Scientific Research Publishing

Modern Economy, 2017, 8, 537-550
http://www.scirp.org/journal/me
ISSN Online: 2152-7261
ISSN Print: 2152-7245

Study on the Balance of Economy and Population in China during 2000-2015

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How to cite this paper: Zhu, J. (2017) Study on the Balance of Economy and Population in China during 2000-2015. *Modern Economy*, **8**, 537-550.
https://doi.org/10.4236/me.2017.84041

Received: February 17, 2017
Accepted: April 14, 2017
Published: April 17, 2017

Abstract

From the perspective of long-term equilibrium, the proportion of a region's economy and population in the country should roughly be equal. In this paper, the quotient of GDP proportion and population proportion is defined as *R*, whose value and characteristics of volatility accurately reflects the feature of distribution and equilibrium between economy and population. By using GIS visualization technology, this paper finds that the economic and demographic distribution in Chins is still far from matching currently, with a trend of polarization between east and west. However, from 2000 to 2015, the matching degree of economy and population at the national level is actually on the rise. This paper then divides apart the economic factor and demographic factor that cause the *R* value to change, and comes to a conclusion that the status between the economy and the population in most provinces is affected by economic factor to a greater extent, and the role of population factor is relatively minor.

Keywords

Economy and Population, Industrial Transfer, Migration

1. Introduction

With the sustained development of economy and the urbanization, the differences in economy and society between urban and rural areas and among regions around the nation have caught the public eyes, and how to balance the relationship between economy and population has become an inevitable issue. As the geographical conditions, cultural foundation and technological level of each region are different, each country faces a certain degree of regional disparity, and this disparity appears particularly conspicuous in a vast country like China. Despite the fact that many policies like the western development, the revitalization of the northeast old industrial base and the rise of the central have been made by

the government to narrow the regional gaps, there is no denying that the current state of population and economy among provinces is still very uneven [1] [2] [3]. Generally speaking, the western region is backward in economy and the eastern region is relatively economically developed. To build a well-off society in an all-round way, we must coordinate the economic and demographic relations between the East and the West, so that the potential of our economy and the population can be released and fully utilized.

In the field of economic and population research, the former scholars often separate these two aspects [4]. Study on population distribution mainly concentrated in the population distribution is mainly focused on the changing trend and influencing factors of population spatial distribution, of which "Aihui-Tengchong population distribution line" proposed by Hu Huanyong is the most famous [5]. The economic distribution is mainly focused on the spatial distribution of the economy and the description of the current situation of industrial agglomeration and its influencing factors.

Over the past few years, due to the uneven distribution of population and economy resulting in the loss of spatial efficiency and regional disparities, the analysis of population and economic distribution has been paid more and more attention. At present, the literature of economy and population spatial distribution mainly focused on two aspects. The first aspect is the study of the distribution of population and economy the consistency problem, using the concept of gravity center, respectively study the population and economy center, to reveal the distribution of population and economy inconsistency [6] [7] [8]. The second aspect focuses on the regional level, such as Wang Lei (2009) [9] pointed out that the reasons for the inconsistency of the Yangtze River Delta population and economic distribution is that the speed of the regional economic center of gravity is far quicker than that of the population gravity center.

Many scholars hold the view that the economic and population mismatch should be harshly blamed for leading to the urban-rural dual structure and regional imbalances and many other problems [10] [11]. According to many academics' research, in the process of social development in the world's most developed countries and even in many developing countries, their regional economy and the population would tend to match, meaning the level of economic development and population concentration will become more and more balanced [12] [13]. Especially, when the social develops to the advanced stage, the degree of economy and population matching will reach to a very high level. However it is foreseeable that China's regional economic and demographic development will also become increasingly balanced in the future spontaneously, but appropriate policy guidance and incentives can shorten the time to achieve equilibrium, which is of great benefit for the whole society.

Therefore, from the perspective of economic and population matching, it is of great practical significance to study how to better arrange population flow and promote economic development in the process of economic development.

In general, this paper has reviewed the literature, such as the history and

background of economic and population research, and then puts forward the research method of this article, then empirically studies the status and development process of China's economy and population, and finally sums up and gives policy recommendations based on the results.

2. Research Methods and Data

2.1. Sources of Data

The GDP and population data of each provincial administrative region are derived from the China Statistical Yearbook (2001-2016) published by the National Bureau of Statistics of the People's Republic of China, excluding the Hong kong Special Administrative Region, the Macao Special Administrative Region and Taiwan province. As the data in the yearbook is directly added to the provincial data, and the classification of accounting and statistical inconsistencies and other reasons, it leads to a fact that the province's total data is greater than the sum of provincial data. In this paper, considering the consistency and operability, the national GDP and population data are the sum of the 31 provincial administrative regions, and the regional economy and population share are correspondingly divided by national data by provincial data.

In this paper, the 31 provincial administrative regions (excluding Hong Kong, Macao and Taiwan) are the objects of observation, whose GDP accounted for the proportion of the country's GDP can be used to measure the degree of economic agglomeration in the province, and the province's population (population of permanent residents) accounted for the proportion of the country's total population can be used to measure the degree of population aggregation.

2.2. Research Methods

2.2.1. Analysis on Regional Economy and Population Matching Degree

The regional disparity can be measured by the ratio (defined as R) of GDP per capita in the region to the national per capita GDP, which equates to the ratio of economic to population share in the region. The formula for calculation is as follows:

$$R_i = \frac{\text{Regional per capita GDP}}{\text{national per capita GDP}} = \frac{\dfrac{\text{Regional GDP}}{\text{Regional population}}}{\dfrac{\text{national GDP}}{\text{national population}}} = \frac{\dfrac{\text{Regional GDP}}{\text{national GDP}}}{\dfrac{\text{Regional population}}{\text{national population}}} = \frac{\text{Economic aggregation degree}}{\text{Population aggregation degree}} = \frac{m_i}{n_i} \tag{1}$$

where R_i measures the degree of economic and demographic matching in the region i, and m_i represents the degree of economic aggregation of region i, and n_i represents the population aggregation of region i.

The meaning of R_i value is quite obvious: when R_i is less than 1, the relative scale of economic output in the region is less than the size of the population,

the per capita GDP is lower than the national average, usually in the region for less developed regions; when $R_i = 1$, the economic level and the national level; when $R_i > 1$, the economic scale of more than the size of the population, the per capita GDP is higher than the national average, the region is usually relatively developed areas. $R_i = 1$ is a standard state, the closer to 1, indicating that the region's economic and demographic mismatch is smaller.

2.2.2. Regional Unevenness Evaluation Index

Referring to the previous research methods [14] [15], this paper constructs the regional economic and population imbalance index E, and the formula is as follows:

$$E = \sqrt{\frac{\sum_{i=1}^{i=n}\left[\frac{\sqrt{2}}{2}\left(m_i - n_i\right)\right]^2}{n}}. \tag{2}$$

where n is the number of individuals studied, m_i is the degree of economic aggregation, and n_i is the degree of population aggregation. Uneven index $E \in [0,1]$, and the smaller E indicates that the economy and population development degree is more balanced while a bigger E shows that the economic and population development deviated from the balance.

2.2.3. Absolute Incremental Weighting Analysis of the Economy and Population

Taking into account the large differences between the provincial administrative regions, so the this paper constructs the absolute incremental weighting analysis of the economy and population, denoted as I_m and I_n, the formula is as follows:

$$I_m = \frac{\Delta M_i}{\Delta M} \times \frac{1}{S_i} \tag{3}$$

and

$$I_n = \frac{\Delta N_i}{\Delta N} \times \frac{1}{S_i} \tag{4}$$

I_m and I_n can be used to measure real regional developments. Where ΔM_i is the economic increment for a period of time, ΔM is the national economic increment during that period, ΔN_i is the population increment for that period of time, ΔN is the national The population growth, and S_i is the proportion of the land area of region i to the country's whole land area.

3. Empirical Analysis

Population aggregation and economic agglomeration are the results of development, which are achieved through population movements and capital flows. At present, China's population movement is mainly manifested as a large number of rural population migrant workers, and capital flows are mainly reflected in the industrial transfer. If population growth is not consistent with the pace of economic agglomeration, such as industry transfers faster than the population

flow, then there would be more distance between regional GDP share and the proportion of population, and the differences between the various places will be more obvious.

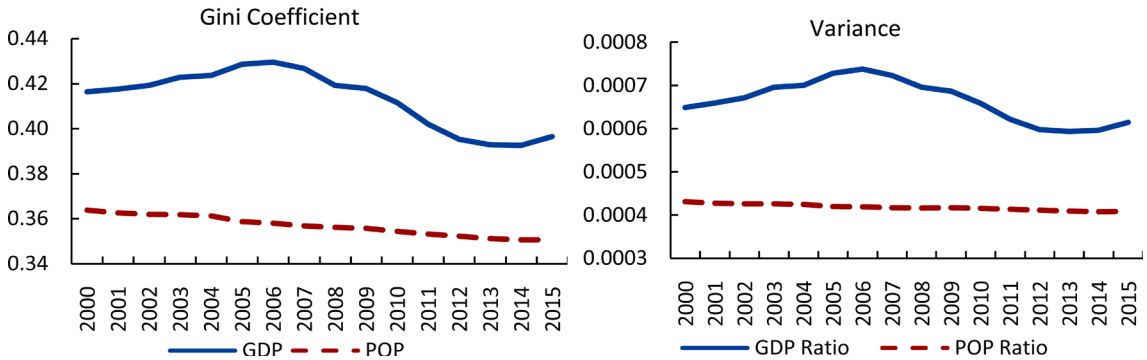
Figure 1 shows the Gini coefficient of GDP and population between 2000 and 2015, and the variance between provincial GDP and population. It can be seen from the figure that the change of population factor is stable and clear in direction, which makes the Gini coefficient and variance decline. The economic factors change greatly, which leads to the large fluctuation of Gini coefficient and variance. In particular, this fluctuation presents a significant bandage like ascending-descending-rising cycles. According to the Gini coefficient of GDP and the variance of GDP share, it can be divided into three stages from 2000 to 2006, 2006 to 2013, 2013-2015. In general, the inter-provincial economic differences have expanded in the first phase, inter-provincial economic differences have decreased in the second phase, inter-provincial economic differences to re-expand in the third stage.

According to the variance of GDP accumulation and population aggregation, the variance of GDP accumulation have experienced a process of rising-falling-rising between 1995 and 2015, which is consistent with the tendency of resources to gather in the eastern developed provinces and then move to the central and western regions. In the meantime, the variance of population aggregation have generally declined, and the variance of GDP aggregation is higher than that of population.

These facts can lead to two conclusions that the degree of aggregation of population and economy does not match at the current stage, leading to the regional differences in China, and economic aggregation precedes population aggregation and plays a more important role.

3.1. The Imbalance between Economy and Population in China Is Still Rigorous

As the economy is more likely to match the population when the R value is closer to 1, so for ease of statistics, this paper regards R values between 0.9 and 1.1 as a high degree of match, between 0.7 to 0.9 and 1.1 to 1.3 as a general match,



Notes: The Gini coefficient is calculated by the author himself with data from previously mentioned data sources. The specific calculation of the Gini coefficient can be found in other literature, which is not discussed in detail here due to layout restrictions.

Figure 1. Gini coefficient of GDP and population (left) and GDP share and population parity variance (right).

while other sections are considered mismatched.

It can be seen that the provinces with higher R values are mainly located in the eastern coastal areas, followed by the central provinces. The provinces with lower R values are mainly in the western provinces and some central provinces such as Jiangxi and Anhui. In general, the R value of the eastern region is higher, while the R value in the western region is lower, making the distribution of economy and population in our region very uneven, and the overall situation can be concluded as "high in the east and low in the west".

By observing the highly matched and generally matched provinces of 2000, 2006, 2013, and 2015, it turns out that many provinces are only temporarily balanced. Moreover, as the process of industry transfers and population movements continue to advance, the list of matched and mismatched provinces is constantly changing. And in four years, there have respectively been 21, 18, 15, and 15 provinces considered as economic and demographic imbalance (The R value is outside 0.7 to 1.3).

In general, we can see from Table 1 that the majority of the provinces have suffered the economy and population imbalance, and China's current economic and demographic imbalance among regions is still very grim.

3.2. The Overall Measure of Economy and Population Imbalance

The R value of a region is the ratio of the proportion of the economy to the proportion of the population. According to this definition, when the economy and population are more balanced, the closer the R value is, the smaller the variance of the R value. Conversely, the mean value of the R value will be farther away from 1 and the greater the variance. Therefore, we can use the R value of the mean and variance to measure the national economy and population imbalance, as shown in Figure 2.

Table 1. Economic and demographic characteristics among provinces.

Year	Highly Matched $(0.9,1.1)$	Generally Matched $(0.7,0.9]\cup[1.1,1.3)$	Mismatched $(0,0.7]\cup[1.3,+\infty)$
2000	Heilongjiang, Hebei, Xinjiang, Jilin	Shandong, Hainan, Inner Mongolia, Chongqing, Hubei, Shanxi	Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu, Fujian, Fujian, Hunan, Henan, Ningxia, Qinghai, Shaanxi, Jiangxi, Anhui, Yunnan, Sichuan, Tibet, Guangxi, Gansu, Guizhou
2006	Hebei, Heilongjiang	Liaoning, Fujian, Inner Mongolia, Jilin, Xinjiang, Shanxi, Chongqing, Hubei, Henan, Shaanxi, Hainan	Shanghai, Beijing, Tianjin, Zhejiang, Jiangsu, Guangdong, Shandong, Hunan, Ningxia, Qinghai, Jiangxi, Sichuan, Tibet, Guangxi, Anhui, Gansu, Yunnan, Guizhou
2013	Jilin, Shaanxi, Chongqing, Hubei	Hebei, Heilongjiang, Xinjiang, Hunan, Qinghai, Hainan, Shanxi, Henan	Tianjin, Beijing, Shanghai, Jiangsu, Zhejiang, Inner Mongolia, Liaoning, Sichuan, Anhui, Jiangxi, Guangxi, Tibet, Yunnan, Gansu, Guizhou
2015	Chongqing, Jilin, Hubei, Shaanxi	Fujian, Guangdong, Liaoning, Shandong, Ningxia, Hunan, Qinghai, Hainan, Hebei, Heilongjiang, Xinjiang, Henan	Tianjin, Beijing, Shanghai, Jiangsu, Zhejiang, Inner Mongolia, Sichuan, Jiangxi, Anhui, Guangxi, Shanxi, Tibet, Guizhou, Yunnan, Gansu

Notes: "Highly Matched" means that the $R\in(0.9,1.1)$, while "Generally Matched" meaning that $R\in(0.7,0.9]\cup[1.1,1.3)$, and "Mismatched" meaning that $R\in(0,0.7]\cup[1.3,+\infty)$.

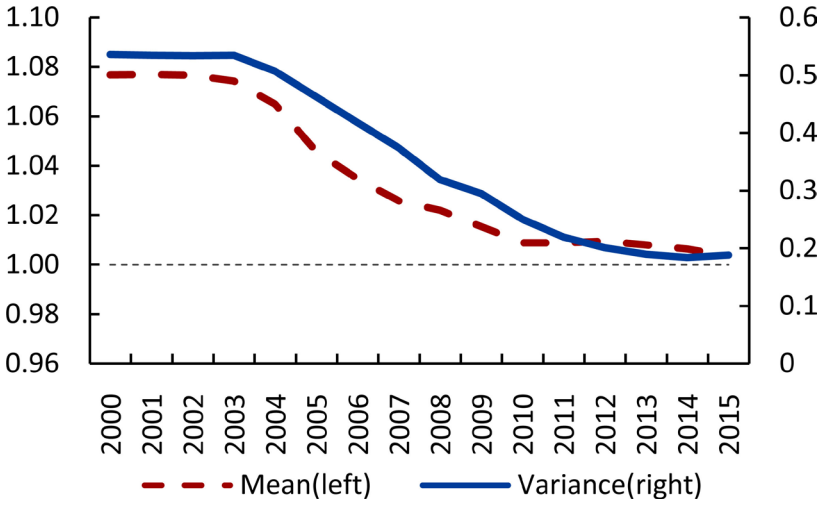


Figure 2. Mean and Variance of *R* Values for 31 Provinces in 2000-2015.

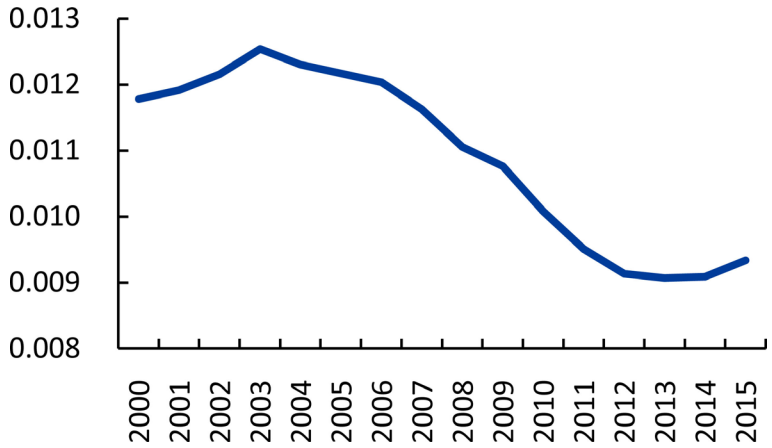


Figure 3. China's economy and population imbalance index changes over time.

The mean of the R values come closer to 1 except for 2001 and 2012. Correspondingly, the variance is steadily declining, with only a small increase in 2003 and 2015. From 2000 to 2015, the mean value of R value gradually decreased from 1.08 to 1.00, and the variance decreased from 0.54 to 0.19, suggesting that the overall degree of matching between China's economy and population gradually increased.

The unbalanced index reflects the overall match between China's economy and the population from another perspective. The greater the unbalanced index, the less the match between China's economy and the population. And the smaller the index, the more balanced the distribution of the economy and the population among the provinces. Observing the variability of the imbalance index, and we can get the trend of change, as shown in the following figure.

As can be seen from Figure 3, from 2003 to 2003, China's unbalanced index changes from 0.0118 to 0.0125, showing an upward trend. The overall situation of overall match between economy and population has deteriorated. From 2003 to 2013, China's unbalanced index have experienced a gradual decline from 0.0125 to 0.0091, showing a good trend of the economy and population. But from 2013 to 2015, the imbalance index has risen to 0.0093 again.

In summary, the mean and variance of the R value and the unbalanced index generally reflects the balanced degree between China's economy and population. The three show a common conclusion, that is, from 2000 to 2015, China's economic and population imbalance has been gradually improved, and the economic and demographic situation is also moving in a balanced direction in the future.

3.3. Comparative Analysis of Economic Factor and Population Factor

This paper has been divided 2000 to 2015 into three phases, and the change in R value at each stage may be caused by economic factors, or may it be a demographic factor, but which plays a major role? We get the total differential of ΔR as

$$\Delta R_i = \frac{\Delta m_i}{n_i} - \frac{m_i}{n_i^2} * \Delta n_i + \mu$$

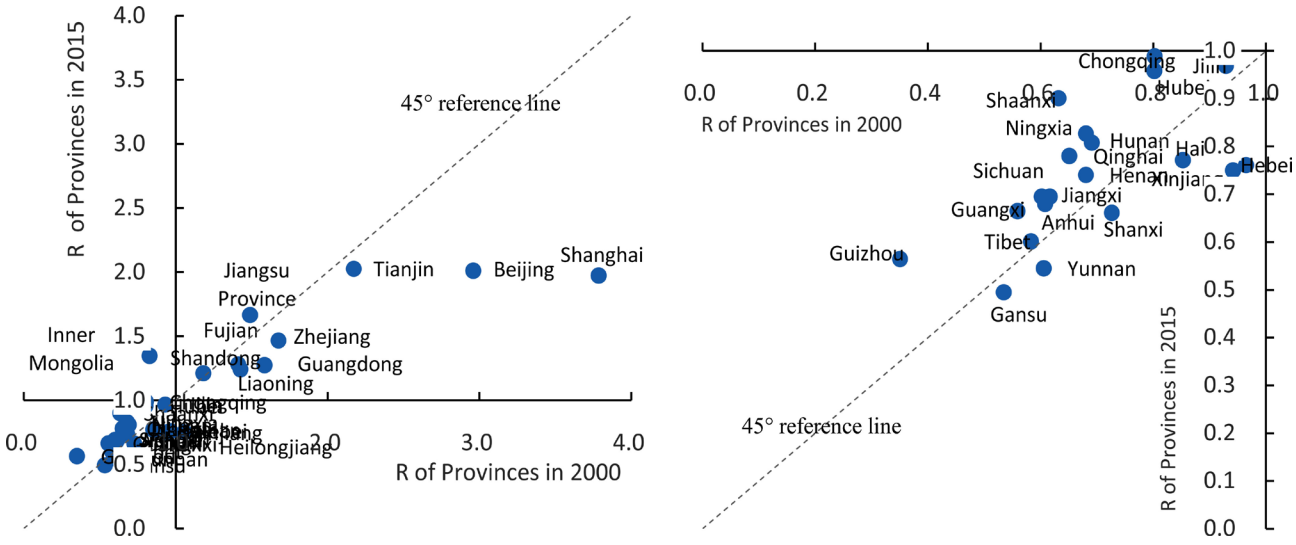
where the first term on the right side of the equation represents the result of the economic factor, and the second represents the result of the population factor. As the length of the segment is inconsistent, the paper defines $\alpha_i = \frac{\Delta m_i}{n_i} * \frac{1}{\Delta R_i} * 100\%$, $\beta_i = -\frac{m_i}{n_i^2} * \frac{\Delta n_i}{\Delta R_i} * 100\%$, then α_i reflects the economic factor, and β_i reflects the role of population factor. It should be noted that economic factor and population factor are working at the same time, may leading to two directions, that is, the signs of α_i and β_i symbols may not be the same. For example, the increase in the proportion of GDP makes the R increase, while the proportion of the population may also increase, then the direction of changing of R is determined by the stronger factor.

3.4. Comparative Analysis of R Value in 2000 and 2015

With the R value of 2000 as the abscissa, the R value of 2015 is the ordinate, and (1, 1) as the origin to plot the scatter plot to reflect the overall change in R value between 2000 and 2015, as shown in **Figure 4**.

The farther the corresponding point from the vertical axis, the further the economy and the population from match, and vice versa the higher the degree of matching. The farther the corresponding point away from the abscissa, the higher matching degree of economy and population, and vice versa is lower. At the same time, if the scatter is below the 45˚ reference line, the R value of the corresponding province is reduced between 2000 and 2015. If the scatter is above the 45˚ reference line, the R value is increased between 2000 and 2015. Moreover, the farther the distance from the scatter to the 45˚ line is, the greater the R value changes.

From the size of R value,, the R value in 2000 and 2015 are larger in Shanghai, Beijing, Tianjin, Zhejiang, Jiangsu and Guangdong, indicating that the proportion of their economy accounted for more than the proportion of population. For the balanced development of our country, these areas should be gradually implemented policy as part of the industrial transfer and population introduction. It is noteworthy that all the corresponding scatter of the 31 provinces are



Notes: In Figure 4, the horizontal axis represents the *R* value of provinces in 2000, and the vertical axis represents the *R* value of provinces in 2015. We can find out the change of the *R* value from 2000 to 2015 by obserbving the position of the corresponding point in the coordinate axis. The chart on the left contains 31 provinces, while the figure on the right is a partial enlarged image. Since some of the provinces are located very close to each other, the third quadrant of the left figure is not clear and some of the labels would be overlapped, but we can clearly recognize the relative position from the enlarged image on the right.

Figure 4. Comparison of *R* values and partial magnification.

located in the first and third quadrants except Heilongjiang and Inner Mongolia, whose economic and demographic conditions have grown from one imbalance to another. From Table 2 we can tell that the economic factors play a major role in these provinces, and what distinguishes them apart is that the Inner Mongolia's economic development has improved while Heilongjiang has trapped into a continuous economic trouble.

The value of R of Inner Mongolia, Shaanxi and Guizhou has increased more than 0.2. These three provinces are located in the western part of China, with low *R* values and the proportion of the economy being less than the proportion of the population in 2000. The increase of *R* value may owe to economic factor (the economy development)or to the population factor (the population outflow) or the two factors combined. Specifically, the reasons for the increase in *R* values in these three provinces are slightly different. Referring to the analysis data in Table 2, answers for the increase of *R* value in Inner Mongolia and Shaanxi mainly lie in the rapid economic development, while the situation in Guizhou is more complex as the population factor worked dominantly from 2000 to 2006 and economic factor was stronger from 2006 to 2015.

R has declined for more than 0.2 in Shanghai, Beijing, Guangdong, Heilongjiang, Zhejiang and Hebei. The reason for the decline in *R* may be economic factor (economic losers), or demographic factor (population inflows) or combined. Shanghai, Beijing, Guangdong and Zhejiang are the richest provinces in China, whose original R value is comparatively higher and stay after higher than 1.2 after a substantial decline. The specific causes of decline are also more complex with demographic factor and economic factor alternatively play a major at different stages. The pace of development has gradually slowed down after un-

Table 2. Comparison of economic factor and population factor.

Province	2000-2006			2006-2013			2013-2015		
	α_i	β_i	ΔR_i	α_i	β_i	ΔR_i	α_i	β_i	ΔR_i
Liaoning	103.99%	−4.69%	−0.21	79.27%	18.97%	0.11	119.75%	−21.08%	−0.08
Jilin	119.44%	−20.68%	−0.06	75.07%	21.49%	0.14	123.54%	−24.62%	−0.04
Heilongjiang	113.68%	−16.00%	−0.15	133.65%	−37.77%	−0.10	123.86%	−25.60%	−0.05
Beijing	−188.60%	302.78%	−0.14	35.99%	90.28%	−0.82	377.64%	−276.17%	0.01
Tianjin	174.32%	−69.85%	0.14	−203.28%	334.15%	−0.21	−15.50%	119.39%	−0.07
Hebei	87.50%	13.04%	−0.04	86.17%	15.43%	−0.10	98.94%	1.15%	−0.07
Shandong	106.64%	−6.00%	0.13	100.87%	−0.94%	−0.10	110.57%	−10.56%	0.00
Shanghai	29.07%	89.66%	−0.79	68.22%	49.30%	−1.06	47.53%	51.32%	0.04
Jiangsu Province	129.05%	−27.41%	0.09	49.18%	49.93%	0.03	80.77%	18.55%	0.06
Zhejiang	291.75%	−186.32%	0.05	79.41%	24.20%	−0.26	−307.21%	406.80%	0.00
Fujian	88.52%	13.74%	−0.23	112.49%	−11.87%	0.06	115.62%	−15.06%	0.05
Guangdong	−413.86%	520.04%	−0.02	68.93%	38.82%	−0.31	150.57%	−49.81%	0.02
Hainan	84.81%	18.27%	−0.14	135.70%	−33.37%	0.05	138.42%	−37.79%	0.01
Shanxi	111.39%	−10.28%	0.08	64.48%	38.31%	−0.06	101.73%	−1.95%	−0.08
Inner Mongolia	96.48%	2.56%	0.31	94.65%	4.21%	0.31	108.53%	−9.17%	−0.10
Henan	48.13%	48.16%	0.05	1965.85%	−1870.05%	0.00	66.28%	33.28%	0.01
Shaanxi	88.99%	9.75%	0.08	87.78%	9.48%	0.21	118.69%	−19.07%	−0.02
Anhui	126.47%	−28.93%	−0.05	69.02%	25.31%	0.12	−154.89%	255.61%	0.00
Jiangxi	738.37%	−636.64%	0.00	95.76%	3.85%	0.06	90.78%	9.04%	0.01
Hubei	124.85%	−26.76%	−0.06	85.72%	11.64%	0.17	94.76%	5.00%	0.04
Hunan	344.04%	−250.02%	−0.02	105.89%	−5.05%	0.11	107.79%	−7.57%	0.02
Guangxi	−3295.49%	3392.11%	0.00	69.44%	26.14%	0.09	129.88%	−29.41%	0.01
Chongqing	211.99%	−116.11%	−0.03	106.90%	−5.81%	0.15	106.01%	−5.60%	0.07
Sichuan	363.25%	−267.84%	−0.01	65.47%	29.38%	0.10	62.17%	37.86%	0.00
Guizhou	−513.64%	609.21%	0.00	67.42%	23.29%	0.14	97.17%	2.48%	0.07
Yunnan	87.34%	15.48%	−0.11	99.11%	0.81%	0.04	101.33%	−1.32%	0.01
Tibet	−175.22%	282.68%	−0.02	−186.72%	291.36%	−0.01	137.67%	−35.02%	0.04
Gansu	119.94%	−21.43%	−0.04	38.33%	58.57%	0.03	107.97%	−8.43%	−0.03
Qinghai	384.65%	−281.54%	0.01	105.04%	−4.23%	0.13	5.63%	94.94%	0.00
Ningxia	−258.47%	364.53%	−0.01	116.94%	−13.45%	0.17	47.30%	53.67%	−0.02
Xinjiang	43.64%	64.21%	−0.12	−49.57%	155.12%	−0.03	51.79%	51.25%	−0.05

dergoing many years of rapid development, while attracting a large number of population in the process, which makes the R value decreased. R value in Heilongjiang and Hebei has been relatively low, but more serious is that the sharp decline is mainly economic factor, which implies that these two provinces have encountered economic difficulties in 2000 to 2015.

3.5. Economic Resources and Population Flow Analysis

This paper calculates the GDP absolute weighting index according to Equation (3), and the results are showed in Figure 5.

If the economic resources are allocated evenly across the country, then the absolute incremental weighting index is 1. Thus we can take 1 for a reference, and a score bigger than 1 implies that the corresponding area possesses more resources than the national average, otherwise lower than the national average. As shown in Figure 5, Shanghai, Tianjin, Beijing, Jiangsu, Zhejiang, Shandong and Guangdong get the top highest score. These provinces are all located in the eastern coastal areas, followed by Henan, Hebei, Anhui and Chongqing and other central and western regions. However, Tibet, Qinghai, Xinjiang and Gansu and other western provinces are ranked at the end with scores below 0.2. Therefore, the economic resources on the whole mainly flow to the eastern coastal provinces that are originally developed, and less to the western relatively backward provinces. There exists a very obvious Matthew effect about the flowing economic resources.

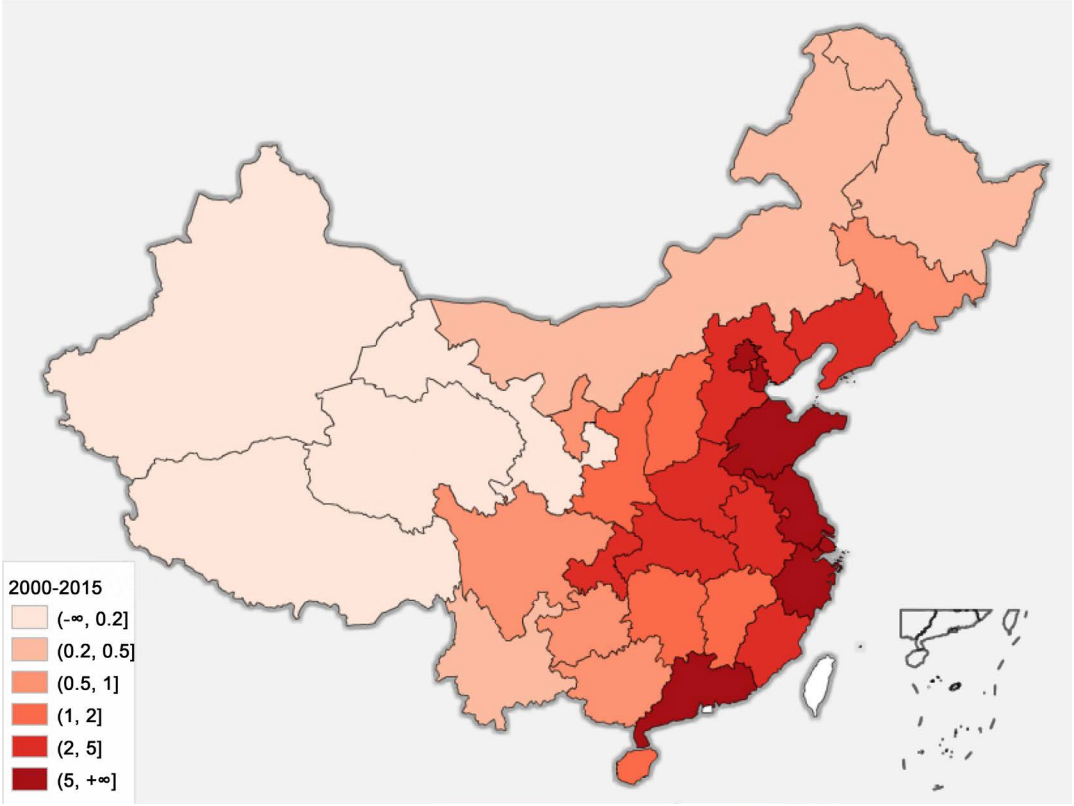


Figure 5. GDP absolute incremental weighted index (2000-2015).

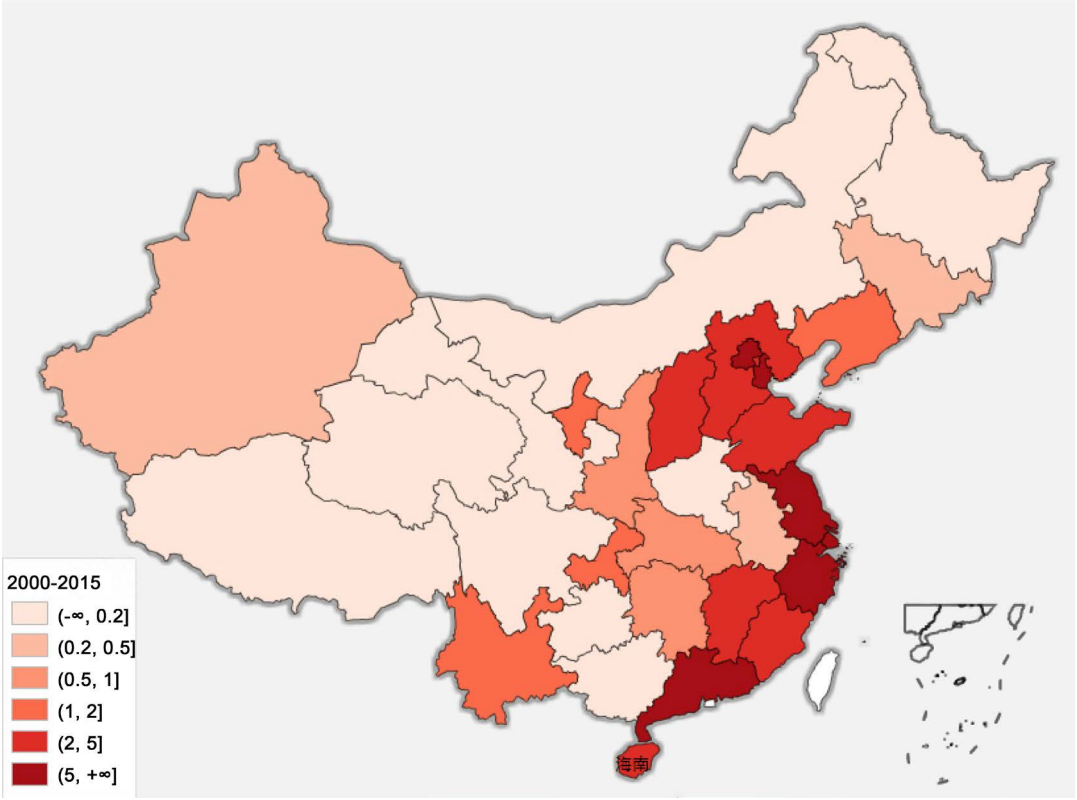


Figure 6. Population absolute incremental weighted index (2000-2015).

As can be seen from Figure 6, the place of highest score lies in Shanghai, Tianjin, Beijing, Guangdong and Zhejiang, with a great coincidence with the direction of flowing of economic resources. Generally speaking, the destination of population migration in 2000-2015 is concentrated in the eastern coastal provinces, while the western region and the central part of the country and the northeast region enjoy only a small or even negative population growth. The flow of population to the developed areas such as the eastern coastal areas is in line with the development of China's economy and population, and is also the inevitable result of social development.

4. Conclusions and Summary

In this paper, we study the degree of economic and population matching of 31 provinces in China during the period of 2000-2015, as well as the mechanism of its variation, so as to find the way to realize the balanced development of economy and population. Summarized as follows.

Firstly, China's economic and population distribution between regions is not balanced, forming an overall situation of "high in the east and low in the west". In terms of statistics, there are 21, 18, 15 and 15 provinces are in unbalanced situation (R falls outside of 0.7 to 1.3), and nearly half of the provinces are in an uneven state. Provinces with higher R value concentrates in the eastern region, while the western region generally showing lower R value.

Secondly, from 2000 to 2015, China's economy and population imbalance has

improved. The mean value of the *R* value decreased from 1.08 in 2000 to 1.00 in 2015, and the variance of the *R* value decreased from 0.54 in 2000 to 0.19 in 2015, and the unbalanced index decreased from 0.0118 in 2000 to 0.0093 in 2015. Although there are fluctuations in the short term, the degree of matching between our economy and population gradually increased on the whole.

Thirdly, generally speaking, economic factor dominate the relative situation of the economy and the population in most provinces. R values can be regarded as the result of both economic factor and demographic factor. The economic factor dominated in 31 provinces, with 70.97% of the provinces in 2000-2006, and this percentage reached 80.65% in 2006-2013 and 2013-2016. There have been 70.97% of the provinces dominated by economic factors among 31 provinces in 2000-2006, and this ratio reached 80.65% in 2006-2013 and 2013-2016. For most provinces, the economic factor is greater than the population factor.

Fourthly, from 2000 to 2015, China's economic resources and population are transferring to the eastern coastal areas, and measures need to be taken to safeguard the transfer of industries to the west and the process of population diversion to the east. The importance of industrial transfer is beyond doubt, and part of the industry from the eastern developed areas moving to the central and western regions is inevitable. So the central need to do overall planning, while the local government to grasp their own advantages and realize the direction of development, so as to achieve a good transition period of industrial transferring and regional balanced developing. It should be noted that some provinces in the northeastern and central regions are economically problematic and local governments need to take more effective measures to promote economic viability. In addition, the importance of population factor should be taken seriously and the government should also take measures to guide the rational flow of personnel.

However, there are many deficiencies in this paper still. Due to the more specific data is difficult to obtain, so this paper only uses the provincial data, but the truth is that there are gaps in terms of economy and population within each province. In particular, these gaps are even more pronounced when the provinces involved are large or complex.

In addition, the economy and population have a more specific structure than discussed in this paper, such as different industrial structures and different age compositions. There is no distinction between these structures, so the conclusions are somewhat vague to some extent.

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