Patterns of China's industrialization: Concentration, specialization, and clustering ☆

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A R T I C L E   I N F O

A B S T R A C T

This paper presents a few stylized facts on the patterns of China's industrialization by computing a set of multi-dimensional measures on industrial concentration, regional specialization, and clustering based on census data at the firm level in 1995 and 2004. Our results show that China's rapid industrialization is characterized by the following patterns: industries have become more spatially concentrated; regions have become increasingly specialized; and firms have become more interconnected, both within industries and within regions. In addition, the number of firms is growing faster in clustered areas than non-clustered ones. Together these patterns suggest that China's industrialization process is largely cluster-based—a phenomenon in which a large number of highly interconnected firms are located within a well-defined geographic region.

1. Introduction

In the past three decades, China has experienced the same degree of industrialization that took two centuries to occur in Europe (Summers, 2007). The rapid industrialization has been accompanied by the emergence of numerous "specialty cities". Thousands of firms, large and small, each specialized in a finely defined production step, are lumped together in a densely populated region, where some particular manufactured consumer good is churned out in millions (if not billions) annually. Many formerly rural towns in the coastal areas have become so specialized that they proclaim themselves to be the world's Socks City, Sweater City, Kid's Clothing City, Footwear Capital, and so on. Despite numerous popular media reports on this phenomena, few studies have rigorously documented these patterns using data covering a large sample over a long period.[1]

Each of the specialty cities described above fits Porter's concept of an industrial cluster, which is "a geographically proximate group of inter-connected companies (and associated institutions) in a particular field" (Porter, 2000, 6). Is increasing clustering a general pattern of China's industrialization and economic growth over the past three decades? In this paper, we plan to explore

1 For example, see http://www.nytimes.com/2004/12/24/business/worldbusiness/24china.html for a *New York Times* report.

this issue by conducting the following tasks. First, we will propose new measures for industrial clustering that capture the degree of interconnectedness among firms within the cluster. Next, we will document the patterns of clustering in China by constructing three sets of multi-dimensional measures: (1) the conventional concentration measure for geographic concentration of industries, (2) an extension of the concentration measure to gage the degree of regional specialization, and (3) the clustering measure proposed above. Finally, we will evaluate the drivers behind clustering in China.

Geographic concentration of industries (or industrial concentration) and regional specialization are sometimes used interchangeably in the literature (for example, Bai, Duan, Tao, & Tong, 2004). In our view, however, regional specialization is better reserved for describing how much a region chooses to focus on production in a limited number of industries. This is quite distinct from an industry's total production being concentrated in a small number of regions, which is the defining feature of industrial concentration.

In contrast to the two concepts discussed above, agglomeration is often used in the literature of spatial economics. It not only emphasizes how specialized a region is, but it also relates to how close (and consequently interconnected) the firms are within a region. However, because the degree of agglomeration is usually measured by the regional concentration of industries, these two concepts are often used interchangeably in the literature. To highlight the importance of interconnectedness among firms and industries, we will reserve the usage of clustering throughout this paper for the case where firms (and other related institutions) within a well-defined geographic region maintain a high level of interaction among themselves. In contrast, we will use *agglomeration* in a more general sense (i.e., any place witnessing high industrial concentration, also referred as *spatial agglomeration*), and will treat *clustering* as a special case of agglomeration where the interaction among firms is an integral feature. For a graphic illustration for how these concepts relate to one another, see Diagram 1.

The definition of clustering thus suggests that the phenomenon is usually accompanied by regional specialization, a relationship that follows naturally from the high interconnectedness among firms in the same region of clustering. In addition, increased geographic concentration of industries may also occur in successful clusters thanks to the increased productivity of firms in the cluster and their enhanced competitiveness on the national market. Consequently, multi-dimensional variables are needed to fully describe the phenomenon of clustering–including the conventional ones measuring regional specialization and industrial concentration–as well as those documenting interactions among firms and industries. The aforementioned is the approach taken in the current study.

The structure of this paper is as follows. Section 2 reviews the literature on the measurement of these related phenomena and that on China's industrialization. Section 3 describes the data and the specific procedures for constructing the various measures, while Section 4 presents the patterns of China's industrialization based on these measures. Section 5 provides a preliminary analysis of why China has seen increased clustering during 1995–2004, and a short conclusion is offered in Section 6.
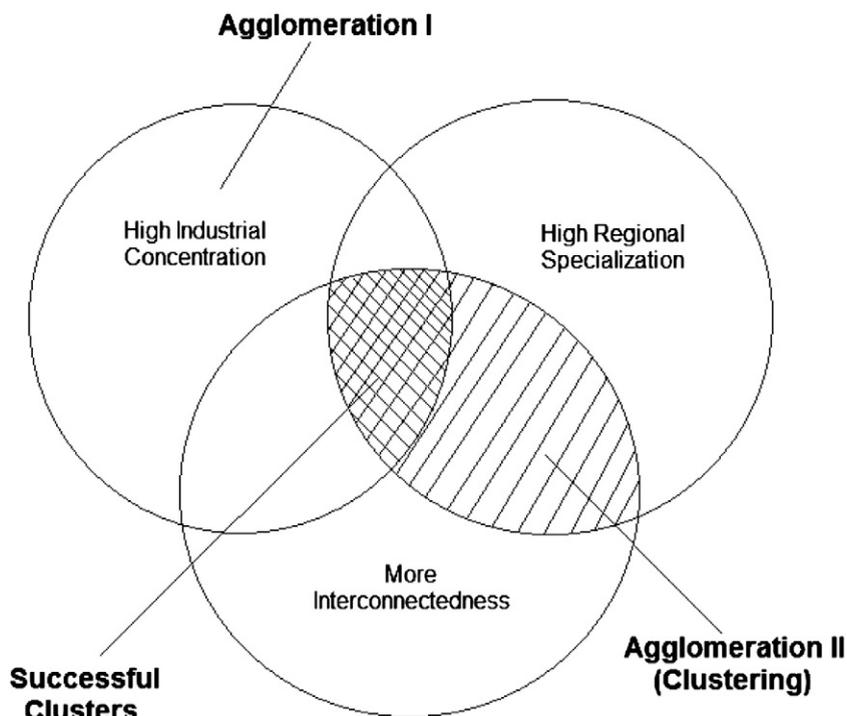

Diagram 1. Regional Specialization within Industry (1995 v. 2004): CR3. Note: The left figure presents the distributions of the Krugman Gini coefficient in 1995 versus 2004 computed at the county level, while the right figure presents the corresponding distributions for the proximity measures. All the data is computed by authors based on China National Bureau of Statistics, 1995 and China National Bureau of Statistics, 2004.