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The regional types of China's floating population: Identification methods and spatial patterns

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Abstract: With the rapid increase of the number and influence of floating population in China, it is urgently needed to understand the regional types of China's floating population and their spatial characteristics. After reviewing the current methods for identifying regional types of floating population, this paper puts forward a new composite-index identification method and its modification version which is consisted of two indexes of the net migration rate and gross migration rate. Then, the traditional single-index and the new composite-index identification methods are empirically tested to explore their spatial patterns and characteristics by using China's 2000 census data at county level. The results show: (1) The composite-index identification method is much better than traditional single-index method because it can measure the migration direction and scale of floating simultaneously, and in particular it can identify the unique regional types of floating population with large scale of immigration and emigration. (2) The modified composite-index identification method, by using the share of a region's certain type of floating population to the total in China as weights, can effectively correct the over- or under-estimated errors due to the rather large or small total population of a region. (3) The spatial patterns of different regional types of China's floating population are closely related to the regional differentiation of their natural environment, population density and socio-economic development level. The three active regional types of floating population are mainly located in the eastern part of China with lower elevation, more than 800 mm precipitation, rather higher population densities and economic development levels.

Keywords: China; floating population; regional types; spatial pattern; composite-index identification method

1 Introduction

Due to the large regional disparities between cities and rural areas and between the coastal region and the inland region in China during its fast socio-economic development since 1978, the number of China's floating population has been growing rapidly and China has currently become a migration-active society (Cai and Wang, 2003; Zhang, 2001). According to the 3rd and 5th census data and the 2005 1% population sample survey (Population Cen-

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sus Office of the State Council, 1993, 2002), China's floating population increases from only 6.57 million or 0.65% of the total population in 1982 to 121 million or 9.55% of its total population in 2000, and further to 147 million or 11.26% of its total population in 2005. Apart from that, China's floating population is found to be high dynamic and vulnerable. Whenever massive accidents occur, such as the SARS in 2003 and H1N1 in 2009, the floating population becomes not only the most vulnerable group but also the most difficult manageable group. Obviously, such huge scale of floating population and its spatial migration patterns are bound to produce strong and extensive socio-economic and environment and resource impacts on those urban areas with large immigrants and those rural areas with large emigrants. Thus, various-level governments in China urgently need the accurate and timely information on floating population because it is the scientific basis for most great decision-making, such as the formulation of regional socio-economic development strategy and urban planning. Otherwise, it is easy to make serious mistakes.

At present, China is still lack of the systematic dynamic monitoring on the floating population and proper floating population data. Currently, the sources of floating population data are mainly from: (1) the census every 10 years, (2) the irregular special investigations in very few cities or by some governmental departments, and (3) public security departments' registration on temporary residents. However, data from the first two sources are with relatively good accuracy but poor timely effectiveness and high social and economic costs while those from the 3rd source are with better timely effectiveness and lower social and economic costs but lower accuracy and creditability due to the constraints from the data collecting method and system. International and domestic scholars have carried out extensive studies on the characteristics (Jiang, 2006; Chen and Liu, 2009), migration factors and mechanisms (Junichi, 2008; Yao *et al*., 2008; Fan, 2008; Zai and Ma, 2004), management and countermeasures (Li, 2006) of China's floating population, but studies on the regional types and their spatial patterns of the floating population are still weak. Even among the few this kind of research and literature, most of them are of macro analysis at the provincial level (Fan, 2009; Fan, 2005; He and Pooler, 2002), and the single-index identification method such as the net migration rate (Lu *et al*., 2004, 2006) or the scale of migration is used (Zhu *et al*., 2001). No literature is available on the regional types of China's floating population at the county-level and using the composite-index identification method is used.

Through using the 5th census floating population data at county-level (Population Census Office of the State Council, 2003), this paper firstly initiates the composite-index method and its modification version for identifying the regional types of China's floating population, then actually identifies four different regional types of floating population in 2000: the active net-immigration region, the active balanced-migration region, the active net-emigration region and the inactive migration region, and thirdly analyzes the spatial patterns and characteristic of those different regional types of China's floating population. Thus, this paper is helpful to enhance scientific understanding of the regional differences of China's floating population and provide guidelines for constructing an effective dynamic monitoring network on floating population in China.

2 Methodology and data

2.1 The single-index identification methods

Among the international and domestic literature on the regional types of floating population,

there are two types of single-index identification methods which are most frequently used:

(1) The number of floating population of one region or its share to the national total (such as the number of immigrants, emigrants, net migrants or total migrants). For example, according to the 5th census data, the number of immigrants in Guangdong Province is 23.50 million or 17.5% to the national total immigrants in 2000, so it is the province with the largest scale of immigrants in China in 2000. This method is straight forward, but it is too simple and even does not take the impact of the scale of a region's total population into account.

(2) The rate of its floating population (such as the number of immigrants, emigrants, net migrants or total migrants) to its total population of one region. In particular, the net migration rate and the total migration rate are two most commonly-used indexes. Their expressions are as follows:

$$NM_i = \frac{I_i - O_i}{P_i} \tag{1}$$

$$GM_i = \frac{I_i + O_i}{P_i} \tag{2}$$

where NM_i is the net migration rate of region i, I_i is the number of immigrants of region i, O_i is the number of emigrants of region i, P_i is the total population of region i, and GM_i is the total migration rate of region i.

The index of net migration rate can clearly distinguish regions with net immigrants ($I_i > O_i$) from those with net emigrants ($I_i < O_i$). The former is usually located in the urban areas in eastern China, while the latter in the rural areas in the central and western China. However, this index can not measure the active levels of migration, and thus can not distinguish those active migration regions with large scale of both immigrants and emigrants from those inactive migration regions with small scale of both immigrants and emigrants. On the contrary, the index of total migration rate can accurately measure the active levels of migration, and thus can distinguish the active migration regions from those inactive migration ones. However, it cannot identify the migration direction or nature of a region, namely that a region is of net immigration or net emigration.

In sum, although the current single-index identification methods have their own advantages, but each method also has its constraints and can not correctly identify the multiply regional types of floating population in China. Thus, a new identification method is in need.

2.2 The composite-index identification method

Based on the above analysis, this paper initiates a new composite-index identification method in which the net migration rate (NM_i) is the X axis and the gross migration rate (GM_i) is the Y axis. The spatial relationship between the two indexes of the net migration rate (NM_i) and the gross migration rate (GM_i) is determined by formulas (3), (4) and (5), and is expressed by Figure 1.

$$NM_i + GM_i = \frac{2I_i}{P_i} \geqslant 0 \tag{3}$$

$$NM_i - GM_i = -\frac{2O_i}{P_i} \leqslant 0 \tag{4}$$

And,

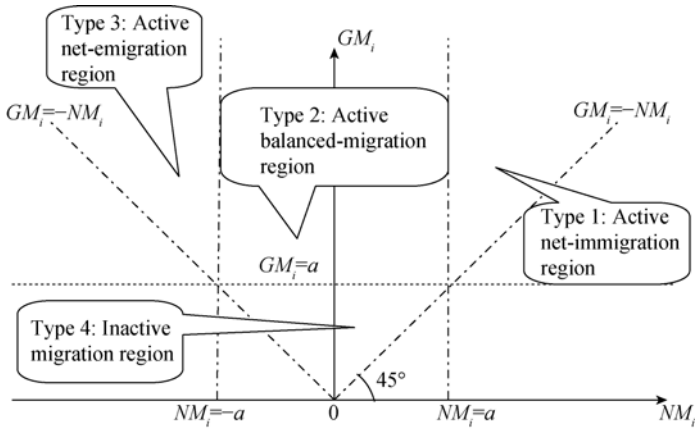

Figure 1 The spatial relationship and regional types of the composite-index method

$$\begin{cases} GM_i \geqslant -NM_i \\ GM_i \geqslant NM_i \end{cases} \tag{5}$$

According to formula (3), all regions should be located in the area intersected by two straight lines of line 1 ($NM_i = GM_i$) and line 2 ($NM_i = -GM_i$). Besides, as those three formulas and Figure 1 show that the threshold values of NM_i and GM_i for identification regional types of floating population are closely related.

Assumed that the threshold values GM_i for distinguishing the active migration regions from those inactive migration regions is a, then, by using the composite-index method, four different regional types of floating population are identified:

(1) Type 1: Active net-immigration region, when $GM_i > a$ and $NM_i > a$.

(2) Type 2: Active balanced-migration region, when $GM_i > a$ and $-a \leqslant NM_i \leqslant a$

(3) Type 3: Active net-emigration region, when $GM_i > a$ and $NM_i <- a$.

(4) Type 4: Inactive migration region, when $GM_i \leqslant a$.

2.3 The modified composite-index identification method

The composite-index identification method has combined two single-index identification methods, and thus can identify multiply regional types of floating population more accurately. However, because this method does not take the share of floating population of one region to the national total of the national population into account, it may result in overestimation or underestimation errors to both indexes of the net immigration rate and the total migration rate. For example, in regions with small floating population and total population but relative high proportion of floating population to total population, usually in the western rural counties with low population density, the two indexes may be overestimated; while on contrary, in regions with large floating population and total population but relative small proportion of floating population to total population, usually in the counties in central China, the two indexes may be underestimated.

Therefore, this paper thinks that it is necessary to further modify the composite-index by using the share of one region's floating population to the national total as weights. The modified composite-index identification method is expressed as follows:

$$RNM_i = \begin{cases} NM_i \times \dfrac{I_i}{\sum_{i=1}^{n} I_i} \times 1000 \left(\text{ if } NM_i > 0 \right) \\ NM_i \times \dfrac{O_i}{\sum_{i=1}^{n} O_i} \times 1000 \left(\text{if } NM_i < 0 \right) \end{cases} \tag{6}$$

$$RGM_i = GM_i \times \frac{I_i + O_i}{\sum_{i=1}^{n} I_i + \sum_{i=1}^{n} O_i} \times 1000 \tag{7}$$

$$ra = a \times \overline{RGM}_i \tag{8}$$

where RNM_i and RGM_i are respectively the modified index of the net immigration rate and the total migration rate of the region i, n is the number of all regions in China, and $\overline{RGM}_i$ is the national average of the total migration rate for all regions.

2.4 Data

Floating population and population data are from the 5th census at county-level in China in 2000, and the economic data are from the 2001 China Statistical Yearbook. The basic region for analysis is the county unit. Data of "immigrants of one county or city" is derived by adding the item of "immigrants from other counties or districts in the same province" and the item of "immigrants from other provinces", and data of "net immigrants of one county" is derived by subtracting the item of "population with household registration" from the item of "total population" of the county, then data of "emigrants of one county" is derived by subtracting the item of "immigrants" to the item of "net immigrants" of the county. The spatial data is the administrative map of China at county level at the scale 1:100 10000 (Albers blocky cut conic projection) provided by the National Basic Geographic Information Center.

3 Results and analysis

3.1 Signal-index identification methods: regional types and spatial patterns

By using the single index of net immigration rate and the natural break clustering method, four regional types of floating population have been distinguished: major net immigration region (Type 1), minor net immigration region (Type 2), major net emigration region (Type 3) and minor emigration region (Type 4).

As Figure 2 shows, the spatial patterns of those four regional types have the following characteristics: (1) The major net immigration regions (Type 1) and major net emigration region (Type 3) only take up small proportion of the number of spatial units but high proportion of immigrants or emigrants in China. The spatial units belonging to Type 1 and Type 3 are respectively 185 or 8% and 329 or 13%, but the amount of immigrants in Type 1 accounts for 64% of the national total, and the amount of emigrants in Type 3 accounts for 40% of the national total. (2) The major immigration regions are concentrated in the urban agglomeration areas of eastern China such as the Pearl River Delta, the western side of Tai

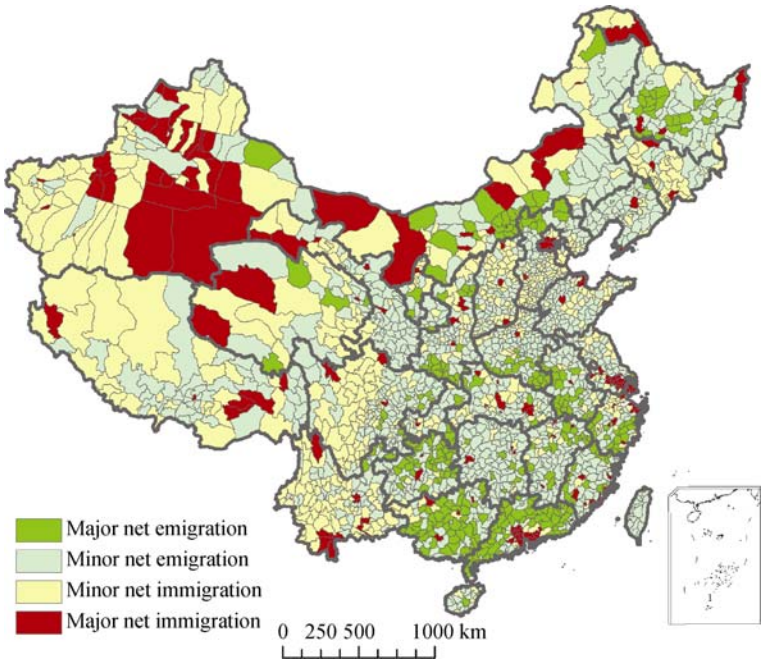

Figure 2 Regional types and spatial patterns of China's floating population by the single-index method of net migration rate in 2000

wan Straits, the Yangtze River Delta, Beijing etc., and in the northwestern border area such as Xinjiang, Inner Mongolia etc., but are rarely located in northeastern and central China. However, those major immigration regions in the northwestern border area seem to be very striking and obvious in the map due to their large areas, but actually most of them are not worthy of the name because the amount of their immigrants and their share to the national total are usually relatively small. (3) The major emigration regions are mainly located in eastern rural areas (such as the outlying areas of the Pearl River Delta Region and the Yangtze River Delta), and the central and western China with high population density, such as Anhui, Henan, Hunan, Guangxi, Guizhou and other areas, but are rarely located in the western and northern China with less population density.

By using the single index of gross migration rate and the natural break clustering method, four regional types of floating population have been distinguished: high-active migration region (Type 1), medium-active migration region (Type 2), low-active migration region (Type 3) and inactive migration region (Type 4). As Figure 3 shows, the high-active and medium-active migration regions (Types 1 and 2) are mainly concentrated in the southeast coastal areas from the Pearl River Delta to the Yangtze River Delta and the northern border areas from Heilongjiang to Xinjiang, while the low-active and inactive migration regions are mainly located in the central and western parts of China. Generally speaking, the southern and northern parts of China have higher degree of migration activity while the central and western parts of China have a lower degree of migration activity.

3.2 The composite-index method: regional types and spatial patterns

Based on international experiences and Chinese characteristics, this paper assumes that the

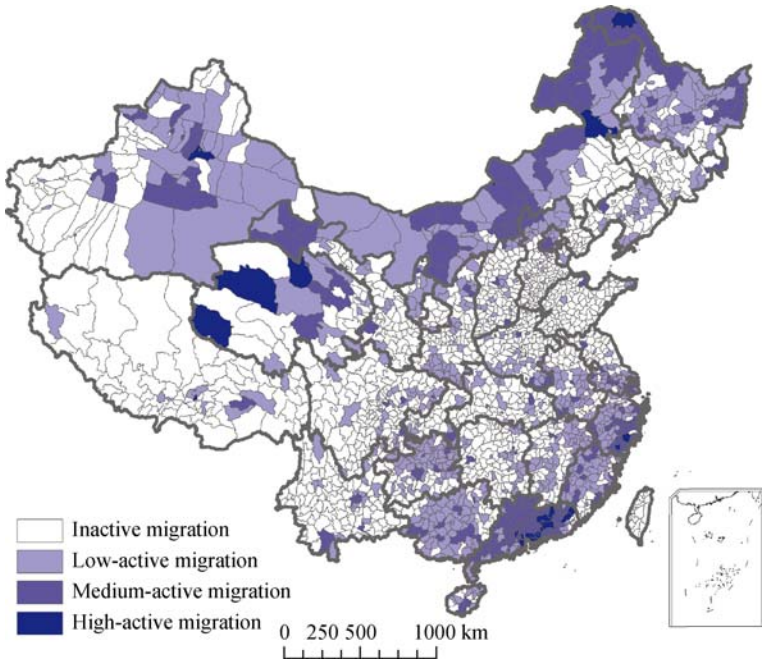

Figure 3 Regional types and spatial patterns of China's floating population by the single-index method of gross migration rate in 2000

threshold value of (a) of the gross migration rate (GM_i) for distinguishing the active migration regions from those inactive migration regions is 10%. International experiences generally agreed that it should be regarded as a active migration society when the proportion of its migrants or floating population to its total population surpasses 10% (Huw, 1990; Caroline *et al*., 2000; Chan, 2010; Suzanne, 2010). Further, according to the 5th census data, the proportion of China's floating population to its total population is 9.55% in 2000.

Therefore, by using the composite-index identification method, 4 regional types of floating population have been distinguished: active net-immigration region (Type 1), active balanced migration region (Type 2), active net-emigration region (Type 3) and inactive migration region (Type 4). The results are showed in Table 1 and Figure 4.

The spatial patterns of those four regional types have the following characteristics:

(1) The inactive migration regions account for 60% of spatial units of China and are mainly located in the central and western parts of China, while the other three types of active migration regions only account for 40% of spatial units of China in total and are concentrated in the southeast coast and the northern border area of China. Those are similar to the results identified by the single-index method of gross migration rate (Figure 3).

(2) The active immigration regions are mainly concentrated in the eastern urban agglomeration areas and the northwestern border area of China, while the active net-emigration regions are mainly concentrated in the eastern rural areas and the central and western parts of China with high population density. Those are similar to the results identified by the single-index method of net migration rate (Figure 2).

(3) The active balanced migration regions, which is a special advantage of this method and can not be correctly identified by the single-index methods, are mainly located in the

Table 1 Regional types of China's floating population by the composite-index method

Regional types	Indexes	Number of units (%)	Immigrants (10^6)		Emigrants (10^6)		Net migrants (10^6)	Spatial distribution
			Number	%	Number	%.		
Type 1: Active net immigration region	GM>10% NM>10%	185 (8%)	52.4483	64.45	3.9456	5.35	48.5027	In the eastern urban agglomeration areas such as the Pearl River Delta Region, Yangtze River Delta, Beijing, etc.; and the north-western border area of China in Xinjiang, Inner Mongolia, etc.
Type 2: Active balanced migration region	GM>10% –10%≤NM ≤10%	461 (19%)	13.7362	16.88	18.0803	24.54	–4.3441	In the rural areas of those eastern urban agglomerations such as in Zhejiang, Fujian and Guangdong, and in the northeastern and northern border areas of China
Type 3: Active net emigration region	GM>10% NM<–10%	329 (14%)	2.2664	2.78	28.9102	39.24	–26.6438	In the eastern rural areas and the central and western parts of China with high population density
Type 4: Inactive migration region	GM≤10%	1440 (60%)	12.9289	15.89	22.7447	30.87	–9.8158	In the central and western parts of China

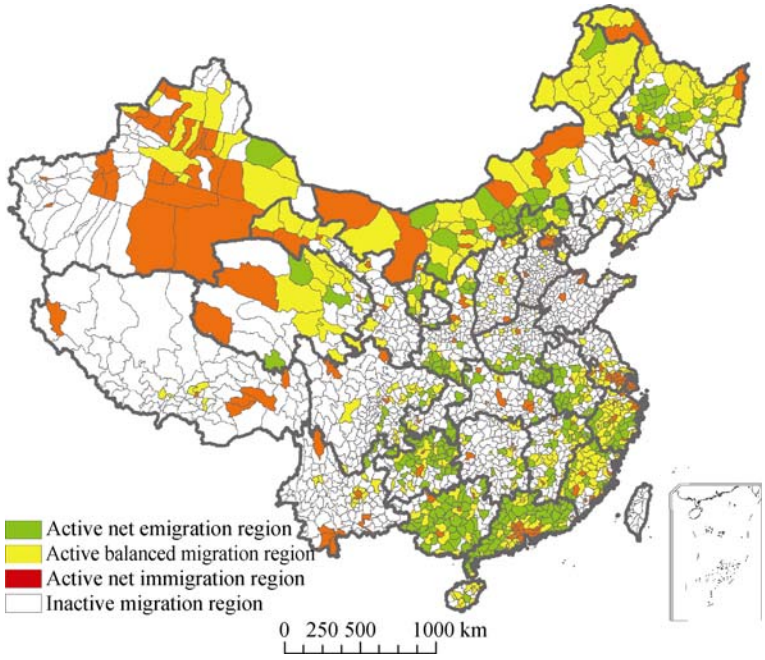

Figure 4 Regional types and spatial patterns of China's floating population by the composite-index method in 2000

periphery and rural areas of those eastern urban agglomerations such as Zhejiang, Fujian and Guangdong, and in the northeastern and northern border areas of China. Most of those regions are classified as minor immigration regions or minor emigration regions by the sin-

gle-index method of net migration rate (Figure 2), but as high-active or medium-active migration regions by the single-index method of gross migration rate (Figure 3). Because the regions of this type usually have relative large scale of both immigrants and emigrants, so that they have small net migration rates but relative high gross migration rates.

Obviously, the composite-index identification method has combined the perspective advantages of the three single-index methods and thus can measure the direction and activity of regional floating population simultaneously. However, this method still keeps the overestimation errors in the northwestern border area of China due to its small total population.

3.3 The modified composite-index method: spatial patterns and characteristics

According to the formula (10), the threshold (*ra*) value for distinguishing active migration regions from inactive migration regions at the modified composite-index method, has been adjusted to 4%. Its results are showed in Table 2 and Figure 5.

Through comparing Table 2 with Table 2 and Figure 5 with Figure 4, the spatial patterns of regional types identified by the modified composite-index method are found to have the following characteristics:

(1) The spatial patterns of the active net immigration regions (Type 1) have changed significantly and the original concentrated area in the northwestern border of China has greatly shrunk and almost disappeared, although there is almost no change on the number of its spatial units. After modified, its total number of spatial units increases from 185 to 191. Among those, 142 units remain the same type with no change. 43 units have changed into Type 4 (38 units) and Type 2 (5 units). Most of those are located in northwestern border areas such as Xinjiang, Inner Mongolia and Heilongjiang, due to their small share of immigrants to the national total. Besides, 49 spatial units have changed into the active net immigration regions

Table 2 Regional types of China's floating population based on the modified composite-index method

Regional Types	Indexes	Number of units (%)	Immigrants (10^6)		Emigrants (10^6)		Net migrants (10^6)	Spatial distribution
			Number	%	Number	%		
Type 1: Active net immigration region	RGM>4% RNM>4%	191 (8%)	57.2583	70.36	5.6822	7.71	51.5761	In the eastern urban agglomeration areas such as the Pearl River Delta Region, Yangtze River Delta, Beijing, etc.
Type 2: Active balanced migration region	RGM>4% –4%≤NM ≤4%	141 (6%)	6.1282	7.53	5.9524	8.08	0.1758	In the rural areas of those eastern developed provinces such as Zhejiang, Fujian and Guangdong,
Type 3: Active net emigration region	RGM>4% RNM<–4%	382 (16%)	4.5152	5.55	37.0937	50.34	–32.5785	In the central and western parts of China with high population density
Type 4: Inactive migration region	RGM≤4%	1701 (70%)	13.4783	16.56	24.9524	33.87	– 11.4741	In the central and western parts of China, eastern China such as Shandong, Hebei, Northern Jiangsu, and Northeast China such as Jilin and Liaoning

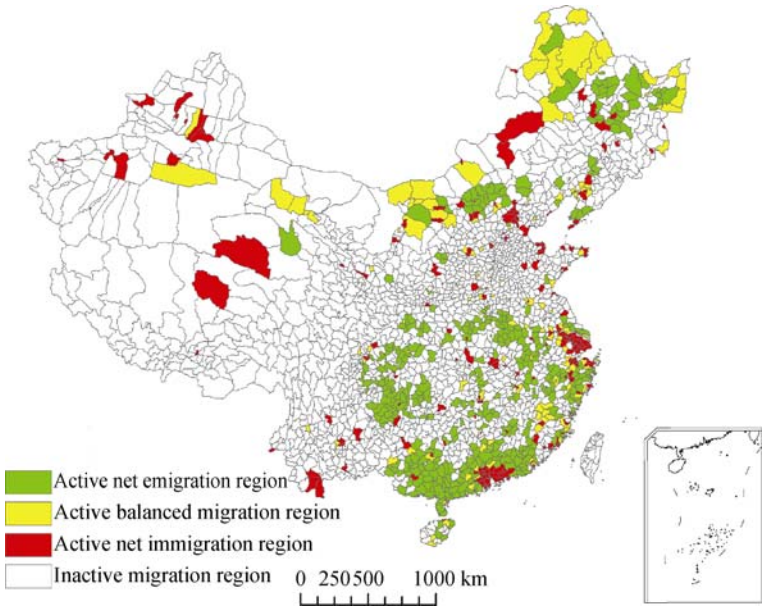

Figure 5 Regional types and spatial patterns of China's floating population by the modified composite-index method in 2000

(Type 1) from the original Type 2 (40 units) and Type 4 (9 units), due to their relative big share of immigrants to the national total. Those units are mainly situated in the major coastal urban areas of the Yangtze River Delta and Shandong Peninsula.

(2) The number of spatial units of the active net emigration region (Type 3) has increased a bit, in particular in the central and western parts of China with high population density, while their spatial pattern has little change. After modified, its total number of spatial units increases from 329 to 382. Among those, 258 units remain the same type with no change; 71 units that are mainly located in Inner Mongolia have changed into Type 4 of inactive migration regions (70 units) and Type 2 of active balanced migration region (1 units), due to their small share of immigrants to the national total. Besides, 124 spatial units have changed into the active net emigration regions (Type 3) from the original Type 2 (90 units) and Type 4 (34 units), due to their relative big share of immigrants to the national total. Those units that are mainly situated in the central and western rural areas with high population density, are in the intersection area of Henan, Anhui, Hunan and Jiangxi provinces and the Sichuan hilly area.

(3) The number of spatial units of the active balanced migration region (Type 2) has largely decreased, in particular in western China with low population density, and also their spatial pattern has significantly changed along multiply directions. After modified, its total number of spatial units decreases from 461 to 141, or by 69%. Among those, 124 units remain the same type with no change; 40 units have changed into Type 1, 90 units into Type 3 and 207 units into Type 4. Besides, 16 spatial units have changed into the active balanced migration regions (Type 2) from the original Type 1 (5units) and Type 4 (11 units).

(4) The number of spatial units of the inactive migration region (Type 4) has increased a bit while their spatial pattern has little change. After modified, its total number of spatial units increases from 1440 to 1701, or by 18%. Among those, 1386 units remain the same type with no change. There are 261 newly-added units of inactive migration regions (Type 4).

Most of them are situated in western China with low population density, due to their relative small share of migrants to the national total.

In sum, the modified composite-index method has largely shrunk the number of spatial units of various active migration regions in the northwestern border area along Heilongjiang, Inner Mongolia and northern Xinjiang, thus it has successfully resolved the overestimation error caused by small total population of a region. Apart from that, this method has also effectively reduced the underestimation error caused by large total population of a region because plenty of rural areas in the central and western China with high population density are modified from the inactive migration regions to active net emigration regions. Therefore, the results produced by the modified composite-index identification method are more reasonable and close to the actual situation.

Table 3 Changes of spatial units of regional types by the composite-index method and its modified version

Spatial units by the composite-index method	Spatial units by the modified composite-index method				
	Type 1: Active net immigration region	Type 2: Active balanced migration region	Type 3: Active net emigration region	Type 4: Inactive migration region	Total
Type 1: Active net immigration region	142	–	5	38	185
Type 2: Active balanced migration region	–	258	1	70	329
Type 3: Active net emigration region	40	90	124	207	461
Type 4: Inactive migration region	9	34	11	1386	1440
Total	191	382	141	1701	2415

3.4 Correlation Analysis with regional environment and socio-economic development

(1) The overall spatial patterns and long-term trend of regional types of China's floating population are determined by the regional differentials of its natural environment

China's natural environment is of significant regional differentials, which is divided into three parts: namely the eastern monsoon region dominated by plains and hills, the northwest arid region dominated by basins, mountains and plateaus, and the Qinghai-Tibet alpine region dominated by plateaus and high mountains. As a result, this has determined the overall spatial patterns and long-term trend of China's population distribution and socio-economic development. The famous population geographer Hu Huanyong identified the "Hu Huanyong Line" (namely the line from Heihe to Tengchong) in 1935, which distinguishes the southeastern China with very smaller proportion of land but very higher proportion of population from northwestern China with very higher proportion of land but very smaller proportion of population. In fact, that line is the integrated result of the contour of 400 mm annual precipitation and the edge of the 2nd terrain step in China. The "Hu Huanyong Line" is still valid that has been confirmed by the 4th and 5th census data (Liu *et al*., 2007).

As Table 4 shows, China's active migration regions are mainly located in the 3rd terrain step and the eastern monsoon region with annual precipitation more than 800 mm. China's 3rd terrain step has concentrated 74% of its active migration regions (529 units), 53.61% of its national total emigrants and 69% of its national total immigrants. The region with annual

Table 4 Spatial characteristics of regional types of floating population in different natural geographical regions in China

Natural geographical regions		The number of spatial units				Share of emigrants in 3 types of active migration regions to the nation total (%)	Share of immigrants in 3 types of active migration regions to the nation total (%)
		Active net emigration region	Active net immigration region	Active balanced migration region	Inactive migration regions		
China		382	191	141	1701	100	100
Three terrain steps	The 3rd step	282	139	108	799	53.61	69.00
	The 2nd step	99	48	32	736	12.19	12.58
	The 1st step	1	4	0	167	0.15	0.75
The contour of annual precipitation	800 mm	315	119	78	761	56.45	63.41
	400 mm	56	50	45	689	8.25	16.83
	<400 mm	11	22	18	251	1.56	4.08

precipitation more than 800 mm in China has concentrated 72% of its active migration regions (512 units), 56.45% of its national total emigrants and 63.41% of its national total immigrants.

(2) The population densities in the inactive migration regions and the active net emigration regions are relatively lower while those in the active net immigration regions and the active balanced migration regions are rather higher

Analysis on the frequency distribution of population densities in various regional types of China's floating population shows, that the population densities in the inactive migration regions and the active net emigration regions are mainly distributed in the low value range of less than 500 persons per km^2, and there are no inactive migration regions and the active net emigration regions with population density more than 500 persons per km^2. While, there are some active net immigration regions and the active balanced migration regions with rather higher population density of more than 1500 persons per km^2.

(3) The socio-economic development levels in the inactive migration regions and the active net emigration regions are relatively lower while those in the active net immigration regions and the active balanced migration regions are rather higher.

Analysis on the frequency distribution of the socio-economic development levels (which is measured by the indictor of per capita GDP) in various regional types of China's floating population shows, that the socio-economic development levels in the inactive migration regions and the active net emigration regions are mainly distributed in the low value range of less than 4000 yuan (RMB) per capita. While, there are some proportions of active net immigration regions and the active balanced migration regions with rather higher socio-economic development levels of more than 8000 yuan (RMB) per capita.

4 Conclusions

(1) Due to the variety and complexity, the existed single-index methods are incapable of identifying the regional types of floating population in China correctly. The composite-index identification method, which is initiated by this paper and has combined the perspective advantages of the two single-index methods of net migration rate and gross migrate rate, can

measure the direction and activity of regional floating population simultaneously, and can identify the unique regional types of floating population with both large immigrants and emigrants. However, this method still keeps the overestimation errors in the northwestern border area of China due to its small total population. Therefore, the modified composite-index identification method, by using the share of a region's certain type of floating population to the total in China as weights, can effectively correct the over- or under-estimated errors due to the rather large or small total population of a region.

(2) The majority areas of China still belong to inactive migration regions while most of its immigrants and emigrants are concentrated in a small proportion of active migration regions. The inactive migration regions account for 70% of spatial units of China, the three active migration regions in total only account for 30%. However, the active net immigration regions only take up 8% of spatial units in China, but more than 70% of national immigrants are concentrated in those regions. Also, the active net emigration regions take up 16% of spatial units in China, but more than 50% of national emigrants come from those regions.

(3) The active net immigration regions are concentrated in the eastern urban agglomeration areas such as the Pearl River Delta Region, Yangtze River Delta, Beijing, etc. and the active balanced migration regions are usually located in the periphery of active net immigrants, while the majority of active net emigration regions are located in the central and western parts of China with high population density.

(4) The spatial patterns of different regional types of China's floating population are closely related to the regional differentiation of their natural environment, population density and socio-economic development levels. The three active regional types of floating population are mainly located in the eastern part of China with lower elevation, more than 800 mm precipitation, rather higher population densities and economic development levels.

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