

# **Exporting and Productivity: The Effects of Multi-market and Multi-product Export Entry**

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# Outline of our study

- **Empirical international trade paper, related to multi-product firm models of international trade**
- **What does this paper do?** Investigates the heterogeneity of learning-by-exporting: are the effects of export market entry on firm performance stronger in the case of multi-market and multi-product export entry compared to more limited or sequential export entry?
- **How?** Based on panel of full population of Estonia's manufacturing firms, estimate (causal) effects using propensity score matching approach. Detailed firm-product-market level export data.
- **Main findings?** Stronger effects of export entry on productivity in the case of multi-market and multi-product export entry.

# Background: literature on learning-by-exporting and multi-product trade models

- Standard finding: exporting and productivity of firms are positively correlated.
  - **Explanations:**
    1. **Self-selection** (Melitz 2003, etc.): only more productive firms can cover sunk costs of exporting. **Standard result** (e.g. Bernard and Jensen 1999, Wagner 2007).
    2. **'Learning-by-exporting'** (LBE) hypothesis. Effects of exporting on firm performance due to: knowledge transfer from abroad; technical assistance from buyers; international competition and increased incentives to innovation (e.g. Aghion et al. 2005), 'effort' and upgrade products; scale effects.
- Often, little evidence of LBE is found based on standard firm-level productivity data** (positive LBE effects in de Loecker 2007, van Biesebroeck 2005).
3. **Firm-product and firm-market level** (models of multi-product firms (MPF): Bernard, Redding and Schott 2009, Eckel and Neary 2010 etc): adding vs. dropping products; product entry/exit into export markets / adding & dropping new markets; volume of domestic vs. export sales
- **Motivation:** Is there evidence of LBE in the case of some particular export strategies?
  - **Central issue:** direction of causality.

# LBE effects: different export strategies

- Predominance of **sequential export market entry strategy**
  - Most firms start exporting with 1 variety to 1 (nearby) market (e.g. Iacovone and Javorcik 2010)
  - Role of uncertainty and market experimentation (Rauch and Watson 2003, Albornoz et al. 2011)
- We differentiate here between 4 simple export entry modes (based on yearly data):
  - **Multi-market export entry:** start of export activities with exports to several (at least 2) foreign countries
  - **Single market export entry:** start of export activities with exports to only one foreign country
  - **Multi-product export entry:** start of export activities with exports of several (at least 2) products (at CN-8 digit code level)
  - **Single product export entry:** start of export activities with only one product

# Effects on firm performance

## **Multi-market export entry:**

- more scope for learning from a larger knowledge stock of foreign partners from different locations, less risks from reliance on one destination only (Chesbrough (2006) and Laursen and Salter (2006))

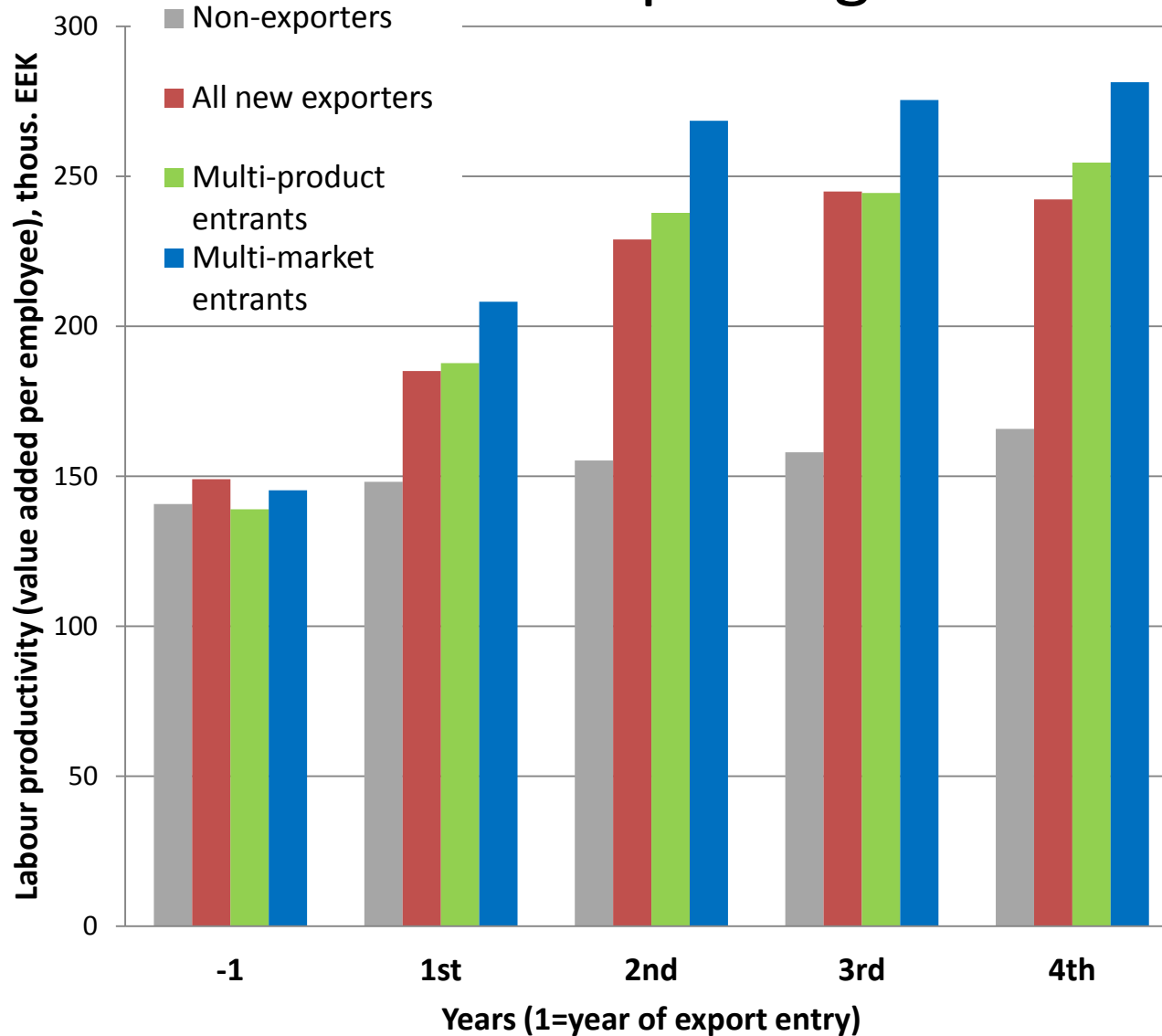
## **Multi-product export entry:**

- Positive effects: potentially greater knowledge transfer from larger number of foreign partners, economies of product scope (Panzar and Willig 1981)
- Negative effects: (an indirect implication from recent multiproduct trade models, e.g. Eckel and Neary 2010 ) export entry with a smaller number of products may be more beneficial for the firm, as it would concentrate on its core-competence products

# Data

- Transaction level export data from **Estonia**, from Statistics Estonia
  - Aggregated to firm-product-destination and firm level annual observations
  - Period: **1995–2003**
  - CN8 (8-digit) level individual products. Examples of CN8 level product definitions:
    - white chocolate (17049030), milk with fat content between 1% and 3%, specific types of fertilizers, specific types of plywood, skiing suits
    - Alcohol: wines by region (22042111- Alsace, etc); 2203 - beer; 2204 – wines; 220410 – sparkling wine, 2204101 – champagne.
  - Population of exporters in manufacturing industry: ca 1,700 – 2,400 firms
  - Other firm level indicators (incl. productivity) from the dataset of the Commercial Registry (full population of all firms, also non-exporters)
- Multi-market export entrants (based on yearly data): **30%** of all export entrants
  - Multi-product export entrants: **53%** of all export entrants
  - Export entrants that export only 1 product to 1 foreign market: 43% of all entrants.

# Average labour productivity after entry into exporting



## Identification of the effects of multi-market and multi-product export entry

- Apply the ‘**propensity score matching**’ method (Rosenbaum and Rubin 1984, Caliendo and Kopeinig 2005)
- 4 ‘treatments’ (N): multi-market entry, single market entry; multi-product entry, single product entry
- Estimate probit models for each of the 4 types of export entry:

$$\Pr(M_{it}^N = 1) = f(X_{it-1}, \pi_{it-1})$$

- Explanatory variables: productivity (TFP), size, age, capital-labour ratio, cash-to-assets ratio, FDI dummy, dummy for capital region, industry dummies, squared continuous control variables (as suggested in Wooldridge 2002), etc.
- Calculate propensity score  $p_i$  of each treatment for all firms. Select for each treated firm  $i$  2 or 5 best matching non-exporter firms  $j$  based on this propensity score.
- Estimate the ATT (average treatment effect on treated) on productivity and TFP growth in post-estimation periods, compare the ATT of different types of export entry

$$ATT^N = \sum_{i \in N} (\Delta \pi_i - \sum_{j \in C_N} w_{ij} \Delta \pi_j)$$



# Quality of matching

*Quality of matching: means of variables in pre-treatment period,  
before and after matching*

		<i>Entry into more than 1 export market vs. no entry</i>		
<i>Comparison</i>		<i>Treated</i>	<i>Control</i>	<i>T-test of difference</i>
Ln (TFP)	Before matching	10.603	10.053	(12.55)***
	After matching	10.121	10.098	(0.19)
Size	Before matching	2.126	1.497	(22.26)***
	After matching	2.587	2.478	(0.95)
Age	Before matching	0.982	1.640	(44.52)***
	After matching	0.912	0.905	(0.11)
Cash/assets	Before matching	1.016	14.934	(0.34)
	After matching	0.709	0.861	(1.29)
Ln(K/L)	Before matching	10.847	10.746	(2.36)**
	After matching	10.529	10.483	(0.29)
FDI dummy	Before matching	0.177	0.069	(22.42)***
	After matching	0.135	0.092	(1.42)

*Notes:* t-statistics of difference between treatment and control group means are in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Firms from manufacturing industry. Period: 1995–2003. Matching based on the values of variables at the time of export market entry, observations with later treatment excluded.

# Results: ATT effects on total factor productivity (TFP)

*Results of propensity score matching: effects of export entry on TFP growth*

<i>Treatment variable</i>	<i>Matching algorithm</i>	<i>Period 2</i>		<i>Period 3</i>		<i>Period 4</i>	
Multi-market entry	NN5	12.107	(3.96)***	4.725	(1.77)*	4.631	(1.73)*
	NN2	14.250	(4.16)***	3.808	(1.25)	4.244	(1.42)
	Unmatched	10.476	(5.27)***	8.792	(5.27)***	7.460	(4.11)***
Single-market entry	NN5	6.599	(3.51)***	3.541	(1.2)	2.721	(0.99)
	NN2	7.222	(3.44)***	2.063	(0.56)	2.233	(0.76)
	Unmatched	6.720	(4.91)***	15.655	(8.59)***	11.314	(6.15)***
Multi-product entry	NN5	11.067	(4.54)***	3.913	(1.98)**	4.884	(2.28)**
	NN2	12.239	(4.4)***	5.767	(2.65)***	4.587	(1.89)*
	Unmatched	11.924	(7.79)***	9.762	(7.76)***	8.235	(5.95)***
Single-product entry	NN5	9.003	(1.54)	2.016	(0.59)	2.761	(0.82)
	NN2	3.759	(1.59)	3.062	(0.75)	2.581	(0.66)
	Unmatched	15.682	(4.51)***	8.741	(4.07)***	9.031	(3.99)***

*Notes:* \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. t-statistics in parentheses. NN5: nearest neighbour matching with 5 matches; NN2: nearest neighbour matching with 2 matches; ATT: Average Treatment Effect on the Treated (ATT), t-statistics are in parentheses. Period 0: period before exports began. Panel data of firms from the manufacturing industry. Period: 1995–2003.

# Possible issues with empirics

- **Effects on the level of TFP and labour productivity** - suggest as well that wider entry into export markets has stronger effects on TFP, but not labour productivity
- **Different export markets** of multi-market and single-market exporters – no significant differences
- **The number of products and markets could be correlated** - the correlation between the number of products and the number of markets is significant but not very strong (0.38).
- **Different definition of product (with a different CN code) in different markets:** e.g. issues related to taxation and trade barriers - likely related to only a small share of firms.
- **Exported products could have been previously imported** - when re-exported products were eliminated, only a small number of multi-product exporters (28) redefined as ‘single-product exporters’.
- **Changes in CN codes over the time** – more relevant for product churning (Masso, Vahter 2012 corrected for that)

# Conclusions

- It is well known that the majority of firms expand their number of export markets and products slowly
- Nevertheless, multi-product and multi-market entrants form a significant proportion of export entrants
- **We show that this more extensive entry into the export markets confer significant benefits for firm's productivity, despite the larger initial sunk costs**
- Early export entry to several markets results in faster productivity growth after entry, compared to firms that enter only one market
- Similar regularity is found in the case of comparison of multi-product and single-product entrants
- These stronger effects may indicate more learning-by-exporting in the case of multi-market and multi-product entry
- **Managerial implication:** important it is for managers to consider strategies for wider entry into export markets
- **Policy implication:** public programmes targeted at promoting the internationalisation of firms should consider the number of markets and products as an evaluation and performance criteria