

# Pension Wealth and Household Portfolio Choice: Evidence from China

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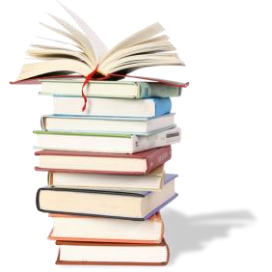


# Background

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## **Part 1**

# Background: Chinese pension issues



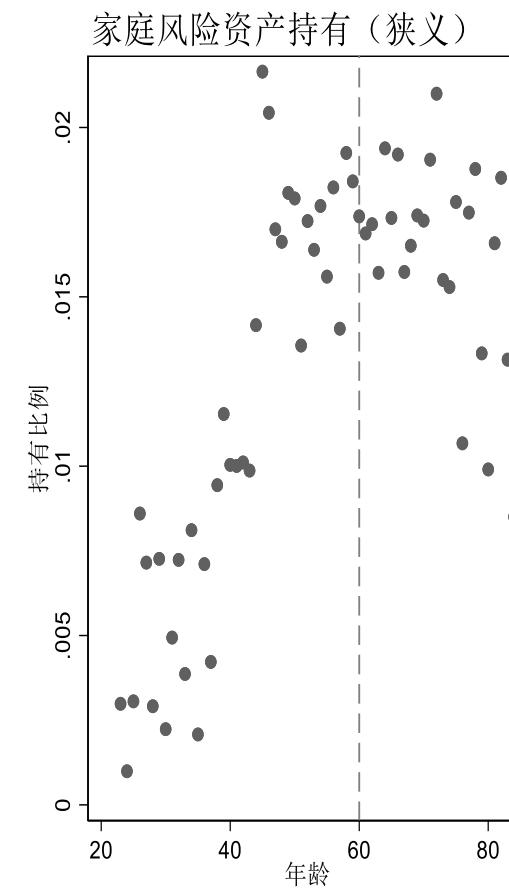
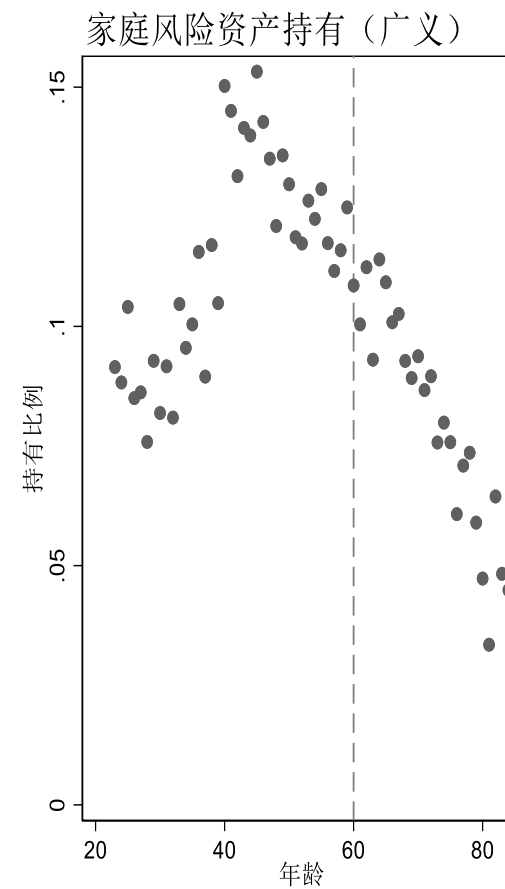
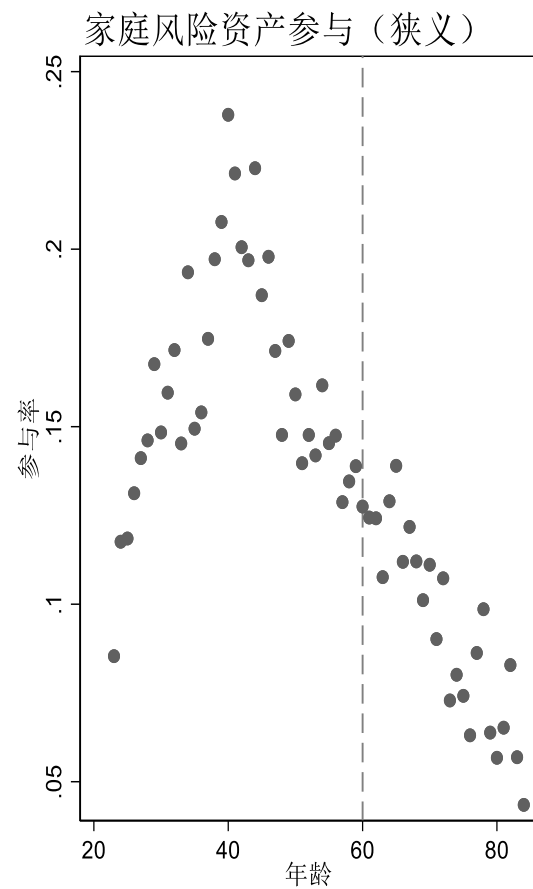
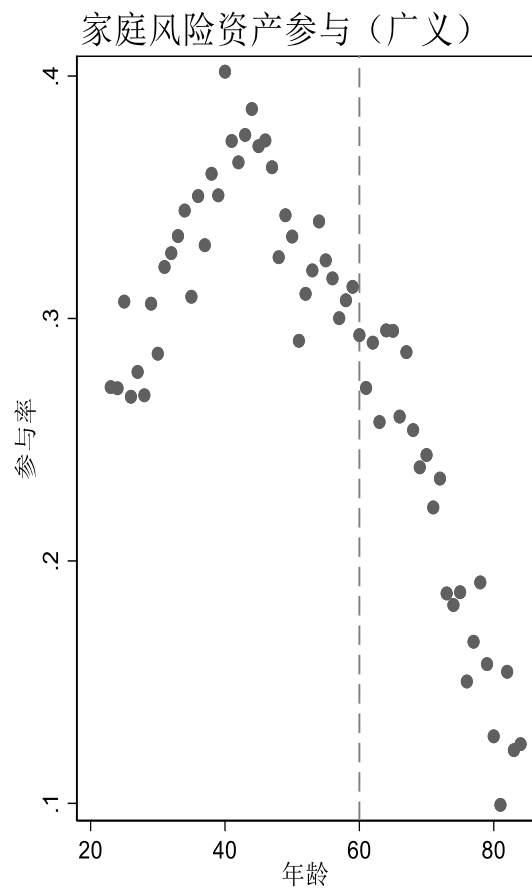
## ● Supporting Model

- Supporting model: Supported by household、 Supported by pension (DB/DC) and 、 Supported by saving (DC). There is an **alternative relationship** between the three main methods.
- East Asian Countries ( Filial Piety Culture ) : household+ pension +saving
- European and American countries : pension +saving
- With the reform of pension system, the pension system covers both social and individual pensions.
- The Chinese urban household shifted from relying mainly on household support to relying mainly on the pension system.(Zhang and Chen,2014;Liu,2016)

## ● The main results

- CHFS ( 2011-2017 )
- Measure pension wealth under different pension systems
- The higher a household's pension wealth is, the higher its participation in the market and its holding of risk asset
- The main reason for this may be that households with more pension wealth have a lower risk aversion
- The effects differ between the households in the public and non-public sectors
- we conduct a sensitivity and an IV analysis to re-estimate the results and find that they remain robust

- Broad risk assets : Financial risk assets + Non-financial risk assets ( Real estate )
- Narrow risk assets : Financial risk assets
- Life cycle effect : Inverted U



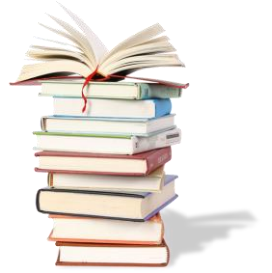


# Introduction

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## **Part 2**

# Introduction: Research Method and Innovation



## ● Research Method

- A recent strand of literature focuses on the effects of participation in pension plans on a household's portfolio choice (Bertaut & Starr, 2000; Tang et al., 2010; Zong et al., 2015). Our article uses pension wealth to measure the level of retirement benefits and examines the effect of pension wealth on a household's portfolio choice.

## ● Why China Evidence?

- The measured error of a household's pension wealth is relatively small when using Chinese data
- The Chinese household pension wealth is hardly allocated with risk assets
- Using Chinese data, we can explore the heterogeneity in a household's portfolio choice under different basic pension subsystems.

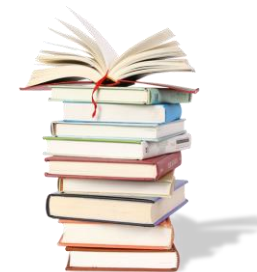


# Literature Review

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## **Part 3**



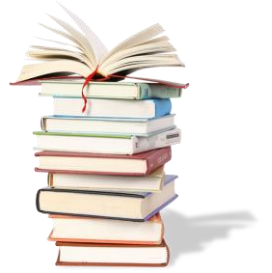


## ● The household portfolio choice

- From the perspective of household background risk, there has been a focus on income risk (Bonaparte et al., 2014; Guiso et al., 1996) and health risk (Love & Smith, 2010; Yogo, 2016).
- From the perspective of household non-background risks, social interaction (Hong et al., 2004), mental state (Bogan & Fertig, 2013; Puri & Robinson, 2007), investment learning experience (Ehling et al., 2018), financial literacy (Rooij et al., 2012), and cognitive ability (Christelis et al., 2010) have been shown to have important effects on a household's portfolio choice.

## ● The role of pensions

- Pension wealth comes from human capital and one's wage determines the base of one's pension contributions. Therefore, the risk of labor income may affect a household's portfolio choice through the accumulation of pension wealth (Fagereng, 2017; Jagannathan et al., 1996)
- Age is one of the most important factors influencing a household's portfolio choice and labor income risk is closely related to age (Cocco et al., 2005; Curcuru et al., 2009)
- many scholars have also been concerned about the relationship between retirement and portfolio choices (Addoum, 2017; Rooij et al., 2012)



## ● Why empirical research?

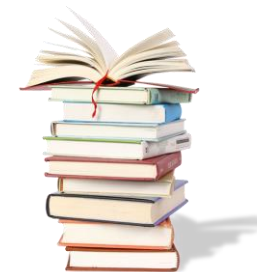
- Pensions are therefore tied to one's age and retirement plans
- On the one hand, pension contributions would lead to a decrease in a household's disposable income.
- On the other hand, the existence of pension wealth can reduce the risk that consumers would experience a shock due to the uncertainty of future income or other events
- the two effects are mutually offsetting to a certain extent, economic theory cannot give a clear answer on the role of pension wealth in portfolio choices



# Pension Wealth Measurement

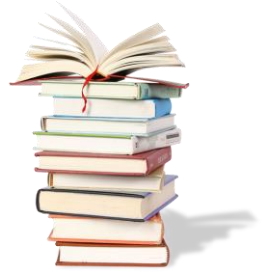
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## **Part 4**



## ● Comparison of Chinese Basic Pension Rules

Rule		Enterprise pension	Public pension	Resident pension
Contribution	Social	20%*wage	None	None
	Personal	8%*wage	None	Contribution + Subsidy
	Transition	Subsidy	None	None
Retirement Age (Female/Male)		50/60	55/60	60
Benefit	Social	Index-wage* N%	Partial Wage	Government subsidy
	Personal	Accumulation/M	None	Accumulation/M



## ● Enterprise Pension

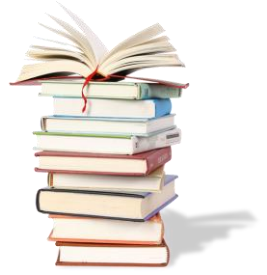
$EnterprisePension_i$

$$= \begin{cases} SocialAccount_{a,t} + PersonalAccount_{a,t} + TransitionAccount_{a,t}, & \text{if } r > a > t - 1998 + a_0 \\ SocialAccount_{a,t} + PersonalAccount_{a,t} & , \text{ if } a_0 \leq a \leq t - 1998 + a_0 \end{cases}$$

$$SocialAccount = \frac{1}{2} \overline{W}_{t-1} (1 + Zindex) N_1 \% S_{a,r} \left( \frac{1+g}{1+d} \right)^{r-a} \sum_{n>r}^T S_{r,n} \left( \frac{1+g}{1+d} \right)^{n-r}$$

$$TransitionAccount = M_T N \overline{W}_{t-1} \frac{1}{N_2} \sum_{i=1}^N \frac{w_i}{\overline{W}_i} S_{a,r} \left( \frac{1+g}{1+d} \right)^{r-a} \sum_{n>r}^T S_{r,n} \left( \frac{1+g}{1+d} \right)^{n-r}$$

$$PersonalAccount_{a,t} = \left( \frac{1}{1+d} \right)^{r-a} \frac{8\% * w_a}{M_P} \left[ \sum_{m=a_0}^{a-1} \frac{(1+R)^{r-j}}{(1+g')^{a-j}} + \sum_{m=a}^{r-1} S_{a,m} (1+g')^{m-a} (1+R)^{r-m} \right] \sum_{n=r}^T S_{r,n} \left( \frac{1+g''}{1+d} \right)^{n-r}$$



## ● Public Pension

$$PublicPension = \theta w_{t-1} S_{a,r} \left( \frac{1+g'}{1+d} \right)^{r-a} \sum_{n>r}^T \left( \frac{1+g}{1+d} \right)^{n-r}$$

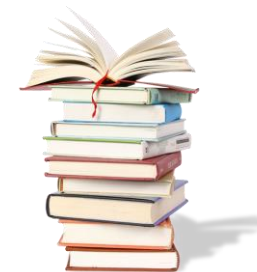
## ● Resident Pension

$$BasicAccount_{a,t} = Pay_{t_0} (1+g'')^{t-t_0} S_{a,r} \left[ \frac{1+g''}{1+d} \right]^{r-a} \sum_{n=r}^T S_{r,n} \left[ \frac{1+g''}{1+d} \right]^{n-r}$$

$$ResidentAccount_{a,t} = \left( \frac{1}{1+d} \right)^{r-a} \frac{G+C_t}{M} \left[ \sum_{m=a_0}^{a-1} \frac{(1+R)^{r-m}}{(1+g')^{a-m}} + \sum_{m=a}^{r-1} S_{a,m} (1+g')^{m-a} (1+R)^{r-m} \right] \sum_{n=r}^T S_{r,n} \left( \frac{1+g''}{1+d} \right)^{n-r}$$

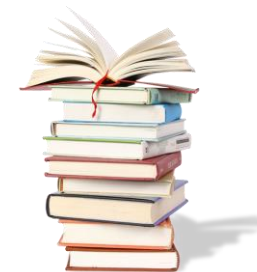
$$C_s = (G+C_t) [15 - (r-a)]$$

$$ResidentPension_i = BasicAccount_{a,t} + ResidentAccount_{a,t} + C_s$$



## ● Distribution of pension wealth under different pension systems

Groups	Obs	g=4%	g=4%	g=5%	g=5%
		d=4%	d=3%	d=4%	d=6%
Total pension wealth	33547	27.7	44.0	43.9	24.3
Enterprise pension		29.4	49.7	49.5	27.2
Social Account	19300	19.9	27.7	27.6	14.6
Transition Account		3.1	4.8	4.8	3.0
Personal Account		6.4	17.2	17.1	9.6
Public sector pension	4645	63.7	87.0	86.7	47.6
Resident pension	9602	6.7	11.9	11.9	7.4



## ● Distribution of pension wealth by individual characteristics

Groups		Obs	g=4% d=4%	g=4% d=3%	g=5% d=4%	g=5% d=6%
Gender	Male	17748	29.9	45.1	44.9	24.8
	Female	15799	25.2	42.9	42.7	23.9
Education	Junior high school or below	10369	11.5	18.4	18.4	11.3
	High school	13934	25.1	39.4	39.3	22.2
	Bachelor or above	9244	49.7	79.7	79.4	42.1
Age	20-30	5446	30.2	56.4	56.2	25.3
	30-40	10874	31.0	49.9	49.7	25.8
	40-50	13426	27.1	38.9	38.8	24.1
	50-60	3801	16.6	27.5	27.4	19.7



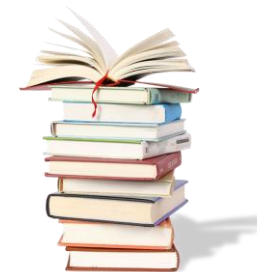


# Empirical Results

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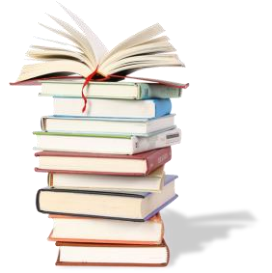
## **Part 5**

## ● Summary statistics



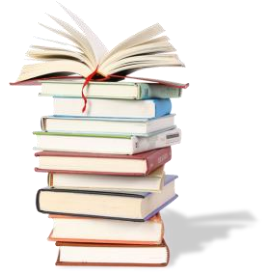
VarName	Obs	Mean	SD	Median	Min	Max
Stock and fund participation	18867	0.24	0.43	0	0	1
Risk assets participation	18867	0.34	0.47	0	0	1
Stock and fund ratio	18867	0.08	0.21	0	0	0.94
Risk assets ratio	18867	0.14	0.27	0	0	0.98
Marriage	18867	0.84	0.36	1	0	1
Age group	18867	2.11	0.90	2	1	4
Education level	18867	2.00	0.76	2	1	3
Medical expenditure	18867	0.28	0.59	0.08	0	4
Household size	18867	3.30	1.26	3	1	20
Household income	18867	11.61	13.01	7.83	0	83.41
Net household wealth	18867	130.87	193.10	62.28	0	1170.54
Public	18867	0.14	0.35	0	0	1
Risk aversion	18867	0.62	0.48	1	0	1
Province	18867	14.47	8.07	14	1	29

## ● The effects of pension wealth on portfolio choice

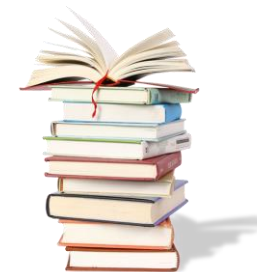


	Probit		Tobit	
	(1)	(2)	(3)	(4)
	Stock and fund participation	Risk assets participation	Stock and fund ratio	Risk assets ratio
Pension wealth	0.0015*** (0.000)	0.0014*** (0.000)	0.0007*** (0.000)	0.0006*** (0.000)
Control variable	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Obs	18867	18867	18867	18867
Pse.R2	0.167	0.181	0.140	0.161

## ● Heterogeneity of pension wealth across different pension systems



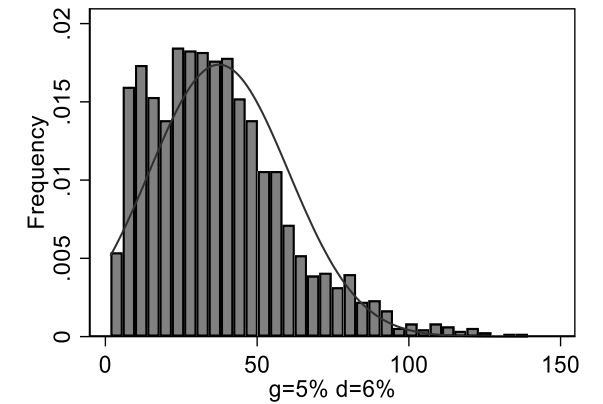
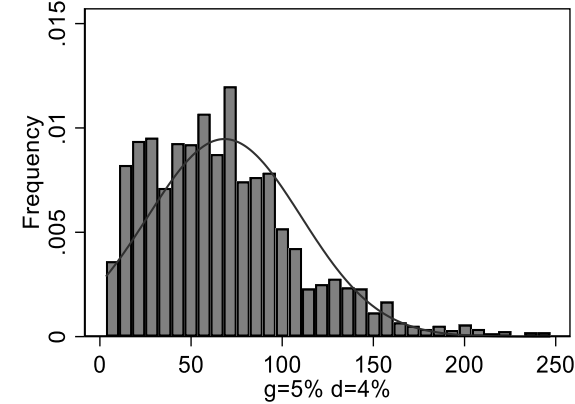
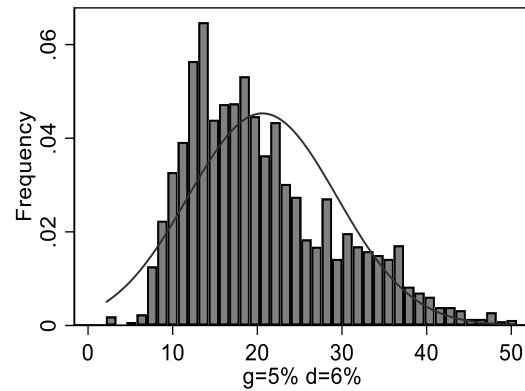
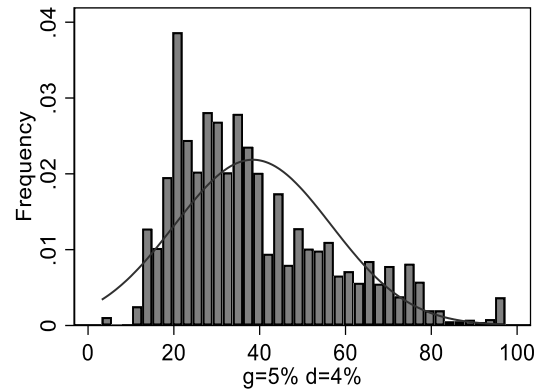
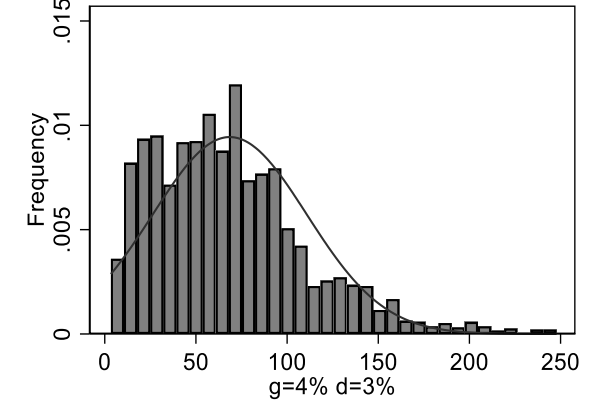
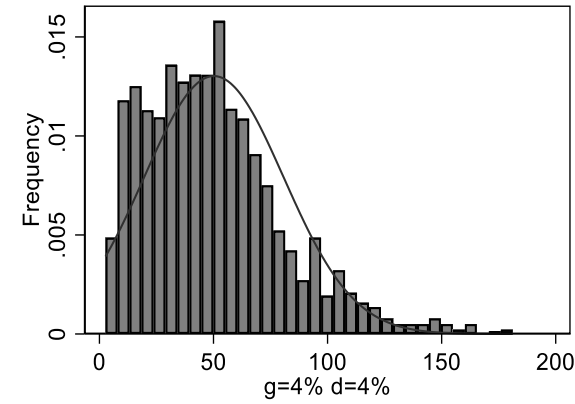
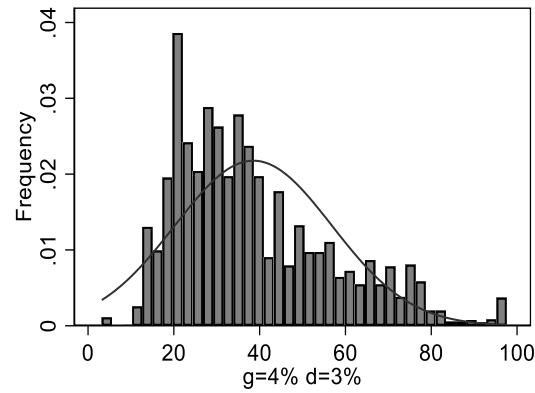
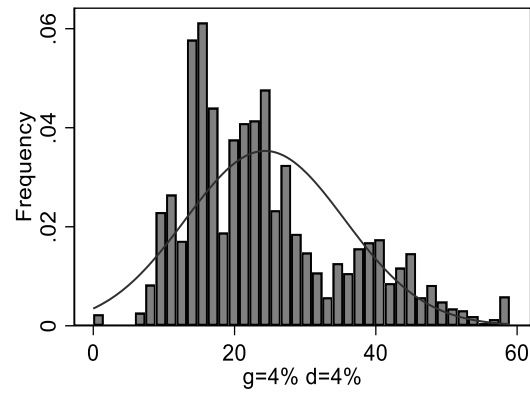
	(1)	(2)	(3)	(4)	(5)
	Stock and fund participation	Risk assets participation	Stock and fund ratio	Risk assets ratio	Risk aversion
PensionWealth*Public	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	0.001*** (0.000)
Pension Wealth	0.002*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	-0.001*** (0.000)
Public	0.172*** (0.047)	0.028 (0.047)	0.142*** (0.027)	0.041* (0.023)	-0.228*** (0.043)
Control variable	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Obs	18867	18867	18867	18867	18867
Pse.R2	0.166	0.182	0.137	0.160	0.079



## ● Differences in pension wealth and risk aversion

Variables	Non-public	Mean	Public	Mean	MeanDiff
PensionWealth g=4%/d=4%	16204	56.5	2663	141.6	-85.1***
PensionWealth g=4%/d=3%	16204	92.0	2663	200.7	-108.7***
PensionWealth g=5%/d=4%	16204	91.7	2663	200.1	-108.4***
PensionWealth g=5%/d=6%	16204	50.9	2663	111.2	-60.3***
Risk Aversion	16204	0.640	2663	0.510	0.13***

# ● Distribution of the pension wealth of Non-public and public sector households



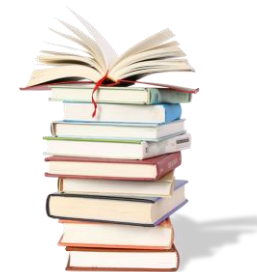


# Robustness of Empirical Results

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## **Part 6**

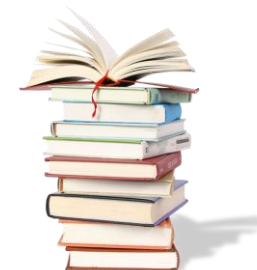
# ● Sensitivity analysis



	Probit		Tobit	
	(1)	(2)	(3)	(4)
	Stock and fund participation	Risk assets participation	Stock and fund ratio	Risk assets ratio
g=4%,d=3%				
Pension Wealth	0.0005*** (0.000)	0.0005*** (0.000)	0.0002*** (0.000)	0.0002*** (0.000)
Control Variable	Yes	Yes	Yes	Yes
Obs	18867	18867	18867	18867
Pse.R <sup>2</sup>	0.157	0.175	0.138	0.156
g=5%,d=4%				
Pension Wealth	0.0005*** (0.000)	0.0005*** (0.000)	0.0002*** (0.000)	0.0002*** (0.000)
Control Variable	Yes	Yes	Yes	Yes
Obs	18867	18867	18867	18867
Pse.R <sup>2</sup>	0.157	0.175	0.138	0.156
g=5%,d=6%				
Pension Wealth	0.0011*** (0.000)	0.0010*** (0.000)	0.0005*** (0.000)	0.0005*** (0.000)
Control Variable	Yes	Yes	Yes	Yes
Obs	18867	18867	18867	18867
Pse.R <sup>2</sup>	0.157	0.175	0.138	0.156



## ● IV for pension wealth



	IV-Probit		IV-Tobit	
	(1)	(2)	(3)	(4)
	Stock and fund participation	Risk assets participation	Stock and fund ratio	Risk assets ratio
Pension Wealth	0.0077*	0.0129***	0.0075**	0.0038*
IV: Age*Province	(0.005)	(0.005)	(0.003)	(0.002)
Control Variable	Yes	Yes	Yes	Yes
Obs	18867	18867	18867	18867
Wald Test	3.51*	10.83***	6.87	3.44*
First stage F	716***	716***	716***	716***

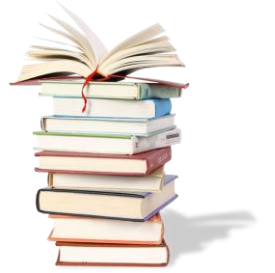


# Conclusion

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## **Part 7**

# Conclusion



- the more pension wealth a household has, the higher its participation in and holding of risk assets are
- Pension wealth has a stronger effect on non-public sector households when compared to public sector households.
- pension wealth affects a household's portfolio through changes in the household's risk aversion.

# Q&A

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