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**Urbanization and Spatial Structure
Evolution of Urban System in China**

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1. Introduction

China has taken a long detour on the road to urbanization (Ye yumin, 2007). The urbanization pattern varies in different regions and during different periods (Wang Chenxin, 2005). Prior to the 1978 reform and opening up, the Communist Party's anti-urban ideology led to its path of "industrialization without urbanization". The Household Registration System (Hukou), adopted in 1958, further restricted rural-urban mobility. During the period 1950-1980, China's urbanization level increased from 11.2 percent to a scanty 19.4 percent, compared to world level from 28.4 percent to 41.3 percent and developing countries from 16.2 percent to 30.5 percent. In the following 20 years, advocates for small cities and small towns had dominated China's urban policies. Because township and village enterprises (TVEs) had absorbed the majority of rural non-agricultural labor with a model of "leaving the soil but not the village, entering the factories but not the cities", high-speed industrialization did not cause rapid urbanization. From 1979 to 1995, China's urbanization level increased only 11 percent, from 18 percent to 29 percent. At the end of 20th century, however, both above conservative urbanization patterns of anti-urbanization and the aggressive development of small towns began to lose ground and entering the new millennium, China lunched a new urban development strategy of "harmonized development of large, medium, small cities and small towns". Unprecedented urbanization has been taking place in China (and will continue over the next decade). From 1996 to 2006, more than 20 million rural people flooded into cities annually, with an average yearly urbanization growth rate of 1.3 percent. However, such large-scale urbanization didn't result in quick growth in city numbers; conversely, the number of cities is on the decline in the last decade. So we can sensibly consider that the structure of urban system in China has been distorted compared to other countries (Au and Henderson, 2005).

Because of its enormous population size, with one every four rural-urban migrants in the world today taking place in China, China's accelerated urbanization over the last two decades and in the future will not only have significant implications for the largest developing nation itself but also be the one key to influence the human development in the globalizing world. What policies should be adopted to facilitate and regulate these comprehensive changes induced by massive rural-urban migration? What kind of urbanization pattern and spatial layout of urban system should be developed to accommodate the huge number of new urban immigrants? Have Chinese cities remained disperse and undersized or become increasingly concentrated in small number of regions in the form of clusters. These are some of the most important questions to be answered by Chinese policy-maker and others concerned about Chinese development.

This paper, through investigating the process of China's urbanization and structural and spatial changes of china's urban system since 1949, attempts to identify that the changing institutional arrangement for urban development has significant impacts on the growth of

number and size, and size distribution of cities in China. More importantly, it attempts to reveal some serious challenges to China's urban development, and look on the prospects for future urbanization and spatial distribution. The paper is organized as follow: The following section 2 introduces changing definition of cities, towns and urban population in China. Section 3 shows the process of china's urbanization since 1949. Section 4 examines the spatial structure of China's urban system. Section 5 presents serious new challenges to urban development of China. In section 6, Chinese future urbanization growth rate and spatial layout of urban system are suggested. Section 7 concludes the paper.

2. Definitions of cities, towns and urban population in China

Due to the frequent changes of criteria for city and town designation and official urban population definition, many international scholars therefore regarded the size of China's urban population to be an "enigma" (Shenhe Liu, et al, 2003; Shen, 1995; Aird, 1983). Before starting, in order to make clear China's urbanization and urban system, it is essential to understand the changing definitions on city, town, official urban population and the resulted various data series.

2.1 Changing definitions of cities and towns

The designation of cities and towns is governed by the State Council or the Ministry of Civil Affairs. Officially approved cities and towns, also known as "designated cities" (jian zhi shi) and "designated towns" (jian zhi zhen) respectively, are the two major components of the Chinese urban system. The criteria of designation change in different time-series, reflecting the prevailing urbanization policy, economic development, and political ideologies. They have considerable impact on the number and population of cities and towns in China's urban system (Fuchen Lo and Yueman Yeung, 1995).

2.1.1 Changing definitions of cities

The status of a city is vitally important for its residents because once the urban place is recognized as designated cities, its residents are allowed to become holders of urban registration to whom the government is obligated to provide better public facilities and more fiscal autonomy (Kojima, 1995).

Since 1949, the Chinese government has defined and redefined the definition of cities four times. The first was in June 1955 when State Council issued the "Decision by the State Council regarding the establishment of Cities and towns" According to the decision, cities that fulfilled the following criteria could acquire urban status: (1) those areas with a population of 100,000 or more permanent residents, (2) those areas with a population of 20,000 or more where local administrative offices of the county level or higher were situated.

These criteria were used until 1963, when “The Criteria of Establishment of Cities and Towns in Order to Reduce Suburban Districts of Cities” was issued. The government decided that there were too many cities in China. Some urban places had included considerable rural areas within their boundaries in order to boost their population to the levels necessary to obtain city status. Although the criteria for the designated cities remain unchanged, the qualifications of all designated cities were required to be strictly checked one by one and smaller-sized cities, with a population of less than 100,000, were redefined as designated towns. The main reason for the above adjustment was stated that the over-fast growth of designated cities and towns and urban population in previous years had resulted in over-heavy burden on agricultural production.

The third change in definition took place in 1986 when “On Adjustment of Standards for City Designation and Conditions for City to Administer Counties” was lunched. Since China entered the decade of reforms in the 1980s and urban growth was encouraged, a set of more relaxed city and town designation criteria was employed by the Ministry of Civil Affairs. According to the new definition: (1) a regional economic center town with 60,000 non-agricultural population and the GNP of more than 200 million *yuan*; (2) an important town does not meet the conditions stated in (1) but is located with in a border, minority, or

Table 1. The current criteria for establishing county-level city

| Population density | | < 100 | 100-400 | > 400 |
|---|---|-------|---------|-------|
| Seat town of county government agencies | Non-agricultural population (10 thousand) | 8 | 10 | 12 |
| | Population with non-agricultural Hukou (10 thousand) | 6 | 7 | 8 |
| | Covering rate of tap water (%) | 55 | 60 | 65 |
| | Covering rate of tar road (%) | 50 | 55 | 60 |
| The whole county jurisdiction | Non-agricultural population(10 thousand) | 8 | 12 | 15 |
| | Population engaged in non-agricultural activities (%) | 20 | 25 | 30 |
| | GDP of the whole county (billion yuan) | 0.6 | 0.8 | 1 |
| | Share of the tertiary industry (%) | 20 | 20 | 20 |
| | Gross industrial product township-level enterprises or above (billion yuan) | 0.8 | 1.2 | 1.5 |
| | Share of gross industrial product township-level enterprises or above (%) | 60 | 70 | 80 |
| | Total local financial revenues (10 thousand yuan) | 4000 | 5000 | 6000 |
| | Per capital local financial revenues (yuan) | 60 | 80 | 100 |

Source: China State council, 1993, On Adjustment of Standards for City Designation.

scenic area, or it is a center of mining, industry, technology, or transportation; the town can be upgraded into cities (3) a county has less than 500,000 people; and the county seat town has more than 100,000 in non-agricultural population, less than 40% agricultural residents and has a GNP of more than 300 million *yuan*; (4) a county has more than 500,000 people; and the county seat town has more than 120,000 non-agricultural population, and has a GNP of more than 400 million *yuan*; the whole county may be designated as a city with the same administrative jurisdiction as before.

In 1993, the fourth change in city designation was approved by the State Council. Counties are divided into three classes according to their population density before transforming the initial county into designated city (see Table 1 for detail). Among the 12 criteria, the scale and ratio of non-agricultural population are still the most important item.

2.1.2 Changing definitions of towns

There are two main types of towns: designated towns (*jian zhi zhen*) and market towns (*ji zhen* or *xiang zhen*). The population in the designated towns is reported in the statistical yearbooks of China as part of the urban population but that in market towns is not reported (Fuchen Lo and Yueman Yeung, 1995). In 1955, a human settlement could be granted town status by the provincial government if (1) it had a population of 2,000 or more permanent residents, 50 per cent of whom were in non-agricultural occupations, and (2) with 1,000–2,000 permanent residents, 75 percent or more of whom were in nonagricultural occupations.

The above criteria were significantly modified by the State Council in 1963. The minimum size requirement for the establishment of a designated town was raised to a clustered population of 3,000 and 70% or more share of non-agricultural population, or a clustered population between 2,500 to 3,000, and 85% or more were non-agricultural population.

The current criteria for establishing designated towns were issued in 1984 in the “Circular of the State Council approving the report of the Ministry of Civil Affairs regarding the adjustments of the criteria of designated town. It stipulates that: (1) all seats of county-level state government agencies should be granted designated towns status; (2) seats of commune (*xiang*)-level government agencies with more than 2,000 non-agricultural population may abolish the establishment of *xiang* and transform into designated towns; (3) Small towns with less than 2,000 non-agricultural population but located within a border, minority, scenic, or remote mountainous areas with sparse population density, or a center of mining, industry, can be established as designated towns if necessary.

2.2 Definition of urban population

Various Chinese authorities, such as the State Council Population Census Office, Ministry of Public Security, State Statistic Bureau, use a variety of terms to refer to China’s

urban population and provide different types of urban population data without clearly defining the terms used, which has caused much confusion and misunderstanding about China's urbanization and urban system.

2.2.1 Changing definition of urban population

The definition of urban population in China has changed in each of the five national Censuses (Shenhe Liu, et al, 2003). In the first 1953 census, urban population included all population, agricultural and non-agricultural, residing in designated cities and towns. In the second 1964 census the total urban population was limited to the non-agricultural population within the designated urban places.

The third 1982 census stepped back in the first 1953 census definition of urban population, for the government had realized that the 1963 definition was too limiting and might cause under-estimation on China's urbanization level.

The fourth 1990 national census adopted a compromise definition for urban population. Cities were divided into two types according to whether a city was further divided into urban districts or not. The urban population is composed of: (a) all population, including agricultural and non-agricultural, of cities with urban districts, which is in line with the 1982 definition; (b) the non-agricultural population of designated towns and cities without urban districts, which is roughly in line with the 1964 definition. It should be noted that the temporary population with stays longer than one-year was included into the urban population.

The fifth 2000 national census to make some corrections the 1990 census definition was further improved, mainly in the following two aspects: (1) only in those urban districts, cities and towns with a population density higher than 1,500 persons per km², all population is regarded as urban population. While with a population density lower than 1,500 persons per km², only the population that lives in streets, town sites, and adjacent villages is counted as urban population. (2) Immigrants without Hukou but who reside in cities and towns longer than 6 months, rather than one year in the fourth census, are accounted as local urban population.

2.2.2 Four current categories of urban population statistics

At present, four categories of urban population statistics below are most frequently used in China.

(a) Non-agricultural population. This criterion is historically consistent and spatially comparable. Therefore, some government agencies and many scholars prefer to use it to calculate China's urbanization level. However, it cannot represent the rapid growth of urban places and the expanding rural to urban migration.

(b) Total population in the City districts. This criterion is adopted by the China Statistical Yearbook 2002 and China urban Statistical Yearbook 2002, including agricultural

population in the city but excluding temporary population. For higher-level cities with large urban districts, the rationality of this criterion for urban population is improved. On the other hand, for lower-level cities without urban districts (county cities) it will greatly overestimate urban population, because all population in the county will be regarded as urban population.

(c) Total permanent population in city districts. For county cities, this definition may greatly improve the comparability of statistical data. Nevertheless, for higher-level cities with large urban districts it has been very problematic, because nearly all the cities have established urban districts with extensive areas, which are far beyond the real spatial scope of urban clusters. Hence large parts of the rural population who are actually employed in agriculture are accounted for as urban population.

(d) Urban population according to the fifth 2000 national census definition. This definition including agricultural population and temporary population in the urban areas maybe more reflect actual urban population. But one obvious problem of this criterion is that statistical data of urban population don't separate seat town of county government agencies from other designed towns, leading to overestimated urban population in county-level cities to a certain extent.

Table 2 shows that there is a tremendous difference in the structure of Chinese urban system resulted from employing above four categories. Category (a) (Non-agricultural population) is the narrowest definition of urban population. Therefore the amount of small cities (<0.2 million) is as much as 326, and the number of extra-large cities or more (>1million) is 45, only accounting for 6.8%. Category (b) (Total population in the city districts) is the broadest criterion in which the number of extra-large cities or more reaches

Table 2. Comparison of the structure of urban system by four categories

| Category | | National | ≥2 M | 1-2M | 0.5-1M | 0.2-0.5M | <0.2M |
|-----------|------------|----------|------|-------|--------|----------|-------|
| (a), 2002 | number | 660 | 15 | 30 | 64 | 225 | 326 |
| | Percentage | 100 | 2.3 | 4.5 | 9.7 | 34.1 | 49.4 |
| (b), 2002 | number | 660 | 33 | 138 | 279 | 171 | 39 |
| | Percentage | 100 | 5 | 20.9 | 42.3 | 25.9 | 5.9 |
| (c), 2003 | number | 650 | 43 | 69 | 113 | 140 | 285 |
| | Percentage | 100 | 6.6 | 10.62 | 17.38 | 21.54 | 43.8 |
| (d), 2000 | number | 665 | 23 | 36 | 92 | 305 | 209 |
| | Percentage | 100 | 3.5 | 5.4 | 13.8 | 45.9 | 31.4 |

Data source: CSSB, China Urban Statistical Yearbook (2003, 2004);

CSSB, 2003, China Statistical Yearbook 2002;

CSSB, 2001, 2000 Population Census of China

up to 171. Category (c) (Total permanent population in city districts) is the second broadest definition, but comparatively accurate in calculating the size of lower-level cities (<0.2 million). Category (d) (The fifth 2000 national census definition) can measure comparatively accurately the size of cities with urban districts but scale up the size of county cities.

For the purpose of data consistency and accuracy, this study mainly adopts the fifth 2000 national census definition of urban population.

3. The trajectory of China's urbanization and its pattern since 1949

Three different stages of urbanization in China may be divided over the period 1949-2006, based on urbanization levels, rural-urban migration, and urban economic development, as reflected in Figure 1 and Table 3.

1949-1978: the stagnant phase;

1978-1996: the early development phase;

1996-2006: the mid-development phase.

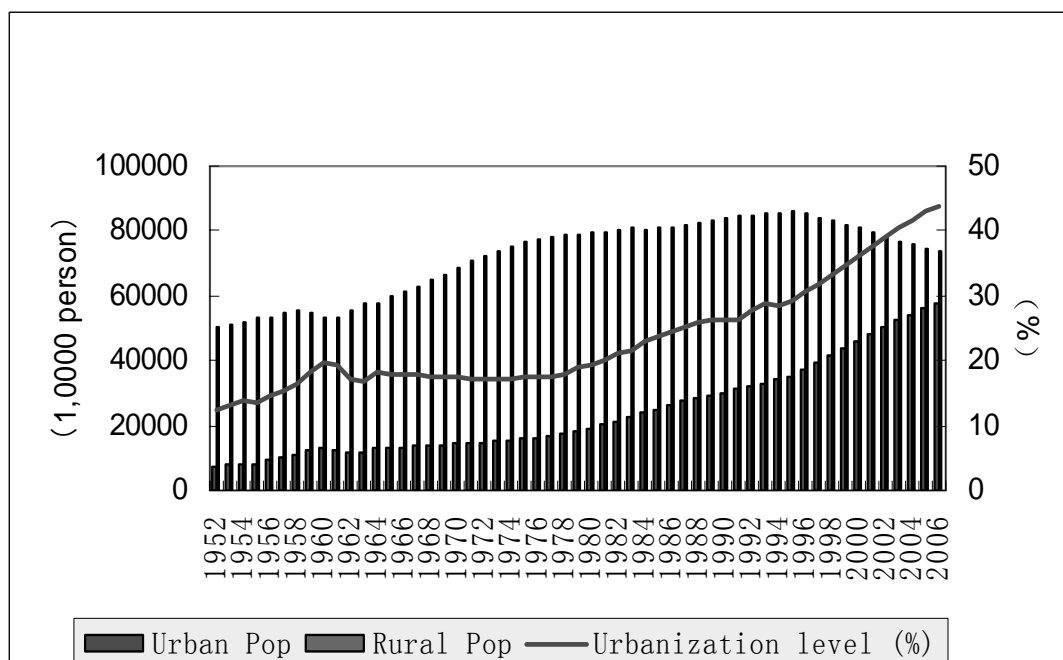


Figure 1. The process of urbanization in China,1952-2006
Data source: SSB, 2007, China Urban Statistical Yearbook 2006.

Table 3. Changes of urban and rural population, 1952-2006

| Year | National population (10,000) | Urbanization level (%) | Annual average changes (10,000) | | |
|-----------|---------------------------------|---------------------------|---------------------------------|-----------|-----------|
| | | | Total | Urban pop | Rural pop |
| 1952 | 57482 | 12.5 | | | |
| 1960 | 66207 | 19.7 | 1090.6 | 738.8 | 351.9 |
| 1970 | 82992 | 17.4 | 1678.5 | 135.1 | 1543.4 |
| 1978 | 96259 | 17.9 | 1658.4 | 352.6 | 1305.8 |
| 1980 | 98705 | 19.4 | 1223 | 947.5 | 275.5 |
| 1985 | 105851 | 23.7 | 1429.2 | 1190.8 | 238.4 |
| 1990 | 114333 | 26.4 | 1696.4 | 1020.2 | 676.2 |
| 1995 | 121121 | 29 | 1357.6 | 995.8 | 361.8 |
| 2000 | 126742 | 36.2 | 1124.2 | 2146.2 | -1022 |
| 2004 | 131448 | 43.9 | 784.2 | 1966.7 | -1182.5 |
| 1952-1978 | | | 1491.4 | 387.8 | 1103.7 |
| 1979-1995 | | | 1462.5 | 1054.6 | 407.8 |
| 1996-2004 | | | 909.9 | 2040.2 | -1134.3 |

Data source: CSSB, 2007, China Urban Statistical Yearbook 2006.

3.1 Stagnant phase, 1949-1978

Prior to 1978, urbanization in China remained at a low level, and annual average urbanization growth rate was only 0.2%. Urbanization in the phase can be further divided into three periods: short-term healthy urbanization growth period (1949-1957), over-urbanization period (1958-1965), and anti-urbanization period (1966-1978).

The first period (1949-1957) experienced the “Rehabilitation” (1949-1952) and the “First Five-year Plan” (1953-1957). Urbanization level was steadily grown from 10.64% in 1949 to 15.39% in 1957, with average growth rate of 0.59% per year.

The second period (1958-1965) witnessed the Great Leap Forward in conjunction with the massive industrialization effort. During the three years of the Great Leap Forward, massive rural-urban migration was encouraged by the government. Then over-rapid urbanization resulted in the sharp decline of the amount of grain available to the urban population. The government started to intensify the Household Registration System (Hukou) and strictly restrict the mobility of the population. The level of urbanization reached its peak of 19.75% in 1960 and then quickly fell to 16.8% in 1963.

The third period (1966-1978) concurred with the Cultural Revolution. The level of urbanization was maintained at around 17% during the 10 years as a result of ‘rustication’ campaign, in which several million city youths were transferred to the rural areas, and other social cleansing policies.

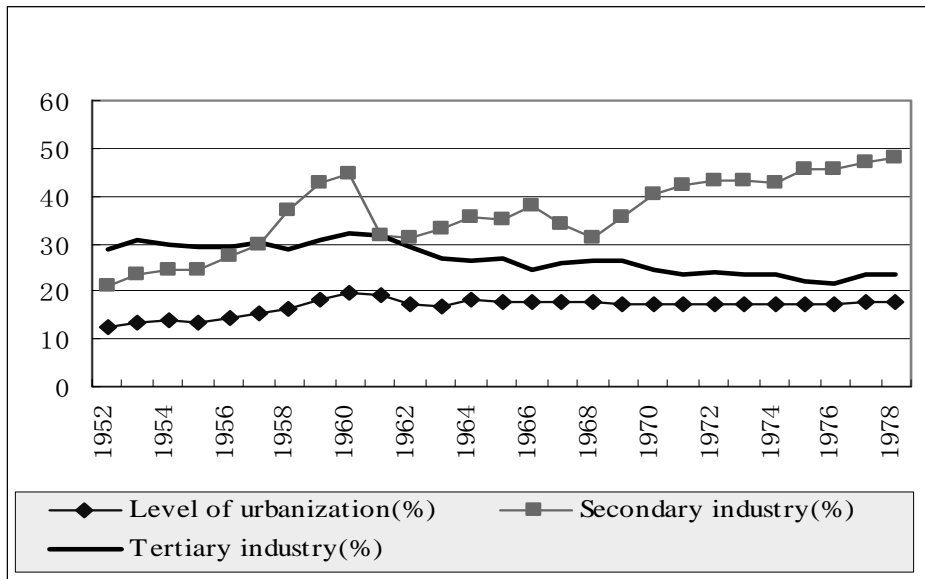


Figure 2. Gaps between industrialization and urbanization in China, 1952-1978
Date source: CSSB, 2003, China Statistical Yearbook 2002

As a whole, the main feature of this phase (1949-1978) is industrialization without urbanization, as presented in Figure 2. Besides disastrous results of “cultural revolution” and the Great Leap Forward as stated above, there are two more important reasons for this feature. First, during the pre-reform period, the central government formed and pursued a development strategy that gave a priority to the development of the heavy industry (Cai fang, 2000 a). The capacity of heavy industry to absorb rural labor is limited compared with labor-intensive light and tertiary industry thus resulting in that urbanization always lags behind industrialization. Second, because the control of labor flows was a key link for implementing the development strategy, a series of formal institutions, especially the Household Registration System, were introduced to restrict rural--urban migration.

3.2 The early development phase, 1978-1995

With the remarkable success in economic reform and open-up, the relaxation of institutional controls of rural-urban migration, and prosperity of township and village enterprises (TVEs) and urban industrial reconstructing, Chinese urbanization entered the stage of rapid growth, urbanization level rose from 17.92% in 1978 to 29% in 1995, with annual growth rate of 0.65%.

3.2.1 The complementary development of the labor-intensive light and tertiary industry gave an impetus to 1978-1995 urbanization

During the years of 1978-1995, in response to the needs of the growing socialist market

economy, the strategy that gave a priority to the development of the heavy industry was abandoned and great attention was paid to the complementary development of the labor-intensive light and tertiary industry to bring into fuller play their important role in absorbing the labor force. Table 4 shows that the light and tertiary industry constrained by traditional institutions was two of the fastest growing industries. Thus, as it were, readjustment of the industrial structure during the period was characterized by the increase of the ratio of the tertiary industry, and the light industry was taking a larger proportion in the secondary industry. As displayed in Figure 3, the period of 1978-1995 witnessed the most rapid development in annual non-agricultural employment increment. The main cause of such a big increment was the fast development of the labor-intensive light and tertiary industry.

Table 4. Changes of industrial structure in China, 1978-1995 (%)

| | primary industry | Secondary industry | Tertiary industry | Light industry | Heavy industry |
|------|------------------|--------------------|-------------------|----------------|----------------|
| 1978 | 28.1 | 48.2 | 23.7 | 43.1 | 56.9 |
| 1980 | 30.1 | 48.5 | 21.4 | 47.1 | 52.9 |
| 1985 | 28.4 | 43.1 | 28.5 | 47.4 | 52.6 |
| 1990 | 27.1 | 41.6 | 31.3 | 49.4 | 50.6 |
| 1995 | 20.5 | 48.8 | 30.7 | 47.3 | 52.7 |

Data source: CSSB, 2005, China Statistical Yearbook 2004.

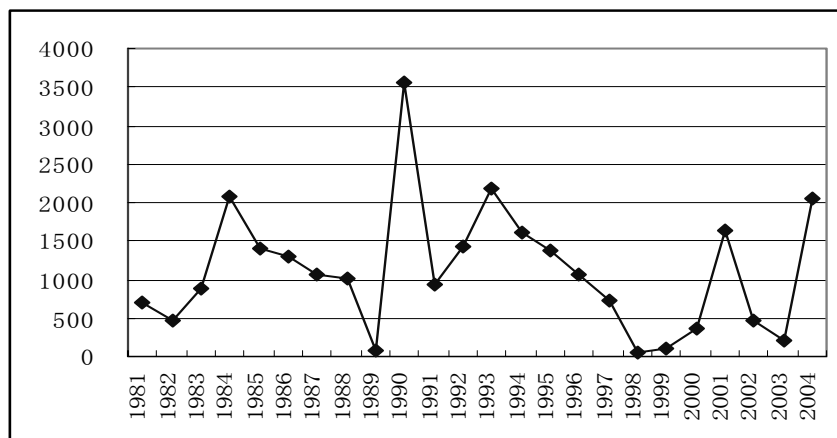


Figure 3. Annual non-agricultural employment increment, 1980-2004

Data source: CSSB, 2005, China Statistical Yearbook 2004.

3.2.2 Prosperity of small-size cities and towns was the 1978-1995 urbanization's most important feature

China's economic reforms started with the introduction of the Household Responsibility System in rural areas in the late 1970s. With the increase in labor productivity of agriculture, a large amount of rural labor became "surplus" relative to land resources. It is essential to transform those surplus rural laborers from the primary to the secondary and tertiary sectors. However in the 1980s, flows of surplus rural laborers were confined within rural areas, and migration to urban areas had not yet been popular. Thus, a model of surplus rural labor transformation that is widely known as "leaving the soil but not the village, entering the factories but not the cities" (Li tu bu li xiang, jin chang bu jin cheng) was invited. Rural laborers were encouraged to establish Township and Village Enterprises (TVEs) and to create non-agricultural employments by using their own resources (land, capital, labor, etc.). Table 5 presents that the TVE employees increased from 28.27 million in 1978 to 128.62 million in 1995, and GDP of TVE from 49.3 to 6891.5 during the same period. Rapid development of TVE, along with a series of policy changes which permitted rural laborers to move to nearby towns with fulfilling certain conditions such as giving up contracted land in home village, finding a stable job and housing steadily, triggered the prosperity of small towns. The number of designed town rose from 7959 in 1985 to 17282 in 1995 (Table 5). The prosperity of small towns played a very important role in urban system in this period. The non-agricultural population in small cities was 11.81 million in 1980, accounting for 13% of the national total of non-agricultural population in cities. This figure increased rapidly to 32.36 million in 1990. it grew by 2.7 times while its share of the national total reached 21.52% (Shenhe Liu, et al, 2003).

Table 5 The development of TVEs and small towns 1978-1995

| | Number of towns and villages | | Number of TVE (10 thousand) | | | TVE employees (10 thousand) | | | GDP of TVE (billion yuan) | | |
|------|------------------------------|-----------------|-----------------------------|------------------|---------------|-----------------------------|------------------|---------------|---------------------------|------------------|---------------|
| | Total | Number of towns | Total | Owned By village | Owned By town | Total | Owned By village | Owned By town | Total | Owned By village | Owned By town |
| 1978 | 52781 | | 152 | 32 | 121 | 2827 | 1258 | 1569 | 49.3 | 28.1 | 21.2 |
| 1980 | 54183 | | 143 | 34 | 108 | 3000 | 1394 | 1606 | 65.7 | 36.9 | 28.8 |
| 1985 | 91138 | 7956 | 1223 | 42 | 143 | 6979 | 2111 | 2216 | 272.8 | 113.9 | 91.1 |
| 1990 | 55838 | 11392 | 1850 | 39 | 107 | 9265 | 2333 | 2259 | 846.2 | 298.7 | 244.2 |
| 1995 | 47136 | 17282 | 2203 | 42 | 120 | 12862 | 3029 | 3031 | 6891.5 | 2140.1 | 20310 |

Data source: CSSB, 1996, China Statistical Yearbook 1995.

3.3 The mid-development phase, 1996-

Since 1996, unprecedented urbanization was taking place and will continue over the next decades (Song, Yan, and Chengri Ding, 2007). The annual growth rate of urbanization was 1.3% over the period of 1996-2004. The mid-development phase started in 1996, instead of 1995 or 1997, mainly because of new definition on urban population adopted by the 5th 2000 national census which sharply raised China's urban population by 69.52 million and its percentage by 5.3% from, 388.92 million and 30.9% in 1999 to 458.44 million and 36.2% in 2000. Nevertheless, according to China statistic yearbook 2000, the new increase in urban population and its percentage was only 9.5 million and 0.49% in 1999. So the State Statistical Bureau decided to share the huge new added urban population in 2000 among the 5 years till to 1996. That is why the turning point in mid-development phase of urbanization came in 1996.

3.3.1 The upgrade of industry: china started modern heavy industrialization

With the progress of China's economic development, the transformation from a sellers' market to a consumers' market, a number of serious and unsustainable problems of the rural urbanization and industrialization model during the period 1978-1995 began to emerge, and the extreme fragmental and decentralized development of TVE in small towns began to lose ground in the nation's new strategies of industrialization. Scaled economy, agglomeration benefits and sustainable development have been put at the top of the agenda (Shenghe Liu, et al, 2003). Then China has been stepping into the new stage of modern

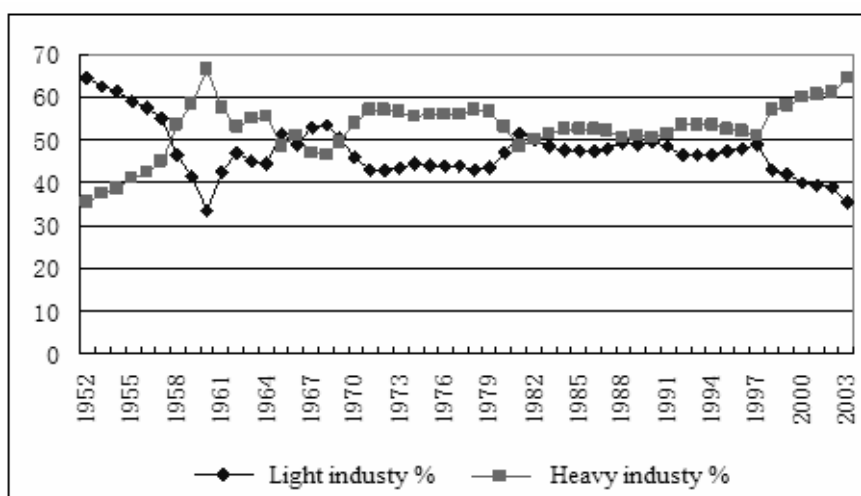


Figure 4 The percentage of heavy industry and light industry (added value), 1955-2003

Data source: CSSB, 2005, China Statistical Yearbook 2004.

heavy industrialization. As showed in Figure 4, the added value of heavy industry was sharing more proportion in the secondary industry since the mid-1990s.

It is worth while to note that this round of heavy industrialization, in sharp contrast with China artificially heavy-industry-oriented development strategy before 1978 which led to the country's economic inefficiency, is the necessary requirement of social and economic development, and characterized by the rapid development of auto-based durable consumer goods, electronic and communication equipment industry, and the development of modern service caused by them, which created more job opportunities and promoted urbanization.

3.3.2 Large cities are playing a more important role in Chinese urbanization

If small towns dominated Chinese urbanization in the period 1978-1995, then one prominent feature of urbanization after 1996 in China is that large cities are becoming the principal form for pushing ahead urbanization. According to 2000 national population census, a total population of about 112.6 million people has flocked into cities and towns, but majority entered into large cities accounting for 71.1%, and only 6.8% of them into small cities and towns (Table 6). As entering the new millennium, the voice of advocating for large cities based on the argument that they promote economies of scale and agglomeration is growing stronger and stronger. The Tenth Five-year Plan promulgated in 2000 pointed out for the first time “coordinated development of large, medium, small cities and small towns”

Table 6. Immigrants distribution ranked by city size

| Groups (10,000) | Immigrants (10,000) | Percentage of immigrants (%) | Percentage of residents (%) | Immigrants per city (10,000) |
|-----------------|----------------------|------------------------------|-----------------------------|-------------------------------|
| Total | 11260.5 | 100 | 100 | 17 |
| >500 | 2518.2 | 22.4 | 16.6 | 359.7 |
| 200~500 | 2000.3 | 17.8 | 14.1 | 125 |
| 100~200 | 1791 | 15.9 | 14.5 | 49.7 |
| 50~100 | 1692.3 | 15 | 18 | 18.4 |
| 20~50 | 2492.3 | 22.1 | 28.1 | 8.3 |
| 10~20 | 688.4 | 6.1 | 8 | 3.9 |
| 5~10 | 69 | 0.61 | 0.62 | 2.5 |
| 3~5 | 8.5 | 0.075 | 0.078 | 1.4 |
| 1~3 | 0.6 | 0 | 0 | 0.6 |

Date source: SSB, 2001, 2000 Population Census of China.

4. Spatial Structure of Chinese Urban System

4.1 Structural and spatial changes of urban system

This part attempts to examine the structural and spatial changes of China's urban system since 1949. There were 660 designated cities and 19,883 designated towns in China in 2004. Because of the lack of detailed statistical data on designated towns, this part concentrates on the analysis of the structural and spatial pattern of urban system with an officially recognized urban status. The assessment of the structural changes of Chinese cities is based on a classification scheme that all Chinese cities are classified into four categories on the base of the non-agricultural population in the city proper (shi qu) and suburban districts (jiao qu) (State Council, 1984). Extra-large cities are those with a non-agricultural population of over 1 million; large cities are those from 0.5 to 1 million; medium-sized cities are those from 0.2 to 0.5 million; and small cities are those with less than 0.2 million. The spatial pattern is analyzed on the basis of a framework dividing the country into three zones, namely the east, central, and western regions.

Tables 7 indicate the growth of cities of different size and different location over the past fifty years. When the People's Republic was founded in 1949, there were only 132

Table 7. Structural and spatial changes of China's urban system, 1949-2002

| | Number of Cities | | | Structure (%) | | | Annual Growth (%) | |
|----------------------------|------------------|------|------|---------------|------|------|-------------------|-----------|
| | 1949 | 1978 | 2002 | 1949 | 1978 | 2002 | 1949-78 | 1978-2002 |
| City Size | | | | | | | | |
| Extra-Large (>1 million) | 5 | 13 | 45 | 3.7 | 6.8 | 6.8 | 3.35 | 5.31 |
| Large (0.5 – 1 million) | 7 | 27 | 64 | 5.3 | 14.1 | 9.7 | 4.76 | 3.66 |
| Medium (0.2 – 0.5 million) | 18 | 60 | 225 | 13.6 | 31.2 | 34.1 | 4.24 | 5.66 |
| Small (<0.2 million) | 102 | 93 | 328 | 77.3 | 47.9 | 49.4 | -3.18 | 5.39 |
| Region | | | | | | | | |
| East | 69 | 69 | 287 | 52.3 | 35.8 | 43.5 | 0 | 6.12 |
| Central | 50 | 84 | 247 | 37.9 | 43.5 | 37.4 | 1.81 | 4.49 |
| West | 13 | 40 | 126 | 9.8 | 20.7 | 19.1 | 3.95 | 4.90 |
| Total | 132 | 193 | 660 | 100 | 100 | 100 | 1.32 | 5.26 |

Date source: CSSB, 1999, New China's Cities Fifty Years;

CSSB, 2003, China Statistical Yearbook 2002.

cities, and the majority of these cities, both in number and population, were located in the eastern coast. Then the following years till 1978, the number of large and extra-large cities increased from 12 to 40, while the same period, the number of small cities dropped from 102 to 93. Large and extra-large cities enjoyed an annual growth rate higher than the average whereas small cities suffered from contraction (Table 7). This pattern of structural change has been the result of political and economic considerations. Politically, most of the large and extra-large cities were China's 30 provincial capitals and special municipalities. They were developed as the most important political centers to maintain territorial integrity and social stability (Lin, 1999). Economically, large and extra-large cities were developed as the most important centers of heavy industrial production and other state sectors because of the advantages in urban infrastructure and agglomeration economies. For the same reasons, the contraction of small cities before 1978 was because state could not afford to upgrade many rural settlements into the city status since upgrading might burden the state in the provision of urban services which in turn went against the development strategy that gave a priority to the development of the heavy industry.

For the same period, great changes have taken place in the spatial distribution of cities. As showed in Table 7, Figure 5 and Figure 6, the central and western regions experienced the growth of cities and urban population. By comparison, the number of designated cities in the eastern coast remained unchanged for the entire period. These spatial changes of urban system can be attributed to the consideration of national defense because during the Mao era China was presented with a hostile international environment. The eastern coast was thought to be vulnerable to potential naval attacks. So, much of the state capital investment in the 1960s was concentrated in the "Third Front" located in the western interior. That is the reason why cities in the western region had witnessed the highest annual growth rate while the eastern coast had scarcely changed in thirty years.

The structure and spatial distribution of urban system marked a fundamental shift as a result of interaction between economic reforms and the open policy since 1978 (Figure 6, Figure 7). Small cities suffered from contraction in the Maoist era have now enjoyed the rapid annual growth rate of 5.39% (Table 7). Geographically, because of the location advantage of the Eastern Coastal region, the open policy has made it grow faster than the Central and Western regions. Table 7 shows that the eastern region has now experienced the highest growth rate in the newly established cities. Obviously, this remarkable reversal has been inseparable from the three powerful forces including the state's shifting development emphasis from the interior to the eastern coast, phenomenal growth of rural industries and small towns from below, and relaxed control of the state over the upgrading of towns into cities (Lin, 2002).

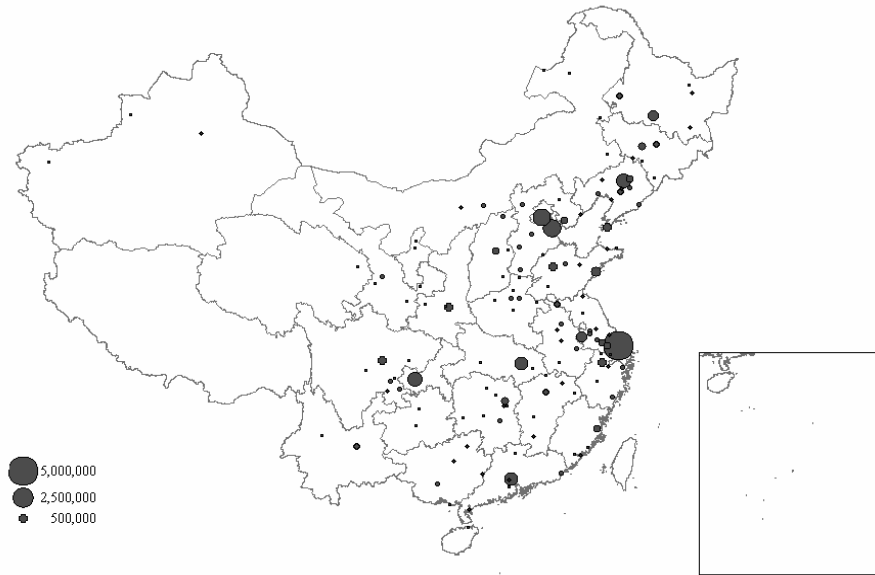


Figure 5. Spatial distribution of 153 cities in China,1952
Date source: CSSB, 1999, New China's Cities Fifty Years.

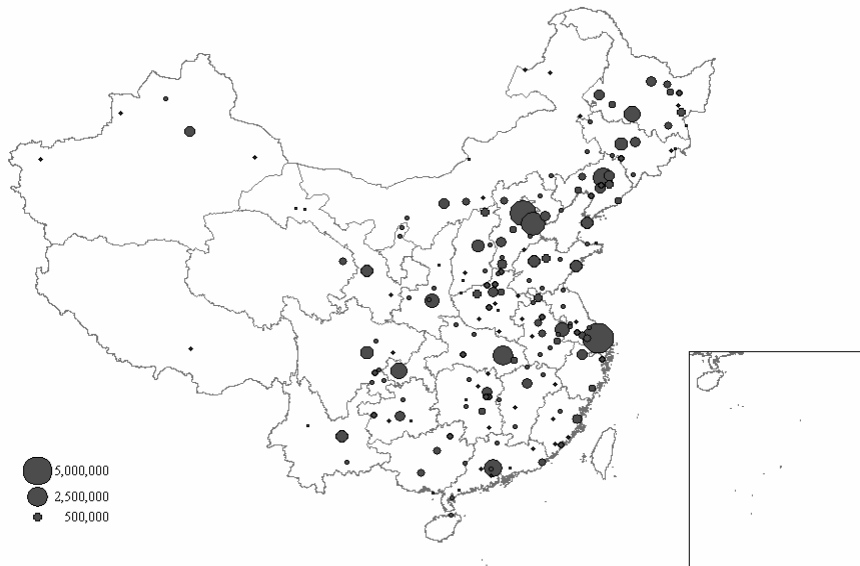


Figure 6. Spatial distribution of 189 cities in China, 1978
Date source: CSSB, 1999, New China's Cities Fifty Years.

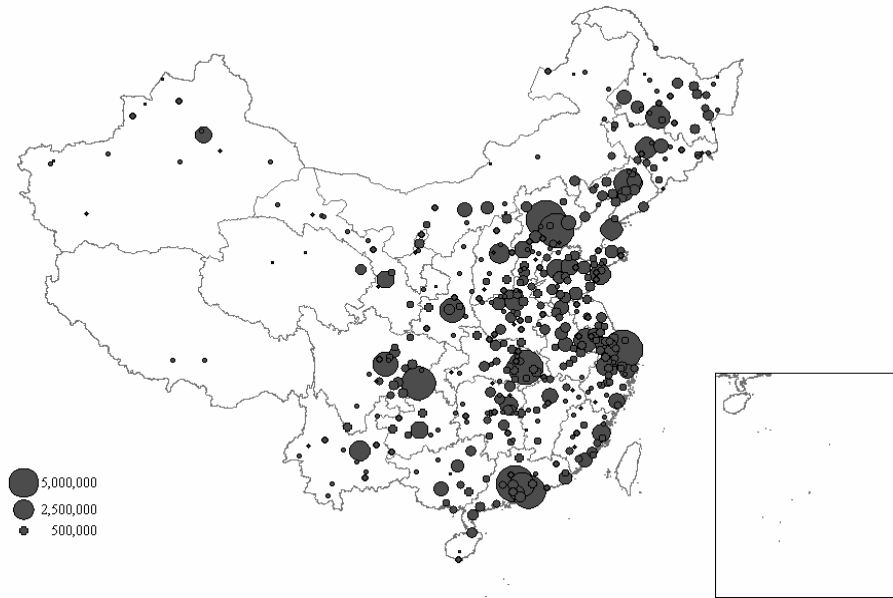


Figure 7. Spatial distribution of 660 cities in China, 2003
Date source: CSSB, 2004, China Statistical Yearbook 2003.

4.2 Spatial disparity of city-size distribution of China

In the numerous existing literatures about city-size distribution of China, there are relatively few studies focusing on it at provincial level. However, considering that China is a big and populous country with the great developing gap among different regions, it is necessary to analyze the spatial disparity of city-size distribution of China at provincial level.

Table 8 depicts each province's urban primacy index (S_2), four city index (S_4) and eleven city index (S_{11}) which were often employed in the study of city-size distribution. They can be written as:

$$S_2 = P_1/P_2$$

$$S_4 = P_1/(P_2+P_3+P_4)$$

$$S_{11} = 2P_1/(P_2+P_3+\dots+P_{11})$$

where P_i is the population of the i th largest city. When $S_2 = 2$, $S_4 = 1$, $S_{11} = 1$, the size distribution is consistent with the so-called rank-size rule. When $S_2 > 2$ ($S_2 < 2$), $S_4 > 1$ ($S_4 < 1$), $S_{11} > 1$ ($S_{11} < 1$), urban system present with the trend of concentration (disperse) which means that there are more large-size (small-size) cities than is predicted by the rank-size rule.

Table 8. Each province's urban primacy index, four city index and eleven city index, 2000

| Province | S ₂ | S ₄ | S ₁₁ | Province | S ₂ | S ₄ | S ₁₁ |
|---------------------------|----------------|----------------|-----------------|-----------------------|----------------|----------------|-----------------|
| Beijing&Tianjin &Hebei | 1.79 | 1.10 | 1.41 | Hunan | 2.55 | 0.87 | 0.72 |
| Hebei | 1.38 | 0.57 | 0.57 | Guangdong | 1.23 | 0.63 | 0.80 |
| Shanxi | 2.43 | 1.30 | 1.36 | Guangxi | 1.39 | 0.62 | 0.67 |
| Inner Mongolia | 1.42 | 0.75 | 0.79 | Hainan | 2.40 | 1.19 | — |
| Liaoning | 1.55 | 0.79 | 0.86 | Chongqing& Sichuan | 1.49 | 1.10 | 1.35 |
| Jilin | 1.97 | 1.19 | 1.25 | Sichuan | 5.70 | 2.02 | 1.57 |
| Heilongjiang | 2.63 | 1.09 | 0.99 | Chongqing | 19.38 | 7.30 | — |
| Shanghai& Jiangsu | 3.69 | 2.05 | 2.15 | Guizhou | 3.40 | 1.67 | 1.60 |
| Jiangsu | 2.42 | 0.84 | 0.77 | Yunnan | 8.78 | 3.67 | 2.77 |
| Zhejiang | 1.79 | 0.65 | 0.75 | Tibet | 3.73 | — | — |
| Anhui | 1.47 | 0.63 | 0.56 | Shanxi | 4.76 | 2.23 | 2.36 |
| Fujian | 1.46 | 0.82 | 0.90 | Gansu | 4.81 | 2.02 | 1.90 |
| Jiangxi | 3.21 | 1.24 | 1.12 | Qinghai | 7.47 | — | — |
| Shandong | 1.05 | 0.49 | 0.48 | Ningxia | 1.84 | 0.98 | — |
| Henan | 2.06 | 0.87 | 0.75 | Sinkiang | 5.78 | 2.10 | 1.70 |
| Hubei | 7.63 | 2.87 | 2.42 | | | | |

Date source: CSSB, 2001, 2000 Population Census of China.

Table 8 displays that the city-size distribution of all provinces in China can be divided into three groups as follow:

(a) Chongqing, Sichuan, Shanxi, Gansu, Sinkiang, Yunnan, Guizhou, Shanghai & Jiangsu, Jiangxi are the provinces with all the largest urban primacy index (S₂), four city index (S₄) and eleven city index (S₁₁);

(b) Hebei, Inner Mongolia, Liaoning, Anhui, Shandong, Fujian, Zhejiang, Guangdong, Guangxi are the provinces with all the lowest urban primacy index (S₂), four city index (S₄) and eleven city index (S₁₁);

(c) Hunan, Jiangsu, Henan are the provinces with higher urban primacy index (S₂) but lower four city index (S₄) and eleven city index (S₁₁); Chongqing & Sichuan with lower urban primacy index (S₂) but higher four city index (S₄) and eleven city index;

(d) The figure of Heilongjiang, Jilin, Shanxi, Hainan, Ningxia, Jingjinji (Beijing, Tianjin & Hebei) are close to rank-size rule, namely, urban primacy index (S₂) equal to 2, or four city index (S₄) and eleven city index equal to 1.

Apparently, the more urban population in the central and west regions is concentrated in large-size cities, while coastal region has more dispersedly distributed cities.

5. Serious new challenges to Chinese urban development

5.1 Institutional barriers to urbanization still exist

The traditional institutional barriers that restricted migration with administrative measures are now replaced by barriers that sharply raise the cost of migration, particularly into large cities. The rural migrants have no or very high priced access to occupation, education, housing, medical care, and social security (Cai fang, 2000 a; Au and Henerson, 2005). The current four institutional barriers which have the most direct and important effect on Chinese urbanization are Household Registration System (Hukou), urban employment system, Social Security system and public housing.

(a) Dual Hukou system. The Hukou system which underwent some drastic changes in the past decades has not lost its importance in Chinese cities. It is still the greatest obstacle to population migration and labor mobility. The nonagricultural Hukou was open to the rural population in some cities, but it was only available in small towns and cities, not large cities. Although the urban Hukou can't be allowed to sale publicly, it is possible to obtain it by exploiting underground deals with extremely high price. In Beijing the most desirable cites, for instance, the price of urban Hukou is as high as 0.3 million yuan which is equivalent to 20 times an ordinary rural migrant's annual income. An urban Hukou in large cities is worth a lot of money owing to the linkages to high-level employment, education, housing, urban public services. Once the linkages break, an urban Hukou alone is not of much use.

(b) Discriminative urban employment system. Due to the existence of Hukou system and employment discriminative policy, rural migrants and local urban residents practically participate in two different labor markets. Firstly, rural migrants take up marginal jobs that are characterized by long hours, low and unstable paying, poor working conditions, and what local workers do not want to take. Secondly, migrant's income and benefit also lag much behind those of local workers with similar education attainments, if including various non-cash benefits such as transportation, food stamps, medical care ,entertainment that enjoyed by local residents , the difference is even wider. Thirdly, local governments in cities have adopted policies that aim at reducing competition from rural migrant workers, setting constraints on urban enterprises for hiring migrant workers for many types of jobs. For example, Beijing Municipal Bureau of Labor issued a list of jobs that are not allowed migrants to occupy. Those jobs were 15 in 1996, 36 in 1998, and 103 in 2000 (Cai fang, 2000 b).

(c) Incomplete social security system. After reform, China makes a series of social security institutions in terms of the law, the statute and the policy. By and large, the frame of

social security system has been established, but rural migrants are excluded out this system. Until today, most of them can't enjoy unemployment benefit, medical insurance, endowment insurance and minimum living security.

(d) Inaccessible Public housing. In recent years, cities are spending a large amount of money to develop public housing which is mostly only available for local low-income resident though the majority of migrants also belong to the low income group. Today, over half of all migrants in big cities live in dormitories, shelters at the work site, and other temporary building. The other half mostly rent inferior housing in the urban peripheral area.

5.2 Disparities between urban and rural areas are widening

Despite the robust growth of its economy, China is suffering a bigger and bigger disparity between rural and urban areas. The income gap between rural and urban residents has kept growing since the mid 1980s. Figure 8 shows that the ratio of rural to urban disposable income declined from 54.8% to 31.2% between 1984 and 2004. The income of urban citizens concerned does not count the welfare they enjoy, including education, housing, medical care, unemployment insurance and minimum living relief, while most farmers have no access to these. If taking into account of all the welfares, the urban residents' income should be four or even five times of that of the rural residents.

Theoretically, urbanization is a significant solution for eliminating urban and rural gaps by moving people from low-productivity rural occupations to high-productivity urban ones.

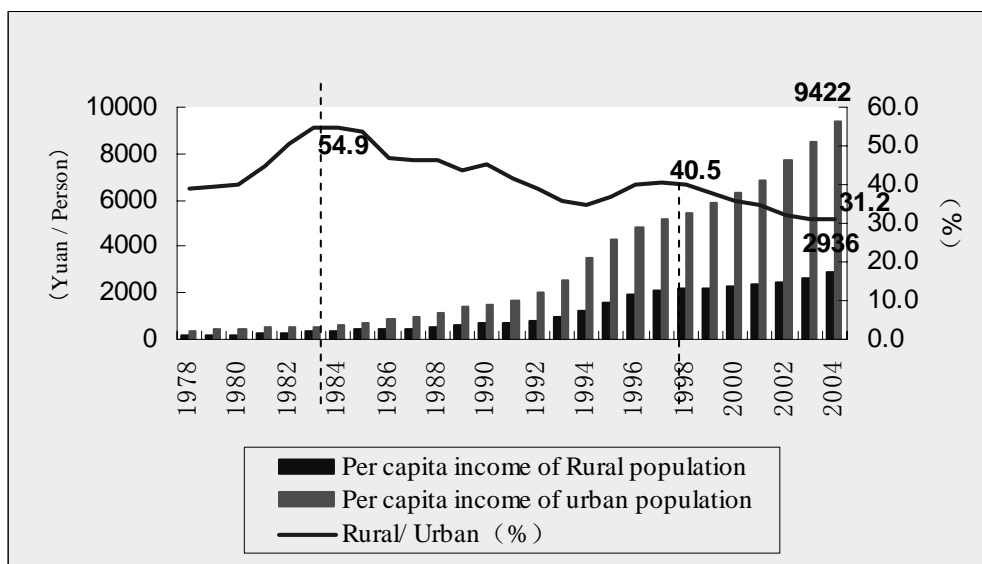


Figure 8. Comparison of income of urban and rural population, 1978-2004
Date source: SSB, 2005, China Statistical Yearbook 2004.

However in China, ongoing urbanization is accompanied by widening income gap between rural residents and urban residents. There are some reasons for such abnormal status. First, the existence of Hukou system and other institutional barriers prevent rural laborers from migrating fully and the growth of coastal regions is too fast for migration to respond so as to narrow the income gap (Lin Justin, et al, 2004). Second, Rural land tenure going against the land reallocation and agricultural large-scale management, along with investment shortage in rural sectors, results in the developments of agriculture and rural sectors have lagged behind that of non-agricultural and urban sectors. Third, the imperfection of labor markets causes discriminations that rural migrants are suffering in job entry and pay.

5.3 The structure of urban system has been serious distorted

According to China Urban Statistical Yearbook 2004, the number of extra-large cities (> 1 million), large cities (0.5-1 million), medium cities (0.2-0.5 million) and small cities (<0.2 million) is 174, 274, 172 and 40 respectively. The number of medium cities is less than that of large cities, and number of small cities is less that of medium cities, which badly violates the rule of city-size distribution. Obviously, the structure of urban system has been serious distorted. Au and Henderson believe that nationally migration restrictions and negative effects of long-term urban development policy: “limit the size of big cities; encourage the growth of small cities”, leave many Chinese cities evidently undersized and city size distribution significantly distorted compared to other countries (Au, Henderson, 2005). They calculate the spatial Gini ranking cities by size from smallest to largest. China’s spatial Gini of 0.43 is substantially less than that of the world of 0.56 and is below all other large countries, illustrating that Chinese cities are relatively small and low centralized.

However, Table 9 shows that not all Chinese cities are relatively small. To be more exact, the average city size of all hierarchies is approximately the same as Japan and USA, except the following two hierarchies, namely, >5 million and <0.03 million, are relatively smaller. Furthermore, as also illustrated in Table 9, the ratios of numbers of China’s cities with population over 0.5 million is between Japan and USA, therefore the structure of these size categories appears to be reasonable. But in the 0.03-0.5 million range, the ratios of each size categories are far below both Japan and USA from 6 percent to 12 percent. So, the numbers of cities in such a range need increased considerably. The numbers of small towns with population below 0.03 million accounts for 59.3 percent, compared to a Japanese ratio of 13.1 percent and USA ratio of 11.9 percent, suggesting that urban system in China today is still characterized by low urban concentration and high dispersion of towns.

Table 9. Comparison of city size structure in China, Japan and USA

| Groups | urban population per city (million) | | | Share of numbers (%) | | |
|-------------------|-------------------------------------|-------|-------|----------------------|------|-------|
| | Japan | USA | China | Japan | USA | China |
| >5 million | 8.135 | 9.274 | 7.703 | 0.1 | 0.7 | 0.4 |
| 2-5 million | 2.732 | 3.249 | 2.718 | 0.4 | 2 | 0.8 |
| 1-2 million | 1.315 | 1.405 | 1.398 | 1 | 2.7 | 1.9 |
| 0.5-1 million | 0.619 | 0.692 | 0.72 | 1.3 | 4.2 | 3.1 |
| 0.2-0.5 million | 0.32 | 3.28 | 0.312 | 10.2 | 11.3 | 4 |
| 0.1-0.2 million | 0.135 | 0.137 | 0.139 | 14.8 | 19.6 | 6.7 |
| 0.05-0.1 million | 0.069 | 0.07 | 0.069 | 27.2 | 22.8 | 11.1 |
| 0.03-0.05 million | 0.038 | 0.039 | 0.038 | 31.8 | 24.8 | 12.7 |
| <0.03 million | 0.027 | 0.023 | 0.016 | 13.1 | 11.9 | 59.3 |
| Total | 0.128 | 0.284 | 0.145 | 100 | 100 | 100 |

Date source: CSSB, 2004, China Urban Statistical Yearbook 2003;

CSSB, 2004, China Town and Village Statistical Yearbook 2003

U.S.Census Bureau, Census 2000 and 1990 Census;

Statistical Bureau, MIAC, 2002, Japan Statistical Yearbook 2001.

There are mainly three reasons for the structural distortion of China's urban system:

(1) China's especial investment and financing systems. Since the 1990s, Owing to strictly tightened lending responsibility, the state commercial banks have strong motives to lend loans to large-scaled, state-owned enterprises, or state supported projects. In the meantime, small and medium-scaled enterprises in general encounter severe difficulties of receiving loans from state banks. Because of their inherent advantages of agglomeration economies, large cities, especially extra-large cities, have clearly been chosen by the large state-owned enterprises as the locations of investment. Moreover, as showed in Table 10, among all cities, state fixed asserts investment and foreign investment also favor large and extra-large cities. As a result, Chin's policy of long-term aversion to large cities has not effectively limited the development of large cities. Among all cities, both the average population size of large cities and the share of numbers of large cities are not small and low, compared to Japan and USA. Instead medium and small cities have no sufficient growth force because of the shortage of investors induced by China's especial investment and financing systems.

Table 10. Domestic and Foreign Investment in Chinese Cities, 1990-98

| City Size | Fixed Assets Investment | | | | Utilized Foreign Investment | | | |
|--------------------------|-------------------------|--------|---------|-------|-----------------------------|------|---------|-------|
| | Billion Yuan | | Percent | | Billion US\$ | | Percent | |
| | 1990 | 1998 | 1990 | 1998 | 1990 | 1998 | 1990 | 1998 |
| Extra-Large (>1 million) | 86.81 | 707.23 | 46.53 | 52.56 | 0.84 | 13 | 35.34 | 43.56 |
| Large (0.5-1 million) | 31.14 | 184.49 | 16.69 | 13.71 | 0.28 | 4.87 | 11.68 | 16.33 |
| Medium (0.2-0.5 million) | 53.61 | 340.65 | 28.74 | 25.32 | 0.9 | 8.89 | 37.88 | 29.79 |
| Small (<0.2 million) | 15 | 113.22 | 8.04 | 8.41 | 0.36 | 3.08 | 15.11 | 10.32 |

Source: CSSB, 1999, New China's Cities Fifty Years.

(2) Small town strategy results in overabundance of extremely undersized small towns. Small town strategy that gives a high priority to small towns played a very important role in promoting the development of TVE and absorbing surplus rural labors and brought out a quantum leap in the establishment of towns. Since 1980s, a series of policy changes, including permitting rural laborers to move to nearby towns and easing the official criteria for town designation in 1984, spurred thousand of village to apply for designated town status (Richard, et al, 2000). As table 11 presents, in 2002, there were 21044 of designated towns, and among them, those with population of below 5 thousand accounted for 62.3 percent, illustrating that China's small towns present with excessive number and high degree of diffusion, which can also be illustrated by the Figure 9, rank- size distribution of China's towns.

Table 11. Population and numbers of designated towns in China, 2002

| Size (10,000) | Total Population (10,000) | Percentage (%) | Number | Percentage (%) |
|---------------|---------------------------|----------------|--------|----------------|
| ≧ 10 | 125.8 | 7.5 | 92 | 0.4 |
| 8-10 | 82.4 | 4.9 | 93 | 0.4 |
| 5-8 | 209.5 | 12.4 | 337 | 1.6 |
| 3-5 | 209.8 | 12.4 | 547 | 2.6 |
| 1-3 | 449.4 | 26.6 | 2,748 | 13.1 |
| 0.5-1 | 284.3 | 16.9 | 4,114 | 19.5 |
| 0.2-0.5 | 260.7 | 15.5 | 7,905 | 37.6 |
| <0.2 | 65.1 | 3.9 | 5,208 | 24.7 |
| | 1687.1 | 100 | 21,044 | 100 |

Date source: CSSB, 2004, China town and village Statistical Yearbook 2003

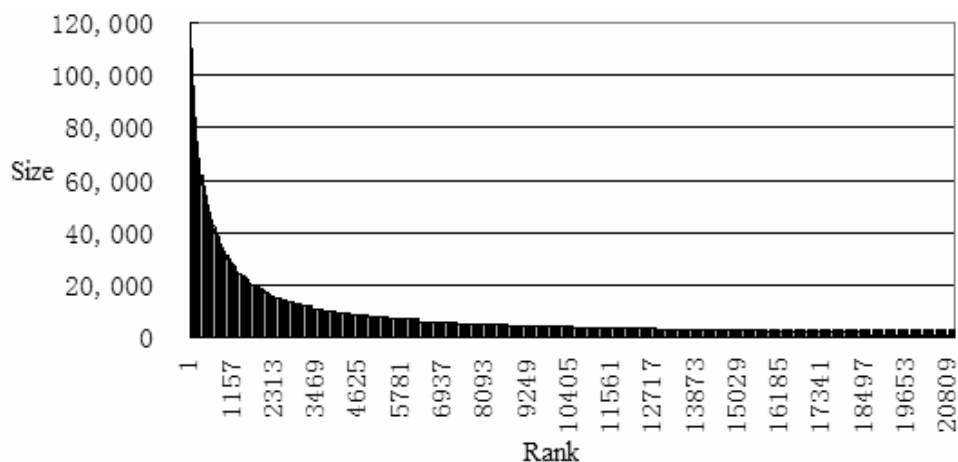


Figure 9. Rank- size distribution of China's towns
Date source: SSB, 2004, China town and village Statistical Yearbook 2003

(3) **The unreasonable criteria for city designation are the main reasons for underdevelopment of medium and small cities.** China has the most complicated and stringent criteria for city designation all over the world. In addition to requiring satisfying other twelve criteria, it provided a criterion for city designation: having more than 100 thousand nonagricultural population before a county of a county being approved to upgrade seat town into a designate city, compared to 2,500, 50,000, 5,000, 2,500, 2,000, 2,000, and 1,000 for other large countries of United States, Japan, India, Mexico, France, Spain and Canada respectively (see Table 1 and Table 12). This is no doubt that the criteria of China are too high, and many towns with qualification can't develop into cities. For example, there are 7 towns with more than 0.2 million population and 85 towns with more than 0.1 million population (Table 11). Due to the current criteria are unreasonable and the new criteria still await to be issued, central government have suspended the procedure of establishing a new city since 1997. In the meantime, some middle and small cities were either transferred into nearby large cities' districts or involved into large cities themselves. Hence an abnormal Phenomenon appears in China's urban system: the number of medium cities is less than big cities while greater than small cities. It is necessary to lunch the new criteria for city designation which will lay institutional foundations for restructuring China's distorted urban system. The new criteria are proposed to reduce to one simple standard: Place of 30,000 or more permanent residents.

Table 12. Comparison of the Criteria for city designation among different countries

| Countries | Criteria |
|---------------|--|
| United States | Places of 2 500 or more inhabitants and urbanized areas. |
| Japan | Having 50,000 or more inhabitants with 60 per cent or more of the houses located in the main built-up areas and 60 per cent or more of the population engaged in urban type of business. |
| India | Having 5,000 or more inhabitants, a density of not less than 1 000 persons per square mile, and at least three fourths of the adult male population employed in pursuits other than agriculture. |
| Mexico | Localities of 2,500 or more inhabitants. |
| France | Communes containing an agglomeration of more than 2,000 inhabitants living in contiguous houses. |
| Spain | Localities of 2,000 or more inhabitants. |
| Canada | Places of 1 000 or more inhabitants, having a population density of 400 or more per square kilometer. |

Source: Department of Economic and Social Affairs, 2003, Demographic Yearbook 2001, New York: United Nations.

6. Prospect for future urbanization and spatial distribution of china

6.1 Prediction of China's urbanization level

Based on the data of 1978-2004, two different simulation models are developed: the hyperbola regression model and the logistic regression model. Eventually, results of both models are used to provide references for further comprehensive analysis on predictions of China's long-term urbanization growth rate or urbanization level.

6.1.1 The Hyperbola Regression Model

The hypothesis of positive link between urbanization and economics development in the period of 1978-2004 may be described as a hyperbola formula:

$$y=k-1/(a+bx)$$

Where y is the dependent variable of urbanization; x is the independent variable of the per capita GDP; k is set as 0.8.

Based on the urbanization levels in 2000 Census definition in the period of 1978-2004, with the OLS method, the constants in this formula are estimated and the simulation equation is:

$$Y=0.8-1/(1.506441+0.000106X) \quad R^2=0.9755$$

Assuming that China's annual growth rate of GDP and population in 2000-2020 would be respectively 7.2% and 0.65%, calculated by this equation, China's urbanization levels in 2000 Census definition are respectively 46.7% in 2010, 51.9% in 2015, and 56.9% in 2020 (Table 13).

6.1.2 The Logistic Regression Model

Its formula is:

$$y=k/(1+ab^t)$$

Where, t is the independent variable of year, y is the dependent variable of urbanization level, k is set as 1 for extreme point of urbanization level is 100%.

Based on the urbanization levels in the period 1978-2004, the simulation formula of the logistic regression model is:

$$Y=1/(1+4.484780708*0.959502903^t) \quad R^2=0.9795$$

Calculated by this equation, China's urbanization levels in 2000 Census definition are respectively 45.6% in 2010, 50.7% in 2015, 55.9% in 2020 (Table 13).

Comparing results for two regression models above, the margin of the estimated urbanization level is narrow, only one percent. China's urbanization level in 2020 is between from 55.9% to 56.9%, with the annual growth rate of 0.88%-0.94% from 2004 to 2020, which is slightly higher than the UN predictions. As showed in Table14, China's urbanization level is 45.1% in 2010, 53.6% in 2020, and 60.5% in 2030, or at the growth rate of about 0.8% per year on average.

Table 13. Prediction of China's urbanization level by different models

| | Urbanization level in 2010 | Urbanization level in 2015 | Urbanization level in 2020 |
|--------------------------------|----------------------------|----------------------------|----------------------------|
| The hyperbola Regression Model | 46.7% | 51.9% | 56.9% |
| The logistic regression model | 45.6% | 50.7% | 55.9% |

Table14. Prediction of China’s urbanization level by UN

| year | Urban population (hundred million) | Rural population (hundred million) | Urbanization level (%) |
|------|---------------------------------------|---------------------------------------|------------------------|
| 2005 | 5.36 | 7.86 | 40.5 |
| 2010 | 6.16 | 7.49 | 45.1 |
| 2015 | 6.94 | 7.08 | 49.5 |
| 2020 | 7.66 | 6.64 | 53.6 |
| 2025 | 8.27 | 6.18 | 57.2 |
| 2030 | 8.78 | 5.73 | 60.5 |

Date source: UN Department of Economic and Social Affairs, 2004, World Urbanization Prospects: The 2003 Revision. York: United Nations.

6.1.3 Comprehensive analysis on the predictions

The predictive regression models, discussed in the last section, would certainly provide insights on the long-term urbanization trends in China. However, care should be taken to interpret their results because they are purely “statistical” models and the speed of urbanization depends on long-term social and economic development trend, potential institution and policy reforms. Therefore, taking the average annual growth rate of urbanization of China in the period of 1978-2004 as a reference, it is essential to conduct a comprehensive analysis of the impacts of social and economic development on urbanization, and make often adjustments based on institutional reforms.

**Table 15. The indicators of urban development
in different growth rate of urbanization**

| Urbanization growth rate | year | National population | Urbanization level | Urban pop. | Rural pop. | Changes in Urban pop. | Annual changes |
|--------------------------|------|---------------------|--------------------|------------|------------|-----------------------|----------------|
| 0.5 | 2004 | 129988 | 41.8 | 54335 | 75653 | | |
| | 2010 | 134177 | 44.8 | 60111 | 74066 | 5776 | 963 |
| | 2020 | 139920 | 49.8 | 69680 | 70240 | 9569 | 957 |
| 0.6 | 2004 | 129988 | 41.8 | 54283 | 75705 | | |
| | 2010 | 134177 | 45.4 | 60916 | 73261 | 6633 | 1106 |
| | 2020 | 139920 | 51.4 | 71919 | 68001 | 17636 | 1100 |
| 0.8 | 2004 | 129988 | 41.8 | 54283 | 75705 | | |
| | 2010 | 137000 | 46.6 | 63842 | 73158 | 9559 | 1593 |
| | 2020 | 146000 | 54.6 | 79716 | 66284 | 25433 | 1587 |
| 1.0 | 2004 | 129988 | 41.8 | 54283 | 75705 | | |
| | 2010 | 137000 | 47.8 | 65486 | 71514 | 11203 | 1867 |
| | 2020 | 146000 | 57.8 | 84388 | 61612 | 30105 | 1890 |

Predictions on China’s urbanization growth till 2020 can be summarized into three categories: (a) highly rapid growth, with an annual growth rate of 1 percent or above; (b) moderately fast growth, with an annual growth rate between 0.6 and 0.8; (c) slow growth, with an annual growth rate of 0.5 or below. The results of different growth rate are showed in Table 15.

(1) Growth rate of 1 percent is too fast for China to reach. It is a theoretical attractive goal, but hardly realized. First, in so high growth, the total urban population in China will be 655 million in 2010 and 844million in 2020; the average annual growth of the urban population would be 18.67 million in 2004-2010, 18.9 million in 2011-2020, which means that more than 12 million new employment opportunities are required to be created. However, the job creation from 1996-2004 is only 48.53 million, with annual average increase of 6.93 million far less than 12 million.

Second, although China’s urbanization is experiencing a high growth stage, it follows the objective laws. Table16 shows that in all big developed countries except Japan, the speed of urbanization is far from 1 percent during the fastest growth period. Japan achieved a record period of postwar urbanization growth because of the special historical conditions. Firstly, Japanese long term human capital accumulation laid a solid foundation for post-war economic miracle. Secondly, provision of rich and cheap nature resource, especially oil, in the post-war international market greatly decreased the cost of Japan’s industrialization and thus promoted the process of industrialization. Thirdly, hostilities in the Korean peninsula provided a huge market opportunity for Japanese industrial product in 1950 because the U.S. government paid the Japanese government large sums for “special military procurement”. Lastly, Japanese government economic interventionism fostered rapid postwar growth. Considering the soaring oil price, shortage of human capital, ineffective market mechanism, China has no means of getting the same growth rate of 1 percent as Japan in the post-war period.

Table 16. Comparison of urbanization rate of developed countries in the period rapid urbanization

| Nation | Urbanization level (%) | period | years | Rate of urbanization (%) |
|---------------------|------------------------|-----------|-------|--------------------------|
| Developed countries | 26.1–52.5 | 1900–1950 | 50 | 0.53 |
| USA | 30.5–60.1 | 1885–1950 | 65 | 0.46 |
| German | 36.1–54.4 | 1871–1900 | 29 | 0.63 |
| Japan | 32.7–63.5 | 1930–1960 | 30 | 1.02 |

Date source: Ye Yumin, 2007, *Urbanization and Sustainable Development in China*, Science Press.

(2) 0.5 percent is the bottom line. Assuming the growth rate is 0.5 percent, the average annual growth of urban population in China is 9.63 million in 2001-2010, 9.57 million in 2011-2020, which are both less than annual the national nature population growth of 9.85 million in 1995-2004. It is unacceptable because the number of rural population taking low-productivity rural occupations will continue to increase in the future 15 years.

(3) 0.6-0.8 percent is the most likely growth rate of China's healthy urbanization. If the growth rate is 0.8 percent, the total urban population in China will be 638.4 million in 2010, 731.6 million in 2020; the average annual growth of urban population will be 15.93 million in 2001-2010, 15.86 million in 2011-2020. Cities and towns are required to generate more than 10 million jobs to absorb about 15.9 million new urban populations. Although the new increasing jobs per year in China was about 7 million in 1978-2004, it is a possible goal to create 10 million jobs based on the following two reasons. First of all, a series of market-oriented institutional reforms, such as Hukou system, employment system and social security system, have been or are expected to be launched in China to actively promote the urbanization process. Secondly, the tertiary industry in cities and towns has great development potentials. Currently, the tertiary industry in Chinese cities and towns is rather backward and less developed. With increasing income and living standards, the demand on services will rise strongly.

6.2 Emerging megalopolises are becoming a spatial carrier of Chinese urbanization

As previously stated, China's urbanization pattern varies during the different period. In the pre-reform era, in order to achieve maximum capital accumulation and heavy industrial growth, "anti-urbanization" pattern was adopted to control urban growth. From 1978 to the mid-1990, Chinese government emphasized the development of small cities and towns and used a series of administrative measures to control large cities. In the tenth Five-year period (2000-2005), urbanization pattern was modified to "coordinated development of large, medium, small cities and small towns", and more attention was paid to development of large cities. In the Eleventh Five-year Plan launched in 2005 first time explicitly raised that "making megalopolises as the leader, exerting the functions of central cities and forming several new megalopolises with less land utilization, more employments, strong element concentration ability and rational population distribution", and a high priority was given to emerging and potential megalopolises. As displayed in Figure 10, China has three emerging megalopolises and seven less clear or potential megalopolises.

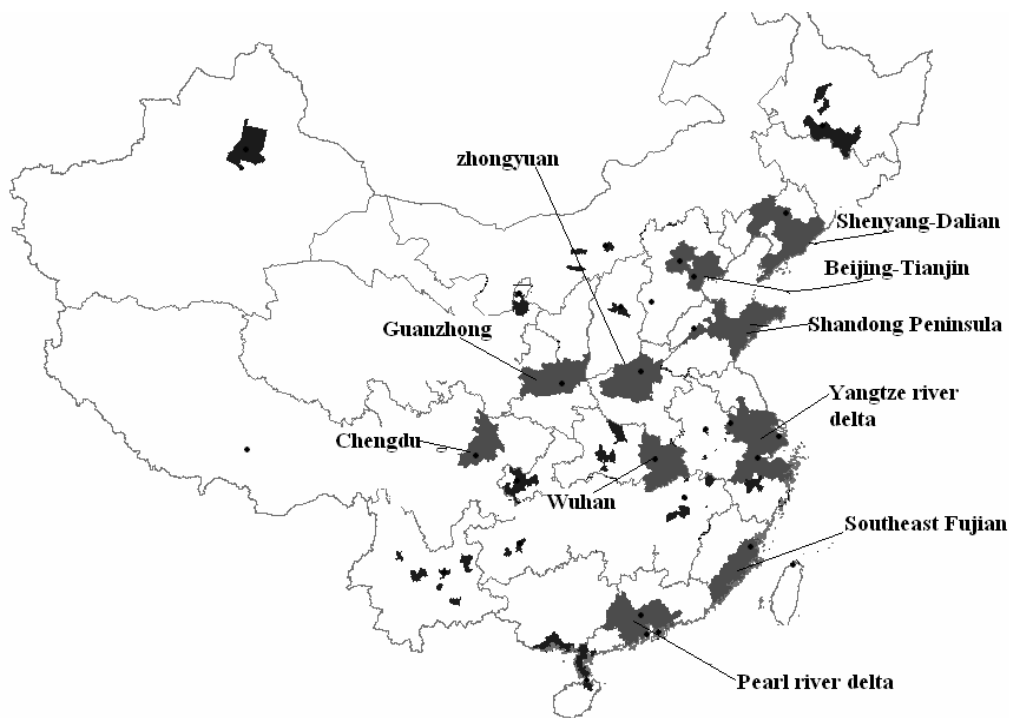


Figure 10. Ten emerging and potential megalopolises in China
Date source: SSB, 2001, 2000 Population Census of China.

Three emerging megalopolises have appeared on the east coast of China, and there are:

The Yangtze River Delta between southern Jiangsu province and northern Zhejiang province. It contains at least 16 cities including Shanghai, Nanjing, Hangzhou, Ningbo, Nantong, Suzhou, Taizhou(台州), Taizhou(泰州), Yangzhou, Wuxi, Shaoxing, Changzhou, Jiaxing, Zhenjiang, Huzhou and Zhoushan (Total 87.5million, migrant workers included).

The Pearl River Delta in Guangdong region, it contains 10 cities including Guangzhou, Shenzhen, Zhuhai, Dongguan, Foshan, Jiangmen, Zhaoqing, Huizhou, Zhongshan and Qingyuan (Total 42.9million, migrant workers included).

Beijing–Tianjin in China, it contains 6 cities including Beijing, Tianjin, Tangshan, Qinhuangdao, Langfang, and Baoding (30.5 million, migrant workers included).

Seven less clear or potential megalopolises include: Shandong Peninsula (39.8 million), Zhongyuan (38 million), Shenyang-Dalian(30 million), Wuhan (26.7 million), Southeast Fujian (23 million), Guanzhong (21.8 million), Chengdu (20 million).

Ten megalopolises above have a total urban population of 359.78 million, about 28.95% of national population in 2000, but absorbed floating population of about 72.29 million accounting for 50.06% of the whole floating population, indicating that megalopolises have now been a spatial carrier of Chinese urbanization (Table 17).

**Table 17. Number of permanent residents and immigrants
And
related percentage in 10 megalopolises of China, 2000**

| Megalopolises | Permanent residents in urban areas | | Immigrants | |
|---------------------|------------------------------------|----------------|------------------|----------------|
| | Total (thousand) | Percentage (%) | Total (thousand) | Percentage (%) |
| Yangtze river delta | 87,431 | 7.036 | 17776 | 12.311 |
| Pearl river delta | 42,879 | 3.451 | 21704 | 15.032 |
| Shandong Peninsula | 39,807 | 3.204 | 4958 | 3.434 |
| Zhongyuan | 37,985 | 3.057 | 3234 | 2.24 |
| Beijing-Tianjin | 30,458 | 2.451 | 7335 | 5.08 |
| Shenyang-Dalian | 29,667 | 2.388 | 5132 | 3.554 |
| Wuhan | 26,616 | 2.142 | 3169 | 2.194 |
| Southeast Fujian | 23,032 | 1.853 | 4623 | 3.202 |
| Guan zhong | 21,840 | 1.758 | 1551 | 1.074 |
| Chengdu | 20,067 | 1.615 | 2806 | 1.943 |
| Total | 359,783 | 28.954 | 72288 | 50.064 |
| National | 1,242,612 | 100 | 144391 | 100 |

Date source: SSB, 2001, 2000 Population Census of China.

Enter the new millennium, China will be thought to gradually form the highly efficient and sustainable urbanization spatial layout that the coastal and Beijing-Guangzhou Line and Beijing-Harbin Line is the longitudinal axis, the Changjiang River and Longhai Railway Line is the transverse axis, with several extra-large cities being the principal part, other cities and small towns being spot distributed. The three emerging megalopolises where continuous agglomerations have formed are beginning to exert the leading and radiation actions. The seven less clear or potential megalopolises that is making extra-large cities as the leaders and strengthening cooperation and advantage complementation of all cities to speed up the process of the formation of new urban agglomerations. The regions with disperse population and poor resource conditions mainly located in west china that do not have the conditions for megalopolises development shall mainly develop existing cities and county towns and become the concentrating centre of economy, population and public service in the region.

7. Conclusion

Urbanization in China is a comprehensive process involving changes in many areas, including ongoing process of industrialization, rural-to-urban migration, structural and spatial changes of urban system, and institutional innovation concerning Hukou system, employment, security, education and land use policy. All of these changes are a part of China's transition from a centrally planned economy to a socialist market economy.

Detailed analyses of urban statistical data for the period of 1949-2006 are made to examine China's urbanization and spatial structure evolution of urban system in this study. At least four important conclusions can be formed.

First, the speed and scale of urbanization as well as urban development in China have been heavily planned and controlled by the state government. The urbanization patterns and definitions on cities, towns and urban population were changed corresponding to national economic and industrial development planning and government political considerations. Even the Chinese Hukou system was designated not only to provide population statistics and identify personal status, but also directly to regulate population distribution and serve many other important objectives desired by the state (Chan K.W., 1999).

Second, China's policy of long-term aversion to large cities has not effectively limited the development of large cities, because neither the average population size nor the share of numbers of large cities is not small or low, compared to Japan and USA, two of world's largest economies. However underdeveloped medium and small cities as well as numerous and extremely undersized small towns mainly resulted from the unreasonable criteria for city designation and small town strategy respectively, indicated that the structure of urban system in China has been distorted. Only when there is a sharp increase in the number of middle and small-size cities and at least a 50 percent drop in the number of small towns, the structure of urban system will tend to become more reasonable.

Third, with a shift of urbanization pattern from small towns-based to large cities and megalopolises dominating, more population will become increasingly concentrated in megalopolises, especially three emerging megalopolises, namely, Yangtze River Delta, Pearl River Delta and Beijing-Tianjin.

Fourth, the growth rate of urbanization in China will tardily decrease, from highly rapid speed, with an annual growth rate of 1 percent or above at the end of 20th century, to moderately fast speed, with an annual growth rate between 0.6 and 0.8 percent in the next two decades. If long-term growth rate of urbanization is 0.8 percent, Cities and towns in China are required to generate about 10 million jobs to absorb about more than 15 million new urban population.

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