Productivity, Exporting and the Learning-by-Exporting hypothesis: direct evidence from UK firms

Gustavo Crespi

Chiara Criscuolo

Jonathan Haskel

Motivation

- Extensive theoretical and empirical literature on the relationship between exporting and productivity
  - Macro level: +ve relationship between trade and growth
  - Micro level: +ve relationship between exporting and productivity (growth)
    - Self-selection of better firm into exporting
    - Learning-by-exporting
      - Mixed evidence
- Policy issue: relevance of export-supporting policies

Our work

- ***What do we do?*** We focus on both the exporting-productivity link and the exporting-learning relationship using direct evidence on learning flows
- ***How do we do it?*** We use a panel of UK firms that contain information on learning, exporting and labour productivity
- ***What do we find?*** Suggestive evidence supportive of learning-by exporting especially for new exporters.

Theoretical framework

$$Y = A \bullet F(Z, m)$$

$$TFPG = \Delta Y - \Delta F(Z, m) = \Delta A$$

$$\left.\begin{matrix} \Delta Z \\ \Delta A \end{matrix}\right\} = \begin{cases} g(L^{BUYERS}, L^*, m) \\ h(L^{BUYERS}, L^*, m) \end{cases}$$

$$\left.\begin{matrix} L^{BUYERS} \\ L^* \end{matrix}\right\} = \begin{cases} L^{BUYERS}(X, m) \\ L^*(m) \end{cases}$$

$$X = X(L^{BUYERS}, L^*, m)$$

The empirical approach

$$\ln(Y/L)_{i,t} = \alpha_1 X_{i,t-2}$$

$$(L^{BUYERS} - L^*)_{i,t} = \beta_1 X_{i,t-1}$$

$$(L^{COMPET} - L^*)_{i,t} = \beta_{11} X_{i,t-1}$$

$$\ln(Y/L)_{i,t} - \ln(Y/L)_{i,t-1} = \gamma_1 (L^{BUYERS} - L^*)_{i,t-2} + \gamma_2 L^*_{i,t-2}$$

Data

- Community Innovation Survey
  - CIS2 1994-96
  - CIS3 1998-2000
- Questionnaire asks about:
  - Innovation related questions
  - Exporting at the beginning and at the end of period
  - Turnover and employment at the beginning and at the end of period
  - information flows

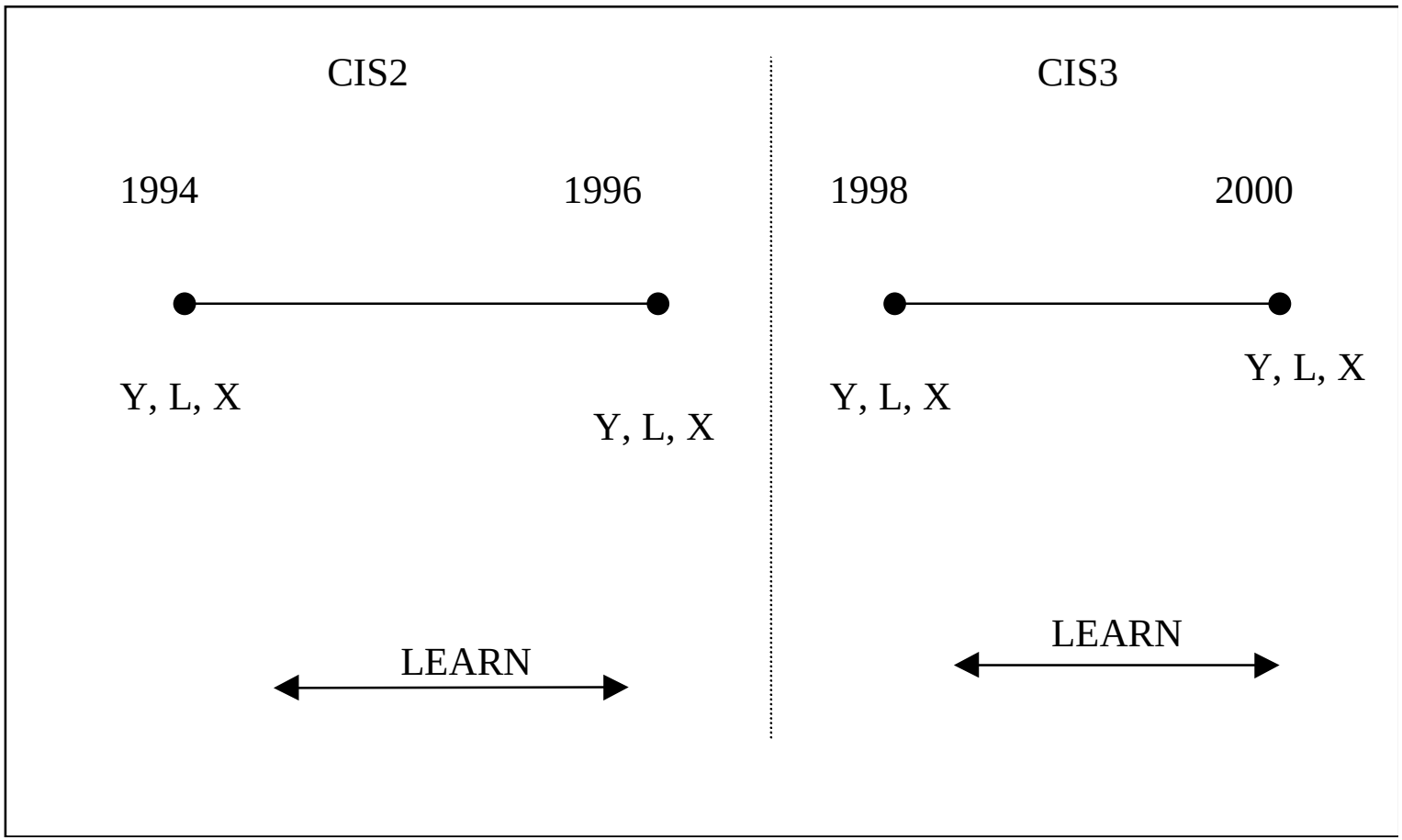
Information flows

"Please indicate the sources of knowledge or information used in your technological innovation activities, and their importance *(please tick one box in each row)*

		N	L	M	H
Internal					
	Within the enterprise				
	Other enterprises within the enterprise group				
Market					
	Suppliers of equipment, materials, components or software				
	Clients or customers				
	Competitors				

Institutional	*Universities or other higher education institute;s Government research organisations; Other public sector e.g. business links, Government Offices; Consultants; Commercial laboratories/ R&D enterprises; Private research institutes*
Specialised	*Technical standards; Environmental standards and regulations*
Other	*Professional conferences, meetings; Trade associations; Technical/trade press, computer databases; Fairs, exhibitions; Health and safety standards and regulations*

The structure of information in CIS



Estimation and Results

LP and exporting

To compare our work with others we start by estimating:

$$\ln(Y/L)_{i,00} = \alpha_1 X_{i,96} + \sum_{j=2}^{k} \alpha_j D_{jit} + \lambda_I + \lambda_i + \varepsilon_{it}$$

We estimate this equation in levels and in difference (also using IV). In differences:

$$\textit{Reference group}: \quad X_t = 0, X_{t-1} = 0 \qquad \textit{never exporting}$$

$$X_t - X_{t-1} = \begin{cases} X_t > 0, X_{t-1} = 0 & \textit{starters} \\ X_t = 0, X_{t-1} > 0 & \textit{stoppers} \\ X_t > 0, X_{t-1} > 0 & \textit{continuers} \end{cases}$$

LP and exporting

Labour Productivity	Column 1 Contemp Levels YL(i,t)	Column 2 Before Levels YL(i,t-2)	Column 3 After Levels YL(i,t)	Column 4 After FD [YL(i,t)-YL(i,t-4)]	Column 5 After FD,status [YL(i,t)-YL(i,t-4)]	Column 6 After FD,IV [YL(i,t)-YL(i,t-4)]
X(i,t)	0.2357	0.2415				
	[6.32]***	[4.14]***				
X(i,t-2)			0.2473			
			[5.75]***			
[X(i,t-2)-X(i,t-6)]				0.1177		0.225
				[1.67]*		[2.02]**
X(i,t-2)>0,X(i,t-6)=0					0.1586	
					[1.53]	
X(i,t-2)=0,X(i,t-6)>0					-0.0037	
					[0.04]	
X(i,t-2)>0,X(i,t-6)>0					-0.0718	
					[1.15]	
Constant	3.4575	3.5558	3.562	-0.7596	-0.7083	-0.7436
	[16.30]***	[13.31]***	[16.07]***	[1.49]	[1.34]	[1.45]
Observations	2147	1027	1408	738	656	738
R-squared	0.30	0.30	0.32	0.09	0.10	0.08

Learning and exporting

$$(L^{BUYER} - L^{*})_{i,00/98} = \beta_1 X_{i,96} + \sum_{j=2}^{k} \beta_j D_{jit} + \lambda_I + \lambda_R + \varepsilon_{it}$$

Where the dependent variable is a (0/1) dummy.
The dummy is 1 if for the firm the score on information from Buyers is higher than the average of all the other sources of learning (calculated using the original Likert scale (0-3)).
We estimate using a linear probability model (LPM) estimated by OLS

Learning and exporting

Learning	(1) Contemp Levels	(2) Before Levels	(3) After Levels	(4) After FD	(5) After FD,Status	(6) After Levels	(7) After Levels	(8) After Levels	(9) After FD	(10) After FD
From	Learn(i,t) Clients	Learn(i,t-4) | Learn(i,t-6) Clients	Learn(i,t) Clients	Learn(i,t)-Learn(i,t-4) Clients	Learn(i,t)-Learn(i,t-4) Clients	Learn(i,t) Suppliers	Learn(i,t) Competitors	Learn(i,t) Trade Assoc	Learn(i,t)-Learn(i,t-4) Suppliers	Learn(i,t)-Learn(i,t-4) Competitors
X(it)	0.1171									
	[3.53]***									
[X(i,t)>0 | X(i,t-2)>0]		-0.0226								
		[0.32]								
X(i,t-2)			0.0888			0.0545	0.0191	0.047		
			[2.65]***			[1.52]	[0.54]	[1.57]		
[X(i,t-2)-X(i,t-6)]				0.0981					-0.0081	0.0158
				[1.51]					[0.14]	[0.25]
X(i,t-2)>0,X(i,t-6)=0					0.1308					
					[1.40]					
X(i,t-2)=0,X(i,t-6)>0					-0.0961					
					[0.77]					
X(i,t-2)>0,X(i,t-6)>0					0.0726					
					[0.97]					
Constant	0.1633	-0.2492	0.1683	0.1984	0.2437	0.3202	0.1408	0.1927	-0.1174	0.1546
	[1.10]	[1.02]	[1.13]	[0.68]	[0.83]	[1.99]**	[0.90]	[1.44]	[0.46]	[0.55]
Observations	1418	403	1418	749	749	1418	1418	1418	749	749

Discussion of Learning results

- On the learning-by-exporting hypothesis:
  - Past exporting is associated with statistically significantly more learning from buyers relative to other sources.
  - Past exporting is *not* associated with statistically significantly more learning from other sources
  - past learning is not statistically significantly associated with more exporting, indicating no evidence for pre-exporting sorting by learning and non-learning firms.

Productivity and learning

$$(Y/L)_{i,00} - (Y/L)_{i,96} = \gamma_1 (L^{BUYERS} - L^*)_{i,96/94} + \gamma_2 L^*_{i,96/94} + \sum_{j=2}^{k} \gamma_j D_{jit} + \lambda_I + \lambda_R + \varepsilon_{it}$$

	Column 1 FD, OLS [YL(i,t)-YL(i,t-4)]	Column 2 FD, OLS [YL(i,t)-YL(i,t-4)]	Column 3 FD, IV [YL(i,t)-YL(i,t-4)]
(L(BUYER)-L*)(i,t-4)	0.0919	0.0701	0.0786
	[2.50]**	[1.84]*	[1.78]*
L*(i,t-4)		0.0575	0.0588
		[1.84]*	[1.95]*
Constant	-0.0465	-0.0367	-0.0447
	[0.37]	[0.29]	[0.35]
Observations	755	755	755
R-squared	0.07	0.08	0.08

Note: Pooled CIS2/CIS3. Control variables included are 2 digit sector dummies, regional dummies, structural changes (start-up and mergers), multiplant; ownership dummies and lag (log) size

Conclusions

- We examine directly the learning-by-exporting hypothesis using a panel with firm level information on productivity; exporting and the mechanisms through which firms learn
- Using the panel element to control for fixed effects and explore timing (and IV to control for endogeneity) we find that exporting firms have higher productivity; different learning intensities and patterns to non-exporting firms.
- Our results suggest some support for the learning-by-exporting hypothesis, especially for new exporters.

Policy implications

- Do our results support subsidies to exporters? Not necessarily.
  - Yes, if exporting firms, who learn from the experience, transfer non-internalised externalities to other firms in the UK; I.e. if exporting of one firm might affect TFPG in others.
  - As learning mostly confined in new exporters; results suggest that subsidies should be directed at new exporters and not to all exporters.

Transition matrix for exporters

	YES			
NO	1994	1996	1998	2000
1994		35	95	111
1996	<10		75	89
1998	50	62		31
2000	42	52	<10	

Note: On average in each period 671 firms do not change exporting status relative to the previous year

Summary Statistics

Descriptive Statistics-Pooled Sample (1994,1996,1998,2000)

Variable	Obs	Mean	Std. Dev.
X (0/1)	3120	0.46	0.50
turn (£000)	3120	52533.89	537257.70
Employ	3120	271.31	824.45
LP (£000)	2962	112.17	240.58
US_MNE	3120	0.04	0.19
NOUS_MNE	3120	0.09	0.29
UK_MNEx	3120	0.10	0.29
Multiplant	3120	0.42	0.49
Information Sources			
Internal	3120	0.63	0.48
Clients	3120	0.64	0.48