

The panel data analysis of the regional insurance differences on the basis of demand point

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Abstract

While China's insurance industry is in high-speed growth, the problem of the regional insurance unbalance becomes more and more prominent, which seriously affects the regional economic development of china. Based on the predecessors' research, this article elected the corresponding demand factors that influence insurance development and used the panel data econometric model to analyze the whole county, eastern, central and western regions. Finally, we obtained the factors' impact on different regions, and gave some suggestions, hoping to assist the regional insurance' development.

Keywords: regional insurance; differences; panel data

1. Introduction

After entering the 21st century, as the improving of china's macroeconomic environment, the insurance industry has developed a lot and the premium income of various regions has come to a rapid increasing stage. According to a report released by China Insurance Regulatory Commission, the national premium income reached CNY564.1 billion in 2006, which was 1.8 times of that of 2002, ranked No. 9 in the world, which means an increase of seven compared to 2002. But accompanied to the high growth of insurance industry, the imbalance of the

regional insurance development becomes more and more serious. This imbalance of China's three economic regions is represented obviously grads differences from east to west. The average premium income ratio of the east, central and west is 3.61:1.98:1 in 2006. According to the above figures, the east cities' contribution to the total premium income is the biggest, which exceeded 50% in 2006, while the west is the smallest.

The foreign scholars haven't done much research on regional insurance, mostly focused on demand factors affecting insurance. Mark Borwne and Kihong Kim(1993) collected the 1980 and 1987 data of 45 developed and developing countries, and analyzed the factors' impact on life insurance demand by using multiple linear regression model^[1]. Thorsten Beck and Ian Webb (2003) used the panel data of 68 countries from 1961 to 2000 to establish a baseline regression model of five year average^[2]. Mark Browne, Edward Frees and Jack Wook Chung (2000) collected the panel data of OECD countries between 1987-1993, and analyzed the effects of the income, share of foreign insurers, risk aversion and other factors on a country's demand for property insurance (taking automobile insurance and general liability insurance on behalf of the depth)^[3].

The researches of domestic scholars on regional insurance differences have concluded as follows: Fangjie Zhang(2004) analyzed economic factors that affected

development of the insurance environment based on the time-series data from 1980 to 2002, and concluded that the economic development level have the biggest affection^[4]. Xiuqing Sun(2007)analyzed the regional insurance difference by means of constructing development level indexes, development process indexes, structural indexes, and concluded that the regional convergence of insurance practice deviated from diversified objective insurance needs^[5]. Hualin Zhu(2007) selected six provinces and cities as samples, and used the relevant data of 2005, analyzed the discrepancy by horizontal and vertical comparison of premium income, insurance density and insurance depth^[6].

This article rearranged affective factors of regional insurance on the basis of predecessors' research, analyzed the whole and three regions separately by using the panel data, concluded different main factors, and gave suggestion.

2. Variables selection and data specification

2.1. Theory analysis of variables

Insurance is not only an economic phenomenon, but also a social one, their level of development is affected by market supply factors, the economic fundamentals, social factors, population factors, concept factors etc. The first factor is based on the angle of insurance supply, while the later four factors are based on the angle of insurance demand, which this article is based on.

Generally speaking, economic fundamental factors mainly include economic development level, economic structure and income level. The more the economy develops, the higher the income level is, and people's demand for insurance will be higher, too. Social factors include the level of social security level and urbanization.

It is well-known that social security level is treated as an alternative. The population factors includes population gross, burden coefficient, education structural. The impact of population and education is positive in theory. The impact of burden coefficient on demand for insurance is more complicated. The conception factor includes consumer's attitude towards risk and insurance awareness.

2.2. Theory analysis of variables

Considering data availability, accuracy and comprehensiveness, this article choose the following variable as analyzing objects: (1)Premium income(Y) includes property insurance and personal life insurance premium income of all insurance companies in Chinese mainland.(2)The economic fundamentals factors: The GDP of province (X1), per capita disposable income of urban residents (X3),per capita net income of rural households(X4) reflecting economic level; Ratio of the secondary and tertiary industries in the GDP (X2) reflecting economic structure. (3) The social factors: level of social security(X5), which is the aggregate of the relief fund and social security expenditure; Ratios of city and town population to general population(X6) reflecting urbanization level.(4) The population factors: population size(X7) reflecting population scale; The total dependency ratio(X8) reflecting dependency coefficient; The total dependency ratio(X8) reflects dependency coefficient; the number of people above in every ten thousands of people (X9) reflects educational structure. (5) The concept factors: It is replaced by the ratio of premium income to the average saving balance in the end of the year(X10), because of its hard quantization characteristic. As one kind of consumption, the insurance and save have some indistinct substitution, so the ratio of premium income to the average saving can reflect the extent of households' insurance sense.

This article selected the panel data of 31 provinces (cities, autonomous region) from 2000-2006 as samples. The data is derived from < China Statistical Yearbook> and < China's insurance Yearbook>. As to eliminate the effect of the price level, this article chose year of 2000 as the foundation (the price level in 2000 is 100), translated the relevant variables. In addition, considering the differences of dimension between interpretation variables and dependent variable, the paper made logistic process to the interpretation variables and dependent variable, using software of Eviews5.1.

3. Model establishment

3.1. The panel data model selection

Panel Data Model includes the 3-d information of section, time and indexes, this model can reflect the changing law in the time and section of the object we study, and the different characteristics of different time and units. We can use the panel data model to construct equations which are much more real than the section and time series, to analyze the economic phenomenon more deeply and make the evaluated parameters more objective.

The basic structure of this model is:

$$y_{it} = \alpha_i + \beta_i x_{it} + \mu_{it} \quad (1)$$

The intercept term is $\alpha + \mu_{it}$, β_i is the slope, i represents the section data, and t means the time series. The μ_{it} in the intercept term measures the discrepancy between individuals, if μ_{it} is a constant, we call the model fixed impact model; if μ_{it} is a random disturbance of subject observation value, and keep invariant, we call it random impact model;

if μ_{it} does not change as the individual changes, we call it fixed regression model, which can be estimated by the OLS^[7]. Under usual circumstances, if the researchers do the deduction only on the condition of the samples own effects, the fixed impact model is appropriate; if we want to use the samples to infer the general, the random impact model should be adopted.

3.2. Model establishment

This article is to study the effect extent of the interpretation variables in the model, namely considering cross-section variables, so the paper uses fixed impact model to establish regression model. The basic model is:

$$\begin{aligned} \ln Y_{it} = & \alpha_i + \beta_1 \ln X 1_{it} \\ & + \beta_2 \ln X 2_{it} + \beta_3 \ln X 3_{it} \\ & + \beta_4 \ln X 4_{it} + \beta_5 \ln X 5_{it} \\ & + \beta_6 \ln X 6_{it} + \beta_7 \ln X 7_{it} \\ & + \beta_8 \ln X 8_{it} + \beta_9 \ln X 9_{it} \\ & + \beta_{10} \ln X 10_{it} + \mu_{it} \end{aligned} \quad (2)$$

For there may exist the problem of multicollinearity of some variables in the model, which may lead to significant deviations of the result, so the paper uses stepwise regression to the variable, Screened variables, and retained variable which is significant under the given significant level (P less than 0.05).

According to the above method, we used the panel data of 31 provinces, cities and autonomous regions to establish the regression models of the eastern, middle and western region, and adopted the stepwise regression method to estimate the equations as follows:

According to the results in Table 1, the regression model of the nation, east, middle and west are as follows:

Table 1 Results of regression

	Nation	East region	Middle region	West region
	lnY	lnY	lnY	lnY
β_1	0.9199	0.5536	0.4896	0.6555
T-value	31.8389	3.1818	5.5699	6.7057
P-value	0.0000	0.0023	0.0000	0.0000
β_2	0.6166	--	1.9500	--
T-value	2.5897	--	5.0504	--
P-value	0.0103	--	0.0000	--
β_3	0.2061	0.7199	1.6617	--
T-value	2.5496	3.7543	7.0619	--
P-value	0.0115	0.0004	0.0000	--
β_4	--	--	0.8779	--
T-value	--	--	2.7359	--
P-value	--	--	0.0086	--
β_5	0.1540	--	0.2139	0.3350
T-value	4.2677	--	2.3968	4.9273
P-value	0.0000	--	0.0204	0.0000
β_6	-0.1980	--	--	--
T-value	-3.1963	--	--	--
P-value	0.0016	-	--	--
β_7	--	0.4697	--	0.2527
T-value	--	2.6963	--	3.2399
P-value	--	0.0090	--	0.0018
β_8	0.3736	--	--	0.5833
T-value	2.5452	--	--	2.1933
P-value	0.0117	--	--	0.0313
β_9	0.5429	0.6590	--	0.4467
T-value	12.1638	7.5082	--	9.9967
P-value	0.0000	0.0000	--	0.0000
β_{10}	0.0178	0.0271	0.0165	--
T-value	3.1685	3.2535	2.2611	--
P-value	0.0018	0.0018	0.0282	--
α	-13.6970	-14.4621	-18.9164	-12.3850
Adj-R2	0.9654	0.9037	0.9140	0.9740
Number of samples	217	77	56	84

Notes: --means insignificance under 5% level; the east includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan; the middle includes Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan; the west includes Sichuan, Guangxi, Neimenggu, Chongqing, Guizhou, Yunnan, Xizang, Shanxi, Gansu, Qinghai, Ningxia, Xinjiang. This classification method came from reference [8].

Nation:

$$\begin{aligned} \ln Y = & -13.6970 + 0.9199 \ln X_1 \\ & + 0.6166 \ln X_2 + 0.2061 \ln X_3 \\ & + 0.1540 \ln X_5 - 0.1980 \ln X_6 \quad (3) \\ & + 0.3736 \ln X_8 + 0.5429 \ln X_9 \\ & + 0.0178 \ln X_{10} \end{aligned}$$

West region:

$$\begin{aligned} \ln Y = & -14.4621 + 0.5536 \ln X_1 \\ & + 0.7199 \ln X_3 + 0.4697 \ln X_7 \quad (4) \\ & + 0.6590 \ln X_9 + 0.0271 \ln X_{10} \end{aligned}$$

Middle region:

$$\begin{aligned} \ln Y = & -18.9164 + 0.4896 \ln X_1 \\ & + 1.9500 \ln X_2 + 1.6617 \ln X_3 \quad (5) \\ & + 0.8779 \ln X_4 + 0.2139 \ln X_5 \\ & + 0.0165 \ln X_{10} \end{aligned}$$

West region:

$$\begin{aligned} \ln Y = & -12.3850 + 0.6555 \ln X_1 \\ & + 0.3350 \ln X_5 + 0.2527 \ln X_7 \quad (6) \\ & + 0.5833 \ln X_8 + 0.4467 \ln X_9 \end{aligned}$$

4. Conclusions

According to Table One, the values of Adj-R² in the regression models of all regions are high (above 0.9), which indicates that the data can preferably describe the models. Through 0.05 significant level, F test of all equations show that the models can achieve to the better fitting effect. So, the results of the table above are suitable for analysis.

4.1. Analysis of whole nation

According to the econometric model of the nation (3) we can draw that GDP index which reflects economic development level is the most significant influencing factor on premium income. The followed is the ratio of the secondary and tertiary industries in GDP that reflects the economic structure. The third is the amount

of people above in every ten thousands of people. Also, almost all of the selected factors are reflected in the equation, including dependency ratio, insurance awareness etc.

It is worthy to note that the impact of the urbanization level on insurance premium income is negative, which is opposite to the theoretical assumption. The reason is the East-West cultural differences. Compared with Western countries, in a sense, the Orient "family" has evolved into a blood relationship as the core and then extended to family, clan. The concept of "big family" in the East can help the family members share risk. The insured rate differences are the direct expression of such cultural differences.

4.2. Analysis of east region

According to the econometric model of the East (4), we can see that per capita disposable income of urban residents is the most important factor inflecting the premium income. The followed is the number of people above the junior college in every ten thousand which reflects educational level. The third is the region's GDP income. The total population is also a very important factor improving premium income. In addition, the insurance awareness also influences premium income. The economy is relatively developed in the eastern areas, so the increasing of per capita disposable income of the urban residents directly influences the effective demand of the premium income. In addition, the higher education level leads to the improvement of insurance awareness of the residents and buy insurance more actively.

4.3. Analysis of middle region

According to the econometric model of the Middle Area (5) we can draw that the ratio of the secondary and tertiary industries in GDP is the primary factor that the workers are the main customer groups purchasing insurance. The per capita in-

come level of urban and rural residents is an important influencing factor in premium income. The elastic coefficient of this explanatory variable is around 1. So, improving the income level of the middle area is the faster way to expand the scale of insurance. In addition, social security level is also one of the factors that influence the insurance income, which is opposite to the theoretical assumption. This point is in the same situation in the western region, the paper will explain in the fifth part.

4.4. Analysis of west region

The econometric model of the West (6) tells us that the regional GDP income is the main factor, the impact of the dependency ratio on insurance premium income is positive, which is inconsistent with the common theoretical analysis. The total dependency ratio reflects the burden coefficient of the elderly and children in a region and the age structure of the region. The burden coefficient of the elderly and children in a family and the premium income are increasing in the same direction in the West, which indicates that the insurance against the elderly and children occupies the vast majority of the local insurance premium income. In addition, the education level is also an important factor, and the conclusion is different from previous studies. The conclusion tells us that due to western development, the western economy is developing, the educational facilities are improving and the western education level is gradually raising. The level of social security and premium income in the region are increasing in the same direction, which is the same to the middle area.

4.5. Explanation about Positive Correlation of Social Security

In the empirical analysis of the central and western regions, this paper draws a conclusion that the impact of the social security level on the premium income is positive, that is, the raising of social security level helps to the increase premium income, which is opposite to the theoretic analysis. This shows that the promoting effect between China's social security and commercial insurance is greater than the substitution effect. The main reasons: First, China's current social security is in a low level, people are lack of security about living in the future, social security and commercial insurance are need simultaneously; Second, social security expense mainly come from the state's financial expenditure and corporate capital accumulation, which is not the burden of the Consumers. The increasing consumption of commercial insurance along with the increasing of income, the residents don't have to lower the social security level. Social security, to a certain extent, not only protects people's basic living standards, but also enhances their purchasing power of commercial insurance.

5. Suggestions

5.1. Developing Economy and Improving People's Income Level

From the above main influencing factors we can see that the impact of income factor on premium income is the first important, and the main reason for the various premiums among regions is also the income differences. The impact of urban residents' per capita income on insurance premium income is greater than the eastern region. The per capita income of urban and rural residents is the important factor in the central region. While in the western region, GDP income comes mainly from rural residents' per capita

income, this kind of sequencing reflects three different levels of economic development in the eastern, central and western regions. Therefore, in order to narrow the gap, the first and foremost is to make efforts to develop economy, speed up urban development and enhance people's income level.

5.2. Developing Education and Improving People's Cultural Quality

From the above analysis, we can see that the higher level of urbanization can not promote the development of the insurance scale in the country, because concept difference arises from the East-West cultural differences. China, as a typical Eastern country, blood culture makes the Chinese people for their relatives and friends when they are facing risk, this hidden psychological dependence leads to weak insurance awareness among the public, which, to a certain extent, suppresses the China's insurance needs. In addition, educational factor is also important in affecting the insurance needs, people who have higher level of education are generally more aware of the risk and then more willing to avoid risks through purchasing insurance. Therefore, in order to enhance the development of the insurance industry and narrow the differences of regional insurance size in the eastern, central, western, we should vigorously develop education, improve the cultural quality standards, actively promote Western culture ideology and raise insurance awareness.

6. Knowledge

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