Selection and Agglomeration Impact on Firm's Productivity- A Study of Taiwan's Manufacturing Sector

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INTRODUCTION

Firms in large markets have higher productivities. This has been traditionally attributed to agglomeration economies. However, another factor causing higher productivity could be on account of selection due to competition which may cause low productivity firms to exit from large market.

Science parks are planned clusters where firms are likely to benefit from agglomeration namely sharing, pooling and knowledge spillovers.

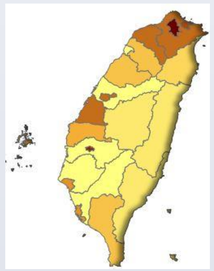
OBJECTIVES/QUESTIONS

- Are firms located in a science park leading or lagging those located in large and small cities in terms of TFP?
- How do agglomeration and selection parameters affect firm's TFP?
- Do firms belonging to different industries equally benefit from agglomeration economies?

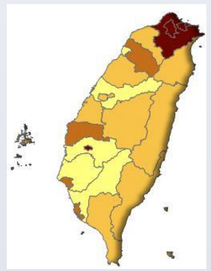
Hsinchu Science Park. (Annual Report,2011)

METHODS

- Firm's log TFP measured using Olley and Pakes (1996) and IV/2SLS methods used to control for simultaneity and selectivity bias.
- TFP distributions compared using summary stats and non-parametric quantile - quantile plots.
- IQR, median and 10th percentile used to measure dispersion, shift and truncation of TFP distributions.
- Above measures used in regression to determine impact of agglomeration and selection on firm's TFP.
- Estimate and compare the TFP distributions for firms belonging to different industries.

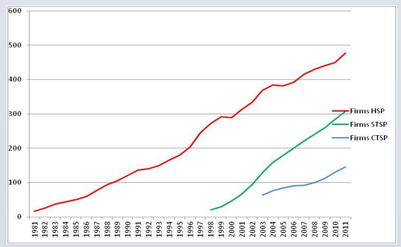


County market Mean TFP



County –level Labor Density

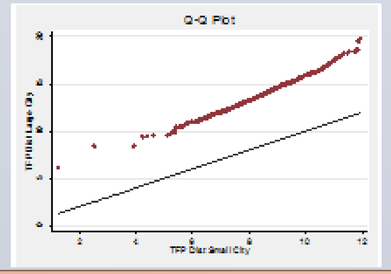
- Graduated colors from light to dark show increasing trend



Yearly Firm Growth in Science Parks. Trend gradient shows CTSP has a slow growth.

Q-Q Plot of TFP distribution for large and small cities shows:

- two sets come from a population with the same distribution.
- two distributions differ only by a shift in location.
- large city quantile values are significantly higher than corresponding values for small cities.

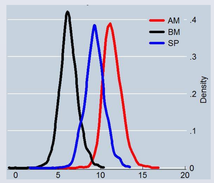


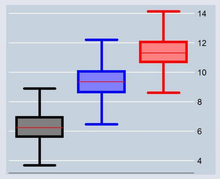
RESULTS

- Summary Stats show that large cities have highest TFP mean, largest dispersion (IQR) and greatest truncation (10th percentile).

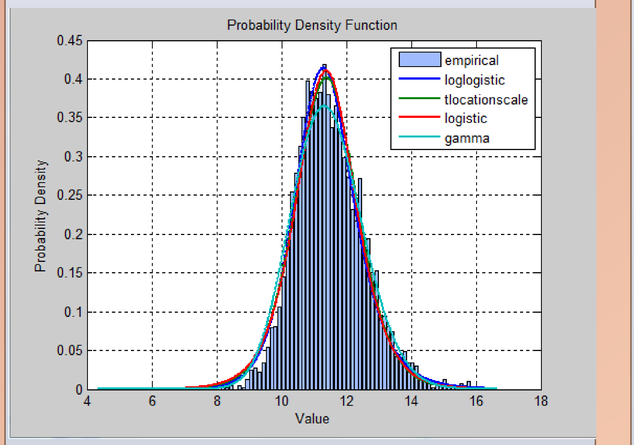
Summary Stats			
N	1698	754	1252
Mean	12.12	7.66	11.91
Max	16.91	11.21	16.73
IQR	1.53	1.19	1.50
10-tile	10.70	6.53	10.51
Median	12.05	7.63	11.85

- Kernel density plot indicate that science parks TFP distributions lag firms in large cities but lead firms in small cities.
- Box-plots of TFP distributions confirm and depict more vividly.





Legend: AM: LARGE CITY, BM:SMALL CITY, SP:SCIENCE PARK



- Fitting log-TFP distribution shows the best fit is log-logistic followed by t location scale.
- Simulation exercise can use distributions to approximate empirical TFP distribution.

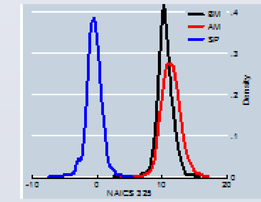
CONCLUSION

- Firms located in science park have a mean TFP lagging those of large cities and leading those of small cities.
- Firms in large cities have greatest dispersion and highest left truncation in TFP distribution.
- Firms located in science parks benefit from localization and specialization. Firms classified under NAICS 334 thus benefit from labor pooling, input sharing and knowledge spillovers.
- Firms located in large cities benefit from diversification but are negatively effected by localization due to higher competition .
- Greater labor density causes greater left truncation of the TFP distribution.

	IQR		MED		10-TILE
	LOC	URB	LOC	URB	Labor Density
SP	0.43***	0.92***	0.16***	0.57***	0.0002***
AM	-1.11***	-1.47***	-0.71***	-1.25***	6.08exp(-06)***
BM	0.53***	1.05***	0.30***	0.75***	-4.95exp(-05)

LOC and URB are localization and urbanization variables
*** results are significant at 1%

Kernel density plot of TFP distribution for the Chemical Industry; NAICS 325



- Hi-tech industries (NAICS 334) benefit from clustering in a science parks but low-tech (NAICS 325) are better-off in large cities.
- Policy implication of this research is that incentives linked with science park are better utilized if the firms benefit from localization otherwise they may be exploited to offset firm inefficiency.

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The data used are from EMIS available via OSU libraries. The data used are for the years 2009-2011. I also used data available on ROC government and science parks websites.

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