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## **Estimating Urbanization Levels in Chinese Provinces in 1982-2000**

Jianfa Shen

Department of Geography and Resource Management, The Chinese University of Hong Kong, Shatin, NT, Hong Kong

### **Summary**

No consistent and reliable annual data series on the urbanization level for provincial regions of China is available. Making use of urban population data from the 1982 and 2000 population censuses, this paper estimates an annual data series of the urbanization level for provincial regions using an estimation approach developed on the basis of a conceptual model of dual-track urbanization. Based on such estimated new urban data of provincial regions, the major trends of urbanization in Chinese provinces and the relationship between urbanization and economic development are analysed for the period 1982-2000.

*Key words:* Census, Urban Population, China, Population Statistics.

### **1 Introduction**

Urbanization has been a key issue among scholars concerned with the development and modernization of China and other developing countries (Kirkby, 1985; Sit, 1995; Shen, 1998; Pannell, 2002, Ma, 2002; Wei & Li, 2002; Cohen, 2004). But the level of China's urbanization has long been an “enigma” (Orleans & Burnham, 1984). There are rarely any systematic data at regional level. The situation is caused partly by the changing definitions of urban population in Chinese censuses and partly by the changing criteria for designating cities and towns (Shen, 2004). Economic reforms since the early 1980s have speeded up urbanization in China under a model of dual track urbanization. A large number of surplus rural labourers have been employed in TVEs (Township and Village Enterprises) and many rural migrants have moved into urban areas as “temporary

population”. In the meantime, institutional settings for urbanization in China have also been altered with the revision of criteria for city and town designation. These changes make it increasingly difficult to count urban population consistently in China. Recent censuses in China in 1982, 1990 and 2000 responded by introducing new definitions of urban population one after another resulting in inconsistent data on urban population.

Although little research has been done to estimate the level of urbanization for Chinese regions, several studies have been conducted to clarify national urban population data in China (Zhou, 1988; Chan, 1988; Shen, 1995; Zhang & Zhao, 1998). One important research question is what kind of population should be counted as urban population in China. Some studies have attempted to clarify how individuals who engaged in the agricultural sector may have been counted as urban population due to the designation of new cities and towns since the 1980s (Ma & Cui, 1987). Martin (1992) and Shen (1995) made attempts to clarify several definitions of urban and rural populations used in various statistics yearbooks. An alternative way to define the urban population based on the urban actual non-agricultural population was proposed by Shen (1994). Zhang and Zhao (1998) also argued that a better alternative was to use a typology based on actual occupation and residential status. They proposed to estimate the urban population by adjusting the reliable data on urban non-agricultural population by two factors, the ratio of *de jure* urban agricultural population to *de jure* urban non-agricultural population and the ratio of *de facto* long-term temporary population to *de jure* urban non-agricultural population. They used survey data to estimate the second ratio. But the overall ratio for adjustment was based on expert views that could not be checked by the real data. They estimated that the national level of urbanization was 27% in 1990, higher than the census figure of 26.2%.

As a new urban population definition was adopted in the 2000 census, the “United Nations” method plus adjustment by an annual ratio has been used to re-estimate the national level of urbanization for the period 1982-2000 or 1990-2000 (Zhou & Ma, 2003; Chan & Hu, 2003). The “United Nations” method assumes a constant difference between the growth rates of urban and rural populations and typically produces a smooth trend. Considering this problem, two previous studies used an annual ratio to adjust the results from the “United Nations” method to capture yearly fluctuations. The ratios used by

Zhou and Ma (2003) are based on the official urban population data series. The ratios used by Chan and Hu (2003) are based on non-agricultural population data from the Ministry of Public Security, assuming implicitly equal growth rates for urban agricultural and non-agricultural populations.

However, no study has been conducted so far on the provincial levels of urbanization. The inconsistency problem of urban population data was much worse in the provincial regions than in the national level. According to Yu (2001), there would be significant undercounting in several provinces such as Zhejiang if 1990 census definition was used in the 2000 census. The level of urbanization was 48.67% in Zhejiang according to 2000 census. But it would be only 36.13% if 1990 census definition was used in 2000 census. This paper attempts to fill this gap in the literature. It has two objectives. First, this paper will estimate a new annual data series of urbanization level for provincial regions for 1980-2000. Second, this paper will examine the major trends of urbanization in Chinese provinces and the relationship between urbanization and economic development for the period 1982-2000, based on the new provincial urban data series.

To provide a sound background of the issue, the paper will first examine the new urbanization process in the reform period and clarify the changing definitions of urban population in the next section. Then the regional approach to estimate national and regional urban populations will be outlined. The major trends of urbanization in Chinese provinces and the relationship between urbanization and economic development will then be analysed for the period 1982-2000. The paper concludes by offering some suggestions for counting urban population in the future.

## **2 New Urbanization Process and the Changing Definitions of Urban Population**

The government has adopted a new pro-urbanization strategy in the reform period leading to the emergence of a new mode of dual track urbanization (Shen, Wong & Feng, 2002). New criteria for the designation of new cities and towns have also been introduced since 1983 by the government, resulting in change of urban administrative areas (Ma & Cui, 1987; Shen, 2004). These changes have necessitated changes in the census definition of urban population from time to time, causing much confusion in the counting China's urban population.

### **2.1 Definition of Urban Population under State Sponsored Urbanization**

The urban population definition used in 1953 census included all registered people living in urban areas. But the government adopted a policy of controlling urban population tightly in the 1960s and 1970s according to its strategy of industrialization without urbanization for maximum capital accumulation. A household registration (hukou) system was introduced nationwide in 1958. According to this system, each individual had a registered place of residence and a status of either agricultural population or non-agricultural population, generally for rural population and urban population respectively. The non-agricultural population was entitled to privileges in employment, grain supply, housing, education, medical service and social welfare. In 1964 census, the urban population was formally defined as including only the non-agricultural population in urban areas. This definition had been in use for 18 years until the 1982 census. A single track of state sponsored urbanization, *i.e.*, the growth of non-agricultural population, prevailed in China before 1978. There was little confusion on the urban population data based on such definition in the period 1964-1978.

## 2.2 Definition of Urban Population under Dual Track Urbanization

Economic reforms in China since 1978 have affected its urbanization path dramatically (Wei, 2001; Wei & Li, 2002; Wei & Jia, 2003; Shen, 2005). The track of state sponsored urbanization has been reconfigured. First, state sponsorship to non-agricultural population has been reduced. The private sector and foreign invested enterprises have offered many jobs for non-agricultural population. The state benefits on housing, health service and social security have been reduced significantly.

On the other hand, rural industries and small towns flourished with initial success of rural reforms from the late 1970s to the early 1980s. A new track of spontaneous urbanization has been formed. Thus a dual track mode of urbanization has emerged. The spontaneous urbanization refers to the TVE-led rural urbanization and the migration of “temporary population” into urban areas. This means that some rural residents have been employed in local township industries without migration while some rural people have migrated to other places to engage in non-agricultural employment. Many scholars have argued that the rural people who were employed in TVEs in small towns, although still with hukou status of “agricultural population”, should be counted as urban population (Ma & Fan, 1994; Shen, 1995; Zhang & Zhao, 1998).

Thus the 1982 census used a new definition of urban population, including both non-agricultural population and agricultural population in urban areas, i.e., cities and towns. This change was correct in 1982 but soon became problematic after 1983 when new criteria for town and city designations were introduced (Shen, 1994).

### 2.3 Definition of Urban Population after Changes in the Criteria of City and Town Designation

Before 1978, the criteria for the designation of cities and towns were very tight (Central Committee of CCP & State Council, 1963). There were only 193 cities and 2173 towns in 1978 (Dai, 2000). The government has speeded up the process of town and city designation since the early 1980s (Ministry of Civil Affairs, 1986; 1993). As a result, the number of towns jumped from 2968 in 1983 to 7168 in 1984 and 19555 in 2001 (Wang, 2001, p.391; NBS, 2002, p.381). Many counties were also converted to cities on a wholesale manner. The number of county-level cities increased from 130 in 1982 to 427 in 1995 and then reduced to 393 in 2001. The number of cities at prefecture-level and above also increased from 115 in 1982 to 269 in 2001. Table 1 shows that the share of non-agricultural population in the total population of cities and towns declined from 69.55% in 1982 to 32.87% in 1990 and stabilized since then.

(Table 1 about here)

Thus scholars urged that the pre-1982 urban population definition should be retained as the urban population since 1984 was over-counted (Kirkby, 1985; Ma & Cui, 1987). A new definition of urban population was introduced in the 1990 census. Urban population was counted differently in cities with or without urban districts. In 188 cities with urban districts, all population was counted as urban population. In 268 cities without urban districts, only the population registered with streets or residents committees in towns was counted as urban population (PCO & DPS, 1993a, p.499). This was a move in a right direction to exclude large agricultural population in county-level cities. But the urban population data for cities with and without urban districts are not consistent (Shen, Chu, Zhang & Zhang, 1999; Zhou & Ma, 2003). The 2000 census made further changes in the definition of urban population.

### 2.4 Comparing Definitions of Urban Population in 1982, 1990 and 2000 Censuses

It is essential to scrutinize the differences in the definition of urban population in various censuses. The spatial system would be outlined first. The administrative area units in China are divided into six levels: the country as a whole, provincial level units, prefecture-level units, county-level units, town/township/street level units and villagers/residents committees (Figure 1). A city could be designated at provincial level, prefecture-level or county-level. A city at the provincial level or prefecture level often had urban districts as urban proper (shiqu). A street is a highly urbanized settlement in a city. A designated town consists of a central urban settlement (zhenqu) and other rural settlements. A township basically consists of rural settlements. Urban residents committees are organized within a street or a town while villagers committees are organized within a town or township. There are hukou and non-hukou populations (people living or not living in their place of hukou) in both residents and villagers committees. There are also people with the hukou statuses of agricultural population and non-agricultural population in residents or villagers committees.

(Figure 1 about here)

In the 2000 census, urban districts were divided into high-density and low-density urban districts with population density over and under 1500 persons per km<sup>2</sup> respectively. All high-density urban districts were considered as urban proper and all people were counted as urban population.

For low-density urban districts and county-level cities, all streets were considered as part of urban proper. A town or township where prefecture administration, a city or urban district government was located was also considered as part of urban proper. Contiguous town or township was also considered as part of urban proper. All population in such urban proper was counted as urban population.

For towns in counties, all its resident committees and the villager committee hosting the town government were regarded as town proper. Contiguous villagers committee was also considered as a part of town proper. All people in the town proper were counted as urban population. In addition, the population in special areas outside a city or a town, each with usual resident population over 3000, was also counted as town population.

In the 2000 census, the non-hukou population, who had left their origin of household registration for over half year, in the urban proper and town proper were counted as urban

population. Both agricultural and non-agricultural populations were included. This is by far the most realistic counting of urban population in China.

The scopes of urban population in 1982 and 1990 censuses were different from the 2000 census (Table 2). The basic area units to count urban population were urban districts, county-level cities and towns in counties in 1982 census, and urban districts, streets in county-level cities, residents committees in towns in county-level cities and counties in 1990 census. In the 1982 census, the urban population definition included both agricultural and non-agricultural populations in cities and towns. In 1982, the criteria of city and town designation remained as tight as 1964. Thus the urban population data in 1982 were comparable to the urban population definition in 2000 census except for the under-counting of non-hukou population who had left their origin of hukou for half to one year (Table 2). The definitions of urban population in the 1990 and 2000 censuses do not match very well.

(Table 2 about here)

### **3 Estimating National and Regional Urban Populations Based on 2000 Census**

#### **3.1 Adjusting Census Data on National and Regional Urban Populations**

Calculation of the level of urbanization must rely on reliable computer-tabulated census data. But the official “census” data on urban population reported in NBS (National Bureau of Statistics) (2001, p. 93 & 101) and DPSSTS (Department of Population, Social, Science and Technology Statistics) (2001, p.31& 41) yearbooks were based on the initial figures released in the census communiqués counted manually. They were different from the detailed computer tabulated data. There were slight differences between the manually counted and computer tabulated data in the 1982 and 1990 censuses, but significant differences in the 2000 census. Census undercounting was adjusted for the 2000 census but not for the 1982 and 1990 censuses in above data.

Consistent data, without adjusting for undercounting, were calculated by the author using computer tabulated census data first (Table 3). These data were comparable if there was no change in census definition and no undercounting of the population in various censuses.

(Table 3 about here)

Further adjustments are made for census undercounting and for changing definitions over censuses (Table 4). First, the total population and urban population were adjusted for undercounting. The rates of undercounting in the census population were released by the authority and they were 0.015%, 0.60% and 1.81% in 1982, 1990 and 2000 censuses respectively (PCO & DPS, 1985, p.553; 1993b, p.530; PCO & DPSSTS, 2002, p.1886). It was assumed that the figure of army population was correct and was considered as part of urban population.

(Table 4 about here)

Second, the 1982 and 1990 censuses did not include non-hukou population who had left hukou place for over half-year to one year. Such non-hukou population was estimated in Appendix 1.

A data set on national and provincial urban populations was obtained after above adjustments. The levels of urbanization were calculated for census years. For China as a whole, the adjusted urban population was 215.71, 314.44 and 469.57 million in 1982, 1990 and 2000 censuses respectively. The national share of urban population was 21.39%, 27.57% and 37.04% in 1982, 1990 and 2000 respectively. The share of urban population was 1% higher generally than the official figures of NBS and DPSSTS in Table 3.

### 3.2 Estimating National and Regional Urban Populations

It is argued previously that the urban population data from 1990 and 2000 censuses are not comparable. There are significant undercounting and over-counting of urban population in some provinces. There is a need to estimate the provincial urban population data for 1990 as well as the inter-censal years in the period 1982-2000. This paper used an approach based on the concept of dual track urbanization. The total population in mainland China was divided into the army population and 31 provincial populations. The estimation of urban population was made for each province while the whole army population was regarded as urban population.

According to the concept of dual track urbanization, the urban population in China consists of people with different hukou statuses of non-agricultural population and agricultural population respectively (Shen, Wong & Feng, 2002). Such people refer to non-agricultural population and agricultural population respectively. The provincial



urban non-agricultural population data from DPES (Department of Population and Employment Statistics) (1995a, p. 433; 1995b, p.378-379) and DPSSTS (2001, p.202; 2002, p.195-196 & 198) were fully utilized. They were fairly reliable due to the hukou system (Zhang & Zhao, 1998). The data on provincial urban agricultural population in 1982 and 2000 were obtained as the difference between the provincial urban population and urban non-agricultural population. They were used as benchmarks for estimating a data series of provincial urban agricultural population from 1982 to 2000. The following steps were taken in the estimation.

First, the year-end national and provincial urban non-agricultural population data were converted to mid-year data for the period 1982-1999 by taking the average of figures at the end of previous year and current year. For 2000, the urban non-agricultural population data at the end of 1999 and 2000 were converted to urban non-agricultural population data on 1 November 2000 when the census took place by applying weights of 2/12 and 10/12 to 1999 and 2000 year-end data respectively.

Second, the growth rate of each provincial urban non-agricultural population for the period 1982-2000 was calculated.

Third, according to provincial urban population and urban non-agricultural population data for 1982 and 2000, the provincial urban agricultural population data in 1982 and 2000 were calculated. But the provincial urban agricultural population data in the period 1983-1999 had to be estimated to match the benchmark data in 1982 and 2000.

It was assumed that the urban agricultural population  $A_{ik}$  would grow at the rate of  $R_{ik}$  while the urban non-agricultural population  $N_{ik}$  would grow at the rate of  $G_{ik}$  in province  $k$  in year  $i$ .  $O_k$  is defined as the ratio of the growth rate  $R_{ik}$  of urban agricultural population to the growth rate  $G_{ik}$  of urban non-agricultural population in province. It was further assumed that  $O_k$  is constant in the period 1982-2000. This means that:

$$R_{ik} = O_k G_{ik} \quad i = 1983, 1984, \dots, 2000 \quad (1)$$

$$A_{ik} = A_{1982k} \prod_{j=1983}^i (1 + R_{jk}) \quad i = 1983, 1984, \dots, 2000 \quad (2)$$

It is also found that:

$$A_{2000k} = A_{1982k} \prod_{j=1983}^{2000} (1 + R_{jk}) \quad (3)$$

As  $A_{2000k}$  and  $A_{1982k}$  and  $G_{ik}$  were known in the above equations,  $O_k$  could be estimated for province  $k$  simply through simulation in an Excel worksheet. Table 5 shows that  $O_k$  ranged from 0.951 in Shandong to 1.169 in Tibet. The provincial urban agricultural population in various years could be calculated using equation (2).

(Table 5 about here)

Fourth, the provincial urban population could be calculated as the total of provincial urban non-agricultural and agricultural populations.

Fifth, the mid-year provincial population data based on NBS data for the period 1982-2000 had to be adjusted using 1982 and 2000 census results as benchmarks (NBS, 1999; 2000; 2001; 2002). The growth rate for a province's total population was first calculated using the NBS data. Then the growth rate was adjusted by a constant ratio so that the total populations in 1982 and 2000 would match the census-based total populations for each province. Such ratio was also determined for each province through simulation in an Excel worksheet (Table 5). It ranged from 0.997 in Qinghai and Guangxi to 1.003 in Beijing. The provincial total populations were then obtained for the period 1982-2000.

Finally, the provincial levels of urbanization were calculated using the estimated provincial total populations and urban populations.

#### **4 Changing Levels of Urbanization in Chinese Provinces**

Using the approach described in the previous section, a complete set of annual urban population data has been obtained for China as a whole and its various provincial regions. The results provide the first opportunity to assess urbanization among Chinese provinces and the relationship between urbanization and economic development in the reform period 1982-2000.

China's transition towards a market economy facilitates decentralization, commercialisation, privatisation and globalisation as well as local development (Wei, 2001; Shen, 2005). Dramatic economic growth and a pro-urbanization strategy of the government have resulted in rapid urbanization in China. The following data confirms such trend of rapid urbanization.

For China as a whole, the urban population increased from 215.71 million in 1982 to 319.74 million in 1990 and 469.57 million in 2000. The level of urbanization increased from 21.39% in 1982 to 28.27% in 1990 and 37.04% in 2000. The estimated figure for 1990 is close to the estimated level of urbanization, 28.14%, by Zhou and Ma (2003, p.193) (took average of their figures 27.93% and 28.35% for 1989 and 1990 year-end) although a different regional approach is used here. Clearly, the speed of urbanization was even faster in the 1990s than in the 1980s. China is expected to reach the important mark of an urbanization level of 50% by year 2010.

In most provincial regions (Figure 2), the estimated levels of urbanization are greater than those from the 1990 census (PCO and DPS, 1993a, p.16-19). The difference was as large as 5 percentage points in Jilin, Zhejiang and Fujian where their level of urbanization was significantly undercounted. The undercounting in Jilin was obvious. In 1982, Jilin's level of urbanization was 40.62%, only 1-3 percentage points less than that in Liaoning and Heilongjiang. However, the 1990 census data indicated that the level of urbanization in Jilin was only increased by 1.14 percentage points while that in Liaoning and Heilongjiang was increased by 6.72 and 6.86 percentage points respectively in the period 1982-1990. Such increasing gap in the level of urbanization among Jilin, Liaoning and Heilongjiang is due to undercounting rather than the real difference in urbanization process.

(Figure 2 about here)

This section will pinpoint the key features of the spatial dynamics of urbanization in the period of 1982-2000 in China. First, urban population growth in Guangdong is really outstanding due to significant dual-track urbanization (Shen, Wong & Feng, 2002). Guangdong had an urban population of 10.60 million in 1982 when it was Liaoning that had the largest urban population of 15.51 million. Over the years, thanks to rapid economic development and industrialization induced by economic reforms, local development initiatives and large-scale foreign investment, urban population in Guangdong grew rapidly (Yeung & Chu, 1998; Wong & Shen, 2002; Shen, 2002). It reached 24.11 million in 1990 and 48.29 million in 2000. Such increase was fuelled by the increase of both urban non-agricultural population and inflow of non-hukou population to urban areas (Shen, Wong & Feng, 2002). In 1992, Guangdong overtook

Shandong (urban population of 27.10 million) becoming the province with the largest urban population of 27.59 million.

Second, China had eight provinces that each had an urban population over 20 million in 2000. These provinces were Guangdong, Shandong, Jiangsu, Hubei, Liaoning, Zhejiang, Sichuan and Henan. Except Jiangsu and Hubei, each of these provinces already had a large urban population over 10 million in 1982. Thus initial foundation of urbanization had important impact on their subsequent urban growth. Nevertheless, these provinces can be divided into two groups. The urban population was more than doubled in the first group including Guangdong, Shandong, Jiangsu, Hubei, Zhejiang and Sichuan while the urban population was less than doubled in the second group including Liaoning and Henan in the period 1982-2000. Although Heilongjiang had the third largest urban population in 1982, its urban population was only 19.01 million in 2000 due to slow urban growth. Another five provincial units including Hebei, Hunan, Anhui, Shanghai and Fujian also experienced rapid urban expansion in the period 1982-2000.

Third, as the most urbanized metropolitan areas in China, Shanghai, Beijing and Tianjin had the highest level of urbanization in the whole period, over 60% in 1982 and over 70% in 2000 (Table 6). Liaoning, Heilongjiang and Jilin had a high level of urbanization, over 40%, in 1982. But their levels of urbanization were increased only slowly by about 10 percentage points in the period 1982-2000. Contrasting with rapid economic development in south China and east China, the SOE (State Owned Enterprise) dominated economy in northeast China was uncompetitive in the emerging market economy. Urbanization in Inner Mongolia was similar to the case of northeast China.

(Table 6 about here)

Fourth, most rapid urbanization took place in Guangdong, Zhejiang, Jiangsu, Fujian, Hainan, Hubei and Shandong. Their level of urbanization was increased by about 20 percentage points in the period 1982-2000 and reached over 38% in 2000. Except for Hubei, all these provinces are located in the east coast of China. The contributing factors include the implementation of reform and open door policies ahead of other regions, dramatic growth in TVEs, private economy and foreign investment. Long business tradition, strong economic foundation and good connection with global economy play important roles in the development of the coastal economy.

Fifth, in addition to rapid urbanization in the coastal provinces mentioned above, many provinces experienced slow urbanization. One outstanding example was Hebei, a coastal province. Its level of urbanization was only 14.04% and 26.33% in 1982 and 2000 respectively. It seems that the two metropolitan areas, Beijing and Tianjin located inside the province, did not bring too much benefit to Hebei. Furthermore, Shanxi, Xinjiang and Ningxia had a level of urbanization greater than the national average in 1982. But by 2000, their level of urbanization was below the national average.

Sixth, the urban population in the eastern region was growing much faster than the central and western regions of China in the period 1982-2000 (Figure 3). The definition of three regions is shown in Figure 2 (Yeung & Shen, 2004). In eastern China, the urban population increased from 93.23 million in 1982 to 229.06 million in 2000. The central and western China had an urban population of 135.65 million and 102.37 million respectively in 2000. The gap in the level of urbanization increased between eastern and central/western regions (Figure 4). In 1982, the level of urbanization in the eastern region was only 4.36 and 5.74 percentage points higher than the central and western regions respectively. In 2000, it was 13.89 and 17.70 percentage points higher than the central and western regions respectively. The eastern region will soon pass the critical urbanization level of 50% and enter a new stage of urbanization toward maturity. Many efforts are required for the monitoring, planning, management, sustainable development and governance of the expanding urban system in the eastern region of China.

(Figure 3 and 4 about here)

## **5 Relationship between Economic Development and Urbanization**

It is generally accepted that there is a positive relationship between economic development and urbanization (Davis & Henderson, 2003; Anderson & Ge, 2004). In an interesting analysis using the national data on urban population and GDP (Gross Domestic Product) per capita, Zhang (2004: 11) found that urbanization in the reform period 1982-2000 still lagged behind economic development. His assessment was based on three regression models between the level of urbanization and logged GDP per capita for all countries, developing countries and socialist countries respectively. The result was consistent based on three different models. Although underurbanization in pre-reform

China was well known (Ran & Berry, 1989), this result was a new finding regarding urbanization in the reform period.

The new data sets on provincial levels of urbanization are useful for a fresh cross-sectional assessment of the relationship between economic development and the level of urbanization in the reform period. GDP per capita is used to represent the level of economic development. It is calculated using provincial GDP at 2000 constant price and the population from the 1982, 1990 and 2000 censuses. The provincial GDP data at 2000 constant price are obtained using the GDP data in year 2000 and the GDP growth index from NBS (1999; 2001, p.56). There are 31 provincial regions in China in 2000. But data for Chongqing in 1990 are not complete so there are only 30 samples for analysis involving year 1990.

Initial correlation analysis between GDP per capita and the level of urbanization in 1982, 1990 and 2000 reveals their significant relationship. The correlation coefficients are 0.839, 0.877 and 0.915 in 1982, 1990 and 2000 respectively. All are significant at 0.05 level. The increasing correlation coefficient from 1982 to 2000 also means that GDP per capita became more and more important in determining the level of urbanization. This can be explained by relaxed control on rural to urban migration and the marketization of the economy (Wei, 2001; Ma, 2002; Shen, 2005).

Simple regression equations can also be estimated with the level of urbanization ( $U_t$ ) as independent variable and GDP per capita ( $GDPPC_t$ ) as explanatory variable as follows:

$$U_{82}=5.914+0.011GDPPC_{82} \quad (4)$$

(2.796\*) (0.001\*\*)

$R^2=0.705, F=69.185^{**}$

$$U_{90}=9.543+0.00708GDPPC_{90} \quad (5)$$

(2.753\*) (0.001\*\*)

$R^2=0.770, F=93.718^{**}$

$$U_{2000}=15.442+0.00298GDPPC_{2000} \quad (6)$$

(2.307\*\*) (0.000\*\*)
  
 $R^2=0.838, F=149.933^{**}$

In above equations, standard errors of regression coefficients are given in brackets. All regression coefficients and regression equations are significant at 0.05 or 0.01 level as indicated by \* or \*\* respectively. From 1982 to 2000, the explanatory power of the level of economic development increased significantly. It can explain 70.5% of variation in the level of urbanization among provincial regions in 1982 but 77.0% in 1990 and 83.8% in 2000. The constant in above equations indicates the base level of urbanization in various provinces of China. Using this constant and the average GDP per capita in a year, the expected average level of urbanization for Chinese provinces can be calculated.

However, the initial level of urbanization, say in 1982, may also have significant impact on subsequent levels of urbanization in 1990 and 2000. This significant relationship is confirmed by correlation analysis among the level of urbanization in 1982, 1990 and 2000. The correlation coefficients are 0.979 between the level of urbanization in 1982 and 1990, 0.888 between the level of urbanization in 1982 and 2000 and 0.948 between the level of urbanization in 1990 and 2000. All are significant at 0.05 level. Given larger correlation coefficients, the level of urbanization 8 or 10 years ago (1982 or 1990) has a closer relation with the current level of urbanization (1990 or 2000) than the current level of development (1990 or 2000). This points to the existence of path-dependency in urbanization that the initial level of urbanization influences subsequent level of urbanization of a region. Hence, multiple regression models are estimated to consider previous levels of urbanization and other variables simultaneously.

Variables considered in the stepwise regression for the level of urbanization in 2000 include GDP per capita (GDPPC) in 1982, 1990 and 2000, annual growth rates of GDP per capita (GDPPCR) in 1982-1990, 1990-2000 and 1982-2000, annual growth rates of GDP (GDPR) in 1982-1990, 1990-2000 and 1982-2000, the level of urbanization in 1982 and urban population in 1982 and 1990. The following optimal regression equation is obtained.

$$U_{2000} = -8.477 + 0.503U_{82} + 0.00414GDPPC_{90} + 2.122GDPR_{8200} \quad (7)$$

(6.340) (0.112\*\*) (0.001\*\*) (0.587\*\*)

$R^2 = 0.930, F = 114.302^{**}$

The above model includes three most important explanatory variables, the level of urbanization in 1982, GDP per capita in 1990 and the annual GDP growth rate in 1982-2000. Their regression coefficients are significant at 0.01 level. As high as 50.3% of the level of urbanization in 1982 was counted in the level of urbanization in 2000. Furthermore, an increase in RMB (Ren Min Bi, Chinese Money Unit) 1000 in GDP per capita in 1990 would result in an increase of 4.14 percentage points in the level of urbanization. An increase of 1% average annual growth rate of GDP in 1982-2000 would also result in an increase of 2.122 percentage points in the level of urbanization in 2000. Initial level of urbanization, GDP per capita and annual GDP growth rate together can explain 93.0% of the variation of the level of urbanization among provincial regions in China in 2000.

A similar regression equation can be estimated for the level of urbanization in 1990. Variables considered include GDP per capita (GDPPC) in 1982 and 1990, annual growth rate of GDP per capita (GDPPCR) in 1982-1990, annual growth rate of GDP (GDPR) in 1982-1990, the level of urbanization in 1982 and urban population in 1982. The following optimal regression equation is obtained.

$$U_{90} = -0.253 + 0.873U_{82} + 0.00118GDPPC_{90} + 0.816GDPPCR_{8290} \quad (8)$$

(2.833) (0.066\*\*) (0.001\*) (0.328\*)

$R^2 = 0.971, F = 288.301^{**}$

In the above model, three most important explanatory variables are the level of urbanization in 1982, GDP per capita in 1990 and annual growth rate of GDP per capita in 1982-1990. Their regression coefficients are significant at 0.01 or 0.05 level. As much as 87.3% of the level of urbanization in 1982 was counted in the level of urbanization in 1990. Furthermore, an increase of RMB1000 in GDP per capita in 1990 would result in an increase of 1.18 percentage points in the level of urbanization and an increase of 1% average annual growth in GDP per capita in 1982-1990 would result in an increase of 0.816 percentage point in the level of urbanization in 1990. Initial level of urbanization, GDP per capita and annual growth rate of GDP per capita together can explain 97.1% of



the variation of the level of urbanization among provincial regions in China in 1990. Clearly, the historical levels of urbanization and economic development contribute to the current level of urbanization.

Comparing the regression coefficients in equation (7) and (8) for 2000 and 1990 respectively, the regression coefficient of the level of urbanization in 1982 became smaller in 2000 than in 1990 while the coefficients of GDP per capita and the growth rate of GDP in 2000 were greater than those of GDP per capita and the growth rate of GDP per capita in 1990. This means that the level of urbanization in 1982 became less important while GDP per capita and the growth rate of GDP became more important in determining the level of urbanization in 2000. This reflects the effect of both a pro-urbanization policy of the government and economic development on urbanization in China.

## **6 Summary and Concluding Comments**

The lack of consistent data on urban population has plagued the students of Chinese urbanization for a long time. Such data are essential for studying the emerging spatial patterns and process of urbanization in the largest country in the world. With the release of the 2000 census data that used a new and more sophisticated area-based definition of urban population, the current level of urbanization becomes clear. However, how to estimate the regional levels of urbanization in the inter-censal periods such as 1982-2000 remains unresolved. This paper has adopted a regional approach to estimate a new and consistent data series of national and regional urban populations making use of the concept of “dual tack urbanization”.

Essentially, the approach of this study has following advantages. First, the estimation of urban population data series used adjusted census figures in 1982 and 2000 as benchmarks. The adjustment was made according to an urban population definition close to the 2000 census.

Second, the national urban population data were the sum of regional urban population data so that they were consistent for the whole period 1982-2000.

Third, reliable urban non-agricultural population data collected by NBS were fully utilized in the estimation of provincial urban population data. The data on provincial urban agricultural population in 1982 and 2000 were obtained as the difference between

the provincial urban population and urban non-agricultural population. They were used as benchmarks for estimating a data series of provincial urban agricultural population from 1982 to 2000 census.

The estimated consistent data series of national and regional urban populations is of great value to the study of Chinese urbanization. Based on the new estimated urban data of provincial regions, the paper has pinpointed the key features of the regional urbanization trends in China in the period 1982-2000. The relationship between urbanization and economic development is analysed for the period 1982-2000. Correlation analysis reveals significant relationship between GDP per capita and the levels of urbanization. GDP per capita became more and more important in determining the level of urbanization in 1982-2000. An optimal and comprehensive model is estimated using stepwise regression. The urbanization level in 2000 was determined by the initial urbanization level in 1982, GDP per capita in 1990 and annual GDP growth rate in 1982-2000.

Regarding the statistical development on collecting urban population data in the future, the following suggestions are offered. First, the NBS needs to produce a set of consistent national and regional urban population data at least from 1982. It may adopt the data series estimated or the approach used by this study. The data on provincial urban non-agricultural population should be used as a major reference in estimating regional urban populations for the period 1982-2000.

Second, with further reform in hukou system and the increase of non-hukou population in urban areas, the statistics on urban non-agricultural population will become less reliable in the future. Other than using a strict definition of urban population in the census, it is also prudent to define a set of standard metropolitan regions (SMRs) using towns and streets as building blocks so that both population and other socio-economic data can be routinely tabulated according to US experience (Adams, van Drasek & Phillips, 1999). Such a system would allow data collection on urban areas on annually basis. The urban area definition used in 2000 census was introduced for the census only. It also involves complicated identification of contiguous urban areas using different kinds of area units. A national standard needs to be introduced so that it can be used

consistently to identify changes in urban areas over time. The SMR system would greatly facilitate planning and research.

Third, the SMR system should be separated from the administrative system in the designation of cities and towns (Zhou, 1988; Shen, 2005). The designation of cities and towns is subject to political and administrative considerations from time to time, often resulting in over-bounding and under-bounding problems of urban areas. The administrative procedure is rigid and time consuming. It could not change city and town designation and boundaries frequently and flexibly. An independent SMR system would avoid the interference of the administrative system allowing reliable data collection of urban areas.

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## **Appendix 1**

This paper estimated a ratio of the number of migrants who had left for over half-year to one year to the number of migrants who had left over one year using detailed temporary population data of 1997 (Administration Bureau of Household Registration, 1997). There were non-hukou populations of 5.92 million, 21.58 million and 9.77 million who had left the place of household registration for less than one month, over one month but less than one year and over one year respectively in 1997.

To estimate the non-hukou population who had left for over half-year to one year, the non-hukou population who had left for each month in the first year needs to be estimated. It is assumed that the non-hukou population would be decreased by  $C_i$  in month  $i$  from month one to month twelve of the first year and that  $C_i$  would change in proportion to the ratio of the non-hukou population  $M_i$  who left in month  $i$  to the non-hukou population  $M_{i-1}$  in previous month  $i-1$ . The non-hukou population in month one  $M_1$  was known as 5.92 million. Given an initial  $C_2$ , subsequent  $M_i$  ( $i=2,3,\dots,12$ ) and  $C_i$  ( $i=3,4,\dots,12$ ) can be calculated. Through simulation in an Excel worksheet,  $C_2$  was found to be 1.19 million. It is estimated that the total non-hukou population who left over half-year to one year was 7.23 million in 1997. Thus the ratio of the non-hukou population who left over half-year to one year to the non-hukou population who left over one year was 0.7804. This ratio was used to estimate the non-hukou population who left over half-year to one year for 1982 and 1990 censuses.

The non-hukou non-agricultural population who left over half-year to one year should have been counted at the origin of household registration in the 1982 and 1990 censuses. They should be excluded to avoid double counting. In 1982 census, the non-hukou non-agricultural population was unknown and such double counting could not be removed. But this figure was small giving that the total non-hukou population who left over half-year to one year was only 5.13 million in 1982 census. In 1990 census, the non-hukou

non-agricultural population who left over one year was 4.53 million for China as a whole. Using the above ratio of 0.7804, the non-hukou non-agricultural population who left over half-year to one year was estimated and deducted from the urban population in the 1990 census.



**Table 1 Share of Non-agricultural Population in City and Town Population in China 1982-2000**

| Year | City and Town | City  | Town  |
|------|---------------|-------|-------|
| 1982 | 69.55         | 67.84 | 73.66 |
| 1983 | 63.15         | 60.08 | 71.97 |
| 1984 | 50.56         | 58.60 | 38.88 |
| 1985 | 46.99         | 56.68 | 34.40 |
| 1986 | 42.32         | 53.68 | 29.27 |
| 1987 | 38.80         | 50.30 | 25.96 |
| 1988 | 37.62         | 47.27 | 25.30 |
| 1989 | 36.89         | 46.83 | 24.46 |
| 1990 | 36.34         | 45.81 | 24.28 |
| 1991 | 36.02         | 45.38 | 24.06 |
| 1992 | 32.87         | 44.29 | 20.11 |
| 1993 | 32.80         | 42.30 | 20.47 |
| 1994 | 32.68         | 40.73 | 20.52 |
| 1995 | 32.06         | 40.59 | 19.91 |
| 1996 | 32.31         | 40.74 | 19.78 |
| 1997 | 32.36         | 40.81 | 19.76 |
| 1998 | 32.50         | 41.30 | 19.68 |
| 1999 | 32.75         | 41.68 | 19.86 |
| 2000 | 32.82         | 42.22 | 19.77 |

Source: DPSSTS (2002).

**Table 2 Scope of Urban Population in 1982, 1990 and 2000 Censuses**

| Census                                                                                                                      | 1982 | 1990 | 2000 |
|-----------------------------------------------------------------------------------------------------------------------------|------|------|------|
| <b>Spatial coverage</b>                                                                                                     |      |      |      |
| <i>Cities/urban districts</i>                                                                                               |      |      |      |
| Urban districts with population density over 1500 persons per km <sup>2</sup>                                               | Yes  | Yes  | Yes  |
| Urban districts with population density less than 1500 persons per km <sup>2</sup>                                          | Yes  | Yes  | No   |
| Cities without districts                                                                                                    | Yes  | No   | No   |
| <i>Streets/towns/townships/ special areas</i>                                                                               |      |      |      |
| Streets in cities that are not wholly covered                                                                               | Yes  | Yes  | Yes  |
| Towns in counties                                                                                                           | Yes  | No   | No   |
| Towns in cities that are not wholly covered                                                                                 | Yes  | No   | No   |
| Town or township as or contiguous to the government seat of its urban district                                              | Yes  | Yes  | Yes  |
| Town or township as or contiguous to the government seat of a city without districts                                        | Yes  | No   | Yes  |
| Town or township as government seat of prefecture in a city not wholly covered                                              | Yes  | No   | Yes  |
| Special area with population over 3000 persons                                                                              | No   | No   | Yes  |
| <i>Residents/villagers committees in towns in counties and cities that are not wholly covered</i>                           |      |      |      |
| Residents committees in towns                                                                                               | Yes  | Yes  | Yes  |
| Villagers committees as town seats                                                                                          | Yes  | No   | Yes  |
| Villagers committees whose seats are contiguous to the seat of its town government                                          | Yes  | No   | Yes  |
| <b>Population coverage</b>                                                                                                  |      |      |      |
| Including all agricultural population in villagers committee in cities that are wholly covered                              | Yes  | Yes  | Yes  |
| Including all agricultural population in villagers committee in towns of counties and in cities that are not wholly covered | Yes  | No   | No   |
| Excluding hukou population who has left their place of registration over one year                                           | Yes  | Yes  | Yes  |
| Excluding hukou population who has left their place of registration for half to one year                                    | No   | No   | Yes  |
| Including non-hukou population who has left their place of registration over one year                                       | Yes  | Yes  | Yes  |
| Including non-hukou population who has left their place of registration for half to one year                                | No   | No   | Yes  |

Sources: PCO & DPSSTS (2002, p.1905-1906); PCO & DPS (1985, p. 26); PCO of Guangdong Province (2002, p. 3146-3155).

**Table 3 Total Population and Urban Population from 1982, 1990 and 2000 Censuses**

| Source\Census                                      | 1982                      | 1990           | 2000           |
|----------------------------------------------------|---------------------------|----------------|----------------|
| <b>Total population (million)</b>                  |                           |                |                |
| NBS (2001, p.93) with army population              | 1008.18                   | <u>1133.68</u> | <u>1265.83</u> |
| Author with army population                        | 1008.18                   | 1133.71        | 1245.11        |
| DPSSTS (2001, p.31) without army population        | 1003.94                   | <u>1130.48</u> | <u>1263.33</u> |
| Author without army population                     | 1003.94                   | 1130.51        | 1242.61        |
| <b>Urban population (million)</b>                  |                           |                |                |
| NBS (2001, p.93) with army population              | <u>210.82<sup>a</sup></u> | <u>299.71</u>  | <u>458.44</u>  |
| Author with army population                        | 210.55                    | 299.34         | 461.27         |
| DPSSTS (2001, p.31) without army population        | <u>206.58</u>             | <u>296.51</u>  | <u>455.94</u>  |
| Author without army population                     | 206.31                    | 296.15         | 458.77         |
| <b>Urban population share (%)</b>                  |                           |                |                |
| NBS (2001, p.93) with army population <sup>b</sup> | <u>20.91</u>              | <u>26.44</u>   | <u>36.22</u>   |
| Author with army population                        | 20.88                     | 26.40          | 37.05          |
| DPSSTS (2001, p.31) without army population        | <u>20.60</u>              | <u>26.23</u>   | <u>36.09</u>   |
| Author without army population                     | 20.55                     | 26.20          | 36.92          |

Notes:

- a. Underlined figures mean that they are initial census data announced in the census communiqués by the authority and they are slightly different from the detailed census data sets published later.
- b. Figures in this row are calculated by the author using the NBS (2001, p.93) data provided in the table.

Sources: NBS (2001, p.93); DPSSTS (2001, p.31); PCO & DPS (1985, p. 16 & 26; 1993a, p. 2-18); PCO & DPSSTS (2002, p. 2); History of the PLA <http://www.globalsecurity.org/military/world/china/pla-hist.htm> (accessed on 10 May 2003).

**Table 4 Adjusted Urban Population Data in China Based on 1982, 1990 and 2000 Censuses**

| Indicator\Census                                                       | 1982     | 1990     | 2000     |
|------------------------------------------------------------------------|----------|----------|----------|
| <b>Total population including army population (million)</b>            |          |          |          |
| Census data including army population by author                        | 1008.18  | 1133.71  | 1245.11  |
| Under-enumerated population                                            | 0.15     | 6.78     | 22.49    |
| Adjusted census data                                                   | 1008.33  | 1140.49  | 1267.60  |
| <b>Urban population (million)</b>                                      |          |          |          |
| Census data excluding army population by author                        | 206.31   | 296.15   | 458.77   |
| Army population                                                        | 4.24     | 3.20     | 2.50     |
| Agricultural population in urban area                                  | Included | Included | Included |
| Non-hukou non-agricultural population who left origin half to one year | na       | -3.53    | Included |
| Non-hukou population who left origin half to one year                  | 5.13     | 16.86    | Included |
| Non-hukou population who left origin over one year                     | Included | Included | Included |
| Under-enumerated population                                            | 0.03     | 1.78     | 8.30     |
| Adjusted census data                                                   | 215.71   | 314.44   | 469.57   |
| <b>Urban population share (%)</b>                                      |          |          |          |
| Adjusted census data                                                   | 21.39    | 27.57    | 37.04    |
| Census data by author with army population                             | 20.88    | 26.40    | 37.05    |
| Census data by author without army population                          | 20.55    | 26.20    | 36.92    |

Sources: Same as Table 3 and author's estimates in Table 3.

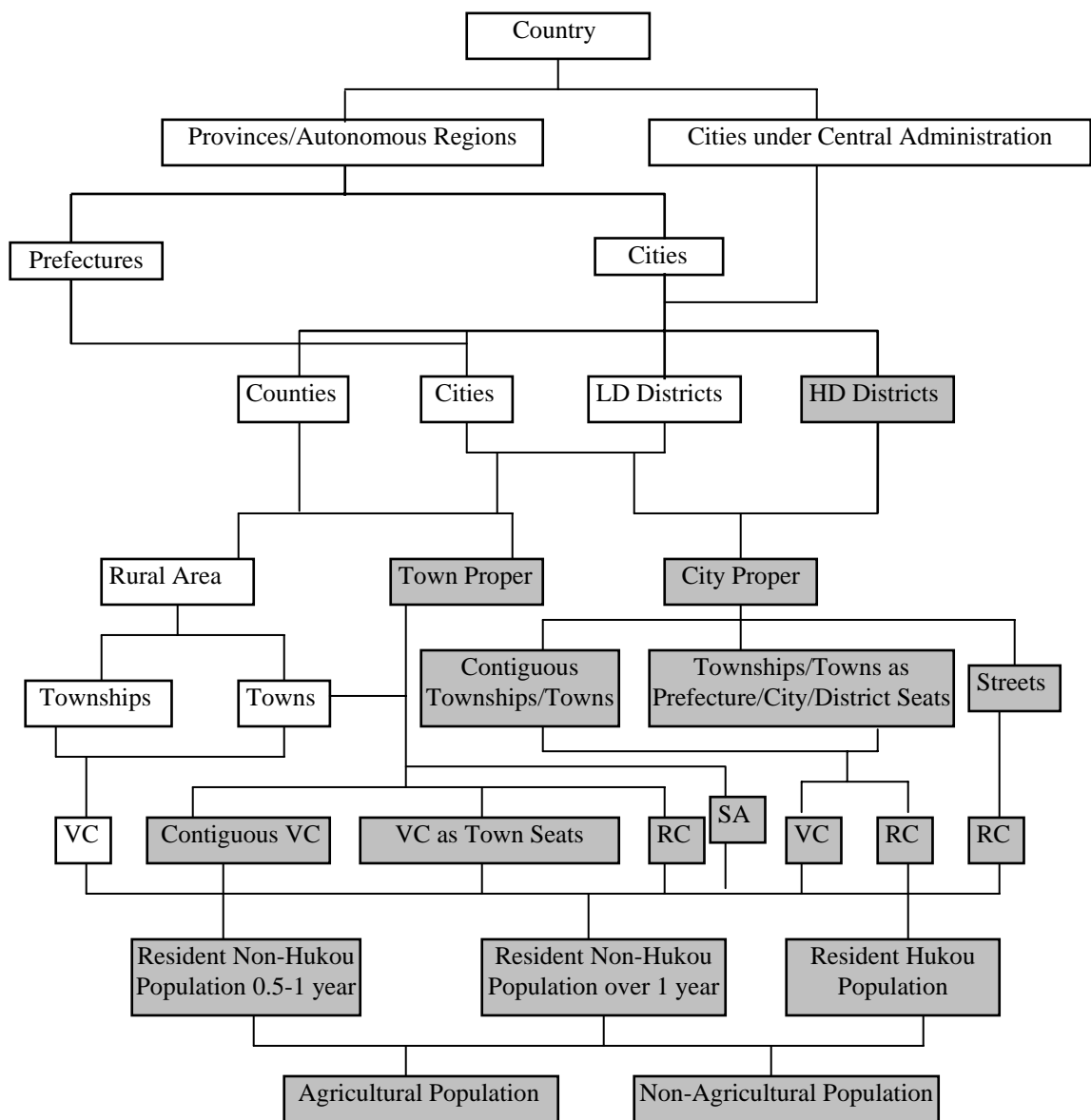
**Table 5 Adjustment Ratio of the Growth Rate of Agricultural Population and Total Population for 1982-2000**

| Region          | Growth rate ratio of urban agricultural population to that of urban non-agricultural population | Ratio of census-based total population growth rate to that of NBS-based growth rate |
|-----------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Beijing         | 1.037                                                                                           | 1.003                                                                               |
| Tianjin         | 1.000                                                                                           | 1.001                                                                               |
| Hebei           | 0.995                                                                                           | 1.001                                                                               |
| Shanxi          | 0.986                                                                                           | 1.001                                                                               |
| Inner Mongolia  | 1.010                                                                                           | 1.000                                                                               |
| Liaoning        | 0.992                                                                                           | 1.001                                                                               |
| Jilin           | 0.967                                                                                           | 1.001                                                                               |
| Heilongjiang    | 0.978                                                                                           | 0.998                                                                               |
| Shanghai        | 1.133                                                                                           | 1.004                                                                               |
| Jiangsu         | 1.022                                                                                           | 1.001                                                                               |
| Zhejiang        | 0.996                                                                                           | 1.002                                                                               |
| Anhui           | 0.983                                                                                           | 0.998                                                                               |
| Fujian          | 1.024                                                                                           | 1.002                                                                               |
| Jiangxi         | 0.962                                                                                           | 0.999                                                                               |
| Shandong        | 0.951                                                                                           | 1.001                                                                               |
| Henan           | 0.952                                                                                           | 0.999                                                                               |
| Hubei           | 1.029                                                                                           | 1.001                                                                               |
| Hunan           | 0.994                                                                                           | 0.999                                                                               |
| Guangdong       | 1.043                                                                                           | 1.008                                                                               |
| Guangxi         | 1.021                                                                                           | 0.997                                                                               |
| Hainan          | 1.069                                                                                           | 0.999                                                                               |
| Chongqing       | 1.023                                                                                           | 1.001                                                                               |
| Sichuan         | 0.991                                                                                           | 0.999                                                                               |
| Guizhou         | 0.973                                                                                           | 0.998                                                                               |
| Yunnan          | 1.010                                                                                           | 1.001                                                                               |
| Tibet           | 1.169                                                                                           | 1.001                                                                               |
| Shaanxi         | 0.993                                                                                           | 0.999                                                                               |
| Gansu           | 0.993                                                                                           | 1.000                                                                               |
| Qinghai         | 1.023                                                                                           | 0.997                                                                               |
| Ningxia         | 0.954                                                                                           | 1.001                                                                               |
| Xinjiang        | 0.964                                                                                           | 1.002                                                                               |
| Army population | 1.000                                                                                           | 1.000                                                                               |

**Table 6 Estimated National and Provincial Levels of Urbanization 1982-2000 (%)**

| Region          | 1982   | 1985   | 1990   | 1995   | 2000   |
|-----------------|--------|--------|--------|--------|--------|
| Shanghai        | 60.28  | 63.21  | 69.05  | 81.63  | 88.31  |
| Beijing         | 66.29  | 68.36  | 70.91  | 75.78  | 77.55  |
| Tianjin         | 70.40  | 72.46  | 74.05  | 74.87  | 71.99  |
| Guangdong       | 19.76  | 24.68  | 36.82  | 54.25  | 55.66  |
| Liaoning        | 43.41  | 48.57  | 51.02  | 53.90  | 54.91  |
| Heilongjiang    | 41.13  | 44.49  | 48.33  | 49.90  | 51.53  |
| Jilin           | 40.62  | 44.37  | 47.62  | 50.37  | 49.66  |
| Zhejiang        | 26.35  | 31.91  | 36.67  | 41.15  | 48.67  |
| Inner Mongolia  | 29.57  | 32.21  | 36.60  | 38.56  | 42.70  |
| Jiangsu         | 16.21  | 19.94  | 24.84  | 31.10  | 42.25  |
| Fujian          | 21.71  | 25.27  | 29.20  | 36.45  | 41.96  |
| Hainan          | 12.68  | na     | 24.44  | 31.14  | 40.68  |
| Hubei           | 17.75  | 22.53  | 28.78  | 35.35  | 40.48  |
| Shandong        | 19.54  | 25.33  | 30.35  | 36.63  | 38.15  |
| Shanxi          | 21.54  | 27.33  | 29.85  | 32.12  | 35.21  |
| Xinjiang        | 29.10  | 33.19  | 33.31  | 33.57  | 33.84  |
| Chongqing       | 15.10  | na     | na     | na     | 33.09  |
| Ningxia         | 23.04  | 24.80  | 28.95  | 31.70  | 32.44  |
| Qinghai         | 20.99  | 28.44  | 30.92  | 31.77  | 32.34  |
| Shaanxi         | 19.47  | 23.78  | 25.70  | 27.72  | 32.15  |
| Guangxi         | 12.12  | 14.47  | 17.51  | 24.09  | 28.16  |
| Jiangxi         | 19.93  | 21.33  | 23.00  | 25.15  | 27.69  |
| Hunan           | 14.56  | 16.86  | 19.84  | 23.53  | 27.50  |
| Sichuan         | 14.45  | 16.97  | 19.65  | 24.95  | 27.09  |
| Anhui           | 14.51  | 16.01  | 19.34  | 23.29  | 26.72  |
| Hebei           | 14.04  | 17.14  | 19.19  | 22.29  | 26.33  |
| Guizhou         | 19.39  | 21.05  | 21.02  | 23.31  | 23.96  |
| Gansu           | 15.72  | 18.31  | 20.73  | 22.13  | 23.95  |
| Henan           | 14.83  | 15.67  | 17.53  | 21.17  | 23.44  |
| Yunnan          | 13.27  | 15.85  | 17.75  | 20.10  | 23.38  |
| Tibet           | 9.70   | 9.63   | 11.01  | 13.77  | 19.43  |
| Army population | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| China           | 21.39  | 24.72  | 28.27  | 33.28  | 37.04  |

Note: the figure for Hainan in 1985 is included in Guangdong and the data for Chongqing in 1985-1995 are included in Sichuan.



**Figure 1 The scope of urban population in China in 2000 census**

Notes:

Scope of urban population: shaded area in the figure

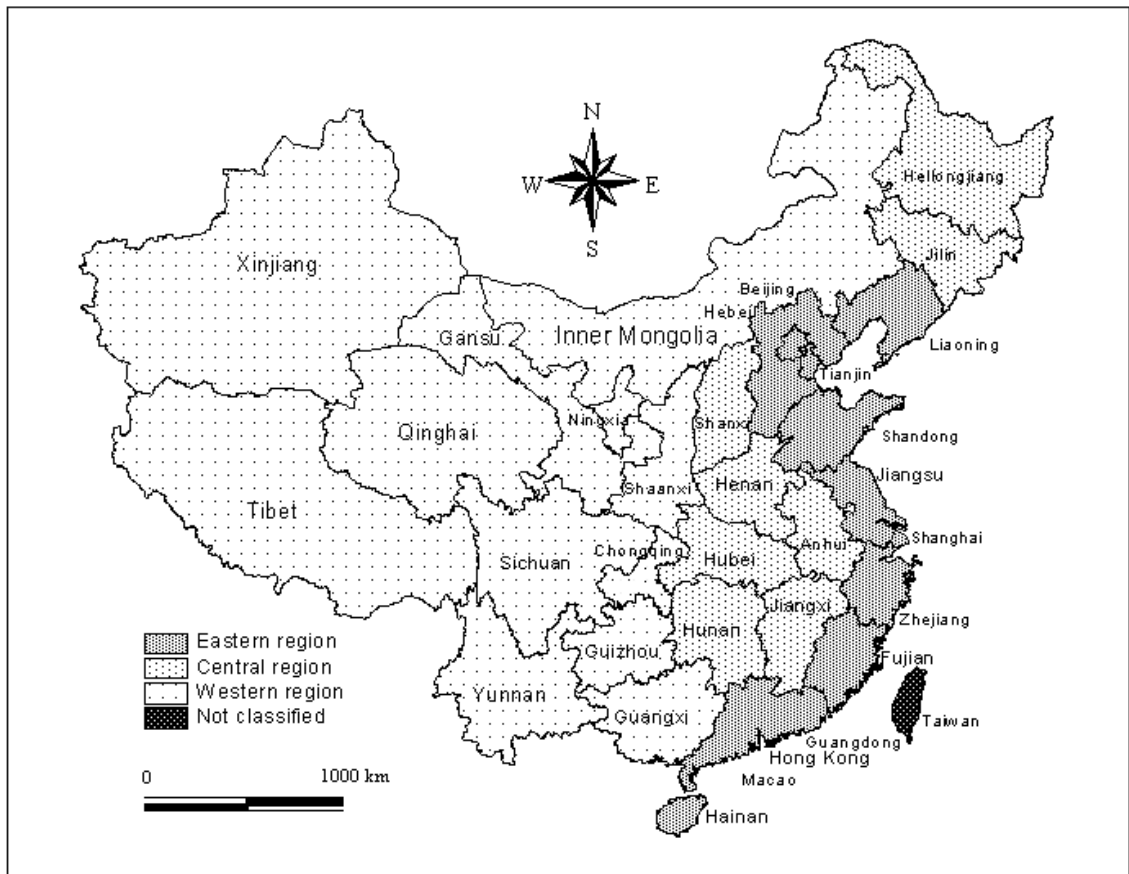
LD districts: urban districts with population density less than 1500 persons per km<sup>2</sup>.

HD districts: urban districts with population density over 1500 persons per km<sup>2</sup>.

VC: villagers committees

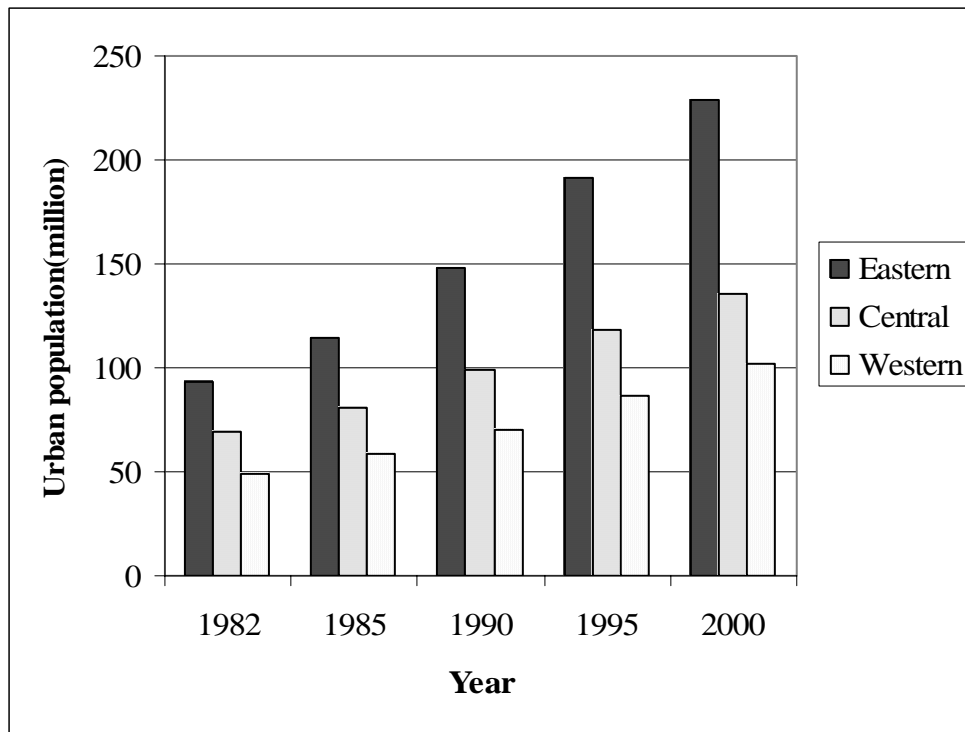
RC: residents committees

SA: Special areas with population over 3000 persons

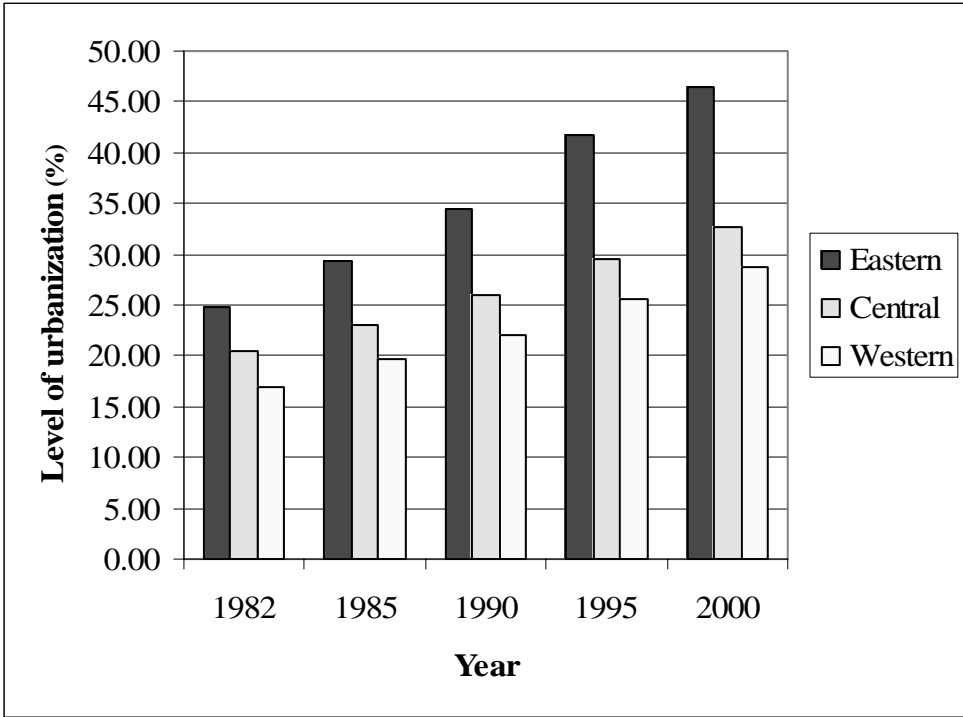


**Figure 2 Provinces and Regions in China**





**Figure 3 Urban Populations in Eastern, Central and Western Regions 1982-2000**



**Figure 4 Levels of Urbanization in Eastern, Central and Western Regions 1982-2000**