EXPORTS AND PRODUCTIVITY
THE ISSUE OF CAUSALITY

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Outline

• Introduction
  • Macro Literature
  • Aggregate Micro Productivity
  • Focus of this presentation
• Learning by exporting
• Productivity Investment and Exporting
• Learning to export
• Conclusions
Macro Literature

• Exports and productivity at the macro level usually found in the literature on ‘openness and growth’
• (Usually) a positive correlation
• Explanations include
  • Economies of scale
  • Learning by exporting
  • Competition effects
  • Quality upgrading
  • Imports
• Issue of causality
  • Simultaneity bias
  • Omitted variable bias
• Micro data a cure?
Aggregate Micro Productivity

• Aggregate productivity of an industry is a weighted average of individual firms productivity
• TFP is aggregate productivity, \( w \) is the size of the firm and \( tfp \) is the firm productivity level.
• Aggregate TFP growth can occur from:
  - within firm growth
  - between firm growth
  - net entry
  - across industries.
Focus of this presentation

- Micro data a cure? No
- Solves simultaneity, but not selection or OVB
- That said, controversy confined to literature on changes to productivity within firms
- Evidence that exporters account for a disproportionate share of output/employment
  - Bernard and Jensen (2004) show that Can-US FTA raised average manufacturing productivity by 4.1%
- Melitz (2003) suggests pull of export markets not push of import competition forces exit. Evidence that trade liberalisation encourages the weakest to die
  - Trefler (2004) and Lileeva (2008) cut in Canadian tariffs led to exit in import competing sectors. As these were low productivity, productivity in manufacturing rose by 4.3%.
  - Pavcnik (2002) following trade liberalisation in Chile, exiting firms were 8% less productive than survivors (on average) – 35% of cohort in 1979 were dead by 1986
Aggregate productivity rise?
Learning by Exporting

- The relationship between exporting and productivity at the firm level (within firm growth)
- Strong evidence they are positively correlated
- Selection or Causal effect?
- Earliest literature about self-selection versus learning
- Bernard and Jensen (1999) found that productivity growth of exporters not significantly different from that of non-exporters.
- The productivity distribution is not widening over time. Learning effects are not permanent.
- Self-selection seen as the dominant explanation (accounting for Melitz’s model).
Learning by Exporting

- Focus became export market entrants
- New exporters were already among the best and their growth differed in the periods leading up to and after entry.
- After a short period they then become indistinguishable from other exporters
- Was this productivity change at the point of export market entry an exogenous improvement (just coincidence) or was it evidence of learning by exporting?
- Dominant Methodology: difference-in-differences
- In practice the hypothesis under test changed from one of self-selection versus learning, to learning conditional on self-selection versus selection.
Learning by Exporting

- Attempt to control for self-selection using either instrumental variable estimation (in early literature GMM) or matching techniques
- Dominant Methodology: matching combined with difference-in-differences.
- Counterfactual – sub-sample of non-exporters with similar pre-entry characteristics
- Van Biesebroeck (2005) not controlling for self-selection will overstate evidence of learning for new exporters in the data.
- Of the 11 studies discussed in G&K (2007) using matching or GMM, 7 find evidence for learning and 4 against (all using matching)
Learning by Exporting

Effect of Export Market Entry on Firm Performance for a Matched and Unmatched Sample of Firms.

<table>
<thead>
<tr>
<th></th>
<th>All time periods</th>
<th>Pre-Entry</th>
<th>Entry Period</th>
<th>Entry t+1</th>
<th>Entry t+2</th>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Export</td>
<td>0.029</td>
<td>0.044</td>
<td>0.036</td>
<td>0.018</td>
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<tr>
<td>Premium</td>
<td>(4.56)**</td>
<td>(5.02)**</td>
<td>(5.21)**</td>
<td>(2.36)*</td>
<td></td>
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<td>Observations</td>
<td>18106</td>
<td>19266</td>
<td>18047</td>
<td>15423</td>
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<tr>
<td>R-squared</td>
<td>0.12</td>
<td>0.14</td>
<td>0.12</td>
<td>0.09</td>
<td></td>
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<tr>
<td><strong>Matched</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Export</td>
<td>0.024</td>
<td>-0.002</td>
<td>0.015</td>
<td>-0.001</td>
<td></td>
</tr>
<tr>
<td>Premium</td>
<td>(3.95)**</td>
<td>(0.16)</td>
<td>(1.41)</td>
<td>(0.07)</td>
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<td>11580</td>
<td>2417</td>
<td>3074</td>
<td>2619</td>
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<tr>
<td>R-squared</td>
<td>0.13</td>
<td>0.17</td>
<td>0.07</td>
<td>0.09</td>
<td></td>
</tr>
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Controlling for self-selection removes the pre-entry difference in productivity growth between new exporters and non-exporters and reduces the magnitude of the post-entry effects.

A problem with matching

• So learning (even conditional on self-selection) not a consistent outcome. Why?
• Learning from particular markets? In particular industries?
• Exporting is not a treatment – omitted variable bias
• Decision to become an exporter is the treatment not the point where export sales begin
• Decision to become an exporter is unobservable (i.e. cannot match on that).
• Greater promise from an instrumental variable approach (not GMM using lags), where the instrument captures an exogenous change to the cost of exporting
Productivity Investment & exporting

- Lileeva and Trefler (QJE 2010)
- Exogenous productivity
- Fixed costs to export market entry
- Firms can invest to improve their productivity (will depend on the returns)
- There are fixed costs to these improvements
- Only invest if the returns are large

Diagram:
- Productivity gains from investing
  - Invest & export
  - No-invest & non-export
  - No-invest & export

Initial productivity
Productivity Investment & exporting

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Productivity gains from investing

Initial productivity

Lowers costs to exporting and returns to investment
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Both firms invest and start to export
One firm starts to export but does not invest, the other for one with lower initial productivity
Productivity Investment & exporting

- Can-US FTA
- Outcome: average annual change in labour productivity between 1988 and 1996
- Firm specific tariff cut - based on (6-digit) product it produces
- Untreated = non-exporters in 1984
- Treated = start to export by 1996
- Within plant productivity increases by 3.5%

<table>
<thead>
<tr>
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<th>Change in LP</th>
<th>T-statistic</th>
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<tr>
<td>Average</td>
<td>0.010</td>
<td>15.92</td>
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<tr>
<td>Low productivity</td>
<td>0.017</td>
<td>9.87</td>
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<td>Med-low productivity</td>
<td>0.015</td>
<td>10.30</td>
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<tr>
<td>Medium productivity</td>
<td>0.012</td>
<td>7.72</td>
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<td>Med-high productivity</td>
<td>0.008</td>
<td>4.57</td>
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<tr>
<td>High productivity</td>
<td>0.003</td>
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Learning to export

- Quality upgrading within a firm in anticipation of entry into export markets
- Uses unit values (price/costs) as a measure of quality
- Examines developments before and after entry into export markets during the period of an export boom
- Mexican export boom stimulated by NAFTA (1\textsuperscript{st} Jan 1994) and the peso devaluation (Dec 1994).
- Use NAFTA to instrument for a future change in trade policy (should observe quality upgrading in anticipation of this)
Learning to export

• 3,186 products manufactured by 6,291 Mexican manufacturing plants between 1994 and 2004. (between 12,887 and 19,154 observations per year)
• Beta 1, 2 and 3 study the price premium of exported products before they are exported
• Price premium is measured as unit value of that product compared to the same product sold by other firms
• Controls for firm-product effects (alphas)

\[
\log (\text{Price premium}_{pit}) = \beta_1 \text{ 1 yr before exporting}_{pit} + \beta_2 \text{ 2 yrs before exporting}_{pit} + \beta_3 \text{ Exported}_{pit} + \alpha_t (+\alpha_p) + \mu_{pit}
\]
Table 4 (plant-product FE): dependent variable is price premium

<table>
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<th>[1]</th>
<th>[2]</th>
<th>[3]</th>
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<tbody>
<tr>
<td>3 years before entering export markets</td>
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<tr>
<td>2 years before entering export markets</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.004</td>
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<tr>
<td></td>
<td>[0.012]</td>
<td>[0.014]</td>
<td>[0.014]</td>
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<tr>
<td>1 year before entering export markets</td>
<td><strong>0.029</strong></td>
<td><strong>0.029</strong></td>
<td><strong>0.029</strong></td>
</tr>
<tr>
<td></td>
<td>[0.012]</td>
<td>[0.011]</td>
<td>[0.011]</td>
</tr>
<tr>
<td>Exported product</td>
<td><strong>0.031</strong>*</td>
<td><strong>0.031</strong>*</td>
<td><strong>0.031</strong>*</td>
</tr>
<tr>
<td></td>
<td>[0.005]</td>
<td>[0.008]</td>
<td>[0.008]</td>
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<tr>
<td>N. Observations</td>
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<tr>
<td>R-squared</td>
<td>0.81</td>
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<td>Year FE</td>
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<td>yes</td>
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<tr>
<td>Plant-product FE</td>
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<td>yes</td>
<td>yes</td>
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<td>Clustered SE</td>
<td>n.a.</td>
<td>plant-product</td>
<td>product</td>
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Table 8 (post entry effects): dependent variable is price premium

<table>
<thead>
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<th></th>
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<tr>
<td>1 year before entering export markets</td>
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<tr>
<td></td>
<td>[0.011]</td>
<td>[0.010]</td>
<td>[0.010]</td>
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<tr>
<td>1st year of exporting</td>
<td>0.034**</td>
<td>0.034***</td>
<td>0.034**</td>
</tr>
<tr>
<td></td>
<td>[0.011]</td>
<td>[0.010]</td>
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<tr>
<td>2nd year (or later) of exporting</td>
<td>0.029***</td>
<td>0.029***</td>
<td>0.029***</td>
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<tr>
<td></td>
<td>[0.005]</td>
<td>[0.008]</td>
<td>[0.008]</td>
</tr>
<tr>
<td>3rd year (or later) of exporting</td>
<td></td>
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<tr>
<td>N. Observations</td>
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<tr>
<td>R-squared</td>
<td>0.81</td>
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<tr>
<td>Year FE</td>
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<td>yes</td>
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<tr>
<td>Plant-product FE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Clustered SE</td>
<td>n.a.</td>
<td>plant-product</td>
<td>product</td>
</tr>
</tbody>
</table>
Conclusions

• Exports and Productivity are positively correlated
• Causal?
  • Between effects – simultaneous
  • Exit – yes, but import competition (exporting insulates against exit)
  • Within effects – selection effects clear, but some causal effect
    • Issues of methodology
    • Starting to export is not the treatment – matching and/or difference in differences inappropriate (except for a sub-sample of firms)
    • Changes to the cost of exporting inducing firms to invest
    • Lileeva & Trefler study a large change – more normal outcome likely to be small (not many firms, the change is not that big)
• Cross-industry - ?
Here is a chart that provides a key insight on why Latin America has done worse than Asia since 1990. The chart decomposes labor productivity growth in the two regions into three components: (i) a “within” component that is the weighted average of labor productivity growth in each sector of the economy; (ii) a “between” component that captures economy-wide gains (or losses) from the reallocation of labor between sectors with differing levels of labor productivity; and (iii) a “cross” component that measures the gains (or losses) from the reallocation of labor to sectors with above-average (below-average) productivity growth. (Danni Rodrik weblog)
Exceptional Exporters

Source: EFIM. Note: Data for Belgium 2004.

Mayer and Ottoviano (2008)
Learning by Exporting

Bernard and Jensen (1999)