Study on the Impact Factors of Commercial Health Insurance Demand in China

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ABSTRACT: This paper establishes an empirical model to explore the relationship between the demand and influencing factors of commercial health insurance in China based on the Two-way fixed effect model, and use the 2013-2020 commercial health insurance data to studies the factors affecting the commercial health insurance demand and the causes of regional imbalance. The results show that the education level, the youth population support ratio and the income of the social basic medical insurance fund had a significant positive impact on commercial health insurance demand. The influence of different factors on the eastern, central and western regions varies greatly.

1. Introduction

At present, China's aging population is serious, the proportion of 65 and over has reached 13%, and will continue to grow in the future. At the same time, due to the outbreak of COVID-19 and the rising incidence of chronic diseases , these problems have led to the increase of people's spending on medical care. Data show that China's per capita medical expenses in 2019 was 1,902 yuan, an increase of 12.8% compared to 2018. However, currently, reimbursement ratio and security coverage of medical expenses of social medical insurance are relatively limited. At the end of 2020, the social basic medical insurance fund accounted for only 35.7% of the medical expenses, which means that there is still a large proportion of the medical expenses borne by the patients. Moreover, many drugs, diagnosis, treatment and services are not within the security scope of social medical insurance, indicating that the basic social medical insurance has no longer been able to meet all people's needs for health security. As an important part of the medical security system, commercial health insurance plays a role in promoting and supplementing the social basic medical insurance.

In recent years, China's commercial health insurance has achieved rapid development. According to the latest statistics released by the CIRC in 2020, the number of insurance market entities has increased to 222, including 149 companies operating in commercial health insurance. With the increase of market entities, the premium scale of commercial health insurance continues to expand. By the end of 2020, premium income from Chinese commercial health insurance had reached 817.3 billion yuan, an increase of 31.57% compared to 2013. As shown in Figure 1.

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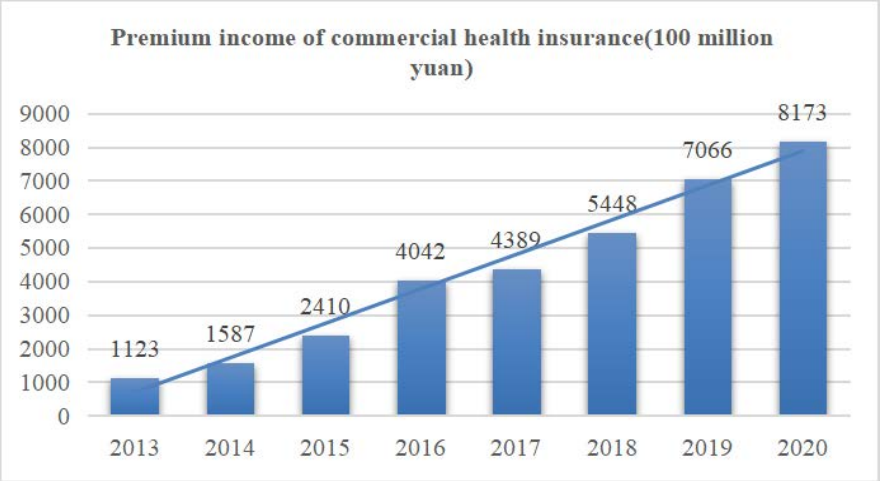

Fig.1 Commercial Health Insurance Premium Income From2013 to 2020

At the same time, the state also attaches great importance to the development of commercial health insurance. In recent years, it has issued a number of policies to support and encourage the development of commercial health insurance. In October 2014, the State Council issued the Opinions on Accelerating the Development of Commercial Health Insurance; in October 2016, the CPC Central Committee and the State Council issued the Health China 2030 Plan, requiring the insurance industry to provide diversified and innovative commercial health insurance products to actively participate in the improvement of the national health care system; in November 2019, the Banking and Insurance Regulatory Commission issued the newly revised Health Insurance Management Measures, which first defined the content and positioning, and further promote and standardize the development of health insurance. The introduction of these series of national supportive policies provides good institutional guarantee and policy conditions for the development of commercial health insurance.

However, there are still many deficiencies in the development of China's commercial health insurance. Firstly, there is still a big gap in the depth of insurance and the number of purchases per person compared with developed countries. For example, the insurance depth of the United States and the United Kingdom is more than 10%, compared with only 4.3% in China. In 2020, the per capita number of health insurance items in China was only 0.59, and the per capita insurance premium was 505 yuan, while the number of US health insurance (mainly medical insurance) was 1.22, with the per capita premium of 5,090 yuan.

Secondly, the demand for health insurance in the eastern, central, and western regions varies greatly. Premium income and insurance density in east is far higher than that in the central and western regions. In 2020, the eastern regional premium income was $ 276.117 billion, representing more than 50%, which was higher than the central regional ($ 160.003 billion) and almost three times that in the western region. By the end of 2020, it can be seen that the insurance density of commercial health insurance in the east is higher than that in the central and western regions. Even after the latter two are combined, they are lower than the eastern region. As shown in Table 1,2.

Table 1 Premium Income And Proportion of Commercial Health Insurance in East,Central Part and West in China from 2013 to 2020

	EAST		Central area		West	
Years	Premium income	proportion(%)	Premium income	proportion(%)	Premium income	proportion(%)

	(RMB 100 million)		(RMB 100 million)		(RMB 100 million)	
2013	609.12	57.66	263.33	24.93	183.94	17.41
2014	853.26	57.01	386.49	25.82	256.9	17.17
2015	1328.63	58.57	550.79	24.28	389.2	17.16
2016	2356.27	61.93	862.65	22.67	586.06	15.40
2017	2290.67	55.43	1135.63	27.48	706.29	17.09
2018	2413.54	53.07	1327.16	29.18	807.33	17.75
2019	2668.61	51.52	1501.37	30.91	893.54	17.92
2020	2761.17	50.51	1600.03	31.17	951.26	18.32

Table 2 Insurance Density Of Commercial Health Insurance in China from 2013 to 2020

unit:Yuan per person

Area	2013	2014	2015	2016	2017	2018	2019	2020
East	190.39	257.94	393.83	601.59	614.82	628.33	640.07	649.21
Central part	54.53	78.17	110.96	175.68	226.48	241.74	264.27	271.58
West	65.70	85.95	121.89	171.27	219.70	235.36	251.29	260.77

To sum up, there are many reasons for affecting the development of commercial health insurance in China, and the insufficient insurance demand is an important aspect. Therefore, studying the influencing factors of commercial health insurance demand is of great significance to meet people's needs for more comprehensive health insurance and to promote the better development of commercial health insurance.

2. Literature Review

In theoretical research, Pauly Mark(1968) proposed that consumers would buy health insurance when the marginal cost was equal to the marginal utility, and when people were unhealthy, the marginal effect of buying additional insurance would rise, the marginal cost decreased relatively[1]. Wenan Fei and Harris Schlesinger(2008) argued that the biggest background risk that affectd people 's need for health insurance was a major social infectious disease event, which would have a significant impact on the people' s need to buy health insurance[2]. Li Yueping, Huang Zijie(2019) thought the country's corresponding macro policy was the main factors affecting commercial health insurance demand. Therefore, they believed that the country should make the corresponding policies to support insurance companies to provide more diverse, more personalized health insurance products[7].

In terms of empirical research, Jonneke Bolhaar et al (2018)processed dynamic panel data to explore the influencing factors of commercial health insurance needs, and the results showed that the needs of education level, health status and income level had insignificant impact on health insurance needs[3].In 2018, Sowa P Marcin and Kault Sam explored how private health insurance (PHI) in Australia was affected by the MLS income threshold. They found MLS at $ 50,000 revenue level, 22% would choose PHI[4]. Denise Doiron,Glenn Jones,Elizabeth Savage(2010) studied the Australian commercial health insurance market and found that risk preferences reduced the demand for commercial health insurance when they do not care about their health conditions[5].Brown Peter's 2017 study noted that private health insurance is not a good option in

rural and remote areas of Australia, due to very limited access to private hospitals in rural areas. He suggested that specific products should be included in commercial health insurance for people in remote areas[6].Li Kehang(2019) established the optimal fitting model and concluded the 10 factors affecting its demand: permanent resident population, urbanization rate, aging degree, number of admissions, number of regional GDP, basic medical insurance, per capita disposable income of urban residents, per capita health care expenditure, insurance density and health insurance density[8].Zhang Yichao et al(2019) used logistic regression analysis and the model results showed that consumer gender, income level and overall image of insurance companies had a positive impact on commercial health insurance demand, while medical insurance participation and consumer disease risk perception show a negative correlation to commercial health insurance demand[9].

The research of commercial health insurance demand structure is mainly aimed at regional structures. Suo Lingyan et al(2015) creatively built the commercial health insurance development index to measure the health insurance regional development imbalance. According to the results, in addition to the impact of economic differences, medical and health resources, life expectancy, education level had an impact on the development of health insurance[10]. Liu Run(2019) selected the section data of 31 provinces and autonomous regions in 2016, and used the main component analysis method to analyze the influencing factors of the commercial health insurance demand in various regions. They constructed 10 variables to analyze the factors affecting the regional commercial health insurance, and finally the three main components explained about 90% of the level of influencing factors affecting the commercial health insurance demand[11].

To sum up, many scholars ' research on the impact factors of commercial health insurance demand hardly involves the impact of social insurance. Moreover, the exploration of Chinese literature on commercial health insurance demand also did not take into account the regional differences. Therefore, this paper adds social insurance as an important variable and establishes a measurement model to analyze the differences of health insurance demand in eastern, central and western China.

3. Empirical Analysis of Impact Factors of Commercial Health Insurance Demand in China

This chapter firstly describes the selection of variables and the data sources. Secondly, I build the model for the most suitable empirical analysis. Then, I used stata software to regression the data and draw conclusions.

3.1 Variable Selection and Data Source

This paper turns the demand for commercial health insurance into the insurance premium income of commercial health insurance, therefore, the interpreted variable selected in this paper is the premium income of commercial health insurance, expressed by y.

This paper has selected eight explanatory variables: Population (x_1);Per capita disposable income of the residents (x_2);Education level (x_3);Senior support ratio (x_4);Juvenile population support ratio (x_5);Social Medicare fund income (x_6);Social Medicare Fund expenditure (x_7);Health care expenses per capita (x_8).

As mentioned above, population, elderly support ratio, juvenile support ratio, education level, per capita disposable income are from China Statistical Yearbook; income and expenses of social medical insurance fund are from the website of National Bureau of Statistics and Wande database; commercial health insurance premium income is panel data from China Insurance Yearbook.

3.2 Model Specification

4. Theory Model

Fixed effects model:Given an individual i, equation can be written as:

$$\bar{y}_i = \bar{x}'_i\beta + z_i'\delta + u_i + \tilde{\varepsilon}_i$$

Set up $\tilde{y}_{it} \equiv y_{it} - \bar{y}_i$, $\tilde{x}_{it} \equiv x_{it} - \bar{x}_i$, $\tilde{\varepsilon}_{it} \equiv \varepsilon_{it} - \bar{\varepsilon}_i$,Expression can be written as:

$$\tilde{y}_{it} = \tilde{x}'_{it}\beta + \tilde{\varepsilon}_{it}$$

Equation 3.2 represents the individual fixed-effect model, which addresses the missing variable problem that changes with the individual but not over time. Similarly, if time-fixed effects are introduced, the problem of missing variables that change over time but not with individuals can be solved. Expression can be written as:

$$y_{it} = x'_{it}\beta + z_i'\delta + \lambda_t + u_i + \varepsilon_{it}$$

5. Data Processing

I use STATA to process panel data. Specifically, I take the logarithm of y , x_1 , x_2 , x_6 , x_7 , x_8 in order to standardize the variables that can narrow the absolute value of the data. Because x_3 , x_4 , x_5 <1 ,They cannot be taken in logarithmic numbers.

Table 4 Descriptive Statistical Results of the Variables

Variables	Mean	standard deviation	minimum	maximum
lny	22.28	1.18	18.54	24.80
lnx1	8.09	0.88	5.74	9.32
lnx2	9.93	0.36	9.18	10.99
x3	0.37	0.08	0.12	0.51
x4	0.14	0.03	0.07	0.21
x5	0.23	0.62	0.12	0.35
lnx6	14.55	0.92	11.85	16.41
lnx7	12.94	1.25	9.10	15.49
lnx8	6.89	0.37	5.61	7.73

According to the dual fixed effect model, the equation can be written as:

$$Iny = \beta_0 + \beta_1 \ln x_1 + \beta_2 \ln x_2 + \beta_3 \ln x_3 + \beta_4 \ln x_4 + \beta_5 \ln x_5 + \beta_6 \ln x_6 + \beta_7 \ln x_7 + \beta_8 \ln x_8 + u_i + \varepsilon_{it}$$

5.1 Empirical Analysis

5.1.1 National Situation

6. Empirical Process

I process the panel data with the stata software and the regression results are shown in Table 5.

Table 5 Double-Effect of Dual Regression Effect

	lny	Std	Prob	t-Statistic
$\ln x_1$	0.143	0.081	0.674	1.77

$\ln x_2$	0.238	0.152	0.153	1.56
x_3	0.383***	0.084	0.002	4.58
x_4	-0.844	0.820	0.173	-1.03
x_5	1.944***	0.547	0.000	3.55
$\ln x_6$	0.597***	0.128	0.000	4.64
$\ln x_7$	0.0178	0.130	0.934	0.14
$\ln x_8$	0.403***	0.106	0.003	3.78
_Iyear_2016	0.157**	0.059	0.034	2.65
_Iyear_2017	-0.834***	0.243	0.000	-3.43
_Iyear_2018	0.578***	0.076	0.000	7.58
_Iyear_2019	0.471***	0.088	0.000	5.36
_cons	3.358*	1.645	0.072	2.04
N	155			

t statistics in parentheses

Note: *, * *, * * * are significant at the 10%, 5%, 1% levels respectively.

As shown in Table 5 above, the preliminary regression equation is:

$$\ln y = 3.358 + 0.383x_3 + 1.944x_5 + 0.597\ln x_6 + 0.403\ln x_8$$

$R^2 = 0.9647$,Overall, the regression equation is well-fitted. However, the table shows that the variable x_1, x_2, x_4, x_7 are not significant at the 95% confidence level. It is shown that the model may have multicollinearity and requires a multicollinearity test and correction.

Firstly, the stata software is used to calculate the correlation coefficients between the explanatory variables and conclude that the correlation and correlation among some variables are large. Then the step by step regression method is used to filter the variables and correct the regression model.

Secondly, I do unary regression about $\ln x_1, \ln x_2, x_3, x_4, x_5, \ln x_6, \ln x_7, \ln x_8$ to $\ln y$ and the results are shown in Table 6.

Table 6 Unary Regression Results for Each Variable

Variable	t	R^2
$\ln x_1$	12.10	0.6495
$\ln x_2$	10.96	0.4640
x_3	8.27	0.9186
x_4	9.44	0.4114
x_5	-5.42	0.3384
$\ln x_6$	37.52	0.9432
$\ln x_7$	37.32	0.9348
$\ln x_8$	10.10	0.3980

Based on the idea of solving multiple colinearity, I first arrange R^2 of the explanatory variables in Table 6 in order from large to small$(\ln x_7, \ln x_6, x_3, \ln x_1, \ln x_2, x_4, \ln x_8, x_5)$.Then I add the variable in this order for regression analysis. If the regression result is better, keep the variable, otherwise, the variable is abandoned.

Finally, the regression equation is given as:

$$\ln y = 7.64 + 0.50x_3 + 0.73x_5 + 0.68\ln x_6$$

After eliminating the multiple colinearity, the $x_3, x_5, \ln x_6$ passed the test, R^2 =0.9637.The results show that the equation fit is high,

7. Result

A.The level of education has a significant positive impact on premium income in commercial health insurance. This shows that the improvement of education makes people have more and more awareness of risk, especially their own health.

B.The youth population support ratio positively affects the premium income of commercial health insurance. This illustrates that when juvenile population increases, families will buy commercial health insurance to avoid future financial pressure and the burden of caring for sick parents on their children .

C.The income of social basic medical insurance fund has a positive impact on the income of commercial health insurance premium. This shows that the social basic health insurance promotes commercial health insurance. Because the social basic medical insurance can only meet the residents ' basic medical insurance, therefore, in order to meet the higher health security needs, people will choose to buy commercial health insurance as a supplement. At the same time, social basic medical insurance has improved people's insurance awareness and risk awareness, so that they are more willing to invest in health.

D.There is no significant relationship between the number of population, per capita disposable income, the support ratio of the elderly, the expenditure of social basic medical insurance fund, per capita medical expenses and the premium income of commercial health insurance.

7.0.1 Comparison among Eastern, Central, and West

This paper divides 31 provinces into east, central and west parts, still selecting the premium income of commercial health insurance as the interpreted variable, population number, per capita disposable income, education level, elderly support ratio, juvenile population support ratio, income and expenditure of social basic medical insurance fund, per capita medical expenses as the explanatory variables. Moreover, I use stata software to do the same processing as the national situation analysis and obtain the regression equation.

8. East

The regression equation results in the eastern region are shown in Table 7. The data in the table shows that the model may have multicollinearity and needs to be examined and corrected. This paper uses gradual regression method to screen the variables and modify the regression model, and the regression equation is:

$$\ln y = 7.80 + 0.65x_3 - 3.14x_4 + 1.39x_5 + 0.60\ln x_6$$

The results show that the premium income of commercial health insurance in Eastern East is significantly affected by education level , senior support ratio ,juvenile population support ratio and Social Basic Medicare Fund income.

Table 7 Regression Results For Eastern Regions

	Coefficient	Std. Error	t-Statistic	Prob.
$\ln x_1$	-0.140	0.157	-0.89	0.379
$\ln x_2$	0.907**	0.354	2.57	0.014
x_3	1.28***	0.202	6.32	0.000

x_4	-0.577**	1.701	-0.34	0.036
x_5	7.003***	1.356	5.17	0.000
$\ln x_6$	0.204	0.339	0.60	0.552
$\ln x_7$	-0.095	0.337	-0.28	0.778
$\ln x_8$	-0.046	0.317	-0.14	0.886

9. Central Regions

The regression equation results in the central region are shown in Table 8. The data in the table show that the model may have multicollinearity and needs to be examined and corrected. This paper uses gradual regression method to screen the variables and modify the regression model, and the regression equation is:

$$\ln y = 7.42 + 0.58\ln x_1 + 0.33x_3 + 0.27\ln x_6 + 0.40\ln x_8$$

The result shows that population education level, Social basic medical insurance fund income ,Health care expenses per capita had significant impact on the premium income.

Table 8 Regression Results In Central Region

	Coefficient	Std. Error	t-Statistic	Prob.
$\ln x_1$	1.368***	0.313	4.37	0.000
$\ln x_2$	0.909**	0.423	2.15	0.038
x_3	0.033**	0.190	0.17	0.034
x_4	-4.128**	2.032	-2.03	0.049
x_5	-2.473	1.121	-2.21	0.865
$\ln x_6$	0.020	0.183	0.11	0.114
$\ln x_7$	-0.085	0.118	1.64	0.476
$\ln x_8$	0.281***	0.172	1.64	0.010

10. Western Part

The regression equation results in the western region are shown in Table 9. The data in the table show that the model may have multicollinearity and needs to be examined and corrected. This paper uses gradual regression method to screen the variables and modify the regression model, and the regression equation is:

$$\ln y = 9.32 + 0.74\ln x_2 - 7.21x_4 - 2.71x_5 + 1.33\ln x_7$$

The results show that the premium income of commercial health insurance in the western region is mainly significantly affected by the four indicators(Per capita disposable income of the residents(x_2), elderly population support ratio(x_4), juvenile population support ratio(x_5), and Expenditure of social basic medical insurance fund (x_7).

Table 9 Return Results For the Western Regions

	Coefficient	Std. Error	t-Statistic	Prob.
$\ln x_1$	0.373	0.226	1.65	0.107
$\ln x_2$	0.816**	0.516	1.58	0.022
x_3	0.028	0.117	0.24	0.811

x_4	-3.968**	1.847	-2.15	0.038
x_5	-1.130	1.090	-1.04	0.306
$\ln x_6$	0.020	0.183	1.88	0.114
$\ln x_7$	0.310**	0.406	0.76	0.049
$\ln x_8$	0.328	0.168	1.95	0.624

11. Conclusion and Suggestions

11.1 Conclusion

This paper uses STATA software to analyze the data, and finds that the education level, juvenile population support ratio, and the income of social basic medical insurance fund have a significant positive impact on the national commercial health insurance demand. The number of population, the per capita disposable income of the residents, senior support ratio, the expenditure of the social basic medical insurance fund, and the per capita medical expenses have no significant effect on the national demand for health insurance.

I also uses STATA to handle the data in the East, central region and West. After empirical comparison, I find that the education level, elderly support ratio, juvenile population support ratio and the income of social basic medical insurance fund had a significant impact on commercial health insurance in the eastern region. In addition to the juvenile population support ratio, others are positively related to demand. The number of population, level of education, income of social basic medical insurance fund and per capita medical expenses have a positive affect on commercial health insurance in the central region. The factors affecting the demand for commercial health insurance in the western region are the residents ' per capita disposable income (positive related), the elderly population support ratio (negative related), the juvenile population support ratio (negative related), and the expenditure of the social basic medical insurance fund (positive related).

11.2 Suggestion

11.2.1 Suggestion for Consumers

A. Improving insurance awareness

Due to early unreasonable marketing strategy of the insurance market in China, people do not believe or even reject insurance. The situation will undoubtedly inhibit the development of China's insurance industry and will make people miss the best time to buy insurance. Therefore, people should actively learn insurance knowledge in their daily life, whether it is to insurance companies to consult or search information online. Only when people really understand insurance can they change the prejudice and improve their awareness of insurance.

B.Understanding the difference between commercial health insurance and social basic medical insurance

People should clarify the boundary between commercial health insurance and social medical insurance, and actively understand the security scope of social medical insurance. At the same time, people can consult insurance companies about commercial health insurance products and compare them. According to our own actual situation, we can have reasonable judgment of whether to buy commercial health insurance.

11.2.2 Suggestion for Insurance Companies

A. Focusing on the diversity of insurance products

Insurance companies should increase their investment and pay attention to the development of new insurance products, especially the Internet insurance.

In addition, different groups of people, different areas for the demand of commercial health insurance is different. Therefore, for the needs of different groups, insurance companies should provide different kinds of health insurance products. Specifically, for married people, companies may provide family portfolio commercial health insurance products. What's more, differences in eastern, central and western parts cannot be ignored. For example, the eastern region has a relatively developed economy, which can provide higher quality insurance services to attract customers, while the central and western regions can pay more attention to the guarantee level of insurance products.

11.2.3 Suggestion for Government

Firstly, the government should publicize the benefits of commercial health insurance, raise residents 'awareness of health risks, eliminate people's bias against commercial insurance, and encourage social investment in commercial health insurance.

Secondly, the government should learn from the advanced experience of other countries, formulate policies conducive to the development of commercial health insurance, and correctly guide health insurance market.

Last but not least, as the higher the education level, the more rationally people choose insurance to transfer their own risks. Therefore, the government should attach great importance to the education level of Chinese residents, encourage residents to go to universities, and help comprehensive universities and universities of finance and economics to open more insurance subjects.

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