The Economics of Using Data Processing to Analyze Changes in Population Flows

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Abstract-with the deepening of China's reform, the scale of autonomous population flow is not increasing. In particular, Southwest China is relatively backward in economic development, relatively fast in population growth, complicated ecological environment, frequent population flow and relatively concentrated ethnic minorities. Population flow is the key factor for the rapid development of China's social economy as a whole, and the change of population flow will inevitably lead to the change of economic welfare. This paper aims to study the changes of Economics under different types of population mobility. Taking the four provinces in Southwest China as the research object, this paper boldly tries to combine the theory of population mobility with the theory of economic welfare, and uses the grey correlation analysis method and Data processing method to explore the value of population mobility on economic welfare; on the basis of summing up the successful experience of predecessors in establishing the economic welfare index system, this paper constructs the economic welfare index system of Southwest China, and analyzes the specific aspects of the impact of population flow on the social and economic welfare of Southwest China. Through data analysis, it is found that the flow of population in the province has the greatest impact on the level of economic welfare, the grey correlation coefficient is 0.7565, and its impact is still increasing; although the inter provincial population flow has an impact on the economic welfare level, it is not as big as the intra provincial population flow, and its grey correlation degree is only 0.4988; the impact of inter provincial population inflow on economic welfare is becoming prominent.

Keywords: Population Flow, Economic Welfare, Ecological Economy, Grey Correlation Coefficient, Data processing method, Economic Welfare Index System

1. INTRODUCTION

With the deepening of reform and the rapid development of China's economy, the scale and frequency of China's autonomous population flow are rapidly increasing [1-2]. Population flow is a double-edged sword. It optimizes the allocation of resources and improves the whole social and economic welfare and driven the development of ecological economy，but at the

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same time, it has a certain resistance to the improvement of the whole social and economic welfare [3-4]. Obviously, population mobility plays an important role in social and economic welfare [5-6]. Although many scholars have done a lot of work on population mobility and economic welfare respectively, there are few researches on the combination of the two [7-8].

Population flow can be divided into intra provincial flow and inter provincial flow. Some scholars have put forward their own views on the economic changes under the population flow. For example, some scholars have analyzed the impact of floating population on urban public security, analyzed the impact of floating population on urban public security based on economic theories such as "poverty generates crime" and put forward corresponding solutions [9]. Some scholars have made economic analysis on the phenomenon of rural population flow to the city, and put forward the theory that this flow will promote economic growth [10].

Based on the specific analysis of population scale and population mobility in four provinces of Southwest China, this paper studies the impact of population mobility on economic welfare by using grey correlation analysis method, and further analyzes the specific aspects of the impact of population mobility on economic welfare. The study found that: the population flow within the province has the greatest impact on the per capita economic welfare level of the four southwest provinces, while the inter provincial population inflow has the least impact on the per capita economic welfare level of the four southwest provinces [11]. At the same time, it is found that the flow of population mainly affects the income and consumption of urban and rural residents; transportation infrastructure, medical and health facilities, literature and art, and housing of public economic welfare [12].

2. ECONOMY UNDER THE CONDITION OF POPULATION FLOW

2.1 Related Theories

2.1.1 Population Mobility

Based on registered residence registered system, the definition of population mobility is based on the definition of population grouping in China's census. The definition of population mobility is as follows: population mobility refers to the phenomenon of population migration that has temporarily and long-term left the place of registered residence for the purpose of specific purposes, and has not changed registered residence registration. The movement of people depends largely on the state of the local ecological economy. The ecological and economic environment is good, the population turnover rate is low, and the economic development is relatively stable, but it is not conducive to the improvement of the economy caused by population restructuring.

2.1.2 Economic Welfare

The definition of economic welfare in this paper is: the influence of all social and economic behaviors in a region on the current and future welfare of the local people in a period of time can be expressed by monetary value. First, economic welfare has value, which can be measured by monetary value. Secondly, economic welfare is produced by social and economic behaviors, including private and government economic behaviors. Thirdly, the flow of population is conducive to the restoration and regeneration of the original regional

environment. Finally, economic welfare not only reflects people's current welfare level, but also reflects people's future welfare level.

Economic welfare includes personal economic welfare and public economic welfare. The equality of income distribution affects the level of individual economic welfare created by per capita income. The higher the fairness of social income distribution, the closer the social and economic welfare created by per capita income is to its own value. This is exactly consistent with the meaning of Sen's formula for calculating the level of welfare. Therefore, we can use Sen's formula for measuring personal economic welfare as follows:

$$W_i = \mathrm{y_i}(1 - \mathrm{G_i}) \tag{1}$$

Where y is the per capita income, and G is the Gini coefficient, which reflects the inequality of social income distribution. The larger the value is, the more unequal the social income distribution is.

Public economic welfare is based on public goods and services. If the level of public goods and services owned by the society is high, the level of public economic welfare of the society will be high, and vice versa. Therefore, the level of public economic welfare of the whole society can be expressed by the amount of public goods or services owned by the society.

To sum up, the formula for calculating the level of economic welfare is as follows:

$$\mathrm{W} = \mathrm{y}(1 - \mathrm{G}) + (\mathrm{t} - \mathrm{r}) \tag{2}$$

Where t is the per capita input of public goods; R is the per capita environmental pollution control cost. According to this formula, in order to calculate the per capita economic welfare index, we need to obtain the data: per capita income, Gini coefficient, investment in public goods, investment in environmental pollution control, and population size.

2.2 Grey Correlation Analysis Method

Grey correlation analysis is a method to judge the correlation level of each factor by comparing the similarity of curves formed by each factor sequence. The steps of grey correlation analysis are: the first step is to determine the number of factors to be analyzed, assuming that the number of factors to be compared is y={y (k) | k=1, 2, ..., n}, and the number of comparative factors is $\mathrm{X_i(k)} = \{\mathrm{X_i(k)}|\mathrm{k} = 1,2, \ldots \ldots \mathrm{n}\}, \mathrm{i} = 1,2, \ldots \ldots \mathrm{m}$. The second step is dimensionless. The third step is to calculate the correlation coefficient, y (k) and X_ The correlation coefficient of I (k) is:

$$\xi_i(k) = \frac{\min \min|Y(k) - X_i(k)| + \rho man\ man|Y(k) - X_i(k)|}{\Delta_i(k) + \rho\ man\ man|Y(k) - X_i(k)|} \tag{3}$$

The fourth step is to calculate the correlation degree, and the fifth step is to sort the correlation degree.

3. Economic Analysis Model of Population Flow

3.1 Survey of Population Mobility in Four Provinces of Southwest China

3.1.1 Respondents

Since the implementation of the western development strategy for more than ten years, it has produced great impetus to the economy of Southwest China and promoted its remarkable progress. The population flow is gradually active. It not only transports a large number of labor force to the eastern and central developed areas, but also increases the population flow in the mainland. This paper will analyze the population status quo in Southwest China from three aspects of population scale, population mobility and ecological environment, and understand the population and population mobility in the four provinces of Southwest China.

3.1.2 Experimental Method

This paper summarizes the important achievements in the study of population mobility and economic welfare through literature review, and seeks for the perspective of research value. At the same time, this method is used to make up for the knowledge loopholes in the concept, measurement and index system of economic welfare. Through qualitative and quantitative analysis methods, based on the data of population flow and economic welfare in four provinces of Southwest China, this paper quantitatively studies the economic welfare effect of population flow, and deeply discusses the influence of the former on the latter. This paper uses comparative analysis method to compare and analyze the differences of the impact of population mobility on economic welfare level and the differences of the impact of different forms of population mobility on economic welfare level.

3.1.3 Survey Data Acquisition

Starting from the comparability of data, in order to fully understand the situation of population inflow, population outflow and population flow, this paper mainly selects the data of the fifth and sixth population census to sort out and analyze, so as to understand the situation of population flow in the four provinces of Southwest China. Because the two censuses did not directly give the data of intra provincial and inter provincial population mobility, this section based on the above definition of population mobility, according to the design of population grouping signs in the two censuses, makes reasonable assumptions, collates and calculates the data of inter provincial and inter provincial population mobility, and carries out relevant research and analysis.

3.2 Economic Welfare Analysis Model

3.2.1 Economic Welfare Data

Based on A. Sen's formula for calculating economic welfare, combined with the understanding of the essence of economic welfare, from its composition, this paper constructs an economic welfare calculation formula that can comprehensively reflect social and economic welfare and

is easy to operate, so as to obtain economic welfare data. The level of public goods input can be expressed by the level of fiscal expenditure. The Gini coefficient data is selected from the article "measurement of China's regional Gini coefficient and Research on its nonparametric model", and the weighted average method is used to calculate the per capita income of southwest provinces.

3.2.2 Establishment of Economic Welfare Index System

First, income and consumption are important components of the economic welfare system. Then, the quality of social environment directly affects people's life and health, and it will affect people's satisfaction with their lives. Therefore, the social aspect should also be considered in the construction of economic welfare system. This paper will select the above three factors as the first level indicators, and then, from the rationality and completeness of the economic welfare index system, and the availability of economic welfare index data, select the appropriate second level indicators to establish the economic welfare index system needed in this study.

4. Experimental Results and Analysis

4.1 Analysis of Population Flow in Four Provinces of Southwest China

The population flow in the province can reflect the population flow in the province as a whole; the inter provincial population flow can reflect the situation that the population of the province flows out of the province and that of other provinces flows into the province. Therefore, this paper will reflect the population flow situation of the four provinces in Southwest China from two aspects of intra provincial and inter provincial population flow, see table 1. As the population flow calculated from the census data is absolute, it can only reflect the scale of population flow in a province, but cannot reflect the degree of population flow in a province, so it cannot well reflect the situation of population flow in a province. Therefore, on the basis of the data obtained in the previous chapter, this paper will calculate the different types of population mobility rates of each province according to the population size of each province, so as to reflect the degree of population mobility of each province and better reflect the situation of population mobility of each province.

TABLE I. Population mobility rate of four provinces in Southwest China

province	Population mobility rate in the province	Inter provincial population mobility rate	
		Outflow rate	Inflow rate
Chongqing	16.34	18.34	3.41
Sichuan	13.27	12.56	1.54
Guizhou	11.25	22.45	2.12
Yunnan	10.67	1.78	2.89

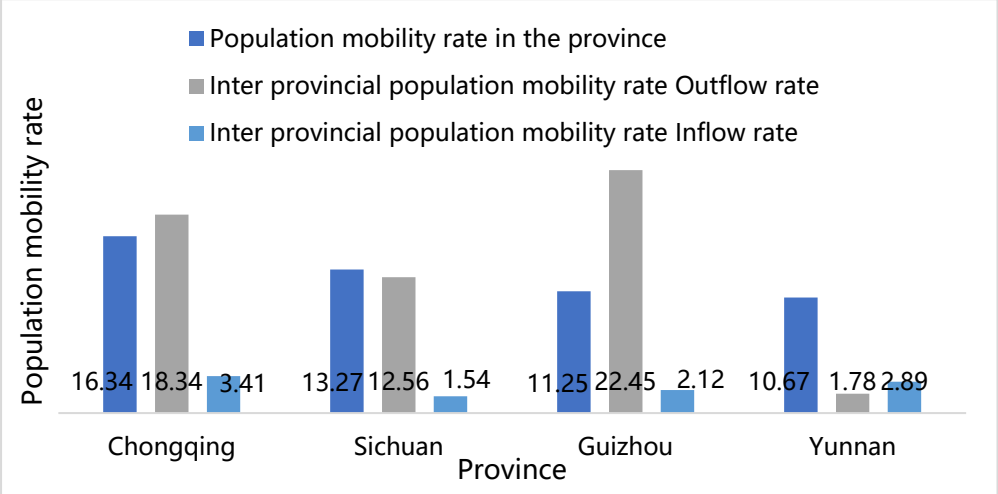

Figure 1. Population mobility rate of four provinces in Southwest China

It can be seen from Figure 1 that the population flow rate among the four provinces in Southwest China is greater than that within the province, and the outflow rate is greater than the inflow rate in the inter provincial population flow.

4.2 Economic Welfare Index

By substituting the data in the previous chapter into the calculation formula of economic welfare, the per capita economic welfare data of various provinces and cities can be obtained. The per capita economic welfare indicators of all provinces and cities are summarized in Table 2.

TABLE II. PER CAPITA ECONOMIC WELFARE DATA

	Guizhou	Sichuan	Yunnan	Chongqing
The fifth census	1987	2839	2328	2296
The sixth census	9234	10364	9358	13172
Average growth rate (%)	16.64	13.82	14.92	19.09

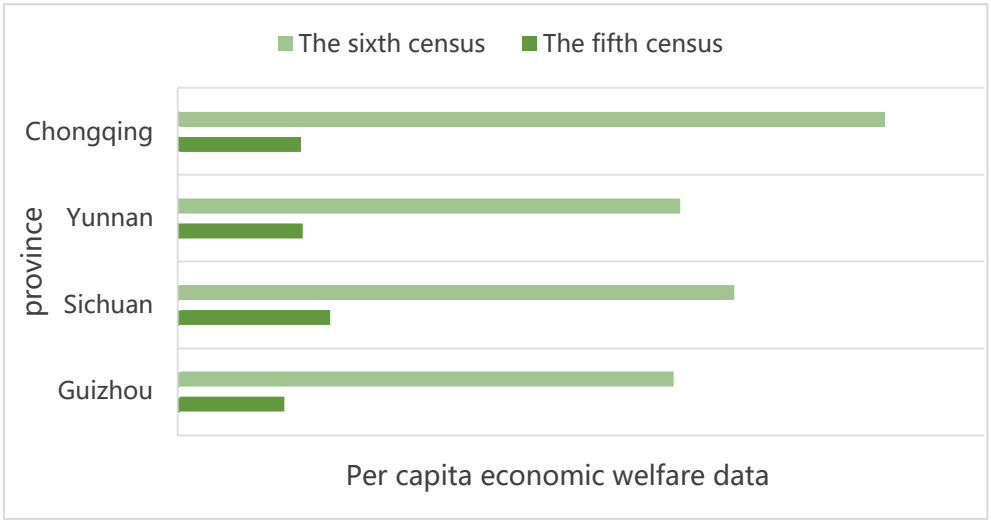

Figure 2. Per capita economic welfare data

From the per capita economic welfare data of the four provinces in Southwest China, Chongqing has the highest per capita economic welfare level, 13172 yuan, with an average annual growth rate of 19.09%; Guizhou Province has the lowest per capita economic welfare value, which is 9147 yuan, an increase of 5789 yuan compared with the five census period, with an average annual growth rate of 16.64%. The per capita economic welfare value of Sichuan Province is the second among the four provinces in Southwest China, with 10364 yuan, the lowest annual growth rate of 13.82%. The per capita economic welfare level of Yunnan Province is 212 yuan higher than that of Guizhou Province, with a growth rate of 14.92%.

4.3 Qualitative Analysis of the Economic Welfare Effect of Population Mobility

4.3.1 The Individual Economic Welfare Effect of Population Mobility

The outflow of population makes part of the labor force leave the region, alleviates the contradiction of more people and less land in the region, and improves the utilization rate of land resources. The inflow of population provides a large number of cheap labor for the inflow area, which can promote the rapid economic development and bring higher income for the local population. It can also make the inflow residents produce certain employment pressure and promote the improvement of their labor productivity. However, population mobility also has a negative effect on personal economic welfare. Sometimes, population mobility is not family mobility, which leads to the separation between migrants and their relatives, resulting in homesickness; at the same time, the inflow has no sense of belonging, lack of understanding and estrangement with local residents; the floating population is also easy to cause the accumulation of talents, so that some people cannot get the jobs and treatment that adapt to their own quality, and their personal economic welfare level cannot reach the corresponding height.

4.3.2 The Public Economic Welfare Effect of Population Mobility

The inflow of population can meet the local demand for labor, promote the rapid development of social economy and increase the social GDP. In addition, the inflow of population provides sufficient labor for the local public infrastructure. However, population flow brings some difficulties to urban management, and a large number of population outflow reduces the labor resources in the outflow area.

4.3.3 The Economic Welfare Effect of Population Flow in the Four Provinces of Southwest China

The variables selected in this paper are per capita economic welfare, inter provincial population inflow rate, inter provincial population outflow rate and intra provincial population flow rate of the four provinces in Southwest China. According to the grey correlation analysis, we can calculate the correlation coefficient and grey correlation coefficient between different forms of population mobility rate and per capita economic welfare in the period of the fifth census, as shown in Table 3.

TABLE III. CORRELATION COEFFICIENT AND GREY CORRELATION COEFFICIENT BETWEEN DIFFERENT FORMS OF POPULATION MOBILITY RATE AND PER CAPITA ECONOMIC WELFARE

Region	ξ_1（k）	ξ_2（k）	ξ_3（k）
Chongqing	0.9224	0.6287	0.5225
Sichuan	0.5961	0.4203	0.4232
Guizhou	0.9988	0.3215	0.4532
Yunnan	0.5400	0.8421	0.5867
Υ_i	0.7565	0.5757	0.4988

It can be seen from the data in Table 3 that the grey correlation coefficient between different forms of population mobility and per capita economic welfare shows great difference in value. The grey correlation coefficient between population mobility rate and per capita economic welfare is the largest, which is 0.7565; the grey correlation coefficient between provincial population outflow rate and per capita economic welfare is 0.5757; the grey correlation coefficient between provincial population inflow rate and per capita economic welfare is the smallest, which is 0.4988. This fully shows the dominant position of the influence of population flow on economic welfare level in the province. At the same time, we can also find that the impact of provincial population outflow and inflow on economic welfare is changing.

5. CONCLUSION

After research, population mobility will have a certain impact on economic welfare. The impact of population mobility on income is reflected in its impact on urban income and rural residents' income, which is conducive to improving the income level of urban and rural residents, and reducing the income gap between urban and rural areas;the improvement of the

ecological environment and the recovery of the ecological economy have been greatly promoted;the impact on consumption is reflected in its impact on the consumption expenditure of urban residents and rural residents; the impact on public welfare is reflected in its impact on citizens' investment in health care construction, entertainment infrastructure construction and housing conditions.

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