REGIONAL DIFFERENCE ANALYSIS OF URBAN PENSION INSURANCE LEVEL IN CHINA

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ABSTRACT

The basic old-age insurance system in China started late, and there are still many imbalances in the regional economy at present, which also leads to the vulnerability of the basic old-age insurance system in China. In view of the low coordination of basic old-age insurance in China, it is urgent to take measures to narrow the existing regional differences and promote the coordinated development of basic old-age insurance in various places. From the aspects of economic base, population (age) structure, government public financial support and so on, this paper selects 11 main indexes, and systematically analyzes the basic current situation of the difference of the development level of regional old-age insurance in China by combining factor analysis and cluster analysis.
Keywords: basic old-age insurance; regional differences; factor analysis; cluster analysis;

1. Introduction

Social basic old-age insurance is a basic social security system established by the government for workers. However, due to the stage characteristics of China's economic reform and social insurance system in the course of its development, there are great differences in the development level of basic old-age insurance in various regions of which reduces the mutual benefit efficiency of the social security system. From the perspective of regional old-age insurance in China, this paper analyzes the regional differences and causes of urban old-age insurance level in China, and provides a reference for narrowing the regional old-age insurance level differences and establishing and perfecting the social old-age insurance system adapted to the regional development level.

2. Construction of Index System

To construct a scientific and reasonable index system of pension insurance level and comprehensively reflect the difference of pension insurance level between regions, we need to consider the index synthetically according to the principles of science, importance, hierarchy and maneuverability. In view of the limitations of data acquisition, practical problems and the objective situation of statistical data, this paper selects 11 index factors with different influence to construct the development level system of urban old-age insurance in our country (Table 1). These indicators reflect the economic situation, government policy, population situation, residents' living conditions of our country, and the development level of old-age insurance in various cities and cities of our country, which can be used to analyze the regional differences of basic old-age insurance level in various provinces and municipalities of our country.

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3 Factor Analysis

Table 1Evaluation indicators system

	Evaluating Indicator
X1	Population by year end（10,000）
X2	Regional GDP (millions)
X3	Regional revenue (billion)
X4	Proportion of urban population at year-end (%)
X5	Employed persons in urban units
X6	Per capita disposable income of urban residents
X7	Per capita consumption expenditure of urban residents (yuan)
X8	Number of urban workers (10,000)
X9	Cumulative balance of pension fund(billion)
X10	Financial expenditure on social security and employment (millions)
X11	Elderly population dependency ratio (%)

Factor analysis is an important extension of principal component analysis, and its main feature is to use the idea of dimensionality reduction, starting with the internal dependence of the original variables, the original variables with complex dependence are summarized and divided into several comprehensive factors. the FACTOR process of SAS software is used here for factor analysis. the parameters are estimated by principal component method, and the eigenvalues, variance contribution rates of 11 variables are obtained (Table 2).

Table 2eigenvalues and cumulative contributions of correlation arrays

	Eigenvalue	Difference	Proportion	Cumulative
1	6.82234650	4.52494623	0.6202	0.6202
2	2.29740027	1.14596242	0.2089	0.8291
3	1.15143785	0.90248709	0.1047	0.9337
4	0.24895076	0.03444931	0.0226	0.9564
5	0.21450145	0.08102968	0.0195	0.9759
6	0.13347177	0.08013410	0.0121	0.9880
7	0.05333766	0.02475336	0.0048	0.9929
8	0.02858430	0.00656246	0.0026	0.9955
9	0.02202184	0.00479900	0.0020	0.9975
10	0.01722285	0.00649810	0.0016	0.9990
11	0.01072475		0.0010	1.0000

It is known that the first three principal components explain 93.37% of the variance, and the eigenvalues are greater than 1, so three common factors are selected. After the factor rotation (Table 3), we call the first factor population and economic development level factor, the second factor urban resident life factor, and the third factor age structure factor.

Table 1Factor load array after rotation

		Factor1	*Factor2*	*Factor3*
X5	Employed persons in urban units	0.94951	0.22527	0.12719
X8	Number of urban workers	0.93899	0.23745	0.15356
X2	Regional GDP	0.91901	0.20387	0.20331
X1	Population by year end	0.88374	-0.21749	0.35936
X3	Regional revenue	0.85507	0.48892	0.08821
X9	Cumulative balance of pension fund	0.84903	0.40170	-0.16992
X10	Financial expenditure on social security and employment	0.70664	0.06516	0.59650
X7	Per capita consumption expenditure of urban residents	0.18949	0.96243	0.02707
X6	Per capita disposable income of urban residents	0.21187	0.94390	0.05465
X4	Proportion of urban population at year-end	0.13496	0.88662	0.22896
X11	Elderly population dependency ratio	0.14597	0.20053	0.94217

The factor score coefficient is obtained by regression method, and the factor score function is obtained:

$$F_1 = 0.19133x_1 + 0.18124x_2 + 0.15303x_3 - 0.10826x_4 + 0.20089x_5 - 0.06233x_6 - 0.06525x_7 + 0.19185x_8 + 0.20913x_9 + 0.06848x_{10} - 0.15864x_{11}$$

$$F_2 = -0.19253x_1 - 0.03432x_2 + 0.08303x_3 + 0.13674x_4 - 0.02771x_5 + 0.32817x_6 + 0.33844x_7 - 0.02265x_8 + 0.05806x_9 - 0.07275x_{10} + 0.03276x_{11}$$

$$F_3 = 0.13435x_1 - 0.01037x_2 - 0.09979x_3 + 0.13674x_4 - 0.07839x_5 - 0.02056x_6 - 0.03933x_7 - 0.05537x_8 - 0.30585x_9 + 0.35190x_{10} + 0.73247x_{11}$$

Then we calculate the total score of each province and city according to the contribution rate of variance as the weight, and get the comprehensive score formula of the influence degree of three main factors on the social endowment insurance level: $F = 0.53358F_1 + 0.31585F_2 + 0.15057F_3$.Substitute the data to get the score of main factor, comprehensive score and of each region:

Table 2Main factor score, comprehensive score and ranking

Region	Factor1	Rank	Factor2	Rank	Factor3	Rank	F	Total Rank
Beijing	-0.16901	15	2.98169	2	-0.30169	22	0.806161	6
Tianjin	-1.02519	31	1.44085	3	-0.05830	17	-0.10071	15
Hebei	0.28242	7	-0.69358	26	0.82000	9	0.055094	12
Shanxi	-0.11622	12	-0.51026	20	-0.74910	25	-0.33597	21
Neimenggu	-0.63754	23	0.22008	8	-0.01494	15	-0.27292	19
Liaoning	-0.23297	17	0.19768	9	1.57764	1	0.175674	9
Jilin	-0.64224	24	-0.38226	17	0.30031	13	-0.41821	24
Heilongjiang	-0.44240	21	-0.58299	23	0.71274	10	-0.31288	20
Shanghai	-0.51931	22	3.06476	1	0.90711	8	0.827495	3

Jiangsu	1.69482	2	0.60846	5	0.57008	12	1.182341	2
Zhejiang	0.84211	6	1.29640	4	-0.22170	19	0.82542	4
Anhui	-0.03540	11	-0.52513	21	1.10378	4	-0.01855	13
Fujian	-0.15686	14	0.49226	7	-0.67025	23	-0.02914	14
Jiangxi	-0.14233	13	-0.52587	22	-0.10702	18	-0.25815	18
Shandong	1.44509	3	-0.34113	15	0.97033	5	0.809428	5
Henan	1.04456	4	-1.15114	31	0.63819	11	0.289861	8
Hubei	0.22268	8	-0.41936	19	0.90955	7	0.123314	10
Hunan	0.14111	9	-0.39011	18	0.93310	6	0.092574	11
Guangdong	3.86954	1	0.49589	6	-2.18720	31	1.892009	1
Guangxi	-0.19625	16	-0.77377	29	-0.04358	16	-0.35567	22
Hainan	-0.96368	28	-0.07336	11	-1.11006	27	-0.70451	28
Chongqing	-0.69129	26	0.13209	10	1.37142	3	-0.12064	16
Sichuan	0.89520	5	-0.79191	30	1.48737	2	0.451489	7
Guizhou	-0.41451	20	-0.64899	25	-0.27684	20	-0.46784	25
Yunnan	-0.02372	10	-0.76157	28	-0.71873	24	-0.36142	23
Xizang	-0.74235	27	-0.73169	27	-2.14873	30	-0.95074	31
Shannxi	-0.25503	18	-0.38130	16	0.15445	14	-0.23326	17
Gansu	-0.65183	25	-0.61769	24	-0.29184	21	-0.58684	27
Qinghai	-1.00629	29	-0.19674	13	-1.20646	28	-0.78073	30
Ningxia	-1.02084	30	-0.11312	12	-1.08625	26	-0.74399	29
Xinjiang	-0.35226	19	-0.31818	14	-1.26337	29	-0.47868	26

In terms of the scores and rankings of the provinces, there are 12 provinces and autonomous regions in the country with comprehensive score of positive and negative scores of 19, and the Guangdong Province with the first score is 1.892009, and the final Tibet score is -0.95074, which can be said to be a big gap in the development level of pension insurance in these two regions.

4 Cluster analysis

The method of cluster analysis is to classify similar samples or variables in the same class according to the data characteristics of samples (or variables), and to classify dissimilar samples (or variables) in different classes. Because the objects of classification are different, the clustering analysis is usually divided into two categories, in which sample clustering is the aggregation classification of samples (observations), and variable clustering is the aggregation classification of variables (indicators). In this paper ,31 provinces and regions are classified, so it belongs to analysis here.

According to the results of the above factor analysis, the scores of 31 provinces (districts) and cities according to population and economic development level, living standard of urban residents and age structure were clustered and analyzed. Finally ,31 regions were divided into 4 categories (Figure 1).

It can be seen from the pedigree chart that the first category is Xinjiang, Qinghai, Gansu, Ningxia, Shaanxi, Shanxi, Inner Mongolia, Heilongjiang, Jilin, Tibet, Yunnan, Guizhou, Guangxi, Hainan,

Jiangxi, Fujian, combined with the results of factor analysis, it is found that the scores of population and economic development factors in these areas are low, and the comprehensive scores are all at a lower level, which belongs to the underdeveloped areas. The second category is Guangdong Province, which has higher scores on population and economic development level factors and urban residents' living factors, and the score of age structure factors is obviously lower than that of other regions, and the comprehensive score ranks first, which belongs to the developed regions. The third category is Beijing and Shanghai, which has obvious advantages in living factors of urban residents, and the comprehensive scores are all at a higher level, which belongs to the more developed areas. the fourth category isHebei, Liaoning, Jiangsu, Zhejiang, Anhui, Shandong, Henan, Hubei, Hunan, Chongqing, Sichuan, most of them are central and coastal areas of our country. one of their common characteristics is that the age structure factor scores are generally higher, the elderly population support is relatively large, the comprehensive score is in the middle level, belong to the middle developed area.

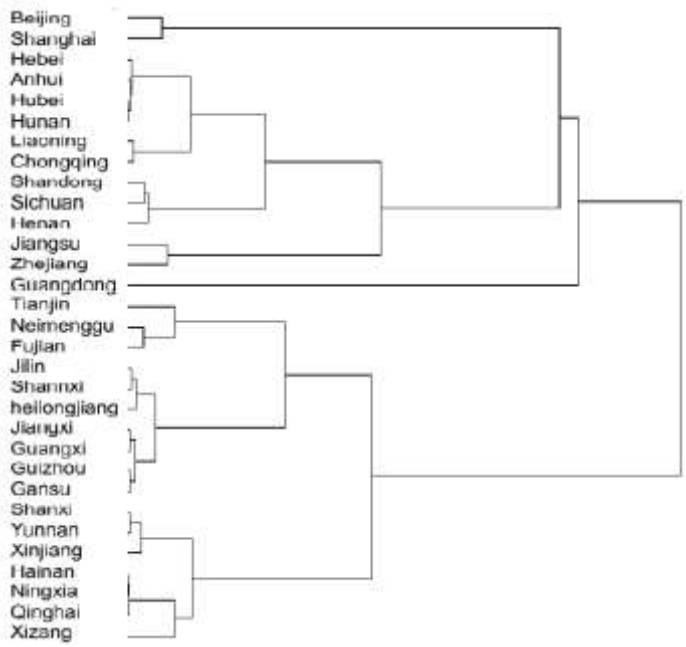

Figure 1Cluster lineage map

5 CONCLUSIONS AND RECOMMENDATIONS

According to the results of factor analysis, there are still some areas in our country that the level of old-age insurance is not coordinated with the level of their respective economic development, such as Beijing and Shanghai in the "population and economic development factor" score of 15,22, and the comprehensive score of sixth and third, respectively. Secondly, in terms of government social security and employment expenditure, although Sichuan Province's per capita GDP ranks 20 in the country and is at the middle and lower level, because the local government's financial support in social security is in the forefront of the country, Sichuan Province ranks seventh in the overall comprehensive ranking of old-age insurance, which clearly shows the importance of regional financial support.

In addition, in the area of urbanization (take Hebei Province as an example), although Hebei Province's "population and economic development factors" score higher, but its "urban residents living factors" pulled down the overall ranking of Hebei Province in the country. In addition to Tianjin and Fujian, the proportion of urban population in less developed regions is relatively small, which is basically consistent with the ranking of living factors of urban residents in various regions, indicating that there are regional differences in urbanization and that urbanization has a certain impact on the development level of old-age insurance in China.

Finally, in terms of age structure, comparing the social security expenditure and the dependency ratio of the elderly population in each region, it is found that the vast majority of regions will adjust the financial support of the government for social security in the light of the severity of the local aging, such as Guangdong, Beijing and the vast majority of the less developed areas, and the government's work in social security expenditure will not be very prominent. However, some regions still have the phenomenon that the social security financial expenditure and the local age structure are not suitable, such as Shanxi Province's population aging degree is not high, but the government social security expenditure ranks fourth in the country, which is easy to cause waste of resources; Anhui Province's population aging degree is more serious, the government social security expenditure lags behind half of China's provinces and regions, hindering the development of local pension insurance level.

6 Summary and outlook

The regional differences of the basic old-age insurance studied in this paper have always been an important problem in perfecting the social security system of our country, and have a great influence on the basic life of the majority of the elderly. As a scientific and exploratory research, there are still many places to be improved in this paper. For example, because the author's knowledge reserve is limited, it is inevitable to repeat or omit the selection of evaluation index when designing and establishing the index system of pension insurance related evaluation.

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