# 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.

$$TFP = \sum_{i=1}^{n} w_i tfp_i$$

# 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?



Series
Manufacturing, value added (constant 2000 US$)
(NV.IND.MANF.KD)
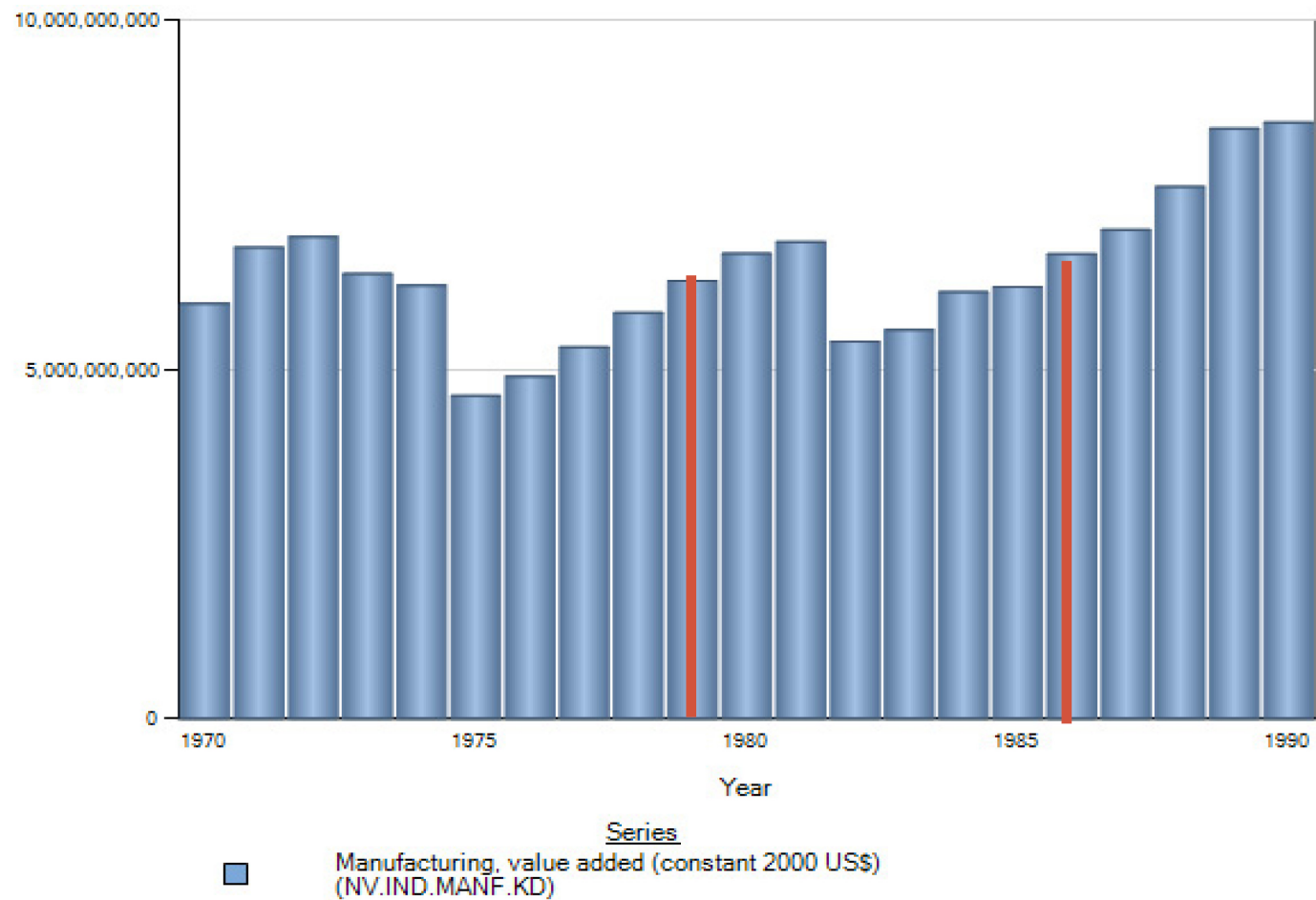
# Learning by Exporting

- 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.**

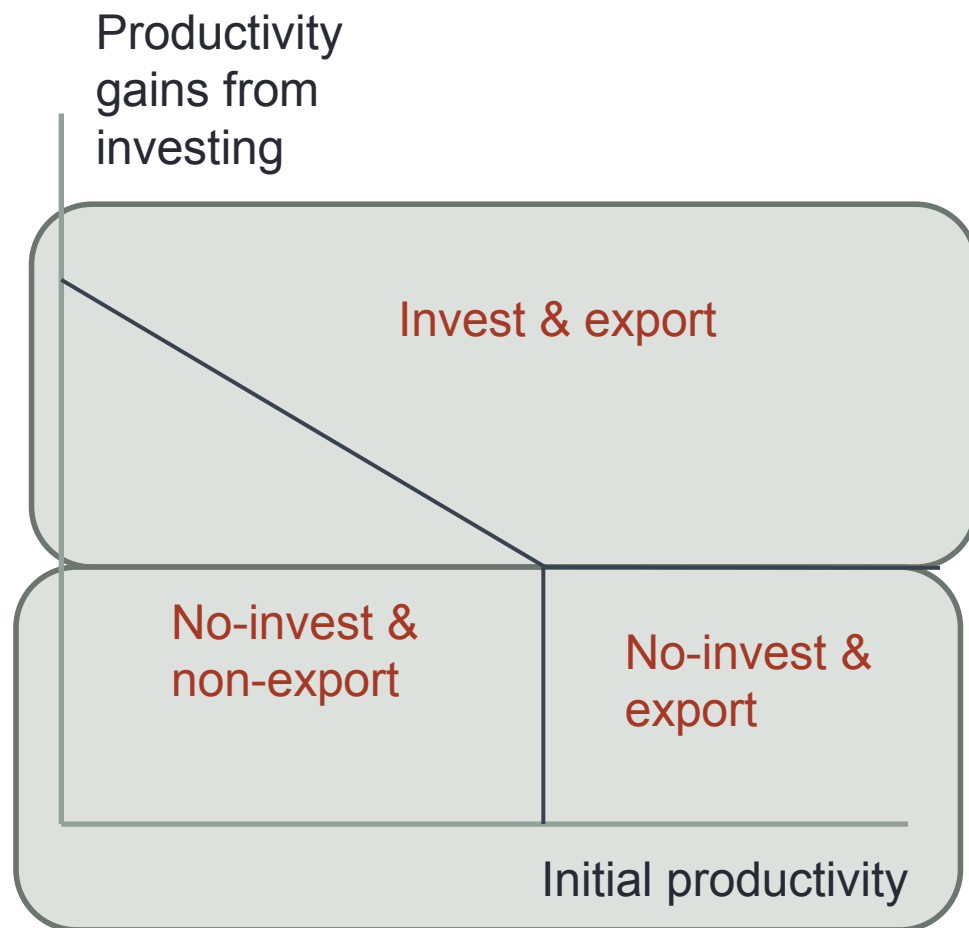|  | All time periods | Pre-Entry | Entry Period | Entry t+1 | Entry t+2 |
|---|---|---|---|---|---|
| | | | *Unmatched* | | |
| Export | | 0.029 | 0.044 | 0.036 | 0.018 |
| Premium | | (4.56)** | (5.02)** | (5.21)** | (2.36)* |
| Observations | | 18106 | 19266 | 18047 | 15423 |
| R-squared | | 0.12 | 0.14 | 0.12 | 0.09 |
| | | | *Matched* | | |
| Export | 0.024 | -0.002 | 0.036 | 0.015 | -0.001 |
| Premium | (3.95)** | (0.16) | (5.16)** | (1.41) | (0.07) |
| Observations | 11580 | 2417 | 3470 | 3074 | 2619 |
| R-squared | 0.13 | 0.17 | 0.23 | 0.07 | 0.09 |

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.

Girma, Greenaway and Kneller (2003)

# 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

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

Lowers costs to exporting and returns to investment
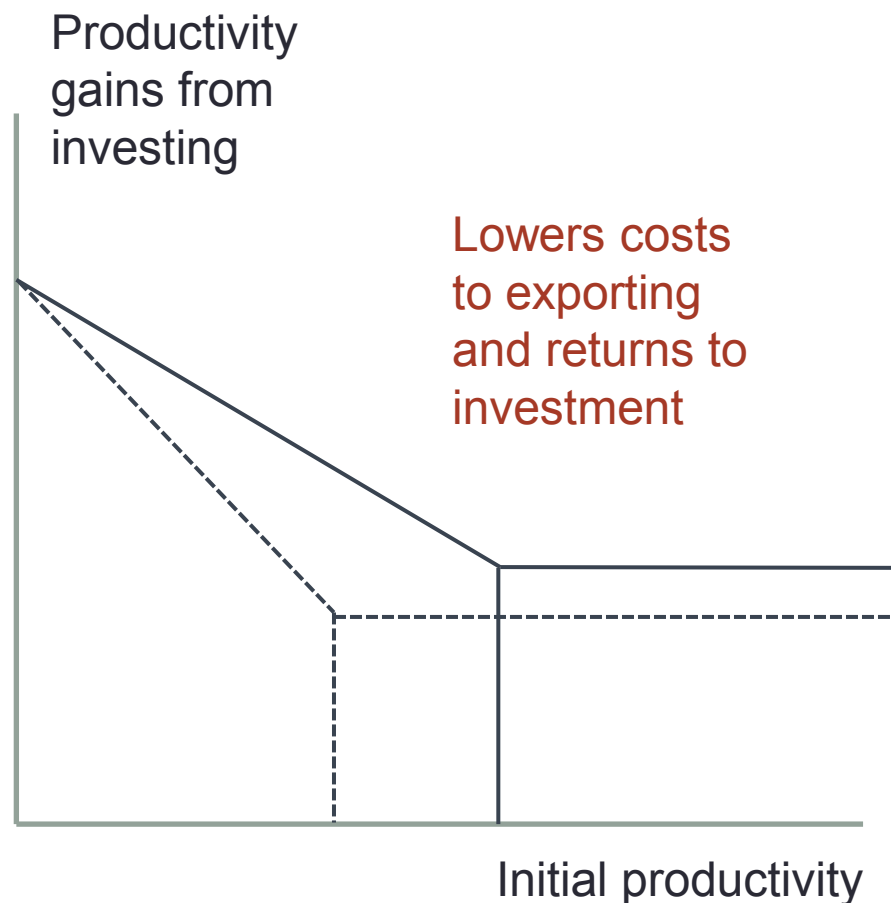
Initial productivity

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Productivity gains from investing

Invest & start exporting

Invest and continue exporting

Start exporting but do not invest
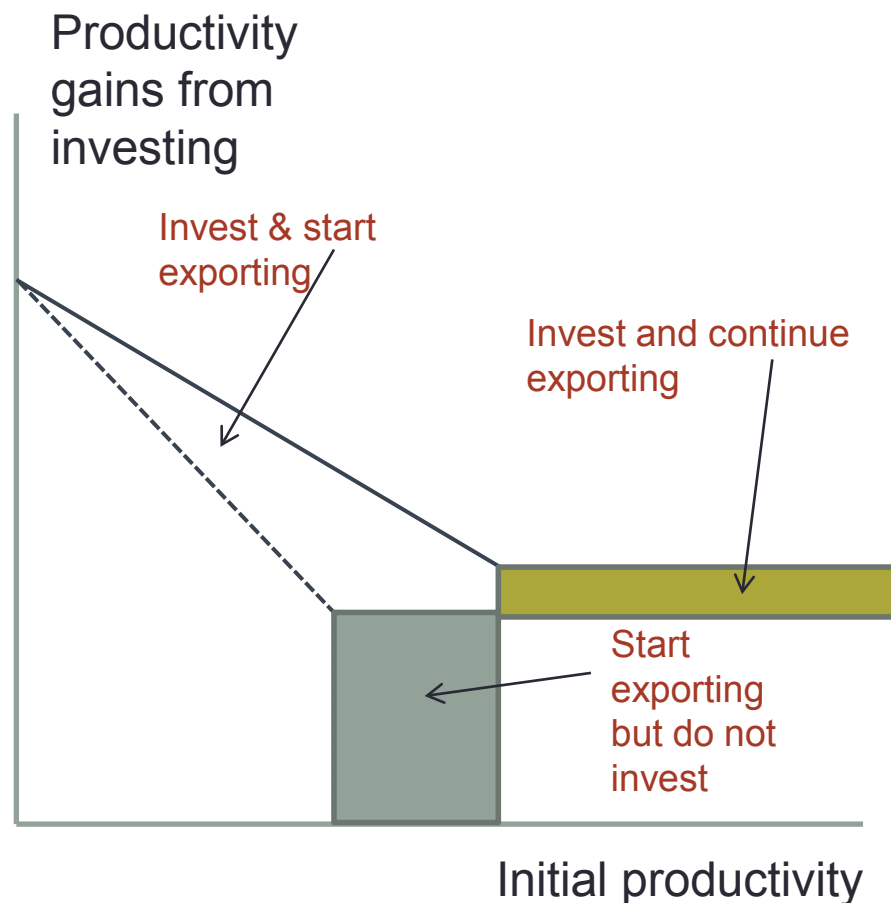
Initial productivity

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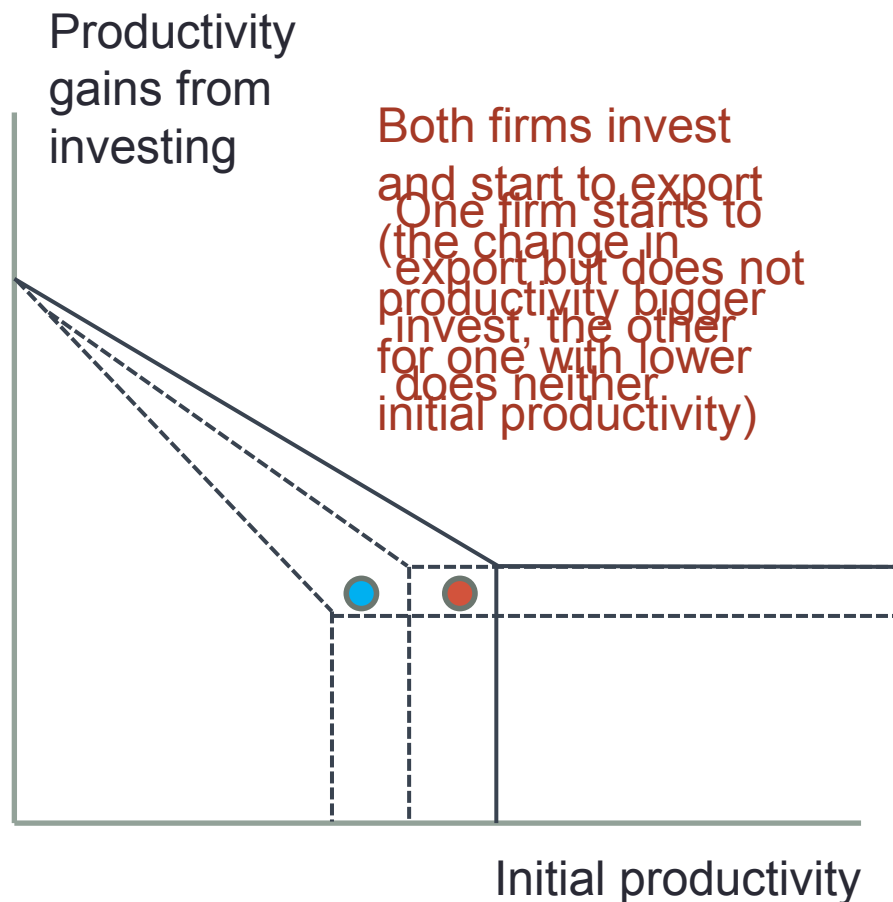
Productivity gains from investing

Both firms invest and start to export (the change in productivity bigger for one with lower initial productivity)

One firm starts to export but does not invest, the other does neither

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%

|  | Change in LP | T-statistic |
|---|---|---|
| Average | 0.010 | 15.92 |
| Low productivity | 0.017 | 9.87 |
| Med-low productivity | 0.015 | 10.30 |
| Medium productivity | 0.012 | 7.72 |
| Med-high productivity | 0.008 | 4.57 |
| High productivity | 0.003 | 2.44 |

# Learning to export

- Iacavone, L. and Javorcik, B. (2010). 'Getting ready: preparation for exporting'

- 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 (1st 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)

$$log\left(Price\ premium_{pit}\right) = \beta_1\ 1\ yr\ before\ exporting_{pit} + \beta_2\ 2\ yrs\ before\ exporting_{pit} +$$
$$\beta_3\ Exported_{pit} + \alpha_t\ (+\alpha_{pi}) + \mu_{pit} \qquad (2)$$

## Table 4 (plant-product FE): dependent variable is price premium

|                                             | [1]         | [2]          | [3]       |
|---------------------------------------------|-------------|--------------|-----------|
| 3 years before entering export markets      |             |              |           |
|                                             |             |              |           |
| 2 years before entering export markets      | -0.004      | -0.004       | -0.004    |
|                                             | [0.012]     | [0.014]      | [0.014]   |
| 1 year before entering export markets       | **0.029**\*\* | **0.029**\*\* | **0.029**\*\* |
|                                             | [0.012]     | [0.011]      | [0.011]   |
| Exported product                            | **0.031**\*\*\* | **0.031**\*\*\* | **0.031**\*\*\* |
|                                             | [0.005]     | [0.008]      | [0.008]   |
|                                             |             |              |           |
| N. Observations                             | 130170      | 130170       | 130170    |
| R-squared                                   | 0.81        | 0.81         | 0.81      |
|                                             |             |              |           |
| Year FE                                     | yes         | yes          | yes       |
| Plant-product FE                            | yes         | yes          | yes       |
| Clustered SE                                | n.a.        | plant-product | product  |

## Table 8 (post entry effects): dependent variable is price premium

|  | [1] | [2] | [3] |
|---|---|---|---|
| 1 year before entering export markets | 0.032** | 0.032** | 0.032** |
|  | [0.011] | [0.010] | [0.010] |
| 1st year of exporting | 0.034** | 0.034*** | 0.034** |
|  | [0.011] | [0.010] | [0.011] |
| 2nd year (or later) of exporting | 0.029*** | 0.029*** | 0.029*** |
|  | [0.005] | [0.008] | [0.008] |
| 3rd year (or later) of exporting |  |  |  |
|  |  |  |  |
| N. Observations | 115724 | 115724 | 115724 |
| R-squared | 0.81 | 0.81 | 0.81 |
|  |  |  |  |
| Year FE | yes | yes | yes |
| Plant-product FE | yes | yes | yes |
| Clustered SE | n.a. | plant-product | product |

# 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)
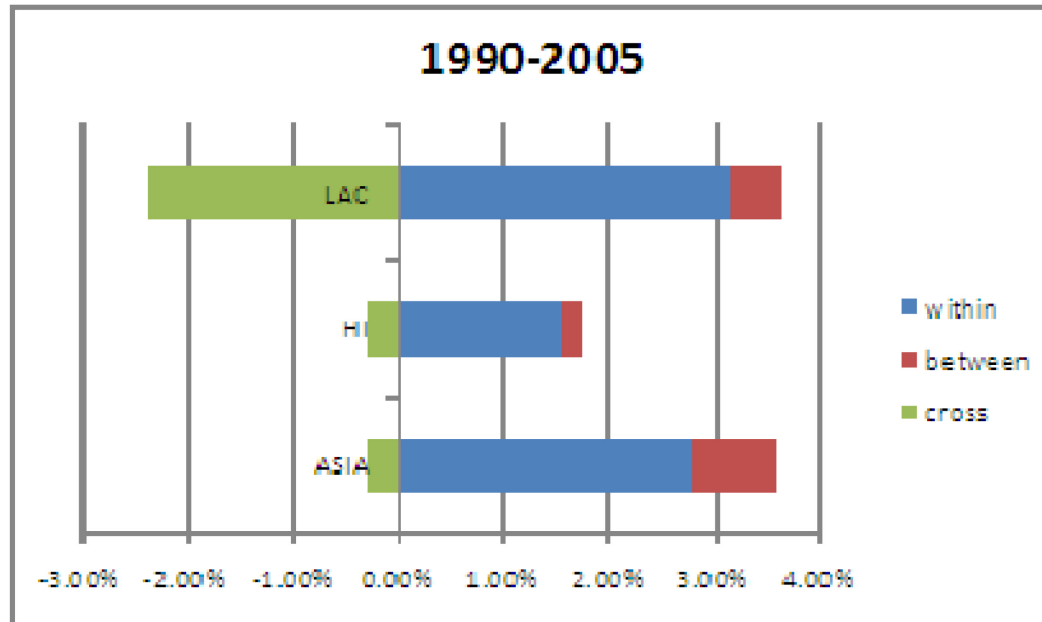
# Exceptional Exporters
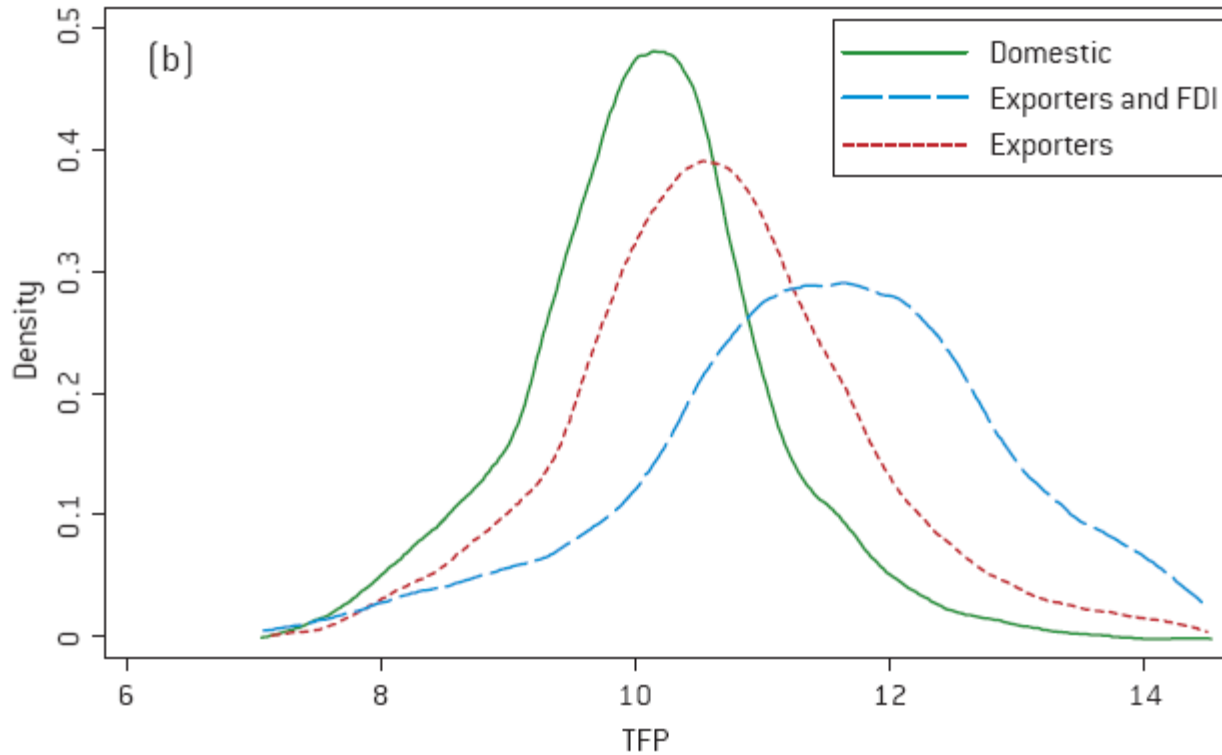


Source: EFIM. Note: Data for Belgium 2004.

Mayer and Ottoviano (2008)

# Learning by Exporting



Bernard and Jensen (1999)