A Firm-Level Perspective on Canada-US Trade

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Evolution of Trade Theory

Productivity and Firm-Level Effects

Fixed Costs of Trade

Empirical Analysis

Conclusions

Editorial Cartoon by Bruce MacKinnon

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Evolution of Trade Theory
Trade Theory: **Country-Level Analysis**

- Assumes that average production cost is independent of output level.

- Gains from trade result from across-industry reallocations of labour, capital, etc.
Trade Theory: Industry-Level Analysis

- Assumes that average production cost falls as output increases.

- Additional gains from trade result from
  - Higher productivity due to higher firm-level outputs
  - More product variety available to consumers
  - Lower mark-ups due to increased competition
Predicted Distributional Impacts of Trade

Export-oriented regions, industries, and workers gain while import-oriented ones lose from trade.
Mexico Trade Vulnerable Regions

Source: Hakobyan and McLaren (2016)
II. Results

Are the CZs that are most exposed to rising trade penetration also those most impacted by computerization? To explore this question, Figures 1 and 2 illustrate the geography of trade and technology exposure at the Commuting Zone level. Each panel of the figures presents a map of the 48 contiguous US states with all 722 CZ boundaries outlined in gray. In Figure 1, panel A, the interior of each CZ is shaded to indicate its quartile rank within the distribution of CZs in the fraction of workers that were employed in routine task–intensive occupations in 1990. Darker colors correspond to higher quartiles of \( RSH \), with the lightest color denoting CZs in the lowest quartile, and the darkest color denoting CZs in the fourth quartile.

Evident from this figure is that the CZs with the highest employment shares in routine task–intensive occupations constitute a mixture of manufacturing-intensive locations (e.g., Cleveland, Detroit, Milwaukee, and Minneapolis) and human capital–intensive population centers, such as New York, Chicago, Dallas, and Los Angeles. This pattern reflects the dual sources of routine task–intensive occupations: blue-collar production occupations associated with capital-intensive manufacturing; and white-collar office, clerical, and administrative support occupations associated with banking, insurance, finance, and other information-intensive sectors.

Figure 1, panel B presents analogous information for exposure to import competition from China. In this panel, the lightest shading indicates CZs in the lowest quartile of trade exposure increase between 1990 and 2007, and the darkest color indicates CZs that are in the highest quartile of trade exposure increase. As expected, many manufacturing-intensive regions appear among the most trade-exposed CZs, including substantial parts of the Northeast and South Central United States, where labor-intensive goods manufacturing, such as furniture, rubber products, toys, apparel, footwear, and leather goods, is concentrated.

A comparison of the two panels of Figure 1 indicates both clear overlaps and pronounced differences among the sets of CZs with high trade exposure and those with high technology exposure. Most notable, however, is that trade exposure is geographically more concentrated. A substantial fraction of the top quartile of trade-exposed CZs are located in a small cluster of states, including Tennessee, Missouri, Arkansas, Mississippi, Alabama, Georgia, North Carolina, and Indiana. By contrast, routine task–intensive CZs are more dispersed throughout the United States.

Table 1 highlights the contrasting geography of trade and technology exposure by summarizing our two exposure measures for the eight major US census divisions that make up the contiguous US states. Growth in import exposure per worker differs by more than a factor of six across.

Panel B. Trade Exposure by Commuting Zone, 1990–2007

Source: Autor, Dorn, and Hanson (2013)
Modern Trade Theory: Firm-Level Analysis

- Assumes that average production cost falls as output increases.

- Assumes that firms within an industry differ in their productivity – firms are heterogeneous.

- Incorporates variable and fixed costs of trade.
Four Insights from Modern Trade Theory

1. There are Additional Effects on Productivity of Increased Trade

2. Firms **Within** Industries Experience Differential Impacts of Increased Trade

3. The Fixed Costs of Participating in International Markets Matter

4. Modern Theory Leads to Modern Empirical Analysis
Productivity Effects and Firm-Level Effects

1. There are Additional Effects on Productivity of Increased Trade

2. Firms Within Industries Experience Differential Impacts of Increased Trade
Heterogeneous firms in the same industry choose whether or not to export and how much to export.

Because there are fixed costs of exporting, the more productive firms will export while the less productive will not export.
Basic Model

Melitz (2003)

Market Share

Lower Productivity Firms  
Non-Exporters

Higher Productivity Firms  
Exporters

Melitz (2003)
Effects of Trade Liberalization

A decrease in trade costs, a decrease in tariffs, or expanded trading opportunities \[\implies\]

- An increase in profits from exporting \[\implies\]
- Expansion by incumbent exporters
- Entry by new exporters

These firms gain from increased trade (winners).
Effects of Trade Liberalization

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Effects of Trade Liberalization

Pre-Liberalization

- Lower Productivity Firms
- Higher Productivity Firms

Post-Liberalization

- Lower Productivity Firms
- Higher Productivity Firms
- New Exporters

Market Share

Pre-Liberalization

Higher Productivity Firms

Post-Liberalization

New Exporters

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Effects of Trade Liberalization

Expansion by exporters $\Rightarrow$

- An increase in the demand for labour $\Rightarrow$
  - An increase in wages $\Rightarrow$
  - A decrease in profits from domestic sales $\Rightarrow$
    - Contraction by some non-exporters
    - Exit by some non-exporters

These firms are harmed by increased trade (losers).
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Effects of Trade Liberalization

- Higher Productivity Firms:
  - Pre-Liberalization: Market Share<br>  - Post-Liberalization: New Exporters

- Lower Productivity Firms:
  - Pre-Liberalization: Exit<br>  - Post-Liberalization: Non-Exporters

- Exporters:
  - Pre-Liberalization: Market Share<br>  - Post-Liberalization: Exporters

- Non-Exporters:
  - Pre-Liberalization: Exit<br>  - Post-Liberalization: Non-Exporters

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Effects of Trade Liberalization

Contraction and exit by less productive firms and expansion by more productive firms $\implies$

- An increase in average industry productivity due to reallocation within an industry
- Winners and losers within an exporting industry
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Extensions

These effects extend to firms’ decisions regarding innovating, importing intermediates, global value chains, ...

Trade can increase differences in productivity across firms within an industry.
Some Empirical Evidence: US-Canada Free Trade Agreement

Estimates of effects of US-CFTA on Canadian manufacturing productivity:

<table>
<thead>
<tr>
<th>Source</th>
<th>Productivity Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth of most productive plants</td>
<td>4.1%</td>
</tr>
<tr>
<td>Contraction &amp; exit of least productive plants</td>
<td>4.3%</td>
</tr>
<tr>
<td>Incumbent exporters’ investments</td>
<td>1.4%</td>
</tr>
<tr>
<td>New exporters’ investments</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

Sources: Trefler (2004) and Lileeva and Trefler (2010)
The degree of firm heterogeneity within an industry matters for the impact of trade policy.
Policy Implications

- Trade policy negotiators need access to quantitative studies based on firm-level and plant-level data.

(For example, to obtain estimates of the degree of heterogeneity within an industry.)
There should be increased emphasis on the links between trade policy and firm, industry, and aggregate productivity.

Trade policies should be coordinated with productivity, innovation, investment, and industrial policies.
There should be increased attention to the distributional impacts of trade policies across firms and workers within industries.

Trade policy should be inclusive and should be coordinated with domestic policy to assist firms and workers in adjusting to changes in policy. (Tapp (2017))
Importance of Fixed Costs

3 Fixed Costs of Participating in International Markets Matter
Extensive Margin Responses

In the presence of fixed costs of trade...

There are intensive and extensive margin responses to changes in the trading environment:

- **Intensive Margin Responses**: Changes in trade flows of existing products by existing firms in existing markets

- **Extensive Margin Responses**: Changes in the number and composition of firms and markets
Effects of Trade Liberalization

Pre-Liberalization

Post-Liberalization

Market Share

Lower Productivity Firms

Higher Productivity Firms

Non-Exporters

Exporters

New Exporters

Exit
Policy Implications

- There should be increased emphasis on the impact of trade policy on potential trade flows due to extensive margin effects:
  - Entry of new trading firms.
  - Expansion of traded products that previously were not traded.
  - Expansion of traded products into new markets.
Policy Implications

- There should be increased emphasis on lowering fixed costs and regulatory obstacles that inhibit market access for trading firms.
Empirical Analysis

4 Modern Theory Leads to Modern Empirical Analysis
Firm-level Empirical Analysis

Firm-based trade theory implies an increased need for firm-level and plant-level empirical analysis to:

- guide the theory
- test the theory
- assess the impact of changes in trade costs
- assess the impact of trade policy

Firm-based trade theory guides firm-level empirical analysis.
Example: Empirical Gravity Analysis

Traditional empirical gravity analysis is based on the idea that the volume of trade between two regions depends on

- Their size

- Features which affect trade costs such as:
  - Distance between regions
  - Whether regions share a common language
  - Whether regions have a trade agreement
  - ....
Empirical Gravity

Modern trade theory showed that Traditional Empirical Gravity equations were misspecified.
Structural Gravity Estimation: Canada-US Trade

<table>
<thead>
<tr>
<th>Impact of a Regional Border on Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canada-US Border</strong></td>
</tr>
<tr>
<td>-79%</td>
</tr>
</tbody>
</table>

Data from 2012 for 201 regions

Source: Brown, Dar-Brodeur, Dixon (2019)

Related Traditional Gravity Estimates were -2100% for 1988 trade and -1400% for 1993 trade.
### Structural Gravity Estimation: Canada-US Trade

<table>
<thead>
<tr>
<th>Distance Range (Kilometers)</th>
<th>Within Canada Trade</th>
<th>Canada-US Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>0.90%</td>
<td>—</td>
</tr>
<tr>
<td>50-150</td>
<td>0.24%</td>
<td>—</td>
</tr>
<tr>
<td>150-500</td>
<td>0.39%</td>
<td>0.95%</td>
</tr>
<tr>
<td>500-1000</td>
<td>1.22%</td>
<td>1.03%</td>
</tr>
<tr>
<td>1000-3000</td>
<td>0.87%</td>
<td>1.13%</td>
</tr>
<tr>
<td>&gt; 3000</td>
<td>0.43%</td>
<td>1.02%</td>
</tr>
</tbody>
</table>

Data from 2012 for 201 regions

Source: Brown, Dar-Brodeur, Dixon (2019)
Conclusions
Contributions of Firm-Level Theoretical Analyses of Trade

1. Models with firm heterogeneity have improved our understanding of the mechanisms through which economies respond to changes in the trading environment.

2. This increased understanding of the margins along which an economy adjusts to shocks are important for evaluating the productivity and welfare effects of changes in the trading environment.
Recent developments in trade theory and firm-level data analysis recognize the importance of heterogeneity in:

- Countries
- Regions within countries
- Industries
- Firms’ technologies
- Firms’ participation in international markets
- Firms’ responses to changes in trade policy
- Products
Effects of Trade Policy

4. Changes in trade policy induce intensive and extensive margin adjustments.

5. The effects of trade policy depend crucially on the composition of firms within industries.

6. Trade policy changes have distributional effects within industries.
There are many sources of gains from trade:

- Comparative advantage
- Increased productivity due to higher output
- Increased product variety
- Lower markups
- Increased productivity due to across-firm reallocations
- Trade-induced product and production innovations
References: Survey Papers


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