Relationships among homogeneous clusters in adjoining cities

Ren Lu
BI Norwegian Business School

Jiang Cao
Humen Port Group Co. Ltd., China

***Regional Insights*, 3(2012)2: 12-14**

DOI: http://dx.doi.org/10.1080/20429843.2012.10590656

Relations among Homogenous Clusters in Adjoining Cities

By
Ren Lu (corresponding author and submitting author)
Department of Strategy and Logistics
BI Norwegian Business School
Nydalsveien 37, 0442 Oslo, Norway
Email: ren.lu@bi.no
Tel: 0047-46410461
Fax: 0047-46410451

&

Jiang Cao
Marketing Department
PSA Dongguan Container Terminal Co.Ltd, Humen Port Avenue
Shatian Xidatan Section
523990 Dongguan City, Guangdong Province, PRC

Abstract

This paper discusses relations between industrial clusters of the same type in six cities in China's Pearl River Delta. The homogenous clusters in metropolitan areas are negatively related to one another. In other words, if the size of a cluster (measured by LQ in terms of the cluster's number of firms) in one city becomes larger, the size of the same type of clusters that are located in the adjoining cities will become smaller. Furthermore, such negative relations would be intensified if the peripheral cities had clusters similar to those of the metropolitan areas in question.

Key words: cluster, metropolitans areas, peripheral cities

Jel Codes: R1

1. Introduction

An industrial cluster (or economic agglomeration) reflects a phenomenon in which a group of firms run similar or related businesses in geographical proximity to one another (Porter, 1998). Cluster theory has reached middle age and now requires further development (Krugman, 2011). At the micro level, economic geographers often combine cluster theories with innovation theories, emphasizing that the trend of globalization has meant that success in business competition relies on knowledge and innovation (Cruz and Teixeira, 2010). At the macro level, many scholars have studied how a cluster interacts with outside units by relying on "local buzz" and "global pipelines" (e.g., Bathelt *et al.*, 2004; Schuldt and Bathelt, 2011). However, few studies have discussed the relations among clusters.

The present paper is inspired by Delgado et al. (2010, p.501), who argued that 'the impact of the strength of the cluster environment in neighboring regions on the growth rate of (the focal) entrepreneurship is ambiguous.' Built on Delgado et al. (2010), the current paper steps further to study relations among clusters of the same type (hereafter, homogenous cluster) situated in adjoining cities. More precisely, relation among clusters refers to if the size of a cluster (measured by its LQ in terms of the cluster's number of firms) becomes larger (or smaller), how such change will influence the size of homogenous clusters that are located in

the adjoining cities. According to Krugman (1991), cluster phenomena are a trade-off between centripetal forces and centrifugal forces. An industrial cluster with an increasing return effect will attract relevant resources from periphery areas until the size of the cluster becomes too large to afford operating costs (such as living costs, high housing prices, and traffic congestion seen in many metropolitan areas). Moreover, Krugman's "core-peripheral" model noted that once a cluster is set down, "it will lead to greater regional industrial concentration and specialization" (Martin and Sunley, 1996, p.277). In reality, however, many cases still show that the same type of clusters can be simultaneously situated in geographical proximity. A typical example is the so-called "the Third Italy": Veneto, Emilia-Romagna, and Tuscany, which are three administrative and neighboring regions in Italy. All the three regions have strong textile clusters that compete in the global market, but also share similar business culture and social networks (Asheim, 2003).

Having collected data on five types of clusters in six cities in China's Pearl River Delta (PRD), the paper will answer two questions. Firstly, what are the relations among homogeneous clusters located in different "core" cities (referred to here as metropolitan areas)? Secondly, what are the relations among homogeneous clusters located in "core" cities and "peripheral" cities (here, peripheral cities refer to small and medium cities located close to metropolitan areas)?

2. Researching Setting and Methodology

The PRD consists of nine prefectures of Guangdong province. This study collected data from six cities in the PRD: Guangzhou, Shenzhen, Dongguan, Jiangmen, Foshan, and Zhongshan. Guangzhou and Shenzhen are metropolitan areas and the other four are peripheral cities. This area was chosen as the empirical setting because it is the most economically dynamic region in mainland China. Since China initiated its "open door" policy in 1979, mainland China has achieved annual GDP growth of approximately 10 percent, although the

PRD's rate has exceeded this rate by as much as two or three percent. In 1991, almost 50 percent of foreign investment in China was in Guangdong and 40 percent in the PRD. By 2010, the PRD's GDP rose to over 3 trillion Chinese Yuan (approximately $460 billion). Furthermore, the PRD area successful promotes the development of its clusters.

[Insert picture 1 about here]

Several methods can be used to measure the size of a cluster. While the most prominent method is the locational Gini coefficient (Krugman, 1991), the simplest and most popular measurement is to calculate Location Quotients, shown as:

$$LQ = \frac{a \text{ region employment sector X}}{\text{total region employment}} \Big/ \frac{\text{a nation employment sector X}}{\text{total nation employment}}$$

The essence of the LQ is to check whether an industry's ratio in one part of an area is greater or smaller than its ratio in the whole area. If the LQ is greater than 1, this means that the local area has industrial clusters. The LQ equation can also be calculated using other kinds of parameters, apart from the employment ratio, such as the ratio of the number of firms, regional GDP, or living standards (Lorenzen, 2005). Chinese statistical yearbooks do not provide detailed relevant employment data; therefore, LQ was calculated here using the numbers of firms. The equation is shown as:

$$LQ_f = \frac{\text{a region firm numbers sector X}}{\text{total region firm numbers}} \Big/ \frac{\text{a nation firm numbers sector X}}{\text{total nation firm nubmers}}$$

Following Hong and Fu's (2011) method, the present paper classified industrial clusters based on the State Statistical Bureau of China's standard. These five clusters are: the electronic information cluster, the electric equipment and special purposes equipment cluster, the textile and garments cluster, the food and beverage cluster, and the logging and paper-making clusters.

This is a longitudinal database that contains all parameters that appeared in the LQ_f equation from 1989 to 2009. Furthermore, "regional population" and "the per capita

disposable income" are chosen as control variables, because: (1) regional population decides firms' investment choices, which are firms should be located in regions with large population and transport goods to regions with small population (Krugman, 1991). (2) the per capita disposable income is another factor that decides local demands. Generally, high per capita disposable income means high local demands, which then attract more suppliers and customers. In one word, these two control variables are two "centripetal" forces, which provide a good platform to push clusters' development (e.g., Cooke, 2008). Additionally, it is important to note that because China is still developing its statistical database, there is currently no data related to some types of firms. Therefore, this paper only investigated enterprises with annual sales of over 5 million Chinese Yuan. Although this method makes it difficult to picture an integrated cluster, it is a feasible method and is favored by Chinese economic geographers (e.g., Hong and Fu, 2011).

3. Empirical Results

The empirical study uses three aspects to test the relations among the same industrial clusters located in different cities. The first aspect is how the clusters of two metropolitan areas (Guangzhou and Shenzhen) interact with each other (as seen in Model 1a and Model 1b). The second aspect is how the two metropolitan areas' clusters interact with the corresponding clusters in the "peripheral" cities (Dongguan, Jiangmen, Foshan, and Zhongshan, seen in Model 2a and the Model 2b). Finally, Model 3a and Model 3b are the integrated models that include all impendent variables.

Models 1a and 1b show that the industrial clusters of the same type in the two "core" cities are negatively related. That means that if a certain type of cluster becomes larger in one city, the size of the same cluster in the other city will decline. However, clusters in the big city (Guangzhou) led to a greater negative impact on clusters in the small city (Shenzhen). Models 2a and 2b provide controversial information about how the two metropolitan areas influenced

their peripheral counterparties. For example, clusters in Guangzhou could have a positive impact on the corresponding clusters in Zhongshan and also have a negative impact on the clusters in Jiangmen. On the other hand, although clusters in Shenzhen have strong positive relations with those in Dongguan, there is no significant relation between Shenzhen's clusters and those in other "peripheral" cities. Models 3a and 3b describe how a cluster in a metropolitan area concurrently interacts with clusters located in the other metropolitan and in peripheral cities. Relations between clusters located in the two metropolitans still exist in these two integrated models, and the bilaterally negative relations broaden. In addition, with regard to the cluster relations between core and peripheral cities, clusters in Guangzhou are now positively related to clusters in Dongguan, but other relations do not change greatly. Last but not least, the "per capita disposable income" control variable was positively related to the dependent variables in every model. This implies that the higher the salary a big city can offer, the larger the size of all local clusters. In contrast, the local population of a big city either has a negative impact on the size of local clusters or has no impact on the dependent variables.

		Model 1a	Model 1b	Model 2a	Model 2b	Model 3a	Model 3b
		Guangzhou	Shenzhen	Guangzhou	Shenzhen	Guangzhou	Shenzhen
Independent Variables	Guangzhou		-0.598***				-0.796*
	Shenzhen	-0.047***				-0.062*	
	Dongguan			0.06	0.622*	0.099*	0.657*
	Jiangmen			-0.282*	0.192	-0.268*	-0.039
	Foshan			-0.128	0.24	-0.114	0.183
	Zhongshan			0.132*	0.05	0.133*	0.123
	Population	-0.057**	-0.08	-0.045**	0.051	-0.047	-0.087
	Income	0.026**	0.119*	0.027*	0.081**	0.031*	0.1*

(* p<0.01, **p<0.05, ***p<0.1)

4. Analysis and Conclusion

This section focuses on the empirical applications of the models. Model 1a and Model 1b show that if two core cities are located in geographical proximity, relations among homogenous clusters in two cities are negative. The probable reason for this is that the two core cities in the PRD (Guangzhou and Shenzhen) are similar to each other in many aspects; the former is the capital of Guangdong province and the latter is the first Chinese special economic zone. Both cities can provide good facilities for talent and investors, such as well-built infrastructure, attractive development policies, and the same vigorous business culture. Therefore, homogenous clusters in both cities must compete with each other from input markets (for example, resource market and labour market) to end-user markets (consumers).

If one only considers cluster relations among homogenous clusters located in core and periphery cities (Model 2a and 2b), our results are not totally consistent with Krugman's (1991) argument that after a cluster is set down and has increasing return, it will attract more resources to the cluster from peripheral areas. On the contrary, clusters in some peripheral places, actually benefited from the enlargement of core cities' clusters. A typical example is Dongguan. On the one hand, core cities such as Guangzhou and Shenzhen do actually attract a lot of qualified resources (e.g., human capitals and financial capitals) from Dongguan. On the other hand, periphery cities, such as Dongguan, also provide entrepreneurship environments for talents who suffer from high living costs in core cities.

Model 3a and 3b show that the regression coefficients are -0.062 and -0.796, which are much higher than the corresponding coefficients -0.047 and -0.598 seen in the Model 1a and 1b. This change reveals that the "zero-sum" relations between clusters in two core cities become intense when considering that homogenous clusters appear both in core and periphery cities. This phenomenon can be explained as follows. Firstly, periphery cities have resources

that core cities require. However, resources in periphery cities are limited and tend to move to core cities. An example can be that core cities (such as Guangzhou and Shenzhen) require cheap labour resource to work for their clusters. Meanwhile, periphery cities (such as Jiangmen and Foshang) have peasants who like to work in core cities for pursuing higher salary and living standard. Secondly, these limited resources can usually only be allocated to one place. For example, a talent living in a periphery city cannot simultaneously work in both Guangzhou and Shenzhen. Thirdly, those resources from periphery cities will break the existing balance between core cities. In other words, the core city that obtains resources from periphery cities will have an advantage that the core city does not have. In the current study, for example, Guangzhou attracted more human resources from periphery cities comparing to that of Shenzhen. Therefore, the 'new' resources generate more benefits to Guangzhou than to Shenzhen in terms of expanding size of clusters.

For practitioners such as cluster and territorial managers, this paper argues that clusters as a regional development policy are not a panacea that can apply in every situation. Clusters certainly release the development powers of a region's endogenous resources, but the trend towards internationalization has meant that clusters must cooperate or compete with their peers in other geographical locations. In this situation, regional planners and decision makers must make a full consideration of relations among clusters before issuing regional policies. For example, in the current PRD case, it is not a good idea to encourage two core cities to develop the same cluster, because relations among clusters in core cities are negatively related.

References:

Asheim, B.T. (2003). 'Industrial districts: the contributions of Marshall and beyond'. In GORDON L. CLARK, MERIC S. GERTLER, MARYANN P. FELDMAN (Eds.), *The Oxford Handbook of Economic Geography*, Oxford University Press, USA, 413-431

Bathelt, H., Malmberg, A. & Maskell, P., 2004. 'Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation'. Progress in Human Geography, 28, 31-56.

Cooke, P. (2008) Jocobian cluster emergence: wider insights from 'green innovation' convergence on a Schumpeterian 'failure', Edward Elgar Publishing
Cruz, S.C.S. & Teixeira, A.a.C., 2010. 'The evolution of the cluster literature: shedding light on the regional studies-regional science debate'. Regional Studies, 44, 1263-1288.
Delgado, M., Porter, M.E. & Stern, S., 2010. 'Clusters and entrepreneurship'. Journal of Economic Geography, 10, 495-518.
Hong, J. & Fu, S., 2011. 'Information and communication technologies and the geographical concentration of manufacturing industries: evidence from China'. Urban Studies, 48, 2339-2354.
Krugman, P., 1991. 'Geography and Trade', The MIT Press, London.
Krugman, P., 2011. 'The new economic geography, now middle-aged'. Regional Studies, 45, 1-7.
Lorenzen, M., 2005. 'Why do clusters change?'. European Urban and Regional Studies, 12, 203-208.
Martin, R. & Sunley, P., 1996. 'Paul Krugman's geographical economics and its implications for regional development theory: a critical assessment'. Economic Geography, 72, 259-292.
Porter, M.E., 1998. 'On Competition', Harvard Business School Press, Boston.
Schuldt, N. & Bathelt, H., 2011. 'International trade fairs and global buzz. Part II: practices of global buzz'. European Planning Studies, 19, 1-22.

[picture 1]

Ren Lu is a PhD Candidate in the Department of Strategy and Logistics at BI Norwegian Business School (Norway). His specialization is strategic management and economic geography.

Jiang Cao is a junior researcher, as well as an investment counselor, at Humen Port Group Co. Ltd. (China). He obtained his master of laws degree in international commercial law from the University of Leicester (UK).