

Research on the Impact of Aging on Household Financial Vulnerability

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Abstract

As the degree of population aging continues to deepen, the impact of aging on micro-level household financial risks cannot be ignored. From the micro perspective of households, the increase in the elderly population not only changes the structure of families but also brings about a series of economic and financial issues. Therefore, in-depth research and understanding of the impact of aging on household financial vulnerability become crucial. Studying the specific effects and mechanisms of aging on household financial vulnerability is significant for maintaining financial stability in families and alleviating financial vulnerability in elderly households. This study utilizes panel data from the China Household Finance Survey for the years 2013, 2015, 2017, and 2019, employing the OLS model to empirically analyze the impact of aging on household financial vulnerability. The study conducts a mediation analysis using the stepwise regression method to examine the mechanism through which aging affects household financial vulnerability via the risk aversion attitude of household heads. The results indicate that with the increasing degree of population aging, household financial vulnerability shows an increasing trend. The risk aversion attitude of the household head is identified as a crucial mediating mechanism through which population aging influences household financial vulnerability. Being male and married household heads tend to reduce financial vulnerability in families. Additionally, higher household income levels and the GDP levels of the provinces where families are located are associated with lower financial vulnerability in households. Based on the research findings, the study proposes recommendations such as formulating differentiated policies to meet the needs of specific groups, enhancing financial education to improve financial literacy, and strengthening the social security system.

Keywords

Population Aging; Household Financial Vulnerability; Risk Aversion Attitude.

1. Introduction

As China's economic development continues to advance, strengthening financial risk supervision and prevention has become a crucial issue in the country. Among these risks, family financial risk is an integral part, manifested in risks related to debt, savings, investment, and consumption. These risks not only impact the quality of family life but also exert significant influence on the stability of the financial system. Numerous scholars (Dartanto and Otsubo, 2016; Leika and Marchettini, 2017; Mian et al., 2017) have confirmed the close connection between family financial vulnerability and the stability of the financial system. Family financial vulnerability is a comprehensive indicator measuring the ability of families to cope with uncertainties, influenced by the magnitude of financial risks faced by families and their ability to withstand these risks. It is an important metric for assessing family financial risk and a significant source of macro-financial risk. Additionally, the "China Urban Resident Family Asset and Liability Survey" indicates that over 50% of urban families have debts, with a relatively concentrated composition of family assets, where housing assets constitute over 70%. This

implies that many families face liquidity risks, emphasizing the need to address issues related to high family debt risk. The household debt leverage ratio reflects the micro-level of family financial vulnerability, with high debt ratios, high leverage, and rapid debt growth being the main characteristics of current family sector debt risk. Therefore, addressing how to effectively reduce the household sector's leverage ratio, curb the rising trend of household indebtedness, thereby reducing family financial vulnerability and preventing systemic financial risks, is a question worthy of consideration.

According to data from the World Health Organization, China ranks second globally in terms of the level of population aging, following only Japan. As of 2021, the population of individuals aged 60 and above in China has exceeded 250 million, accounting for 17.3% of the total population. It is projected that by 2053, China's elderly population will reach 440 million, constituting 39.7% of the total population. National Bureau of Statistics data shows that by 2020, the total population in the country was 1.41 billion, with 264 million people aged 60 and above, accounting for 18.7% of the total population, and 190 million people aged 65 and above, accounting for 13.5% of the total population. Compared to 2010, the proportion of people aged 60 and above increased by 5.4%, and the proportion of people aged 65 and above increased by 4.6%. Aging not only brings negative impacts to society but also affects family finances. Due to the prevalent practice of relying on children for elderly support in China, the pressure of aging is mainly borne by families. Many scholars have begun to pay attention to the relationship between aging and family finances. On the one hand, aging may alter family risk attitudes, influencing asset allocations and subsequently affecting family financial risk. For example, with increasing age, families may become more conservative, preferring stable asset allocations over high-risk investments. On the other hand, the caregiving pressure resulting from aging may exacerbate family debt issues, increase uncertainty in expenditures, reduce labor income, and impact the family's ability to cope with shocks. Therefore, addressing the issue of family financial vulnerability arising from aging is worth attention in the current scenario of escalating population aging.

2. Literature Review

The essence of vulnerability is risk, and it has been widely applied in research across various fields such as economics, politics, psychology, and nature (Zhang et al., 2020). In 1982, American scholar Minsky first introduced financial vulnerability to academia. Narrowly defined financial vulnerability refers to the characteristic of industries with high debt operation determining the inherent susceptibility of the financial sector to failures. Broadly defined financial vulnerability refers to a financially risky state, encompassing the accumulation of risks in all financing domains, including credit financing and financial market financing (Huang and Lao, 2001). There exists a close connection between family financial vulnerability and the stability of the financial system (Dartanto and Otsubo, 2016; Mian et al., 2017). Since the term "vulnerability" was introduced into the framework of family welfare analysis at the end of the 20th century, the concept of family financial vulnerability has emerged, serving to analyze potential financial difficulties within families. It reflects the possibility of families falling into financial distress when unable to fulfill their debt obligations in a timely or complete manner (Ampudia et al., 2016).

Family financial vulnerability is a relatively abstract concept, and in the literature, there is a lack of standardized criteria for defining family financial vulnerability. In initial studies, most scholars focused on analyzing family financial vulnerability among impoverished families (Dercon and Krishnan, 2000; Chaudhuri et al., 2002; Xie Yumei and Ding Fengxia, 2019). This is because impoverished families face more financial risks and are more prone to experiencing issues of family financial vulnerability. However, with further research, it has become evident

that even individuals or families with higher incomes may exhibit features of vulnerability (O'Connor et al., 2019; Anderloni et al., 2011). Definitions of family financial vulnerability in the literature mainly fall into three categories:

Firstly, family financial vulnerability is defined as the inability to bear basic expenses due to excessive indebtedness (Warthinton, 2006; Bridges and Disney, 2004), including financial debts (Jappelli et al., 2013) and consumer debts (Anderloni et al., 2011), when subjected to financial risks and shocks (Poh and Sabri, 2017). This definition emphasizes the potential for families to fall into financial risk.

Secondly, family financial vulnerability is defined as the ability of a family to cope with uncertainty shocks, primarily dependent on the financial risks faced by the family and its ability to resist these risks (Lusardi and Tufano, 2011; Li Bo, Zhu Taihui, 2020). This approach places greater emphasis on a family's ability to cope with risks compared to other definition methods, rather than focusing on a specific financial indicator.

Thirdly, family vulnerability is defined as income falling below a set poverty standard (Xie Yumei and Ding Fengxia, 2019; Dan Depeng, 2019) or welfare and consumption levels below a set poverty standard (Dercon and Krishnan, 2000), leading to the inability to sustain basic living conditions. This method highlights the size of a specific financial indicator relative to a set threshold. This definition method is clearer in delineating family financial vulnerability and initially focuses on impoverished families rather than the entire sample.

In summary, the first two definition methods emphasize the crucial role of risk shocks in defining family financial vulnerability, ultimately leading to financial distress. The third definition method is more explicit, outlining the concept of family financial vulnerability directly through the size of a specific financial indicator relative to a set threshold.

3. Methodology

The sample data used in this study are derived from the database of the China Household Finance Survey (CHFS) conducted by Southwestern University of Finance and Economics. The survey employs a three-year, one-stage, stratified, and population-proportional-to-size sampling method, with the local population flow converted into absolute proportions. It covers 29 regions and provinces (autonomous regions and municipalities directly under the central government) nationwide. The sample includes families from different economic development levels in the eastern, central, and western regions of China, encompassing both urban and rural households, providing national representativeness. Additionally, the China Household Finance Survey records detailed information on family demographics, employment status, asset and liability status, income and consumption levels, as well as subjective attitudes. This allows for a comprehensive and in-depth description of the economic and financial behaviors of Chinese resident families, providing comprehensive data support for studying family financial conditions.

To investigate the impact of aging on family financial vulnerability, families were selected as the smallest research unit, and panel data from four periods, including 2013, 2015, 2017, and 2019, were chosen. This study excluded some outlier samples, missing values, and samples that did not conform to reality, resulting in a final sample of 19,596 households. Stata 16.0 software was used for indicator construction and econometric analysis.

The dependent variable in this study is family financial vulnerability (HFV). Existing research commonly uses the dimensions of "excessive debt" and "emergency savings" to measure family financial vulnerability. These dimensions are discretized by setting relevant thresholds to reflect the degree of financial vulnerability in sample families. Although the threshold-setting method can determine whether a family reaches a critical point of vulnerability, it cannot accurately reflect changes in the degree of vulnerability after surpassing the critical point. To

overcome this limitation, this study draws on previous research experience and selects five dimensions—family debt ownership, debt default, budgeting ability, risk coping ability, and basic social security (social exclusion)—as evaluation indicators reflecting family financial vulnerability. From a statistical perspective, these dimensions of family vulnerability may involve multiple issues. Therefore, a dimensionality reduction process is employed to test whether the original variables show a decreasing trend in the appropriate combination quantity for summarizing family vulnerability. The explanatory variable is the degree of aging. According to the definition of the National Bureau of Statistics, citizens aged 60 and above are classified as the elderly population. Therefore, the aging level of a family is measured by the proportion of elderly people aged 60 and above in the total family population. The mediating variable is the risk aversion attitude of the household head. The risk aversion attitude of the household head is measured by the type of investment tendency through the answers of the household head to relevant questions in the CHFS questionnaire. Specifically, values are assigned based on the household head's responses, with categories of unwilling to take any risks, slightly low risk, average risk, slightly high risk, and high risk being assigned values from 1 to 5. Based on the theoretical analysis and variable measurement discussed earlier, this study focuses on exploring the impact of aging on family financial vulnerability. While previous research mostly defines family financial vulnerability as a binary choice variable, this study defines family financial vulnerability as a discrete variable within the interval [1, 10]. Therefore, ordinary least squares regression analysis is employed.

4. Results

4.1. Benchmark Regression

As shown in Table 1, the first column estimates the impact of population aging on household financial vulnerability without including any control variables. The second column, building on the first, incorporates control variables at the household head level. The third column adds control variables at the household level on top of the second column, and the fourth column further includes control variables at the regional level. Without control variables, the proportion of the population aged 60 and above in the household passed a significance test at the 10% level. With the inclusion of control variables, the significance test was passed at the 1% level, with marginal effects of 0.136, 0.239, 0.395, and 0.431, respectively. It can be observed that as control variables at the household head, household, and regional levels are successively added, the proportion of the population aged 60 and above in the household remains consistently significant and positive. This indicates a positive impact of aging on household financial vulnerability—higher aging in the household corresponds to higher financial vulnerability.

In the fourth column of Table 1, the estimated effects of explanatory variables and all control variables on the dependent variable are presented. Regarding control variables, the household head's age is positively significant at the 1% level, while the squared term of age is negatively significant at the 1% level. This suggests that as the household head's age increases, household financial vulnerability initially increases and then decreases, following an inverted U-shaped trend, consistent with findings by Zhang et al. (2020) using a framework for analyzing household economic vulnerability. The gender of the household head is significantly negative at the 1% level, indicating that male household heads have lower financial vulnerability, consistent with the research of Ampudia (2016). The coefficient for marital status of the household head is significantly negative, suggesting that single, divorced, or widowed household heads have higher financial vulnerability. Household income is negatively significant at the 1% level, indicating that an increase in household income effectively inhibits the increase in household financial vulnerability. This may be because higher household income enhances

the ability to withstand adverse economic shocks, whereas low-income households often struggle to cope with emergencies and meet basic family living expenses, leading to an increase in financial vulnerability. The coefficient for household size is significantly positive, indicating that larger households experience greater financial vulnerability. This could be due to increased expenses associated with education, healthcare, and other aspects, leading to higher financial pressure for larger families. Although larger families may imply more sources of income, effective financial planning and management are crucial; otherwise, they may face greater financial difficulties. Additionally, the financial needs and priorities of individuals in multi-person households may vary, increasing the complexity of household financial management and the likelihood of financial vulnerability. The coefficient for the GDP level of the province where the household is located is significantly negative, suggesting that higher provincial GDP is associated with lower household financial vulnerability. This may be because regions with higher GDP tend to offer more job opportunities, have more robust social security systems, and higher levels of education, encouraging households to have a better economic foundation and financial literacy, thus reducing the likelihood of financial risk and lowering household financial vulnerability.

Table 1. The Impact of Aging on Household Financial Vulnerability - Benchmark Regression

	(1)	(2)	(3)	(4)
Variables	HFV	HFV	HFV	HFV
old_ratio	0.136*	0.239***	0.395***	0.431***
	(0.075)	(0.082)	(0.083)	(0.083)
age		0.044***	0.053***	0.056***
		(0.012)	(0.012)	(0.012)
age_squared		-0.045***	-0.051***	-0.053***
		(0.011)	(0.011)	(0.011)
gender		-0.175***	-0.172***	-0.174***
		(0.047)	(0.046)	(0.046)
edu		-0.065***	-0.038*	-0.031
		(0.022)	(0.022)	(0.022)
marriage		-0.179	-0.193	-0.198*
		(0.120)	(0.118)	(0.118)
lnc			-0.183***	-0.179***
			(0.008)	(0.008)
household_size			0.116***	0.105***
			(0.014)	(0.014)
rural				0.043
				(0.166)
GDP				-0.083***
				(0.020)
_cons	4.425***	3.962***	4.999***	5.012***
	(0.019)	(0.347)	(0.350)	(0.360)
Time Effects	YES	YES	YES	YES
N	19356	19356	19356	19356

Note: The values in parentheses are t-statistics or z-statistics, ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Mediation Effect Testing

Table 2. Results of Mediation Effect Testing for Risk Aversion Attitude

	(1)	(2)	(3)
Variables	HFV	RiskAver	HFV
old_ratio	0.431***	0.103*	0.419***
	(0.083)	(0.055)	(0.083)
RiskAver			0.023*
			(0.013)
Control Variables	YES	YES	YES
Time Effects	YES	YES	YES
<i>N</i>	19356	19356	19356

Note: The values in parentheses are t-statistics or z-statistics, ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

From the first column of Table 2, it can be observed that population aging has a significantly positive impact on household financial vulnerability, with a marginal effect of 0.431. This implies that the total effect of population aging on household financial vulnerability is 0.431. In the second column, it is evident that population aging has a significant positive impact on the risk aversion attitude of the household head, with a marginal coefficient of 0.103.

In the third column, after introducing the mediation variable of the household head's risk aversion attitude, the marginal coefficient for the impact of population aging on household financial vulnerability is 0.419. This is slightly lower than 0.431, and the significance and direction of the effect remain unchanged. This indicates that population aging leads to an increase in the risk aversion level of the household head, thereby increasing the degree of household financial vulnerability."

5. Conclusion

To delve into the impact of aging on household financial vulnerability, this study draws on Noerhidajati's method of measuring household financial vulnerability, employing a classification principal component analysis and entropy weighting. This method evaluates household financial vulnerability comprehensively across five dimensions: debt ownership, debt default, budgeting ability, risk coping capacity, and basic social security (social exclusion). To validate the hypotheses, data from the Chinese Household Finance Survey Panel for the years 2013, 2015, 2017, and 2019 are used, and an Ordinary Least Squares (OLS) model is applied to empirically analyze the influence of aging on household financial vulnerability. Stepwise regression is employed for the mediation analysis, examining how aging affects household financial vulnerability through the mediator of the head of the household's risk aversion attitude.

The following conclusions are drawn: Firstly, with the increase in the aging population, household financial vulnerability shows an increasing trend, even after considering control variables such as head of household characteristics, family features, and regional characteristics. This is primarily due to the rise in aging leading to a reduction in labor income and an increase in uncertain expenditures, thereby causing an excessive burden of household debt. Additionally, robustness tests and endogeneity tests further validate the reliability of the research findings. Secondly, the head of the household's risk aversion attitude is confirmed as a crucial mediating mechanism in the impact of aging on household financial vulnerability. As the population ages, the head of the household's risk aversion increases, subsequently raising the level of household financial vulnerability, forming the "aging population-risk aversion

attitude-household financial vulnerability" mechanism. Thirdly, concerning control variables, having a male head of the household and a married head of the household reduce household financial vulnerability. Higher family income levels and higher provincial GDP levels also decrease household financial vulnerability. Larger family sizes, on the other hand, increase household financial vulnerability.

To address specific group needs, differential policies should be formulated. Through in-depth research, it is found that with the deepening of aging, household financial vulnerability significantly increases, especially in rural areas and low-income families. To effectively address the impact of aging on household financial vulnerability, the study suggests implementing differentiated policies and targeted measures for different target groups. Firstly, attention should be paid to families with a higher proportion of elderly people in rural areas, especially those facing economic difficulties, with specific focus on potential financial risks. Additionally, emphasis should be placed on elderly households with significant health issues. Measures such as establishing a sound system for disease treatment and relief for the elderly, improving access to family credit, and enhancing the development of financial services tailored to the elderly can effectively reduce the negative impact of aging on household financial vulnerability. Promotional and educational activities, as well as narrowing the digital divide within families, are also crucial means. These recommendations are expected to enhance the financial resilience of households facing the challenges of aging. Secondly, it is necessary to formulate differential policies for low-income families. Since the impact of aging on low-income families is more pronounced, as they often lack sufficient financial reserves to withstand uncertain risks, the government can employ measures such as increasing social welfare subsidies, reducing medical expenses, and encouraging financial institutions to provide more flexible financial services. These measures are specifically designed to alleviate the financial pressure on this particular group. Through in-depth mechanism analysis, the study concludes that improving financial literacy can effectively mitigate the impact of aging on household financial vulnerability. The rise in risk aversion attitude due to aging is identified as a critical pathway to increased household financial vulnerability. Therefore, to more effectively address the impact of aging on household financial vulnerability, measures should be taken to enhance financial education, raise the financial literacy of residents, and help them develop rational investment perspectives. The following are a series of recommendations: Firstly, formulate a comprehensive financial education plan. Governments and relevant organizations should jointly formulate a comprehensive financial education plan, incorporating financial education into school curricula to cultivate students' basic financial literacy from an early age. Enhance digital financial education for the elderly, increasing their awareness and usage capabilities of digital payment and mobile banking tools. Through regular training courses and the provision of information booklets, assist the elderly in better understanding and utilizing digital financial tools. For different age groups of elderly people, organize lectures and seminars on financial knowledge to increase their understanding of the financial sector. Secondly, increase community promotion and education efforts to narrow the digital divide. Organize financial knowledge dissemination activities at the community level, invite professionals to explain basic financial knowledge to the elderly, and address their questions regarding financial management. This face-to-face educational approach is more likely to capture the attention and interest of the elderly, raising their financial literacy. Through community promotional and educational activities, regularly organize activities for the elderly to improve their digital literacy, helping them better adapt to the digital age. Simultaneously, establish a parent-assistance program, enabling the younger generation to help their parents enhance their digital skills, reducing the generation gap in digital tools within families. Thirdly, utilize internet platforms for remote education. Considering the special circumstances of the elderly, online financial education

courses can be provided through internet platforms, allowing the elderly to learn flexibly at home.

The research findings indicate that the main causes of the financial vulnerability of households due to aging are primarily associated with a decrease in household labor income and an increase in uncertain expenditures, leading to an excessive burden of debt. Therefore, addressing this issue could involve strengthening the social security system, boosting the labor income of aging households, and reducing uncertain expenditures for these households.

Firstly, promoting reemployment among the elderly to increase the income of aging households. This can be achieved through the implementation of flexible employment policies, providing more options for the elderly, such as part-time, remote work, and flexible working hours, to better meet their specific needs and work capabilities. Encouraging businesses to hire older employees by promoting policies that are friendly to elderly staff, including flexible working environments and adjusted benefits, can attract more companies to employ older workers. The government could also develop and improve entrepreneurial support policies to provide more assistance, including financial support, legal advice, and marketing promotion, to elderly individuals interested in entrepreneurship.

Secondly, establishing a comprehensive healthcare system for the elderly to reduce uncertain medical expenditures for aging households. To address potential health issues faced by the elderly, the government should strengthen the construction of a medical treatment and assistance system to ensure that the elderly can receive timely and effective medical services when they fall ill. Enhancing community-based comprehensive elderly healthcare service networks can improve the accessibility and coverage of medical services. Furthermore, encouraging financial institutions to offer insurance products tailored to the medical needs of the elderly through methods such as government purchasing services can help reduce the financial burden of medical expenses on the elderly and enhance their medical security.

Thirdly, constructing a comprehensive pension security system. Strengthening the construction of the pension insurance and pension system to ensure that the elderly can enjoy stable pension income is crucial. The government should gradually improve the social pension insurance system, increase the basic pension level, and expand coverage. Additionally, encouraging the elderly to actively participate in commercial pension insurance by providing more personalized pension security plans can cater to the diverse needs of different elderly individuals. Furthermore, through tax and other incentive policies, encouraging businesses to provide more comprehensive occupational pension plans can offer reliable pension security for older employees.

Finally, promoting community-based and shared elderly care models. Supporting the development of community-based elderly care services through community cooperation can provide more social support for the elderly. This includes community volunteer assistance, shared elderly care resources, and other initiatives aimed at reducing the cost of living for the elderly and alleviating financial burdens.

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