets?
  o Institutions are formed to manage trade barriers
  o They are subject to bureaucratic capture
  o Customs agents have lots of discretion to withhold goods in bonded warehouses, assess tariff duties, demand more paperwork, etc.

  ➢ Institutions that manage trade barriers may favor firms that can navigate “the system” over firms that can produce efficiently
Customs modernisation increases revenue, trade and investment in Angola/

The modernisation of Angola’s customs administration has enabled Angola to increase revenue collection, facilitate trade and promote domestic and foreign investment. Angola has benefited from the highest rate of economic growth in the Southern African Development Community (SADC) with corresponding growth in job opportunities and improvements to the quality of life for its people.
Misallocation under the Multifiber Arrangement (“MFA”)

• Prior to 2005, every article of clothing exported to US/EU/Canada from a developing country was subject to quotas.

Quota-bound: subject to quota
  ○ “Men’s cotton pajamas” to US/Canada

Quota-free: not subject to quota
  ○ “Men’s cotton pajamas” to EU

• January 1, 2005: all quotas eliminated

Apparel Exports Before and After Quotas

China’s Apparel Exports Before and After Quotas

Source: Khandelwal et al (2013)
Apparel Exports Before and After Quotas

China’s Apparel Exports Before and After Quotas

Source: Khandelwal et al (2013)
Quota Allocation in China

• The Chinese govt set up an institution to allocate quota licenses to its exporters
  ○ Details of allocation are murky

• Allocation via auction:
  ○ Most efficient firms bid for quotas
  ○ Their exports expand with liberalization
  ○ Trade reforms remove standard deadweight triangles

• Allocation via connections:
  ○ Inefficient firms receive quota
  ○ Trade reforms dismantles the inefficient institution and allows efficient entrants to replace inefficient incumbents
Share of SOEs
Before and After Liberalization

Share of Exports by SOEs

Source: Khandelwal et al (2013)
Trade liberalization delivers 13.5% increase in sector TFP in just one year!

Source: Khandelwal et al (2013)
Reallocation After Quotas Ended

- Large decline in market share of incumbent SOEs
- Market share reallocates to privately-owned entrants

<table>
<thead>
<tr>
<th>Change in Market Share (Before vs After Quotas Ended)</th>
<th>Margin</th>
<th>All</th>
<th>SOE</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incumbents</td>
<td>-0.122</td>
<td>-0.106</td>
<td>-0.016</td>
<td></td>
</tr>
<tr>
<td>Net Entry</td>
<td>0.122</td>
<td>-0.041</td>
<td>0.163</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.000</td>
<td>-0.147</td>
<td>0.147</td>
<td></td>
</tr>
</tbody>
</table>

Source: Khandelwal et al. 2013. Bold type indicates statistical significance
Visualizing Inefficient Quota Allocation

How correlated is firm productivity with political connections?

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = 0.95 \]

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = 0.85 \]

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = 0.75 \]

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = 0.65 \]

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = 0.55 \]

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = 0.45 \]

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = 0.35 \]

Source: Khandelwal et al. 2013
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This is the degree of misallocation suggested by the Chinese export data.

ρ = 0.15

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

\[ \rho = -0.15 \]

Source: Khandelwal et al. 2013
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Source: Khandelwal et al. 2013

\[ \rho = -0.25 \]
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\[ \rho = -0.35 \]

Source: Khandelwal et al. 2013
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$\rho = -0.45$

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\[ \rho = -0.85 \]

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

$\rho = -1.00$

Source: Khandelwal et al. 2013
Visualizing Inefficient Quota Allocation

- Decomposition of TFP gains from trade liberalization:
  - 71% due to removing misallocating institution
  - 29% from direct removal of quota

- Reforming institutions can be politically difficult, but this is one example where externally-mandated reforms can deliver large efficiency gains

Source: Khandelwal et al. 2013
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Measuring Productivity

• “Trade liberalization and tariff reforms have provided increased access to Indian companies to the best inputs available globally at almost world prices.”
  ─Rakesh Mohan, former Deputy Governor of the RBI, 2008

• The typical study runs a two-step procedure:
  1. TFP is a residual from a regression of revenues and expenditures
  2. Correlate changes in firm TFP with changes in trade policy
     o Tariffs on final goods (“output tariffs”)
     o Tariffs on intermediate goods (“input tariffs”)

Role of Intermediate Inputs: Evidence from Several Countries

• **Indonesia** *(Amiti and Konings 2007)*
  - 10pp decline in input tariffs raise productivity by 12%
  - Magnitude is twice as large as output tariff reductions

• **Hungary** *(Halpern et al 2011)*
  - Switching to imported varieties would raise TFP by 12%
  - 1993-2002: one-third of aggregate TFP growth was due to imported inputs

• **India** *(Topalova and Khandelwal, 2011)*
  - 10pp decline in input tariffs raises TFP by 4.8%
  - Magnitude for the same decline in output tariffs is 0.32%

• **China** *(Yu 2014)*
  - 10pp decline in output (input) tariffs raised TFP by 9.2% (5.1%)
  - But input tariff magnitude becomes stronger for non-processing firms
Opening the Black Box

• Recent studies are prying open the productivity black box

• Use quantity data to obtain “clean” productivity measures
  - India (de Loecker et al 2014), Chile (Garcia and Voigtländer, 2014)

• Looking at how specific outcomes adjust to trade shocks
  - Investments in R&D (Argentina, Mexico) (Bustos 2011, Teshima 2010)
  - Labor (Argentina, Mexico, Rwanda) (Frias et al 2009, Brambilla et al 2012, Frazer 2014)
  - Productivity and quality (Mexico, Egypt) (Verhoogen 2008, Atkin et al 2014)
  - Input & output varieties (India, China) (Goldberg et al 2010, Bas & Strauss-Kahn 2014)
  - Prices and markups (India, Taiwan) (Goldberg et al 2014, Edmonds et al 2014)

➤ Let’s re-examine the role of imported intermediates in firm performance
Role of Intermediate Inputs


- Fixed cost to import inputs
- Lower input tariffs enables firms to source more input varieties

Diagram:
- Input tariff liberalization → Imports of new inputs varieties → Domestic product expansion
India’s Import Growth, by End Use
1987-2000

Source: Goldberg et al (2010)
India’s Import Growth Decomposition, by End Use
1987-2000

Source: Goldberg et al (2009)
Intermediate Inputs and Product Scope

• Reduced form results:
  ○ On average, input tariffs fell 24pp and firm’ product scope increase by 8%
  ○ Lower tariffs on inputs accounts for 31% of total product scope expansion

• Adding some structure reveals the mechanism driving the result:
  ○ Construct input price indexes for each sector
    ○ “Conventional”: lower input tariffs makes existing imports cheaper
    ○ “Variety”: lower input tariffs provides access to new varieties
  ○ Product scope is responsive to new input varieties, not cheaper inputs

• How did firms finance these new product introductions
  ○ Observe correlations between new products and increased markups
  ○ Costs fell, markups rose --> profits increased

➤ Important role of intermediates (as opposed to final goods) in the case of India
Anecdotes from Pre-Reform India

• “…While we are ready to introduce containers made from 2CR tinplate, we cannot consider their marketing until ... the Government can assure continuing imports. In the development of new products ... we have continuous access to the most advanced technology through our technical associates. We can over a reasonably short period equip ourselves to manufacture all these products, but we need to be certain that raw material of the right quality and specifications will be available...”

–Baskar Mitter, Chairman of Metal Box Co, EPW 1970
Takeaways

• Evidence from many developing countries that large-scale trade reform have improved performance of industrial firms

• Two active areas of research
  ○ Using price data and new methods to accurately measure TFP
  ○ Accessing new data (and designing survey collections) to open the TFP black box

• Related and important questions:
  ○ When resources reallocate across firms, how severe are the adjustment costs to workers?
  ○ When firm productivity improves over time, which types of workers gain and can lower-skilled employees catch up?
Thank You
Prices and Markups

• How do trade reforms affect firm markups
  ○ Conventional answer is markups should fall (Levinson 1993, Harrison 1994)
  ○ But these papers focused on output tariff liberalization

• Due to India’s trade reform, on average:
  ○ Prices fall 18%
  ○ Marginal costs fell 35%
  ○ Markups rose 17%

• Observe positive correlation between product expansion and markup increases