



## Mismatch distribution of population and industry in China: Pattern, problems and driving factors



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### ABSTRACT

The spatial agglomeration of population and industry is a worldwide economic phenomenon. Whether a country's population and industries be synergistically and matched agglomerated in space would significantly affect its socio-economic efficiency, coordinated regional development and even comprehensive competitiveness. Based on geographic information technology and multi-source data, this paper attempts to analyze the situation on the spatial distributed process of China's population and industry since the reform and opening-up and its resulting problems, investigate the driving factors, and finally examine the policy implications. The results indicate that population and industry agglomerated in the eastern region was an inevitably historical phenomenon during the urbanization process since economic reform in 1980s. The scale and speed of the spatial agglomeration of population and industry, however failed to be coordinated, resulting in a series of prominent problems including i) migration of hundreds of millions of “amphibious migratory” type *peasant workers*, ii) cross-regional conveying of energy and bulk commodities, iii) tremendous pressure on resources and environment in the metropolitan areas, and iv) increasingly intensified unstable factors and social contradictions. The reason for the phenomenon and problems might be attributed to i) regional differences in natural conditions and resources endowment of the country, ii) eastern-oriented national development strategy, iii) spatial agglomeration effect and scale effect of resources and elements, iv) obvious development and income gaps between the eastern and the inner regions, v) strict urban-rural dual household registration system, and vi) increasingly high cost of housing and livelihood of the urbanization area. The essence to establish an efficient, balanced and safe spatial pattern of urbanization is to realize an intra- and inter-regional harmonious development across the country. The study emphasizes that the Chinese government should devote itself to implementing suitable development policies to not only enhance people's prosperity, but also highlight the region's prosperity. Several alternative solutions and measures are also discussed, which may be helpful for the country to optimize the spatial layout of urbanization.

### 1. Introduction

The spatial agglomeration of population and industry is a worldwide economic phenomenon, which has arisen an extensive attention among academic community both in China and abroad. As early as the late 19th century, western scholars began to pay attention to the topic about spatial agglomeration of economic activities. Marshall (1890), an economist who first focused on the phenomenon of industrial agglomeration, argued that the fundamental reason of industrial agglomeration is that the industries pursue to share external economies of scale including shared infrastructure and labor market. Weber (1909) believed

that industrial agglomeration is beneficial to reducing the costs of enterprises and enhancing competitive advantages. Hoover (1948) argued that industrial agglomeration is the result of enterprises' pursuit of economies of scale. American scholar Porter (1998) from Harvard University agreed that the spatial agglomeration involving industry-linked enterprises and related supporting agencies would contribute to the formation of strong and sustained competitive advantages.

The new economic geography theory regards that the spatial agglomeration of economic activities is beneficial in innovating techniques, reducing production costs, improving marginal income, increasing embeddedness and inter-relatedness and forming positive

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external economic effect (Fujita, Krugman, & Venables, 2001; Krugman, 1991). According to the new growth theory, industrial agglomeration would form an important “path dependence”, that is, once a region gets its advantages, it would produce circular accumulative effect through forward and backward linkages and finally form a regional industrial specialization pattern. There however exist a “lock-in” effect during the process of evolutionary economic activities that production factors do not agglomerate automatically to the optimum location; instead, there will form several specific location-fixed regions with high density agglomeration of various production factors (Krugman, 1993; Porter, 1998). It should be noted that some location-fixed regions would become locked into development path that create negative externalities and hinder innovation, causing a reduction in relative economic performance, whilst other regions seem able to avoid this danger and in effect are able reinvent themselves through successive new paths or phases of development (Martin & Sunley, 2006).

In the late 1990s, Chinese academic community began to attach attention to the researches on dynamic mechanism and optimization strategy of industrial agglomeration. The researchers argued that the core factors driving spatial agglomeration of various production factors mainly include geographical concentration (agglomeration economies), flexible specialization (social network), innovative environment, cooperation and competition as well as “path dependence” (He, Wei, & Xie, 2008; Wang, 2001; Wei, 2003). However, the major sources in relation to the competitive advantages of industrial agglomeration are economic competitive advantages and regional innovative capacity, which are gained from the cooperation, competition as well as group synergy effect among enterprises in their gathering place (Lu & Tao, 2009; Wei & Shi, 2002).

The research results of abroad and at home indicate that industrial agglomeration is mainly derived from the interaction among regional factors—including locations, innovative technology, increasing marginal income and decreasing transportation costs. This kind of spatial agglomeration is beneficial to promote competition, stimulate innovation and enhance efficiency and in this way to form agglomeration competitiveness of the whole region. At the same time, it is also necessary to see that there is a “path dependence” and “lock-in” effect existing in the spatial agglomeration process of economic activities. On the one hand, it would help competitive regions generate increasing returns and stimulate rising economic performance; on the other hand, it may cause other regions declining in relative economic performance, and thus enlarge the development inequality among regions (Yin, Liu, & Liu, 2012).

China has carried out an “uneven development strategy” since the country entered the period of economic reform in the 1980s. The eastern China, based on its superior location and policy advantages, has attracted a large quantity of foreign capital and techniques, and obtained obvious development advantages (Deng, Huang, Rozelle, & Uchida, 2010). Under the interaction of production factors including talents, capital and techniques, industries began to agglomerate in the east coastal region quickly (He et al., 2008). Meanwhile, the fast-developing eastern area was superior significantly to the central and western regions in the aspects of social development level, development opportunities, resident income, public services and convenient infrastructures, which has attracted therefore a lot of surplus labor force in the inland shifting to the east quickly (Chen, Gong, Li, Lu, & Zhang, 2016). Undoubtedly, it is historically inevitable that population and industries agglomerated in the eastern region during the urbanization process, and it also corresponds to market principles.

It should be emphasized that, in the Maoist periods (1949–1978), China has implemented “heavy industry priority development strategy” in response to achieving the goal of catch-up developed countries (Lu, Guan, He, & Zhang, 2014). This strategy has generated two obstacles to the migration of population and labor force—economic growth based on heavy industry has created less employment opportunities and the planned allocation of labor force has caused a solid

barrier for the transfer of population between different industries and regions (Cai, 1995). As a result, the composition of national economy has made obvious changes while employment structure significantly lagged behind. For instance, the proportion of agriculture in national income dropped from 57.7% in 1952 to 32.8% in 1978 while the proportion of agricultural labor has only dropped from 83.5% to 70.5%. Correspondingly, the urbanization rate in 1978 was 17.9%, only 5.4 percentage points higher than that in 1952. Against this backdrop, the country has undoubtedly accumulated a great deal of potential for the transfer of labor and the migration of population in future (Seeborg, Jin, & Zhu, 2000). In hence, market-oriented economic reforms and the launched eastern-oriented development strategy since 1980s (especially after Deng’s southern China tour in 1992) have triggered both industry aggregation and population migration in the eastern coastal region.

At the same time, here are the questions should be answered: Does the population and industry agglomerate to the east coastal region at a consistent level? If not, how can we objectively evaluate the degree of mismatch distribution of population and industry in China? How should we respond to the prominent contradictions that will stem from the discordant agglomeration process of population and industry across the country? These issues address critically important challenges to realize the new-type urbanization plan. In response, the objective of this study is therefore to contribute to evaluating the degree of mismatch distribution of population and industry during the past 37 years in China, comprehensively investigating the resulting prominent problems and its driving factors, and finally briefly discussing the policy implications so as to establish an efficient, balanced and safe spatial pattern of urbanization.

## 2. The pattern on mismatch distribution of population and industry during the urbanization process in China

### 2.1. Evaluation method and data sources

#### 2.1.1. Evaluation method

In order to understand the spatio-temporal features of, and trends in, mismatch distribution of population and industry across the different decades, index of provincial mismatch distribution of population and industry (PMDPI), index of region’s mismatch distribution of population and industry (RMDPI), and the exploratory spatial data analysis (ESDA) technique were used in our study.

#### (1) PMDPI index

$PMDPI_i$  indicates the ratio of the share of province  $i$ ’s GRP to the share of province  $i$ ’s population. The formula is defined as follows:

$$PMDPI_i = \frac{GRP_i / \sum_i GRP_i}{POP_i / \sum_i POP_i} \quad (1)$$

where,  $GRP_i$  represents the gross regional product of province  $i$ ,  $POP_i$  represents the total population of province  $i$ . If  $PMDPI_i$  is equal to 1, indicating that the share of industry and population in province  $i$  is matched; if  $PMDPI_i$  is less than 1, representing that the share of province  $i$ ’ industry is lower than that of population; if  $PMDPI_i$  is greater than 1, indicating that the share of province  $i$ ’ industry is higher than that of population.

#### (2) RMDPI index

The  $RMDPI_j$  is defined as follows (Cai & Zhang, 2012):

$$RMDPI_j = \sum_i \left| \frac{GRP_i}{\sum_i GRP_i} - \frac{POP_i}{\sum_i POP_i} \right| \quad (2)$$

where,  $RMDPI_j$  ( $0 \leq RMDPI_j \leq 2$ ) is the degree of mismatch distribution of population and industry concerning the assessed region  $j$ . When  $RMDPI_j$  is equal to 0, indicating that all of the provinces located in region  $j$  have an equal share of industry and population—that is the distribution of industry and population is perfectly

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