Exporting and firm performance

Evidence from India

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Part I

Introduction

A powerful correlation

- Exporting firms are better:

Outcome variable	Coefficient on export dummy
Log(Gross fixed assets)	1.47 (0.037) ***
Log(Wage bill)	1.63 (0.035) ***
Log(Sales)	1.55 (0.036) ***
Log(Total assets)	1.48 (0.035) ***
Total factor productivity (LP)	0.15 (0.011) ***

- Bigger, pay higher wages, higher productivity etc.
- Cross-sectional and panel regressions: Very strong results.

Could this be exploited?

- If a country wants to do better, perhaps it could foster exporting.
- A seductive story:
  1. Purely domestic firms face low competition, low demand for sophisticated products.
  2. By stepping into the world market, they face high competition and reap economies of scale in building sophisticated products.
  3. Therefore, it should be willing to do all sorts of things to push more firms into exporting.
  4. This will generate growth, productivity, higher wages.

Policies that favour export promotion

- Export promotion policies e.g. Ministry of Commerce
- Subsidies for exporting firms.
- Exchange rate undervaluation: on one hand this distorts monetary policy, but on the other hand it fosters exporting.
- Justification for 'Bretton Woods 2': close the capital account, financial repression, run an undervalued exchange rate, get high growth in exports.

The problem

- Correlation and not causation.
- Three different causal stories could be at work:
  1. **Melitz model**: Maybe more productive firms export
  2. **Learning to export**: Maybe firms choose to push up their own productivity before entering export markets
  3. **Learning by exporting**: Or maybe years spent exporting induces learning and then productivity goes up

Without empirical evidence of how firms perform prior and subsequent to exporting, we are at risk of selecting inappropriate policies.

Literature review

- Wagner (2007) reviews 45 studies from 33 countries. Concludes that more productive firms self-select into export markets, while exporting does not necessarily improve productivity ex-post.
- Evidence for LBE is mixed from both developed and developing countries.
- Hallward-Driemeier, Iarossi and Sokoloff (2002), and Alvarez and Lopez (2005) provide evidence on how invest to augment their productivity before starting to export.
- Evidence from India: Mallick and Yang (2013), Ranjan and Raychaudhuri (2011) find evidence for LBE; Haidar (2012) and Tabrizy and Trofimenko (2010) report no LBE gains.

Questions

Q1 Do more productive firms become exporters?

Q2 Do firms augment their productivity *before* exporting?

Q3 Do firms experience a rise in productivity *after* they start exporting?

Q4 Do firms grow at an increasing rate after they begin to export?

India is a great lab

- We see numerous firms jump up into exporting since early 1990s.
- Can exploit the transition of firms to study the direction of causality.
- Many firms that have never exported.
- Large firm-level panel: CMIE Prowess dataset, 59985 firm year observations from 1994 to 2014.
- High growth economy. Substantial increase in exports.
- Key intuition: Pure observational data is raw material from which to construct quasi-experimental designs which yield causal effects.

Part II

Methodology

Measuring firm productivity

$y_{it} = \beta_0 + \beta_1 k_{it} + \beta_2 l_{it} + w_{it}$

- Unobservable productivity shocks and input levels are correlated.
- We use a semi-parametric estimator for total factor productivity developed by Levinsohn Petrin (2003). Uses intermediate inputs as a proxy.
- We estimate TFP for each industry separately.
- We deflate all series to control for high and volatile inflation.
- We demean productivity values by their industry mean to make it comparable across industries

We repeat the analysis with 4 other measures of productivity.

Defining export starter

Category	Percentage of firms
Constant exporter	22%
Constant non-exporter	32%
One switch from non-exporter to exporter	6%
One switch from exporter to non-exporter	3%
Flip-flop	7%
Missing data	29%

Purpose: Need to study a firm for a few years, both before and after it 'starts' exporting.
Problem: Many firms flip-flop (7%). Many report intermittently (29%).
Solution: Filter down to a clean trajectory of 0,0,1,1,1 to define exporter starter.
Outcome: 473 firms with a clean transition into exporting.

Compare like-to-like

Problem: Export starters are likely to be inherently different from non-exporters.
Solution: Use matching techniques to generate a counterfactual for each export starter. Match on firm observables and check for good match balance.

Problem: Firm transitions are scattered across time. We need a time-neutral result.
Solution: Rescale time. A firm starts exporting at s=0. Use event studies to study the divergence in the performance of export starters (i) and their matched counterfactuals (j) at each event time s.

Part III

Prior to export entry

Q1: Self-selection

$$Pr(START_{it} = 1) =$$
$$F(Productivity_{it-1}, Age_{it-1}, Wagebill_{it-1}, Industry_k, Year_t)$$

Run a logit model, where

- $START = 1$ when a firm begins to export, O otherwise (0,0,1,1,1)
- $Industry_k$ is the industry dummy
- $Year_t$ is the year dummy

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	−19.74	−19.05	−18.25	−18.41	−17.84
	(1670.17)	(1640.28)	(1664.37)	(1692.41)	(1654.16)
$Log(Age)_{it-1}$	−0.24**	−0.17*	−0.33***	−0.29***	−0.36***
	(0.07)	(0.08)	(0.07)	(0.07)	(0.08)
$Log(WageBill)_{it-1}$	0.40***	0.51***	0.42***	0.43***	0.45***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
$TFP(LP)_{it-1}$	0.57***				
	(0.10)				
$LabourProd_{it-1}$		0.53***			
		(0.07)			
$CapitalProd_{it-1}$			0.26***		
			(0.06)		
$OLS - Residual_{it-1}$				0.64***	
				(0.15)	
$Log(PAT/Sales)_{it-1}$					0.35***
					(0.07)
N	5687	5557	5592	5681	4908
AIC	3043.74	2956.69	3009.91	3073.90	2721.14
BIC	4160.25	4069.32	4123.60	4190.24	3812.90
log L	−1353.87	−1310.34	−1336.96	−1368.95	−1192.57

All variables are 3 year averages

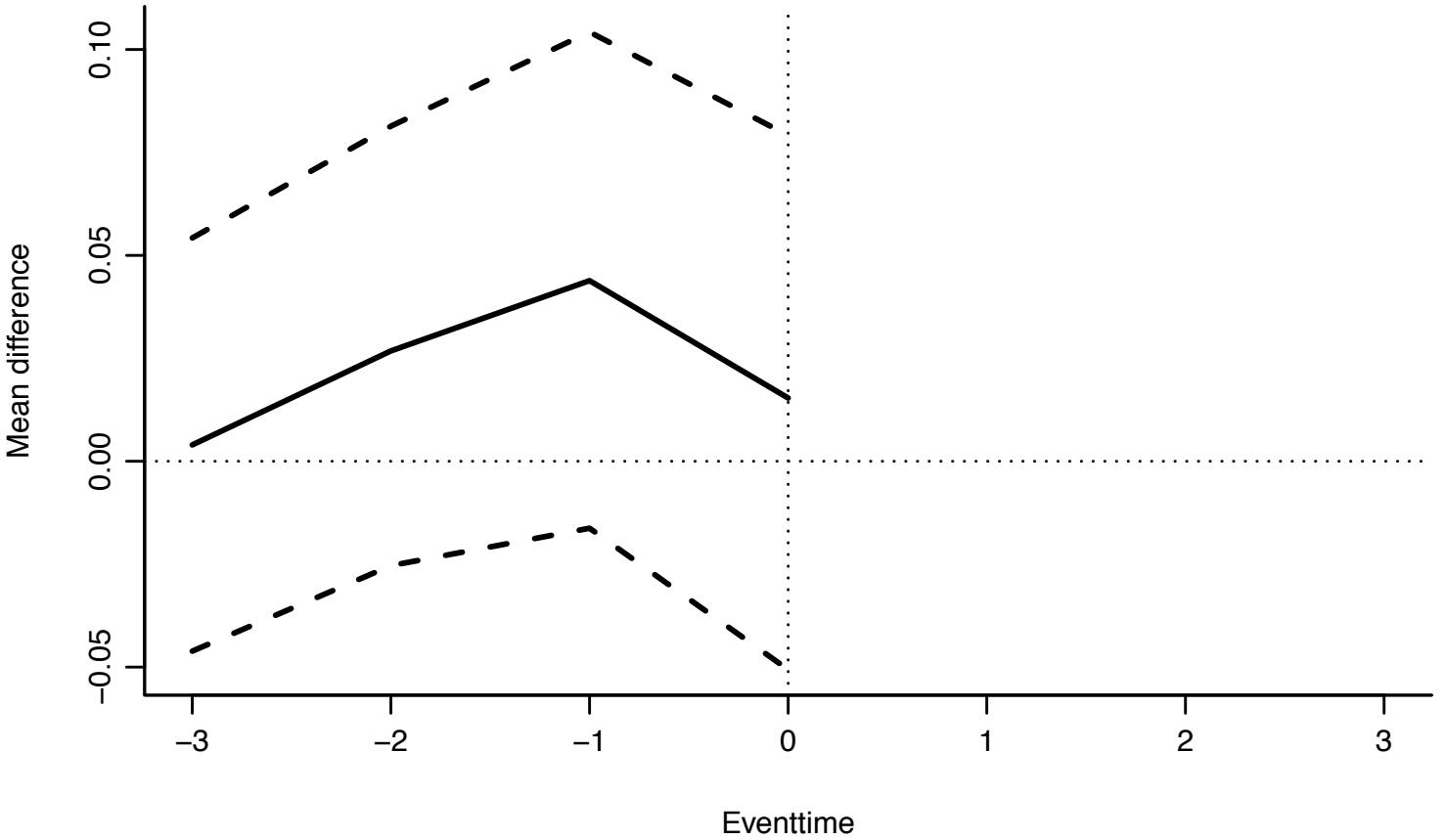
† significant at $p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

Q2: Do exporters invest in productivity augmenting strategies *before* exporting?

- Assumption: Firms take the decision to export 3 years before they start exporting.
- We use Mahalanobis distance matching to match each export starters with non-exporters 3 years prior to entry.
- We use age, wage bill, size, and productivity to match firms.
- We check for match balance using the Kolmogorov-Smirnov test.
- We get 210 matched pairs.

Learning to export: Productivity premium

$$\frac{1}{N_s}\sum_i (Prod_{i,s} - Prod_{j,s})$$



We get similar results using other measures of productivity.

Part IV

After export entry

Q3: Do firms experience a rise in productivity *after* they start exporting?

We use propensity score matching (Rosenbaum and Rubin, 1983) to control for self-selection of better firms into exporting

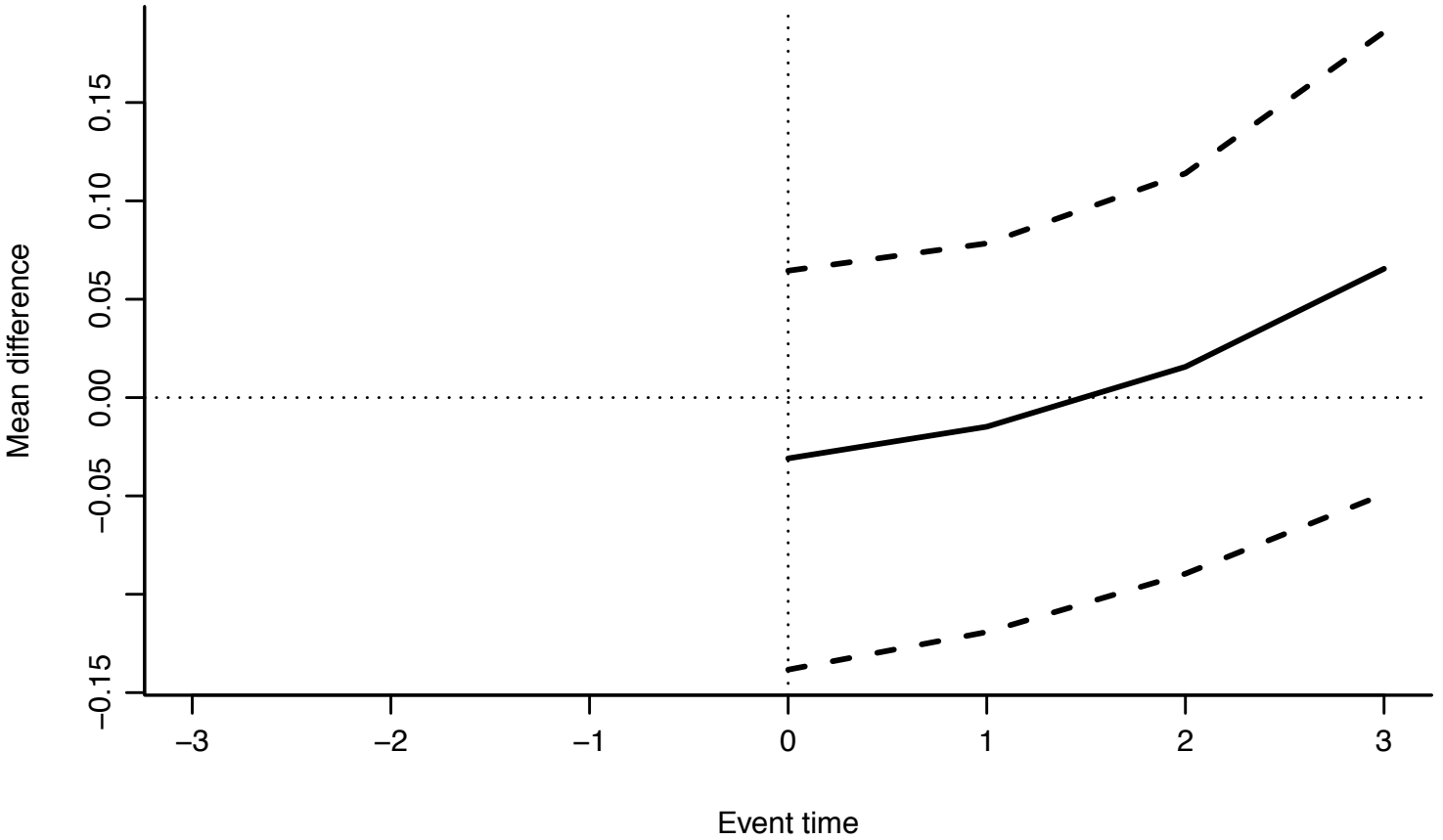
- **Propensity score calculation**: We run a logit model to estimate the probability to export (p) for export starters (i) and non-exporters (k).
- **Nearest neighbour matching**: We select a matching firm j for each i in the year i begins to export, using the following formula: $|p_i - p_j| = min_{k \in EXP=0}(p_i - p_k)$
- **Common support**: We drop all the export starters for which there is no 'close enough' match.
- **Match balance**: We check for match balance using the Kolmogorov Smirov test.
- This gives us 336 matched pairs.

Summary statistics of matched pairs

Variable	Category	Mean	SD
Sales (INR Million)	Treatment	1237.81	2020.57
	Control	1268.11	1967.54
Total assets (INR Million)	Treatment	1100.45	2276.53
	Control	1123.88	2293.20
Wage bill (INR Million)	Treatment	56.15	138.61
	Control	46.96	90.61
TFP (LP) ()	Treatment	1.82	0.78
	Control	1.78	0.70

Learning by exporting: Productivity premium

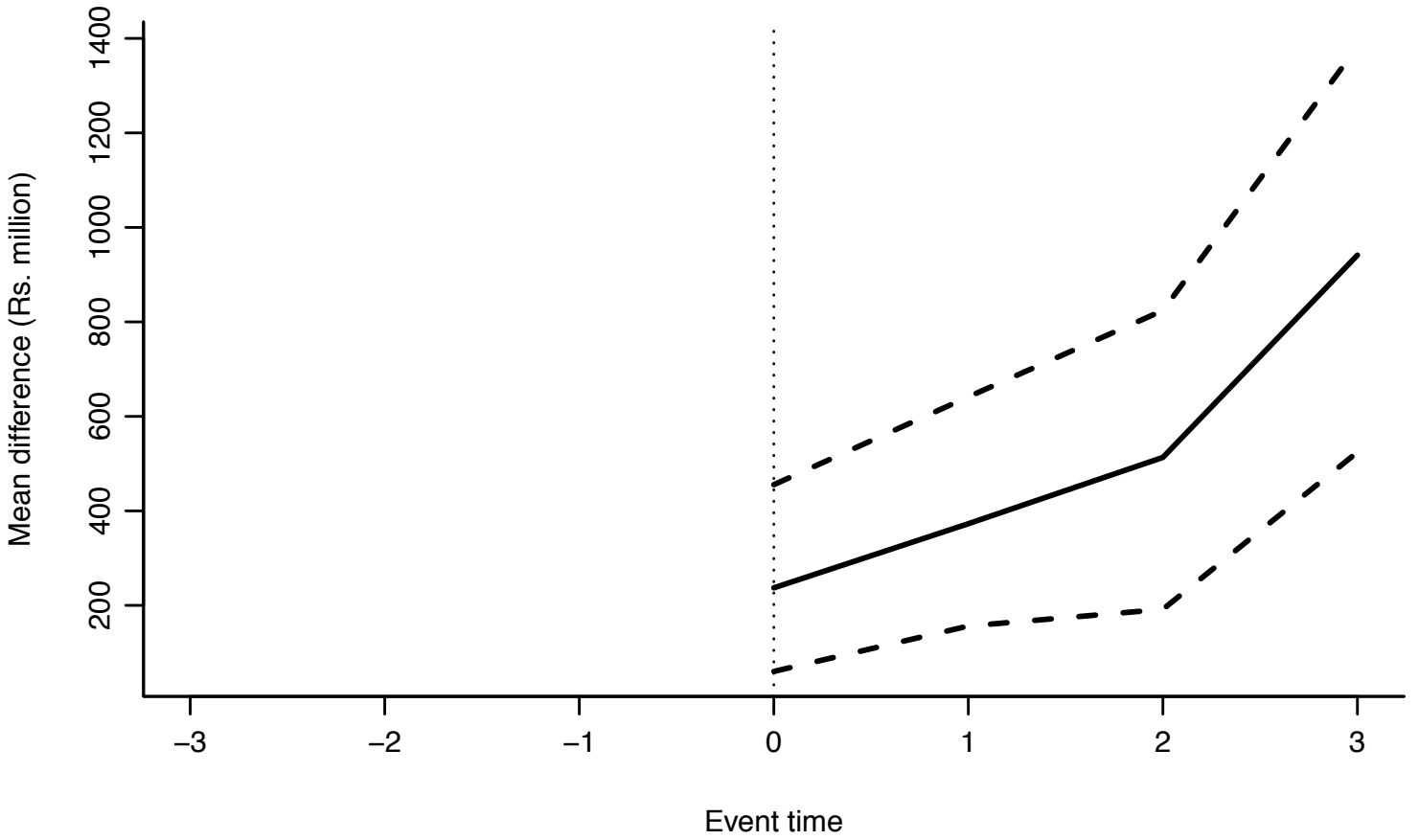
$$\frac{1}{N_s}\sum_i (Prod_{i,s} - Prod_{j,s})$$



We get similar results using other measures of productivity.

Q4: Firm growth

$$\frac{1}{N_s}\sum_i (Size_{i,s} - Size_{j,s})$$



Rs 1 billion difference by the end of 3 years.

Part V

Conclusion

Conclusion

Q1 More productive firms get self-selected into exporting.

Q2 Firms do not learn to export. There is no *conscious* gain in productivity.

Q3 Firms do not learn by exporting. There are no post entry productivity gains.

Q4 Exporters grow substantially after entering foreign markets.

Thank you.