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Trade Liberalization and Learning by Exporting: Evidence from Vietnam

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Overview of paper

- Investigate the relationship between exporting and productivity in different trade regimes (pre- and post- WTO accession)
- We examine the case of Vietnam using an firm-level panel dataset for the period 2001-2010
- We separate out productivity effects of exporting due to self-selection allowing us to identify the extent to which export firms learn-by-exporting
- We explore some of the underlying mechanisms focusing on the impact of trade costs and protection
- Our results suggest that protecting sectors in order to help firms prepare for export markets may be a good strategy in promoting export participation
- However, learning is less likely in protected environments and so there is a trade-off between supporting firms that wish to export and ensuring that the productivity benefits of exporting are realized
- We also explore technology transfers as a mechanism through which firms experience learning effects

Motivation and related literature

- Empirical evidence on whether firms learn-by-exporting :
  - Clerides et al. (1998): efficient firms self-select to become exporters but no evidence of learning-by-exporting [Columbia, Mexico and Morocco]
  - Bigsten et al. (2004); Bigsten and Gebeeyesus (2008): evidence of learning-by-exporting various African countries
  - Fernandes and Isgut (2005) evidence of learning-by-exporting in Colombia
  - Van Biesebroeck (2005) finds productivity improvements for exporting firms in a number of African countries post-participation in foreign markets

- Gaps in knowledge:
  - Impact of trade barriers and protection on selection into exporting and learning-by-exporting is not well understood
  - Little evidence exists on how firms learn by exporting

- Filling these gaps is clearly important for the effective design of industrial policy aimed at linking domestic producers with global value chains

Empirical Approach

- Step 1: Detecting self-selection

- Clerides et al. (1998) propose two testable hypotheses that are consistent with the self-selection of productive firms into export markets

  1. Entry exporters should experience positive productivity shocks in the period prior to entry into foreign markets

  2. Firms experiencing negative productivity shocks should cease exporting in the subsequent period

Empirical Approach

- Step 1: Detecting self-selection
- Compute firm specific measure of TFP using Index Number Approach:

$$\omega_{ijt} = \left(lnY_{ijt} - \overline{lnY_{jt}} \right) + \sum_{\tau=2}^{t} \left(\overline{lnY_{jt}} - \overline{lnY_{jt-1}} \right)$$
$$- \sum_{m=1}^{k} \frac{1}{2} \left(s_{mijt} + \overline{s_{mjt}} \right) \left(ln\, X_{mijt} - \overline{ln\, X_{mjt}} \right) + \sum_{\tau=2}^{t} \sum_{m=1}^{k} \frac{1}{2} \left(\overline{s_{mjt}} + \overline{s_{mjt-1}} \right) \left(\overline{ln\, X_{mjt}} - \overline{ln\, X_{mjt-1}} \right)$$

- We use this measure to compute binary indicators of whether a firm experienced a positive (negative) productivity shock between two periods

- Estimate: $\text{export}_{ijt} = \alpha_1 TFPshock_{ijt-1} + \alpha_2 l_{ijt-1} + \alpha_3 lprod_{ijt-1}$
$$+ \alpha_4 kl_{ijt-1} + c_{it} + \eta_i + s_j + e_{ijt}$$

- $\alpha_1 > 0$ evidence of self-selection

Empirical Approach

- Step 2: Detecting learning-by-exporting
- One-step approach where production function parameters and the impact of exporting on productivity are estimated simultaneously, while controlling for self-selection. (see Bigsten et al, 2004; Fernandes and Isgut, 2005; Van Biesebroeck, 2005)
- Advantage of reducing the bias due to correlation between the export status of the firm and unobserved productivity
- Learning model:

$$q_{it} = \beta_0 q_{it-1} + \beta_1 y_{it-1} + \boldsymbol{\beta}_2 \mathbf{Z}_{1it} + \boldsymbol{\beta}_3 \mathbf{Z}_{2it-2} + \eta_i + \tau_t + s_j + \pi_p + e_{it}$$

- $\beta_1 > 0$ evidence of learning-by-exporting
- The inclusion of the lagged dependent variable complicates the econometric estimation
  - We consider a model that excludes the lag of the dependent variable
  - Estimate the model using a random effects estimator with a Mundlak adjustment to control for heterogeneity
  - Estimate the model using system-GMM (Blundell and Bond, 1998)

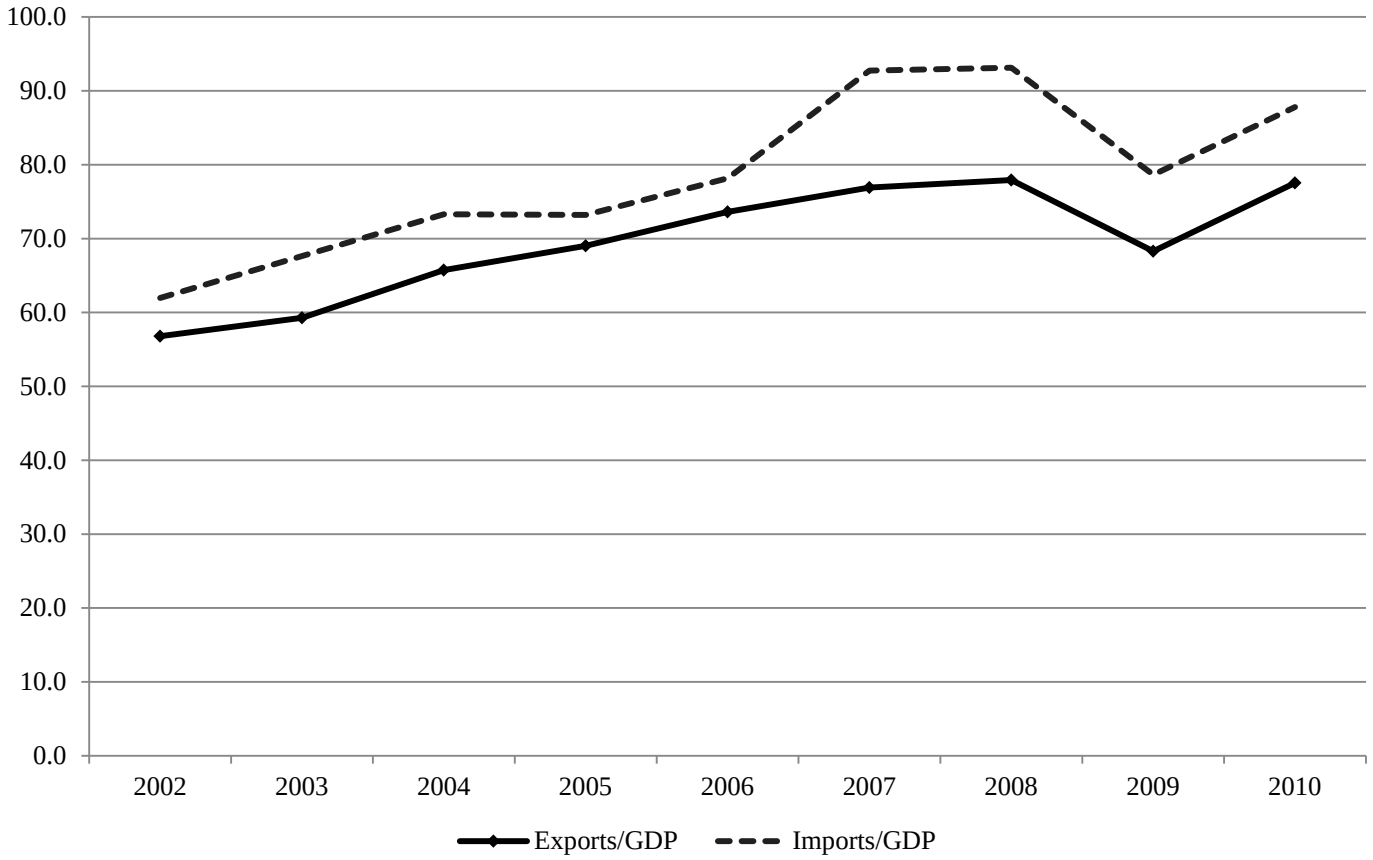
Vietnamese Context

- The opening up of the Vietnamese economy began in 1986 with the adoption of a range of policy measures under *doi moi* (renovation) in particular relating to trade liberalisation and the promotion of foreign direct investment (FDI)

- Trade liberalization took the form of the removal of export taxes and non-tariff barriers and the negotiation of various trade agreements with ASEAN, the US and the EU which ultimately lead to WTO accession in 2007

- Significant growth in exports and imports over 2000s

Trade in Vietnam



Source: General Statistics Office Vietnam, National Accounts

Data

- Vietnamese Enterprise Survey collected annually by the GSO for 2001 to 2010
- Data gathered on population of all registered enterprises in Vietnam with 30 employees or more and representative sample of smaller firms
- Trade intensive sectors – 2-digit sectors where exports account for more than 10% of output (Clerides et al, 1998)
- Export and import data at 4-digit level taken from COMTRADE
- Balanced panel (2,741 firms) to abstract from reallocation effects due to firm turnover but robustness check using unbalanced panel
- Use specially designed technology module from 2010 and 2011 rounds of Enterprise survey which examines whether export relationships result in technology transfers (8,359 firms)

Data

- Exporting firms are those that paid export tax in the previous year
- Proportion of firms that export:

Year	All firms	Trade Int. Sectors	Balanced Panel	Trade Int. Sectors & Balanced Panel
2001	15.17	15.35	25.24	25.99
2002	15.45	15.57	25.24	25.58
2003	15.81	15.84	25.39	25.52
2004	16.40	16.28	25.85	25.84
2005	15.40	14.87	24.65	24.07
2006	14.91	14.78	27.59	27.45
2007	15.79	15.76	29.70	29.26
2008	13.00	13.06	28.62	28.00
2009	15.89	16.47	33.30	33.32
2010	22.64	26.15	45.40	49.25
Non-export	69.44	67.11	45.80	42.09
Entry-export	22.07	24.76	42.07	46.71
Exit-export	14.33	15.40	28.26	30.91
Cont-export	5.87	5.53	10.09	9.24

Data

- Characteristics of export firms (fixed effects LPM):

Dep Var: Export	Full Panel	Balanced Panel
Labor prod	0.005**	0.010*
Labor prod x WTO	0.011***	0.007
TFP	-0.006	-0.029***
TFP x WTO	0.010	0.032**
Cap-lab ratio	-0.004	0.007
Cap-lab ratio x WTO	-0.004	-0.004
Foreign owned	0.091**	0.037
Foreign owned x WTO	0.071***	0.042***
State-owned	-0.072***	-0.074***
State-owned x WTO	0.042***	0.008
R^2 within	0.062	0.078
Nr firms	33,807	2,697
Nr obs	104,483	22,163

Empirical Results

Detecting self-selection and learning-by exporting effects

β_2

Results – testing for selection effects

Dependent Variable:	Entry Exporter			Exit Exporter		
	Pre WTO (1)	Post WTO (2)	Pooled (3)	Pre WTO (4)	Post WTO (5)	Pooled (6)
Pos TFP shock	0.009*	0.036***	0.017***			
WTO x Pos TFP shock			0.012*			
Neg TFP shock				-0.002	0.026***	0.002
WTO x Neg TFP shock						0.019***
WTO indicator			0.017***			-0.032***
Within R^2	0.013	0.023	0.011	0.009	0.013	0.010
Nr firms	2,720	2,673	2,754	2,720	2,673	2,754
Nr obs	13,120	10,489	23,609	13,120	10,489	23,609

β_2

Results – detecting learning-by-exporting

Dep Var: lnq	(1)	(2)	(3)	(4)	(5)	(6)
L.export	0.054***	0.010	0.049***	0.014	0.027**	-0.004
WTO*L.export		0.092***		0.065***		0.060***
WTO		0.061***		0.070***		0.062***
Inputs						
lnlab	0.470***	0.467***	0.420***	0.418***	0.351***	0.349***
lncap	0.364***	0.367***	0.336***	0.338***	0.280***	0.282***
Selection						
L2.export			0.015	0.014	0.014	0.013
L2.lnlab			0.114***	0.113***	-0.028	-0.029
L2.lnlabprod			0.047***	0.046***	-0.033**	-0.033**
L2.Cap-Lab			-0.025	-0.024	-0.042**	-0.041**
L.lnq					0.301***	0.301***
Within R^2	0.298	0.298	0.268	0.269	0.332	0.332
Firms	2,754	2,754	2,741	2,741	2,741	2,741
Observations	23,634	23,634	20,970	20,970	20,969	20,969

Key findings:

- Productivity differences between exporting and non-exporting firms appears to depend on the prevailing trade regime
- Under a more strict trade regime pre-WTO export firms are less productive and are less likely to self-select in and out of export markets
- Under a liberalized trade regime post-WTO export firms are more productive and self-selection is more obvious.

Empirical Results

Self-selection and learning-by exporting: role of trade regime

Self-selection: role of trade regime

1. Trade restrictions may make exporting prohibitively costly, even for the most efficient firms
   - If so we should observe less selection into exporting in sectors where costs are lower.
   - We proxy trade costs using indicator for low vs. high export sectors constructed using aggregate data
2. Firms might be more capable of selecting into export markets in more protected sectors
   - Higher levels of import tariffs or industry concentration could afford firms protection needed to start exporting
   - If so we should observe more selection into exporting in protected sectors in pre-WTO period when costs of exporting are higher
   - Post WTO selection less likely in concentrated sectors given lack of ability to compete on export markets so we should see more selection into exporting in unprotected sectors where firms are more prepared to compete on world markets

β_2

Results – selection effects: role of trade regime

Dependent Variable	Entry Exporter		Exit Exporter	
	Pre WTO (1)	Post WTO (2)	Pre WTO (3)	Post WTO (4)
Pos shock	0.016**	0.049***		
Pos shock x HCE	-0.020**	-0.037***		
Neg shock			-0.003	0.031***
Neg shock x HCE			0.005	-0.021**
HCE	0.022*	0.026	0.004	0.039***
Within R^2	0.013	0.024	0.009	0.015
Nr firms	2,720	2,673	2,720	2,673
Nr obs	13,120	10.489	13,120	10,489

Results – selection effects: role of trade regime

Dependent Variable	Entry Exporter		Exit Exporter	
	Pre WTO (1)	Post WTO (2)	Pre WTO (3)	Post WTO (4)
Pos shock	0.003	0.004		
Pos shock x HT	0.010	0.071***		
Neg shock			-0.013*	0.016***
Neg shock x HT			0.021**	0.014*
HT	0.025***	0.025***	0.012*	0.026***
Within R^2	0.013	0.024	0.010	0.019
Nr firms	2,720	2,673	2,720	2,673
Nr obs	13,120	10.489	13,120	10.489

Results – selection effects: role of trade regime

Dependent Variable	Entry Exporter		Exit Exporter	
	Pre WTO (1)	Post WTO (2)	Pre WTO (3)	Post WTO (4)
Pos shock	0.004	0.034***		
Pos shock x HHI	0.264	0.064		
Neg shock			0.004	0.026***
Neg shock x HHI			-0.284	-0.010
HHI	0.055	0.005	-0.020	-0.111
Within R^2	0.013	0.024	0.009	0.013
Nr firms	2,720	2,673	2,720	2,673
Nr obs	13,120	10.489	13,120	10,489

Learning-by-exporting: role of trade regime

- Evidence from the literature suggests that there is also heterogeneity across firms and sectors in the extent that learning effects associated with exporting are observed:
  - Fernandes and Isgut (2005): depends on the age of the firm and the destination of exports
  - Van Biesebroeck (2005): scale economies are important for learning

Learning-by-exporting: role of trade regime

- Why do firms not appear to learn from exporting in the pre-WTO period but do once trade is liberalized?
  1. Costs imposed by protectionist trade regime that may make it more difficult for firms to learn
  2. In protected sectors inefficient firms can survive for longer in export markets even though they do not learn-by-exporting
  3. Firms in protected sectors might be less efficient due to the fact that they are not exposed to competition and so learning may be less likely as a result

- Costs and protection should matter less in the post-WTO period.

Results – learning-by-exporting: role of trade regime

Dependent Variable: lnq	(1)	(2)	(3)
L.export	0.015	0.002	0.002
WTO x L.export	0.046*	0.101***	0.072***
HCE x L.export	0.005		
WTO x HCE x L.export	0.049		
HT x L.export		0.035	
WTO x HT x L.export		-0.099***	
HHI x L.export			0.652
WTO x HHI x L.export			-0.376
Within R^2	0.270	0.270	0.269
Firms	2,741	2,741	2,741
Observations	20,970	20,970	20,970

Key findings:

- Lowering trade costs will assist productive firms in entering into export markets and will encourage them to exit if they experience negative productivity shocks
- No evidence that reducing the costs of exporting will have any effect on learning
- Selection of productive firms into export markets is more likely in sectors that are themselves protected from import competition
- This is consistent with a policy of supporting domestic sectors in the early stages of trade exposure to assist them in getting established
- However, learning is less likely to take place in high tariff sectors so there is a trade-off between supporting firms that wish to export and ensuring that the productivity benefits of exporting are realized.

Empirical Results

Learning-by exporting: role of technology transfers

Learning-by-exporting: role of technology transfers

- Little known about mechanisms through which firms learn by exporting.
  - Hausmann et al. (2005) who finds that countries with higher quality exports perform better suggesting that what firms export matters for productivity improvements
  - Aw et al. (2008) show that the effect of export participation on future productivity is larger if the firm has also made investments in R&D
  - Fernandes and Isgut (2005) find that learning-by-exporting is more likely for firms that export to high technology countries suggesting that technology transfers might be a potential mechanism.

- We explore the technology transfer channel directly using data gathered in a specially designed module that was included in the Enterprise Survey in 2010 and 2011
- We gather data on whether the firm's relationship with export markets results in technology transfers
- Estimate same model as before with two years of data and disaggregation of export status variable

Results – learning-by-exporting: role of technology transfers

Dependent Variable: lnq	(1)	(2)	(3)	(4)
Export firm	0.041**			
Export of final goods		0.052*		
Export of intermediate goods		0.037*		
Exports with technology transfer			0.067***	
Exports without technology transfer			0.042**	0.039*
Export of final goods with tech transfer				0.047
Export of intermediate goods with tech transfer				0.116*
Within R^2	0.173	0.173	0.174	0.173
Firms	8,359	8,359	8,359	8,359
Observations	13,839	13,839	13,839	13,839

Summary of key findings

- Productive firms self-select into export markets pre- and post-WTO but learning effects are only observed in the more liberalized regime

- Three key findings regarding mechanisms at work:
  - Self-selection: lowering trade costs will assist in the self-selection process but selection of productive firms into export markets is more likely in sectors that are themselves protected from import competition.
  - Learning-by-exporting: no evidence that the cost of exporting impacts on learning but firms in protected sectors are much less likely to experience learning effects
  - Technology transfers: learning-by-exporting effects are greatest for exporters of intermediate goods and that this is most likely attributed to technology transfers

Thank you

Questions and comments most welcome

APPENDIX

Table A1: List of trade intensive sectors

15 Food Products and Beverages
17 Textiles
18 Wearing Apparel
19 Tanning/Dressing Leather
20 Wood and Wood Products
25 Rubber and Plastics
27 Basic Metals
29 Machinery and Equipment
31 Electrical Machinery
32 Radio, Television, etc
33 Medical, Precision and Optical
36 Furniture

Manufacturing firm characteristics

	Number of firms	Size Employees	Entrants (%)	Exits (%)	Foreign (%)	State (%)	Import (%)
2002	13,663	156	24.83	17.35	11.89	10.43	12.76
2003	15,401	159	26.68	15.39	12.35	8.84	13.44
2004	18,238	151	28.55	11.91	12.13	6.97	13.33
2005	21,618	141	25.68	15.88	11.81	5.58	13.38
2006	23,803	136	23.60	13.93	12.29	4.67	13.38
2007	28,821	133	28.92	14.84	11.85	3.95	12.23
2008	36,363	113	32.50	21.50	10.64	3.13	10.12
2009	39,101	108	26.99	18.31	10.82	2.96	10.67
2010	38,217	120	16.42	-	10.86	2.76	14.57

Sectoral composition in Vietnam

	Share of Employment			
	Manufacturing	HT Manufacturing	Services	Agriculture
2002	51.06	14.74	39.27	9.67
2003	53.20	15.31	38.42	8.37
2004	53.83	15.63	38.55	7.62
2005	53.10	15.49	39.62	7.28
2006	54.18	15.93	39.05	6.76
2007	54.01	16.51	39.91	6.08
2008	50.05	15.72	42.49	7.17
2009	48.83	16.20	44.44	6.72
2010	45.67	15.19	48.35	5.97

Sectoral composition in Vietnam

	Share of Output			
	Manufacturing	HT Manufacturing	Services	Agriculture
2002	33.89	15.07	59.51	6.60
2003	34.23	16.01	60.00	5.76
2004	37.74	17.60	55.29	6.96
2005	37.10	17.50	55.55	7.35
2006	37.75	17.82	55.72	6.52
2007	38.73	19.03	56.82	4.45
2008	36.08	18.05	60.68	3.24
2009	40.14	20.33	56.75	3.10
2010	37.29	19.47	59.90	2.81

Sectoral exposure to trade: Direct

	Share of Exports			Share of Imports		
	Man	Man HT	Ag	Man	Man HT	Ag
2002	73.45	18.29	26.55	93.85	70.29	6.15
2003	49.87	17.43	50.12	89.70	71.34	10.29
2004	34.99	13.83	65.01	83.90	69.71	16.08
2005	46.97	17.27	53.03	84.19	63.05	15.78
2006	35.58	12.53	64.42	86.11	70.96	13.78
2007	31.38	12.87	68.62	82.92	70.38	16.90
2008	36.18	13.15	63.81	77.55	63.18	22.27
2009	32.36	13.98	67.62	71.39	58.33	28.31
2010	33.23	14.85	66.69	70.12	58.26	29.55

Trade in Vietnam – Sectoral Composition

Source: Author's calculations based on COMTRADE database.
Notes: Deflated to 2000 values using 4-digit sector level GDP deflator

Sectoral composition in Vietnam

	Share of Employment			
	Manufacturing	HT Manufacturing	Services	Agriculture
2001	49.69	14.62	39.41	10.89
2002	51.06	14.74	39.27	9.67
2003	53.20	15.31	38.42	8.37
2004	53.83	15.63	38.55	7.62
2005	53.10	15.49	39.62	7.28
2006	54.18	15.93	39.05	6.76
2007	54.01	16.51	39.91	6.08
2008	50.05	15.72	42.49	7.17
2009	48.83	16.20	44.44	6.72
2010	45.67	15.19	48.35	5.97

Sectoral composition in Vietnam

	Share of Capital			
	Manufacturing	HT Manufacturing	Services	Agriculture
2001	33.06	16.81	56.54	10.39
2002	37.87	18.89	51.46	10.66
2003	37.83	19.38	52.92	9.24
2004	36.54	18.59	54.56	8.90
2005	35.64	18.63	56.57	7.79
2006	33.72	18.29	59.63	6.65
2007	30.00	16.15	65.47	4.52
2008	30.48	16.39	66.07	3.45
2009	29.26	17.60	67.10	3.64
2010	20.97	12.31	75.41	3.62

Sectoral composition in Vietnam

	Share of Output			
	Manufacturing	HT Manufacturing	Services	Agriculture
2001	34.77	16.35	57.04	8.18
2002	33.89	15.07	59.51	6.60
2003	34.23	16.01	60.00	5.76
2004	37.74	17.60	55.29	6.96
2005	37.10	17.50	55.55	7.35
2006	37.75	17.82	55.72	6.52
2007	38.73	19.03	56.82	4.45
2008	36.08	18.05	60.68	3.24
2009	40.14	20.33	56.75	3.10
2010	37.29	19.47	59.90	2.81

Sectoral exposure to trade: Direct

	Share of Exports			Share of Imports		
	Man	Man HT	Ag	Man	Man HT	Ag
2001	42.21	15.21	57.79	84.50	65.86	15.49
2002	73.45	18.29	26.55	93.85	70.29	6.15
2003	49.87	17.43	50.12	89.70	71.34	10.29
2004	34.99	13.83	65.01	83.90	69.71	16.08
2005	46.97	17.27	53.03	84.19	63.05	15.78
2006	35.58	12.53	64.42	86.11	70.96	13.78
2007	31.38	12.87	68.62	82.92	70.38	16.90
2008	36.18	13.15	63.81	77.55	63.18	22.27
2009	32.36	13.98	67.62	71.39	58.33	28.31
2010	33.23	14.85	66.69	70.12	58.26	29.55