The Relations between Concentration and Agglomeration in Manufactures Development of China

Kai Li, Tao Xiang

Professor, Assistant Professor

School of Business Administration, Northeastern University
China, 110004

txiang@mail.neu.edu.cn
024-83671629

The Relations between Concentration and Agglomeration in Manufactures Development of China

Abstract

Industrial concentration and industrial agglomeration are both hot phenomena in industrial development. The former focuses on the scale of individual enterprises. And the latter cares about the scale of specific industry in a named place. Researches on the two respective topics are numerous.

However, researches on the relations between them are seldom seen from the beginning researches of most famous economist, like Marshall, till now. It's very important to discuss the relations because they will influence the two related fields and the efficiency of relevant industrial policies on the two aspects if there are really critical relations.

Therefore, whether there is any relation between them, what are the relations' characters, and how the relation behaves in the developing process need discussion. During the fast growing and transiting process of Chinese economy, the relations will surely have more specialties. The researches on above questions will help decide on proper policies and improve the developing health of Chinese industries.

This paper discusses the relation by reviewing theories of concentration and agglomeration first. From the literature review, we can find that the relation's essence is the contrast of scale economy and agglomeration economy.

Manufactures are the most representative industries. Using secondary data research with panel data from yearbooks on Chinese manufactures and case researches of the still industry, the paper calculates agglomeration and concentration degrees of manufactures, proves some results and leaves some proposals for further study.

Key words: Industrial concentration, Industrial agglomeration, Industrial development

1. Introduction

From the middle and late 1980s on, economists began standard and systematic researches on industrial organizations. During the researches, many scholars paid attention to the low concentration degrees.

At the same time, theoretic and empirical researches on industrial agglomeration are increasing. Luo and Cao (2005) calculated agglomeration degrees of 20 manufactures on 1993, 1997, 2002 and 2003 and pointed out that the agglomeration degrees kept decreasing from 1993 to 1997 and increasing from 1997 to 2002 and to 2003.

Even though concentration and agglomeration may have close relations, economists paid little attention to such issues. A possible reason lies in the fact that the two phenomena come from two different fields. However, Marshall (1920) touched on their possible relations, which give us energy to do further researches on them.

And it's meaningful to research on the relation. First, such researches will provide the knowledge of the micro subjects and market space mechanism and help make harmonious industrial decisions. Second, this research will help coordinate regional economic development.

This article's structure is as follows: The second section provides some literature background; The third section describes research methods and data collection; The forth section calculates panel data and empirically proves the possible results; And the last section provide the discussion.

2. Literature background

Division, specialization and scale economy

As Smith (1776) stated at the beginning of The Wealth of Nations, "The improvement of labor efficiency and skills in manufactures seems to be the result of division," division is critical to industrial and economic development.

As for as the benefit of division and scale economy, Marshall (1920) used internal economy and external economy to describe.

"We can divide the economy lying in enlarging manufactures scale of any kind of products into two kinds: The first type comes from the general development level of the whole industry; The second one depends on individual enterprises' resources, organization and management efficiency. We call the former as external economy and the latter internal economy."

Then, Hoover (1990) divided scale economies coming from different sources into three kinds: First, internal scale economy resulted from enlargement of individual corporations; Second, location economy of all corporations in a single industry at a single area resulted from enlargement of gross output of that industry at that area; Third, city economy of all corporations in all industries at a single area resulted from enlargement of economical scale of the relevant industries at that area.

Industrial concentration and agglomeration

Industrial concentration is continuously the hot point of researches on industrial organization. As the father of industrial organization theories, Marshall (1920) found the phenomenon of industrial concentration.

At the same time, agglomeration also comes from the three reasons of agglomeration provided by Marshall (1920). First, agglomeration can improve the specialization and service; Second, it build a shared market for skilled workers; Third, it benefits corporations from technology spillovers.

The possible relations of concentration and agglomeration

Because concentration and agglomeration are both products of competition during industrial development, they have some certain relations. First, concentration and agglomeration both come from pursuit for scale economy. Second, the border of concentration and agglomeration both depend on balance of marginal scale economy and exchange cost.

At the beginning of industrial development, scattered industries tend to agglomerate gradually even though the specific locations are random (Krugman, 1991). At the same time, when industries arrive at a high concentration and agglomeration degrees, they are possible to scatter if they can't adapt themselves to increasing uncertainty (Scott, 1988).

3. Research method and data

From Marshall (1920) on, manufactures became the main subject of researcher on scale economy. Because China is industrializing, manufactures are important researches subjects. (Luo and Cao, 2005; Chen, 2004)

Because of the limited database, this article mainly uses panel data of multiple industries on concentration and agglomeration to do empirical researches. It selects manufactures with two numbers in The National Economical Industries Types (GB/T4754-2002).

Some data are collected by us, especially for the steel industry, which come from The Yearbooks of Steel Industry (In Chinese). Other data are second data coming from some relevant researches, including concentration data in Wei (2003) and agglomeration data in Liang (2003). Even though the two sets of data are used for different purposes in their specific papers, they are not used for researches on the relations of concentration and agglomeration. Therefore, using their data is a suitable way to arrive at our goal.

Concentration degrees are mainly represented by CR_4, which is the sum of market shares of the largest four firms, and CR_8. Agglomeration degrees are represented by two indexes. One is A_4, which is the sum of market shares of the largest 4 provinces, and A_8. Another is regional Gini-coefficients, which can be calculated by using the method of Krugman (2003).

After panel data analyses, we divide industries into several parts according to their concentration and agglomeration characteristics. Then we select the steel industry as a case to find some scale economy characters of some representative industries.

4. Results

Panel data analyses and industries types

The regional Gini-coefficient and CR_4 are showed in table 1.

Insert table 1

To clarify the relations of concentration and agglomeration, we use figure of scattering points, which is showed in figure 1.

Insert figure 1.

According to current relations of concentration and agglomeration, we can divide manufactures into four types, characters and representative industries of which are showed in table 2.

Insert table 2.

Case study: Steel industry

The steel industry is becoming the main supporting industry of Chinese industries development. Its development attracts attentions from governments and firms. The central government even published The Steel Industry Development Policy of China to guide it.

Insert figure 2.

We can find that the agglomeration is relatively stable while the concentration changed continuously.

5. Discussion

Some scholars found that different industries leaded to difference of concentration and agglomeration. Generally, three factors have impact on concentration: Scale economy, market barrier and differentiation of products. Three factors have impact on agglomeration: Scale economy, transportation cost and resource endowment.

Relations of concentration and agglomeration have different appearance in

different development stages and in different industries. At the beginning of a single industry, there is often the enlargement of a single firm. Then the firm will attract more producing factors and form agglomeration. (Weber, 1967) When the industry becomes mature, some unreasonable agglomeration factors will lead to lack of flexibility of large firms. Then the core firms will cut relevant industries and form agglomeration in a single location. (Scott, 1984) Of course, agglomeration forms competition within near distances. Then some firms with competency are easy to succeed to become larger and larger and improve the concentration degree at the end. Cai (2005) found that agglomeration trend is clearer than the concentration one in Chinese manufactures.

When making decision on industrial policies, we should pay attention to the harmony of different policy tools. If concentration and agglomeration can strengthen each other, we are easy to coordinate them. However, when they have paradoxes, we should be careful to choose between them. If the scale economy in agglomeration is stronger than that in concentration, we should tend to strengthen agglomeration. And vice versa. During China change its plan system to market system, the market's power should be respected by limiting the regulation power.

Before concluding the results, we have some points to say. First, if we can collect more data in more industries, the result will be more reasonable. Second, the limitation of data makes our results descriptive instead of positive.

However, this research discusses the relations of concentration and agglomeration. In case of the limited researches of economists, our researches are very preliminary. With the researcher continuing, the results will become more realistic and properly guide the policies decision on industrial development.

References

Cai, Yongying. (2005), The relations of market concentration and space concentration, *Journal of Chinese Communist Zhejiang Province School*, No.5:72-75. (In Chinese)

Coase, R. (1937), "The nature of the firm." *Economica*, 4: 386-405.

Hoover. (1975), Introduction to regional economics, *Business Publishing House*. (In

Chinese)

Krugman, P. (1991, 2000 In Chinese), Geography and trade, *Beijing University Press* and *China People University Press*.

Liang, Qi. (2003), The Gini-coefficient of Chinese industries: Touching on impact of FDI on agglomeration of manufactures, *Statistical Research*, No.9:21-25. (In Chinese)

Luo, Yong and Cao, Lili. (2005), Empirical research on the changing trend of agglomeration of Chinese manufactures, *Statistical Research*, No.8:22-29. (In Chinese)

Marshall, A. (1920, 2005 in Chinese), Principles of economics, *Huaxia Press*.

Scott, A. J. (1988), "Flexible production systems and regional development: The rise of new industrial spaces in North America and west Europe." *International Journal of Urban and Regional Research*, 12: 171-186.

Smith, A. (1776, 2003 in Chinese), The wealth of nations, *Mid-Southern University Press*.

Weber (1965, 1997 in Chinese), Industrial regions, *Business Press*.

Wei, Houkai. (2003), Market competition, economical performance and industrial concentration: Empirical researches on concentration and market structures on Chinese manufactures, *Economy and Management Press*. (In Chinese)

Table 1. Concentration and Agglomeration in Manufactures in 1995 in China

Industies	Type Number	Regional Gini-coefficient	CR$_4$
Agricultural and non-staple food manufacture	13	0.12	2.8
Food manufacture	14	0.04	5.4
Beverage	15	0.09	5.3
Tobacco	16	0.43	29
Textile	17	0.18	1.5
Paper	22	0.06	2.3
Petroleum	25	0.15	25.7

Chemical materials	26	0.01	7.2
Pharmaceuticals	27	0.05	6.9
Chemical fiber	28	0.23	29.3
Non-metal minerals	31	0.05	0.9
Ferrous metal	32	0.13	19.7
Non-ferrous metal	33	0.20	7.6
Metal products	34	0.12	1.9
General equipment	35	0.07	2.9
Specific equipment	36	0.05	3.7
Transportation equipment	37	0.07	14.1
Electronic machines	39	0.19	5
Communication equipment	40	0.15	9.2
Instruments, and cultural, office machines	41	0.20	5.9

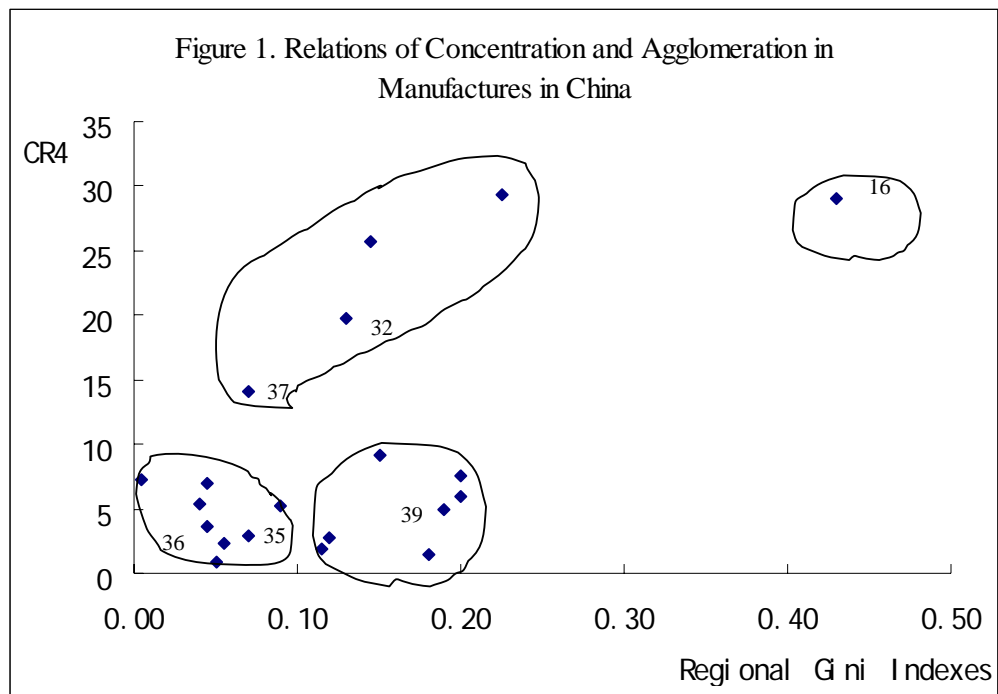Figure 1. Relations of Concentration and Agglomeration in Manufactures in China

Table 2. Types of Manufactures according to Relations of Concentration and

Agglomeration

Types	Characters	Number	Representative industries
I	High concentration ; High agglomeration	1	Tobacco
II	High; Low	4	Ferrous metal, Transportation equipment
III	Low; High	7	Electronic machines
IV	Low; Low	8	General equipment, Specific equipment

Figure 2. Relation of Concentration and Agglomeration in the Steel Industry
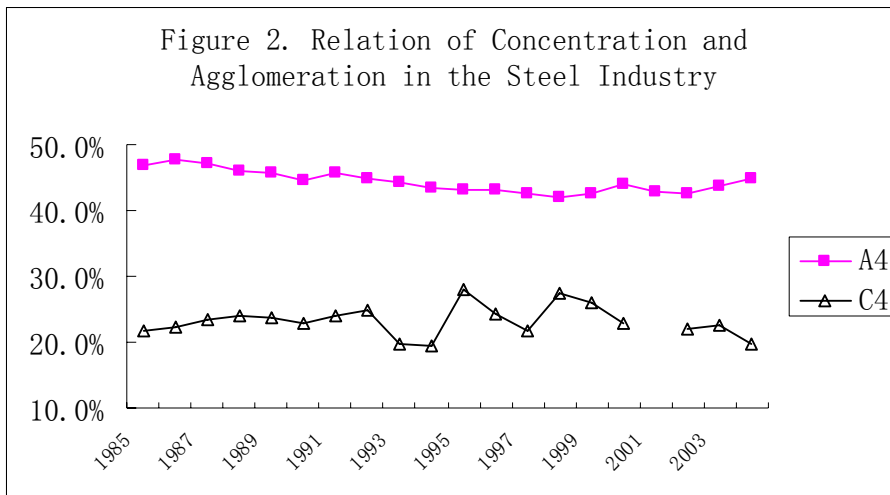
Because of lack of data in 2001, the concentration degree can't be calculated.