Are Manufacturing Firms in Clusters More Productive? Evidence from Vietnam

Emma Howard
Carol Newman
John Rand
Finn Tarp

Motivation

- Clustering facilitates growth
- Empirical evidence of agglomeration economies
- Limited empirical evidence linking clustering to firm performance
- Number of mechanisms through which firms in clusters may be more productive
- Firms may 'self select' into productive clusters

Contribution

- We use a rich and unique data set of firms from Vietnam

- We extend the Olley Pakes (1996) approach to control for self selection

- This allows us to identify how locating in a cluster impacts on firm productivity

- Future work will attempt to uncover the mechanisms

Data

- Vietnamese Enterprise Survey for 2002-2007 (GSO, 2010)

- Unbalanced Panel, all registered manufacturing firms with >30 employees

- Information on commune in which firm is located plus assets, employees etc

Methodology

- Extend Olley Pakes (1996) approach by controlling for cluster productivity when estimating firm productivity

- Similar approach to De Loecker (2007) who controlled for export status

➢ Two main parts to the analysis

1) Estimate firm productivity controlling for cluster productivity

2) Estimate the impact of cluster productivity on firm productivity

Olley Pakes Estimation

- Traditional productivity estimation→ Cobb Douglas production function, estimate coefficients, then productivity given by;

$$\omega_{it} = y_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it}$$

- Results in two main biases; simultaneity and survival bias
- OP controls for both in 3 step estimation procedure

Extended OP:
Control for Self-Selection

Assume:

i.   productivity follows a first-order Markov process

ii.   Cobb Douglas Production function

iii. Investment monotonically increasing in productivity

➢ Proxy productivity by a function in investment, capital and cluster productivity

➢ 1st stage: consistent estimate for coefficient of labour

➢ 2nd stage: predicted probability of survival

➢ 3rd stage: consistent estimate for coefficient of capital

Production Function Estimation

- Investment given by: $i_t = k_t - k_{t-1}$
- Output = total revenue of firm
- Labour = total number of employees
- Capital = total assets at time t
- Average productivity of cluster:
- ➢ index number approach to measure TFP
- ➢ for firm *i* take average of all other firms in cluster
- ➢ firm and cluster specific variable

Production Function Estimation

	OLS	Commune	District	Province
Capital	0.622***	0.674***	0.685***	0.691***
	(0.005)	(0.036)	(0.036)	(0.034)
Labour	0.489***	0.190***	0.193***	0.198***
	(0.006)	(0.002)	(0.009)	(0.007)
Av Cluster Productivity		0.002	0.021**	0.006
		(0.006)	(0.011)	(0.013)
Observations	35,154	17,306	19,370	19,703

Bootstrapped standard errors are presented in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

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Methodology (2)

- We then estimate the impact of the cluster on the productivity of the firm

$$\omega_{it} = \beta_0 + \beta_1 \omega_{it-1} + \beta_2 i_{t-1} + \beta_3 p_{cit-1} + \varepsilon_{it}$$

where $\omega_{it} = y_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it}$

Results

	Commune		District		Province	
	(1)	(2)	(1)	(2)	(1)	(2)
Productivity (t-1)	0.464***	0.464***	0.457***	0.458***	0.562***	0.458***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Investment (t-1)	0.036***	0.040***	0.034***	0.036***	0.033***	0.035***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Av Cluster Prod (t-1)	0.019***	-0.008	0.033***	0.007	0.096***	0.046
	(0.003)	(0.013)	(0.005)	(0.016)	(0.010)	(0.026)
Inv(t-1)*Cluster Prod(t-1)		0.003**		0.003*		0.006*
		(0.002)		(0.002)		(0.003)
Province Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17,306	17,306	19,370	19,370	19,703	19,703
R-squared	0.34	0.34	0.33	0.33	0.33	0.33

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Conclusions and Next Steps

- ➢ Evidence of productivity spillovers
- ➢ Investment necessary to benefit from spillovers

Next Steps:

- ▪ Estimate productivity separately for each four-digit sector
- ▪ Robustness checks: other cluster characteristics- labour productivity, size of cluster
- ▪ Mechanisms: technology transfers, foreign firms, competitors

Thank you

howardek@tcd.ie