



Regional Innovation Policy in Taiwan and South Korea: The Impact of Science Parks on SME Productivity



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Abstract

Using a regional economics approach, this paper evaluates the effectiveness of regional innovation policy creating science parks on small and medium-sized enterprises (SME). Science parks created to support innovation and regional growth target productivity gains associated with agglomeration economies. Besides, other phenomena may spur productivity. Spatial proximity of firms stimulates selection, whereby less competitive firms are forced to exit, and hence a cluster of high-productivity, surviving firms is observed at the regional level. Also, either high or low-productivity firms or both may spatially sort into a region. While controlling for sorting and selection, estimates of firm-level total factor productivity distributions of Taiwanese and South Korean SMEs are mapped and analyzed. The results indicate heterogeneity in location choice and productivity levels of SMEs. Empirical evidence suggests that policy establishing science parks can cause productivity improvements if the incentives are reinforced through national level policies, else such incentives may end up protecting only the inefficient firms.

Introduction

- Establishment of science parks to stimulate technological innovation and regional growth is considered an important policy measure in Taiwan and South Korea.
- Over years, both countries have placed great emphasis on the growth of SMEs as an engine of economic growth.
- However, national-level economic models pursued by each country are quite different. The dominance of the SME-network model in Taiwan and the scale-based technological development model in South Korea has affected the efficiency of SMEs in a varied manner.
- The objective of the research presented in this paper is to determine the impact of incentives offered through science parks on SME productivity when the national models pursued are not homogeneous.

Methods and Materials

The analytical methodology adopted in this paper draws on Okubo and Tomiura (2012), and Forslid and Okubo (2014).

First, productivity distributions for all firms-SMEs and large firms (top figure), in cities and science parks are simultaneously analyzed to identify the impact of agglomeration and selection effects as in Combes et al. (2012).

Given that science park incentives are designed to support the growth of SMEs, and that self-selection by firms into a science park region is very likely, a two-stage Heckman (1979) selection model is used to have unbiased estimates.

Next, the impact of policy incentives on firm-productivity is determined using both regression and matching techniques.

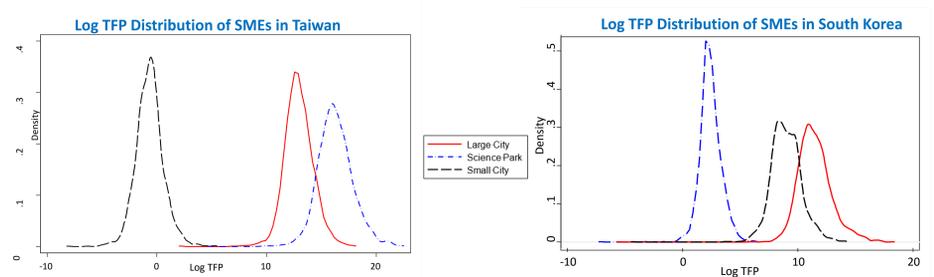
Finally, to observe impact of unobserved heterogeneity and resultant productivity variations on spatial sorting behavior of firms, percentile-wise probability of location (bottom figure) is estimated for science parks in the two countries.

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Results

- SMEs in Taiwanese science parks have higher productivity compared to SMEs located elsewhere in the country. This is in complete contrast to South Korea.
- The analysis of spatial sorting and competitive selection behavior of SMEs indicates that both selection and one-sided sorting (high end) occur in Taiwan, whereas two-sided (both high and low end) sorting is prevalent in South Korea.
- Results from Mahalanobis matching technique indicate that in Taiwan, the average treatment effect is positive and significant; SMEs located in a science park have 12 percent higher TFP and the treatment effect is also statistically significant, TFP being 8 percent higher. By contrast in South Korea, the average treatment effect is not statistically significant, but the treatment effect is positive and significant, indicating that treated SMEs exhibit 13 percent higher TFP.



Discussion

- The impact of industrial clusters such as science parks is not homogenous across firms and the productivity shock at the aggregate level of manufacturing is weak.
- Purposeful utilization of the policy is only possible if science park incentives are offered to firms that have strong production linkages with industries on the “national comparative advantage” list.
- For SMEs, provision of a protective environment or tax credits, etc., is not sufficient to stimulate growth and development.
- Unless carefully designed, science park incentives will just insulate firms from the competition they might face in competitive markets.



Conclusions

The overwhelming success of a few science parks across the globe convinced policymakers to provide for state-sponsored support to overcome innovation market failures. As this support comes from public funds it is critical that policy for establishment of science parks be subject to an appropriate evaluation process. The gap in the literature on a uniform methodology for evaluation of science parks indicates that the debate on effectiveness of science parks is still considered open. The research presented in this paper is an attempt to bridge the gap and to develop a robust methodology for policy evaluation to ensure that empirical findings are objective and can form the basis for substantive policy recommendation.

References

1. Combes, P-P, Duranton, G., Gobillon, L., Puga, D., & Roux, S. (2012). The productivity advantages of large cities: distinguishing agglomeration from firm selection. *Econometrica*
2. Forslid, R., & Okubo, T. (2014). Spatial relocation with heterogeneous firms and heterogeneous sectors. *Regional Science and Urban Economics*
3. Okubo, T., & Tomiura, E. (2012). Industrial relocation policy, productivity, and heterogeneous plants: evidence from Japan. *Regional Science and Urban Economics*