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The Influence of Population Aging on Chinese Household Financial Risk

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Abstract: *Based on the data of China's household finance survey in 2019 and Logit binary regression model, this paper discusses the influencing factors of population aging on household financial risk assets from the perspective of empirical analysis. It is found that the holding probability of family financial risk assets by aging population is related to the number of family population. With the increase of family population, it is instructive for the national government to actively guide family residents to allocate assets.*

Keywords: *Population Aging, Family Finance, Binary Logistics Regression*

1. Introduction

In the new era of socialism with Chinese characteristics, the Party has made it clear that we must adhere to the people-centered development thought, develop people's democracy in the whole process, and promote the all-round development and common prosperity of all people to achieve more obvious substantive progress.

People's sense of acquisition and happiness can't be separated from the rise of family financial conditions. And a series of research results have emerged, which are of profound significance in many major macro-policies of China at present, such as real estate market regulation, income distribution and so on. At present, the problem of population aging is becoming more serious. Whether population ageing will affect family financial is also a question worthy of discussion.

The main contributions of this paper are as follows: (1) Different from the previous literature focusing on macro-aspects of population aging, this paper studies the impact of population aging on household financial risk assets from the perspective of family. (2) Except the specific impact of population aging, the impact under different control conditions is also considered, which enriches the related research on population aging.

2. Literature Review

The existing research mainly focuses on micro-factors, such as family income (Zhang Yishan, Hua Shurui, Zhao Wensheng, 2015), education (Wei Xianhua, 2014), partly focuses on macro factors, such as GDP and interest rate of national debt (Deng Liyuan, 2017). The above research has confirmed that the Chinese household financial risk assets not only depends on individual characteristics, but also depends on macroeconomic factors.

To sum up, family finance mostly focuses on the conventional influencing factors, but lacks the research on new factors such as ageing. But population ageing will affect the participation of family financial risks. Studying the impact of that on family financial risk can not only provide theoretical support for China's problem of population aging, but also help families as an individual to better cope with many practical problems.

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3. Empirical Analysis

3.1. Sample Data Selection

The data used in this paper comes from China Household Finance Survey (CHFS) in 2019, which covered 29 provinces in China. In the data processing, this paper first retains the sample of households whose heads are when answering the questionnaire, and deletes the sample of households whose heads are younger than 18 years old and older than 65 years old. Secondly, in order to avoid the interference of outliers, this paper deletes the samples whose total household income and net assets are less than 0.

3.2. Model Principle

The Logistics model is selected, because the financial risk of families can be embodied as a binary variable for every family: whether the family conducts venture capital or not. The selected data is the data between different individuals in 2019.The model only carries out regression analysis on the difference variables among individuals, without considering the time-related factors.16 variables are selected, including 1 explained variable, 2 explained variables, 13 controlled variables. Thus, the core formula of this model can be obtained:

Therefore, dealing with strictly monotone functions can solve the above problems and requirements. $\frac{dQ}{dp}$ Should $\frac{1}{p(1-p)}$ Proportional, then make

$$Q = \ln \frac{p}{p(1-p)} \quad (1)$$

Specifically, the regression model can be expressed as

$$\log istics(p) = \delta + \sum_{k=1}^{n} \beta_k X_k \quad (2)$$

3.3. Variable Selection

(1) Explained variable: whether to make venture capital investment or not.

Based on the analysis of the composition of financial assets held by CHFS, combined with the measurement methods of Zong Qingqing et al. (2015), this paper takes whether or not to hold stocks as the criterion for judging whether or not to invest in venture capital, that is, holding stocks as 1 and not holding stocks as 0. Use stock-if as the variable name.

(2) Explanatory variable: the degree of population aging.

Following the discussion in Liu Zhexi et al. (2020), this paper chooses the proportion of the population aged 65as oldpe and the number of the elderly population as oldsum.

(3) Control variables:

In order to reduce the interference of missing variables on the estimation results and improve the accuracy of the research results, referring to the research of Yin Zhichao et al. (2017), other factors are selected as control variables, specifically including age, gender, whether there is endowment insurance, annual family income and total assets, etc.

1) Medical insurance indicators: according to the questions in the CHFS, have medical insurance is recorded as 1, The rest is recorded as 0, and med-in is used as the variable name.

2) Risk attitude: According to the questionnaire of CHFS, risk attitudes are divided into five categories and assigned values of 1,2,3,4,5 in turn.

3) Family financial: referring Ning Guangjie (2014), the annual household income is recorded as total-income; The annual household consumption is recorded as total-consumer; Total assets of the family are recorded as total-asset; Total household liabilities are recorded as total-debt. The logarithm of total household income is recorded as linincome.

4) Basic situation of family: gender is a binary variable, with 0 as female and 1 as male; The level of education is named edu, which is limited to receiving statistics as the highest degree, and different values

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are given to different degrees; Age is used to express it. Considering the nonlinear influence of age, this paper introduces the age-sq.

5) Financial literacy: The questions that can reflect the respondents' financial knowledge in the questionnaire are selected. This paper draws lessons from Hu Zhen (2018)' s scoring method of financial literacy, that is, the residents' financial literacy score can be obtained by adding up the scores of all questions with one point for each correct answer and zero point for each wrong answer.

6) Whether to buy old-age insurance: The variable name is old-in, with 1 as the owned value and 0 as non-owned.

3.4. Model Building

(1) Basic characteristics of data.

According to the Basic characteristics of data, we can find that only 5% of households hold risky assets. The average proportion of elderly people is 0.2498 and the average number of elderly people is 0.64; The average age is 55.88, it shows that at present, the overall composition of families is aging.

(2) Autocorrelation test.

According to the correlation test, the correlation coefficient among the variables is mainly below 0.4, which shows that the correlation between the variables is low and the collinearity is weak.

(3) Empirical analysis.

Table 1: Empirical analysis of factors influencing the choice of household financial risk assets.

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	edu			162.101	8	0.000			
	edu(1)	1.035	0.534	3.754	1	0.053	2.816	0.988	8.027
	edu(2)	1.753	0.521	11.325	1	0.001	5.774	2.080	16.030
	edu(3)	2.430	0.522	21.703	1	0.000	11.361	4.087	31.582
	edu(4)	2.445	0.531	21.228	1	0.000	11.532	4.075	32.630
	edu(5)	2.693	0.526	26.254	1	0.000	14.781	5.276	41.414
	edu(6)	2.739	0.528	26.959	1	0.000	15.474	5.502	43.518
	edu(7)	2.308	0.564	16.724	1	0.000	10.053	3.326	30.384
	edu(8)	2.496	0.726	11.806	1	0.001	12.130	2.921	50.362
	size	-0.215	0.036	34.780	1	0.000	0.807	0.751	0.867
	age2	-0.001	0.000	22.755	1	0.000	0.999	0.999	0.999
	age	0.129	0.021	39.548	1	0.000	1.138	1.093	1.185
	gender(1)	-0.436	0.076	33.201	1	0.000	0.647	0.558	0.750
	oldpe	-0.793	0.316	6.283	1	0.012	0.452	0.243	0.841
	old_in(1)	0.502	0.139	13.058	1	0.000	1.651	1.258	2.168
	med_in(1)	0.230	0.219	1.108	1	0.292	1.259	0.820	1.933
	mc	0.000	0.000	2.273	1	0.132	1.000	1.000	1.000
	total_income	0.000	0.000	4.166	1	0.041	1.000	1.000	1.000
	tc	0.000	0.000	3.594	1	0.058	1.000	1.000	1.000
	total_asset	0.000	0.000	6.174	1	0.013	1.000	1.000	1.000
	total_debt	0.000	0.000	20.389	1	0.000	1.000	1.000	1.000
	lincome	0.507	0.048	113.473	1	0.000	1.660	1.512	1.822
	risk-atti			160.828	5	0.000			
	risk-atti(1)	-0.398	0.178	4.984	1	0.026	0.672	0.474	0.953
	risk-atti(2)	-0.817	0.157	27.074	1	0.000	0.442	0.325	0.601
	risk-atti(3)	-0.884	0.159	31.001	1	0.000	0.413	0.303	0.564
	risk-atti(4)	-1.584	0.159	99.130	1	0.000	0.205	0.150	0.280
	risk-atti(5)	-1.709	0.224	58.142	1	0.000	0.181	0.117	0.281
	score			778.205	4	0.000			
	score(1)	0.982	0.116	71.394	1	0.000	2.670	2.126	3.353
	score(2)	1.645	0.116	200.995	1	0.000	5.180	4.127	6.503
	score(3)	3.070	0.129	569.631	1	0.000	21.547	16.745	27.726
	score(4)	3.137	0.148	447.965	1	0.000	23.039	17.230	30.805
	oldsum	0.396	0.123	10.326	1	0.001	1.486	1.167	1.893
	Constant	-14.631	0.907	260.073	1	0.000	0.000		

a. Variable(s) entered on step 1: edu, size, age2, age, gender, oldpe, old_in, med_in, mc, total_income, tc, total_asset, total_debt, lincome, risk-atti, score, oldsum.

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Table 2: Empirical model test.

Number of samples	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	χ^2	p	Prediction accuracy rate
26472	6440.571[a]	0.139	0.427	14.881	0.056	94.9%

Box-Tidwell method is used to test whether there is a nonlinear relationship between the continuous independent variable and the dependent variable after logistics conversion. The results show that there is no nonlinear relationship between the continuous independent variable and the dependent variable after logistics conversion. Omnibus test shows that the logistics model is statistically significant, χ^2 =14.881, $p > 0.05$ can correctly classify different cases. In addition, in the analysis of data the maximum likelihood estimation estimated from the logistic regression model is reached through an iterative process, so the fitting degree of OLS method is not applicable. However, to evaluate the goodness of fitting of Logistic model, SPSS gives a similar result. The value of the index is also between 0 and 1, and the fitting degree is significant with the increase of the value given by SPSS. In this paper, Nagelkerkerr R Square=0.427, and it is obtained under the uncertainty of the questionnaire data, which fully shows that the data fit is good. The result of coefficient test shows that many independent variables include the number of elderly population have statistical significance on whether to invest in financial risk assets. For each increase in the number of the elderly population, the investment probability increases by 48.6%, and for each increase in the proportion of the elderly population, the investment probability decreases by 64.8%. To sum up, three variables closely related to aging are selected to classify the data, and the new fitting results under different specific conditions are obtained by using binary logistics regression again.

3.5. Result Analysis and Further Test

(1) Do you have endowment insurance?

In the absence of pension insurance, oldpe has significant statistical significance, but oldsum does not and the value of Nagelkerke R Square is not much different from the total regression. It Indicates that under this condition, the number of the elderly population will not significantly affect the holding probability of risk assets. In the case of holding endowment insurance, both of them have a very high level of significance and there is little difference between Nagelkerkerr R Square and the total regression value. Under this condition, the influence of increasing each elderly population on the holding probability of risky assets depends on the family size. Different family sizes have different impacts.

Table 3: Empirical model test under specific conditions (whether endowment insurance is held or not).

	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Prediction accuracy rate
old-in=0	485.376[a]	0.055	0.405	94.2%
old-in=1	5883.715[a]	0.152	0.424	94.5%

Table 4: Empirical analysis under specific conditions (whether endowment insurance is held or not).

		B	S.E	Wald	df	p	Exp(B)	95% C.I.for EXP(B)	
old-in=0	oldpe	-3.735	1.967	3.608	1	0.058	0.024	0.001	1.127
	oldsum	0.66	0.532	1.537	1	0.215	1.935	0.682	5.49
old-in=1	oldpe	-0.709	0.328	4.665	1	0.031	0.492	0.259	0.937
	oldsum	0.392	0.13	9.144	1	0.002	1.479	1.148	1.907

(2) Do you have medical insurance?

Without medical insurance, neither of the two variables is significant and the difference between the value of Nagelkerke R Square and the total regression is within the allowable range. It indicates that under this condition, aging is not the main factor that affects whether a family holds risky assets. On the premise of holding medical insurance, the number and proportion of the elderly population are extremely significant, which shows that under this premise, aging is the main factor affecting the holding of risk assets.

Table 5: Empirical model test under specific conditions (whether medical insurance is held or not).

	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Prediction accuracy rate
med-in=0	199.326[a]	0.051	0.308	95.1%
med-in=1	6210.422[a]	0.143	0.431	95.3%

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Table 6: Empirical analysis under specific conditions (whether medical insurance is held or not).

		B	S.E	Wald	df	p	Exp(B)	95% C.I.for EXP(B)	
med-in=0	oldpe	-1.966	2.069	0.903	1	0.342	0.14	0.002	8.084
	oldsum	0.949	0.754	1.583	1	0.208	2.582	0.589	11.319
med-in=1	oldpe	-0.756	0.321	5.53	1	0.019	0.47	0.25	0.882
	oldsum	0.381	0.126	9.235	1	0.002	1.464	1.145	1.873

(3) Financial literacy level.

According to the Table 7 and Table 8, the value of Nagelkerke R Square is relatively low, which indicates that the classification effect based on the level of financial literacy is not ideal, and the statistical results are relatively convincing. In the process of the score increasing from 0 to 2, the significance level of the two variables to measure the aging to the holding of risky assets is in a rising process, and the coefficient is constantly increasing. This means that the influence of aging is getting stronger and stronger, which shows that the residents with higher financial literacy level will consider the influence of the number of elderly people in their own families.

Table 7: Empirical model test under specific conditions (different levels of financial literacy).

	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Prediction accuracy rate
Score=0	1152.314[a]	0.020	0.231	88.6%
Score=1	1689.154[a]	0.053	0.182	95.9%
Score=2	1688.894[a]	0.121	0.248	89.5%

Table 8: Empirical analysis under specific conditions (different levels of financial literacy).

		B	S.E	Wald	df	p	Exp(B)	95% C.I. for EXP(B)	
Score=0	oldpe	-0.812	0.778	1.091	1	0.296	0.444	0.097	2.038
	oldsum	0.468	0.29	2.601	1	0.107	1.596	0.904	2.817
Score=1	oldpe	-1.273	0.638	3.981	1	0.046	0.28	0.08	0.978
	oldsum	0.562	0.255	4.867	1	0.027	1.754	1.065	2.889
Score=2	oldpe	-1.713	0.614	7.778	1	0.005	0.18	0.054	0.601
	oldsum	0.657	0.241	7.456	1	0.006	1.93	1.204	3.093

4. Conclusions and Policy Recommendations

4.1. Conclusions

Through the empirical analysis, we can see that for a family, the aging population is an important factor to decide whether to invest in venture capital. According to the different family sizes of different families, the increase of the elderly population will have positive or negative effects. Aging will have different effects in different situations.

4.2. Policy Recommendations

(1) According to the results of empirical analysis, the higher the financial literacy level of householders, the more sensitive householders are to the problem of population aging, and the better they can eliminate the adverse effects of population aging. By improving the financial knowledge level and financial sensitivity of every household, let more residents improve their financial management ability and realize wealth appreciation. At the same time, the society should also improve the professional level and the design ability of financial products, so that residents can choose suitable financial instruments.

(2) The analysis results show that whether you have medical insurance and old-age insurance is the key condition to determine the influencing factors of population aging. Continue to expand the coverage of medical insurance and old-age insurance. On the premise of medical insurance and social insurance, this will help to increase the investment in financial risk assets.

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