Study on population aging, birth policy and long-term care insurance participation

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Abstract. With the deepening of the aging of Chinese society, the participation rate of long-term care insurance for the elderly is rising rapidly. However, at the same time, the implementation of China's multi-child policy has increased the burden of families. In order to realize the balance between providing for the elderly and raising multiple children, how would different families make their decisions on purchasing long-term care insurance? Based on the data of CHARLS 2018, this paper applied Logistic regression method to empirically test the impact of population aging and the number of children on the participation of families in long-term care insurance for the elderly. The results showed that there was a significant positive correlation between the age of the elderly in the family and long-term care insurance participation. With the increase of age of the elderly, families were found to be more likely to buy long-term care insurance, and this effect remained consistent in urban and rural areas. However, the number of children inhibited the purchase of long-term care insurance. The more children a family had, the more likely it would be to reduce the purchase of long-term care insurance for the elderly. This relationship was significant in urban areas, but not in rural areas. Therefore, when China implements the multi-child policy, it is necessary to pay attention to the crowding-out effect of elderly care security.

Key words: population aging; birth policy; long-term care insurance.

1. Introduction

Population aging has become a common phenomenon in the world. Lekshmi V Nair (2014) [1] pointed out that population aging can be considered as the result of the progress of social civilization.

With the deepening of the aging of Chinese society, the two-child policy and the three-child policy was put into practice respectively. Besides, the long-term care insurance system was implemented in 2016. Due to the lack of data on the three-child policy implemented in 2021, this paper will mainly focus on the impact of two-child policy on long-term care insurance participation. Under the background of population aging, the two-child policy has a new impact on family decision-making since families have to simultaneously consider the resource allocation and trade-off between raising children and taking care of the elderly. Therefore, the effect of population aging and the number of children on long-term care insurance participation is worth exploring.

Wang Qun et al. (2021) [2] and Pamela Doty et al. (2015) [3] have shown that population aging promotes the development of long-term care insurance, and long-term care insurance can also alleviate the aging problem.

Liu Qing et al. (2020) [4] found that the universal two-child policy would improve the problem of population aging. In addition, the implementation of the two-child policy may also increase social and family burdens. However, studies have not paid attention to the impact of the two-child policy on the demand for long-term care insurance, which the paper will explore.

2. Empirical Method, Data Source and Variables

2.1 Empirical method

In the benchmark regression, we used the cross-sectional regression model to investigate the impact of aging and two-child policy on long-term care insurance participation, and the specific model is as follows:

$$Y_i = \beta_0 + \beta_1 \text{Oldage}_i + \beta_2 C\text{hildren}_i + \beta_3 X_i + \varepsilon_i$$

Where, Y_i represents whether the i_{th} elderly person is insured or not. Since the explained variable is a dummy variable, this paper will use Logistic model to estimate, accordingly. Oldage_i is the main explanatory variable, representing the age of the i_{th} elderly person. $C\text{hildren}_i$ refers to the number of children of the family of the i_{th} elderly person. This paper mainly adopts two variables to measure the number of children in the family, one is the number of children aged 16 and below, and the other is the proportion of children aged 16 and below in the total family population. X_i represents the relevant control variables, mainly including conditional factors such as family income and expenditure, personal characteristic factors such as education level of the elderly, health, etc. ε_i denotes the random disturbance term.

2.2 Data source

To examine changes in long-term care insurance participation, this paper used the data from the China Health and Retirement Longitudinal Study (CHARLS) in 2018. Compared with other data sets, the survey subjects of CHARLS are mainly middle-aged and elderly people, which is of great significance for aging analysis. Many studies related to long-term care insurance and the elderly have used CHARLS data. For example, Wang Xinjun et al. (2018) [5] used CHARLS data to establish Markov model and calculate the pricing of long-term insurance. Ding Jihong et al. (2019) [6] used CHARLS 2015 data to study the impact of different types of medical insurance on the catastrophic expenditure of the elderly.

2.3 Variable selection and description

The explained variable of this paper is whether families purchase long-term care insurance, and the purpose is to investigate whether population aging and two-child policy will affect the demand for long-term care insurance. This paper matched the data of subjects to the family level, and took family as the analysis unit to obtain the data of whether families participate in the long-term care insurance. Long-term care insurance provides basic medical and living security and expenses for severely disabled persons. However, in China, most people hold the traditional idea that parents will be taken care of by their own children when they get old. Therefore, before the pilot program in 2016, partial payment functions of the long-term care insurance for the care and nursing expenses of the elderly were included in the basic medical insurance, and there was little participation in long-term care insurance. Long-term care insurance data of CHARLS in 2018 cannot accurately reflect the participation of the elderly in long-term care insurance, so it is not representative. Many literatures clearly indicated that long-term care insurance cam be closely related to urban and rural medical insurance. Guan Bo et al. (2020) [7] and Jiang Chunli et al. (2021) [8] pointed out that the long-term care insurance fund was transferred from the balance of the overall fund of medical insurance for employees or residents, and the participants of long-term care insurance mainly cover urban employees, urban residents, and rural residents. On this basis, this paper combined four items, participation in medical insurance for urban employees, medical insurance for urban residents, medical insurance for rural residents, and long-term care insurance, to be a common variable "participation in medical insurance", denoted as Insurance, if at least one of the four items is "1", it would be defined as participation in health care, if all of the four items are "0", it would be defined as no participation in health care. Similarly, this paper combined participation in medical insurance for urban employees and medical insurance for urban residents to be a common variable "participation in urban medical insurance", denoted as Urb_insurance. If at least one of the two items is "1", it would be defined as participation in urban medical insurance; if both items are "0", it would be defined as no participation in urban medical insurance; Meanwhile, participation in the medical insurance for rural residents was denoted as Rur_insurance. These two indicators were used as the replacement indicators of participation in long-term care insurance in the robustness test.

The core explanatory variables are population aging and the number of children. The explanatory variable representing population aging is the age of the elderly (Oldage), with the standard deviation

was 7.006, indicating that the age of the elderly fluctuated greatly. In the context of an aging population with multiple children, the two-child policy is an important factor leading to the increase in the number of children in recent years and a decisive factor leading to the increase in fertility rate. Lu Hongyou et al. (2017) [9] and Guo Keming et al. (2021) [10] concluded that Chinese families generally have the grandparenting culture, which significantly increases the fertility rate of Chinese families and female labor supply. The two-child policy increases the fertility rate and directly increases the number of children raised by their grandparents. Therefore, the number of children aged 16 and below (Children_num) and the proportion of children aged 16 and below in the total number of children in a household (Children_per) were used as explanatory variables in this paper. The birth policy has a direct impact on the number of children, which has both positive and negative impacts on the demand for long-term care insurance. On the one hand, the increase in the number of children will increase the cost of raising children for families, thus crowding out the demand for long-term care insurance for the elderly. On the other hand, the increase in the number of children makes families more likely to switch from family care to social care for the elderly, and the purchase of long-term care insurance will be a major channel.

The purchase of long-term care insurance is a kind of family consumption behavior in essence. Therefore, in addition to the above variables, other factors that may affect long-term care insurance participation are also controlled.

Table 1. Variable definitions and descriptive statistics.

Variable	Definition	Mean	Standard deviation	Minimum	Maximum
Insurance	Whether participating in medical insurance	0.308	0.462	0	1
Urb_insurance	Whether participating in urban medical insurance	0.187	0.390	0	1
Rur_insurance	Whether participating in rural medical insurance	0.121	0.326	0	1
Oldage	The age of the elderly	69.783	7.006	61	118
Children_num	The number of children aged 16 and below	1.124	1.807	0	21
Children_per	The proportion of children aged 16 and below in the total number of children in a household	0.056	0.125	0	0.667
F_expend	The logarithm of family expenditure	7.102	1.146	0	11.918
F_finance	Whether holding bonds, stocks, funds and financial products	0.028	0.165	0	1
F_deposit	The logarithm of family savings in financial institutions	3.278	4.627	0	18.421
I_edu	Education level; The higher the number, the higher the degree	3.457	1.940	1	11
Num_live	Number of family members living together	3.190	1.840	0	20
I_health	Health condition; The higher the number, the worse the condition	2.946	1.025	1	5

3. Empirical Results and Analysis

3.1 The statistical characteristics of population aging, birth policy and long-term care insurance participation

Table 2. Correlation coefficient matrix.

Variable	*Insurance*	*Urb_ insurance*	*Rur_ insurance*	*Oldage*	*Children_ num*	*Children_ per*
Insurance	1					
Urb_insurance	0.922***	1				
Rur_insurance	0.902***	0.912***	1			
Oldage	0.013*	0.016**	0.005	1		
Children_num	-0.115***	-0.142***	-0.032***	0.124***	1	
Children_per	-0.021**	-0.041***	0.010	0.577***	-0.202***	1
F_expend	0.220***	0.303***	0.027***	-0.226***	-0.065***	-0.164***
F_finance	0.151***	0.211***	0.003	-0.060***	-0.052***	-0.043***
F_deposit	0.188***	0.231***	0.064***	-0.076***	-0.058***	-0.101***
I_edu	0.294***	0.408***	0.026***	-0.262***	-0.093***	-0.226***
Num_live	-0.037***	-0.044***	-0.012	-0.094***	0.128***	-0.113***
I_health	-0.078***	-0.092***	-0.031***	0.148***	0.071***	0.064***
Variable	*F_expend*	*F_finance*	*F_deposit*	*I_edu*	*Num_live*	*I_health*
F_expend	1					
F_finance	0.127***	1				
F_deposit	0.160***	0.142***	1			
I_edu	0.291***	0.215***	0.268***	1		
Num_live	0.247***	-0.016**	-0.040***	-0.004	1	
I_health	-0.093***	-0.063***	-0.123***	-0.146***	-0.028***	1

Notes: *,** and *** denote significance at the 10% ,5% and 1% level, respectively.

It can be seen from Table 2 that the age of the elderly was significantly positively correlated with participation in medical insurance, urban medical insurance and rural medical insurance, while there were both positive and negative correlations among Children_num, Children_per and these indicators, and the negative correlation was very significant. This indicated that population aging promoted long-term care insurance participation, while two-child policy mainly inhibited long-term care insurance participation.

3.2 Baseline regression results

Logistic regression analysis was conducted, and the same variables were used for regression of participation in medical insurance, urban medical insurance and rural medical insurance.

Table 3 shows the regression results of the full sample. When aging and the number of children were separately added to the regression equation of long-term care insurance participation, aging and long-term care insurance participation were positively correlated, while the number of children was negatively correlated with long-term care insurance participation, and the regression results were significant.

When aging and the number of children were added to the regression equation at the same time, regression results showed that the age of the elderly was positively correlated to long-term care insurance participation at 99% confidence level, which indicated that aging of population promoted the development of long-term care insurance, that is, with other conditions unchanged, the higher the age of the elderly, the better the long-term care insurance participation. However, the number of children had significant negative effects on long-term care insurance participation. After the implementation of the two-child policy, the burden of raising children was aggravated, with increased investment in all aspects of daily life, which reduced expenditure on elderly care, including the expenditure on long-term care insurance premiums. In this sense, an increase in the number of children would reduce the demand of long-term care insurance.

Table 4 and Table 5 respectively show the regression results of the purchase of urban and rural medical insurance. As for the influence of aging on long-term care insurance participation, the results of urban and rural medical insurance were the same. Aging was significantly positive correlated with both urban and rural medical insurance. However, as for the influence of the number of children on long-term care insurance participation, the results of the two variables were different. In the results of urban medical insurance, the number of children had a negative relationship with long-term care insurance participation at 99% confidence level. In the results of rural medical insurance, there were both negative and positive relationships between the number of children and long-term care insurance participation, and neither of them was significant. In terms of the not significant results, since generally there were already a lot of children in rural families, the increase and decrease of the number of children had no significant impact on long-term care insurance participation. In terms of the dual influences of the number of children, on the one hand, the number of children had a positive impact on the participation of long-term care insurance, which indicated that with the implementation of the two-child policy led to an increase of the fertility rate and the number of children raised by their grandparents. Therefore, the increase in the number and proportion of children under 16 years old promoted medical insurance participation, that is, under the background of the two-child policy, the demand for long-term care insurance increased. On the other hand, also had a substitution effect, when the number of children in a family increased, the family burden increased, and the increase in the number of children made the intergenerational resource allocation appear to favor one over the other, which led to the decline of long-term care insurance participation, that was, the number of children inhibited long-term care insurance participation.

In sum, according to the regression results, aging had a significant positive impact on long-term care insurance participation, while the number of children mainly had a negative impact on long-term care insurance participation.

Table 3. Regression of the purchase of medical insurance (Insurance).

Variable	(1)	(2)	(3)	(4)	(5)
Oldage	0.045*** (0.002)			0.035*** (0.002)	0.047*** (0.003)
Children_num		-0.175*** (0.017)		-0.124*** (0.012)	
Children_per			-0.955*** (0.211)		-0.937*** (0.275)
F_expend	0.389*** (0.046)	0.387*** (0.046)	0.230*** (0.069)	0.451*** (0.021)	0.403*** (0.029)
F_finance	0.729*** (0.179)	0.729*** (0.179)	0.867*** (0.110)	0.835*** (0.111)	0.633*** (0.176)
F_deposit	0.022*** (0.007)	0.022*** (0.007)	0.026** (0.012)	0.044*** (0.004)	0.052*** (0.006)
I_edu	0.302*** (0.022)	0.304*** (0.022)	0.237*** (0.037)	0.275*** (0.011)	0.227*** (0.015)
Num_live	-0.068*** (0.022)	-0.064*** (0.036)	-0.094*** (0.011)	-0.075*** (0.011)	-0.056*** (0.015)
I_health	-0.073** (0.036)	-0.072** (0.036)	-0.081*** (0.018)	-0.072*** (0.018)	-0.073*** (0.026)
Numbers of observations	17006	17006	17006	17006	8384
Maximum likelihood estimate	2678.96	2630.49	2530.49	2630.49	1044.76
R^2	0.1278	0.1255	0.1207	0.1255	0.1042

Notes: *,** and *** denote significance at the 10% ,5% and 1% level, respectively.

Table 4. Regression of the purchase of urban medical insurance (Urb_insurance).

Variable	(1)	(2)	(3)	(4)	(5)
Oldage	0.087*** (0.006)			0.058*** (0.003)	0.080*** (0.005)
Children_num		-0.223*** (0.014)		-0.220*** (0.018)	
Children_per			-2.055*** (0.417)		-2.031*** (0.404)
F_expend	0.955*** (0.033)	0.956*** (0.033)	0.975*** (0.033)	0.956*** (0.033)	0.939*** (0.047)
F_finance	0.857*** (0.125)	0.854*** (0.125)	0.907*** (0.123)	0.854*** (0.125)	0.739*** (0.203)
F_deposit	0.053*** (0.005)	0.055*** (0.005)	0.054*** (0.005)	0.055*** (0.005)	0.063*** (0.007)
I_edu	0.510*** (0.016)	0.516*** (0.016)	0.508*** (0.016)	0.516*** (0.016)	0.426*** (0.022)
Num_live	-0.164*** (0.015)	-0.153*** (0.015)	-0.184*** (0.015)	-0.153*** (0.015)	-0.145*** (0.021)
I_health	-0.084*** (0.025)	-0.080*** (0.025)	-0.095*** (0.025)	-0.080*** (0.025)	-0.090** (0.036)
Numbers of observations	7337	7337	7337	7337	7337
Maximum likelihood estimate	4532.65	4480.90	4335.22	4480.90	1871.92
R^2	0.2969	0.2935	0.2839	0.2935	0.2676

Notes: *,** and *** denote significance at the 10% ,5% and 1% level, respectively.

Table 5. Regression of the purchase of rural medical insurance (Rur_insurance).

Variable	(1)	(2)	(3)	(4)	(5)
Oldage	0.014*** (0.003)			0.010*** (0.003)	0.010** (0.004)
Children_num		-0.044 (0.162)		-0.049 (0.421)	
Children_per			0.212 (0.359)		0.166 (0.340)
F_expend	0.074*** (0.024)	0.079*** (0.024)	0.079*** (0.024)	0.076*** (0.024)	0.040 (0.032)
F_finance	-0.083 (0.212)	-0.072 (0.212)	-0.072 (0.212)	-0.082 (0.212)	-0.207 (0.332)
F_deposit	0.034*** (0.005)	0.035*** (0.005)	0.035*** (0.005)	0.035*** (0.005)	0.037*** (0.008)
I_edu	0.015 (0.014)	0.015 (0.014)	0.015 (0.014)	0.017 (0.015)	0.012 (0.020)
Num_live	-0.014 (0.014)	-0.019 (0.013)	-0.019 (0.013)	-0.011 (0.014)	0.005 (0.018)
I_health	-0.060** (0.023)	-0.063*** (0.023)	-0.063*** (0.023)	-0.060** (0.023)	-0.069** (0.033)
Numbers of observations	7038	7038	7038	7038	7038
Maximum likelihood estimate	106.15	85.59	84.43	95.69	40.75
R^2	0.0090	0.0072	0.0071	0.0081	0.0069

Notes: *,** and *** denote significance at the 10% ,5% and 1% level, respectively.

Among other control variables, firstly, family expenditure, family savings in financial institutions and education level had a significant positive impact on the demand for long-term care insurance. The regression results conform to the common sense, since high savings and consumption level mean higher ability to pay the premium, and high education level means with higher financial literacy and

insurance understanding level, which can promote the understanding of long-term care insurance and participation in it.

Secondly, the health condition had a significant negative influence on participation in long-term care insurance, which can be explained by people's fluke mind, that is, the healthier the elderly are, the more they would consider participating in long-term care insurance as useless.

Thirdly, the number of family members living together may have dual influences on long-term care insurance participation. On the one hand, it can play a promoting role, that is, the number of family members living together may have a positive effect on long-term care insurance participation. This effect may be explained by the quantity effects, that is, the more the number of family members, the higher the expenditure on children, which leads to the inadequacy of elderly health care and further promotes the long-term care insurance participation. On the other hand, the number of family members may have a substitution effect. The more family members, the greater the burden, and the expenditure on the elderly would be reduced and the participation rate of long-term care insurance would decrease; In addition, the more family members who live with the elderly, the more family members share the risk of old age with timely and easy care, thus reducing the demand for long-term care insurance. According to the regression results, it is obvious that the substitution effect of the number of family members living together on long-term care insurance participation was far greater than the promotion effect, and the number of family members living together had an overall negative effect on long-term care insurance.

Finally, as for the participation in the general medical insurance, family risky financial assets holdings had a positive impact on long-term care insurance participation. However, family risky financial assets holdings had totally different impacts on participation in urban medical insurance and rural medical insurance. Urban families that hold more risky financial assets have higher awareness and demand for risk control, so they are have higher participation in urban medical insurance. Therefore, there can be a positive relationship between risky financial assets holdings of urban families and long-term care insurance participation. In contrast, rural families that hold more risky financial assets have little financial literacy and knowledge about insurance, and have more channels to resist risks, thus reducing the demand for rural medical insurance. Therefore, there can be a negative relationship between risky financial assets holdings of rural families and long-term care insurance participation.

4. Conclusions and Suggestions

With the deepening of the aging of China's population, the participation rate of long-term care insurance for the elderly has increased rapidly. After the implementation of the two-child policy, the family burden increases, which is bound to neglect the care of the elderly. In order to meet the needs of health care for the disabled elderly, the participation of the whole population in long-term care insurance is the development trend of the aging society.

This paper made an empirical analysis on whether long-term care insurance could be a choice for the elderly to ensure their life under the circumstance that the aging of the population is deepening and the number of children in the family is increasing with the change of birth policy. The empirical results showed that there was a positive correlation between the age of the elderly and long-term care insurance participation in the family. The older the elderly, the more their participation in long-term care insurance, that is, population aging promoted the development of long-term care insurance. In addition, the number of children had different influences on long-term care insurance participation in urban and rural medical insurance. For the full sample and urban medical insurance, the number of children promoted long-term care insurance participation, and the promotion effect was very significant. For rural medical insurance, the number of children both promoted and inhibited long-term care insurance participation, and the effect was not significant. According to empirical results, the impact of the number of children on long-term care insurance was mainly negative, that is, the increase of the number of children mainly inhibited the demand for long-term care insurance. With

the increase the number of children, family burden and expenditure on children would increase, while expenditure on the elderly would decrease, which lead to the imbalance of resource allocation in different generations, and the substitute effect of the demand and participation in long-term care insurance. Therefore, in the implementation of long-term care insurance, great attention should be paid to families with older people and a large number of children.

Based on this, this paper puts forward suggestions to promote the development of long-term care insurance system in China. First, people are faced with both the increasing demand for care of the elderly and the increasing burden of children raising, and the medical care of the elderly should be transformed into a socialized process. Families need to pay attention to the paradox of demand and behavior of long-term care insurance participation of the elderly, and achieve the goal of universal benefits of long-term care insurance through government encouragement measures and policy support. Second, since the limited resources of families would lead to imbalance of resource allocation in different generations, that is, the increased burden of children raising increase may lead to a decline in resource allocation in the elderly, the government should perfect long-term care insurance system, implement the policy incentives, bonuses and support for two-child and three-child families, so as to offset the negative influence of the increased burden of children raising on long-term care insurance participation of the elderly as much as possible, and realize the popularity of long-term care insurance.

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