Risky and non-risky financial investments and cognition:

How old age cognitive deterioration affects financial decision making

Nicolau Martin Bassols

David Johnston, Sonja C. de New, Michael Shields

Centre for Health Economics, Monash University

nicolau.martinbassols@monash.edu

Introduction

Context

- Age related cognitive deterioration is one of the biggest global problems
  $\Rightarrow$ Only in the UK 850,000 individuals suffer dementia in 2019, predicted to raise to 1,5M by 2040 – Alzheimer's Society (2020)
- Cognitive deterioration can affect financial decision making and lead to sub-optimal investments $\rightarrow$ Financial deprivation at older age
  $\Rightarrow$ In the UK average female is predicted to outlive her savings in 12.6 years and the average male in 10.3 years (Amishi and Han, 2019)

Research questions

1. Do risky and non-risky financial investments differ due to cognition?
2. Do risky and non-risky financial investments differ due to changes in cognition at old age?
3. Do reactions to stock market fluctuations in terms of changes in risky and non-risky financial investments differ due to cognition?

Theoretical background

Assumptions risky assets and cognition - *Christelis et al. (2010)*

1. *Myopic loss aversion* related to low levels of cognition
2. *Participation cost* negatively correlated with cognitive ability

Extended life cycle model - *Fagereng et al. (2017)*

1. Market participation and portfolio choice

$$E \sum_{a=T^b}^{T} \delta^a \left(\prod_{j=0}^{a-1} p_j\right) U(c_{i,a}, \gamma(cog_{i,a})) \tag{1}$$

$\Rightarrow$ *Myopic risk aversion* $\gamma(cog_{i,a}) \rightarrow$ Degree of risk aversion

2. Households optimization problem

$$\begin{aligned} c_{i,a} + \omega_{i,a+1}(s_{i,a+1} + q(cog_{i,a})) + b_{i,a+1} = \\ w_{i,a} + (1 + r_a)\omega_{i,a} s_{i,a} + (1 + r_f) b_{i,a} \end{aligned} \tag{2}$$

$\Rightarrow$ *Participation cost* $q(cog_{i,a})$

Literature Review

1. Cognition and financial investments – Banks and Oldfiled (2007), Delavande et al. (2008), Christelis et al. (2011)
2. Effect of cognitive deterioration on financial investments – Bogan and Fertig (2013), Pak and Babiars (2018)
3. Differences in reactions to stock market fluctuations due to cognition Browning and Falke (2015)

Contributions

- Risky and non-risky financial investments
- Non-linear effect of cognition
- UK scenario – not considered so far
- Continuous fluctuation of stock market, not shocks
- Correct for cohort effects, misreports of financial investments

Motivation

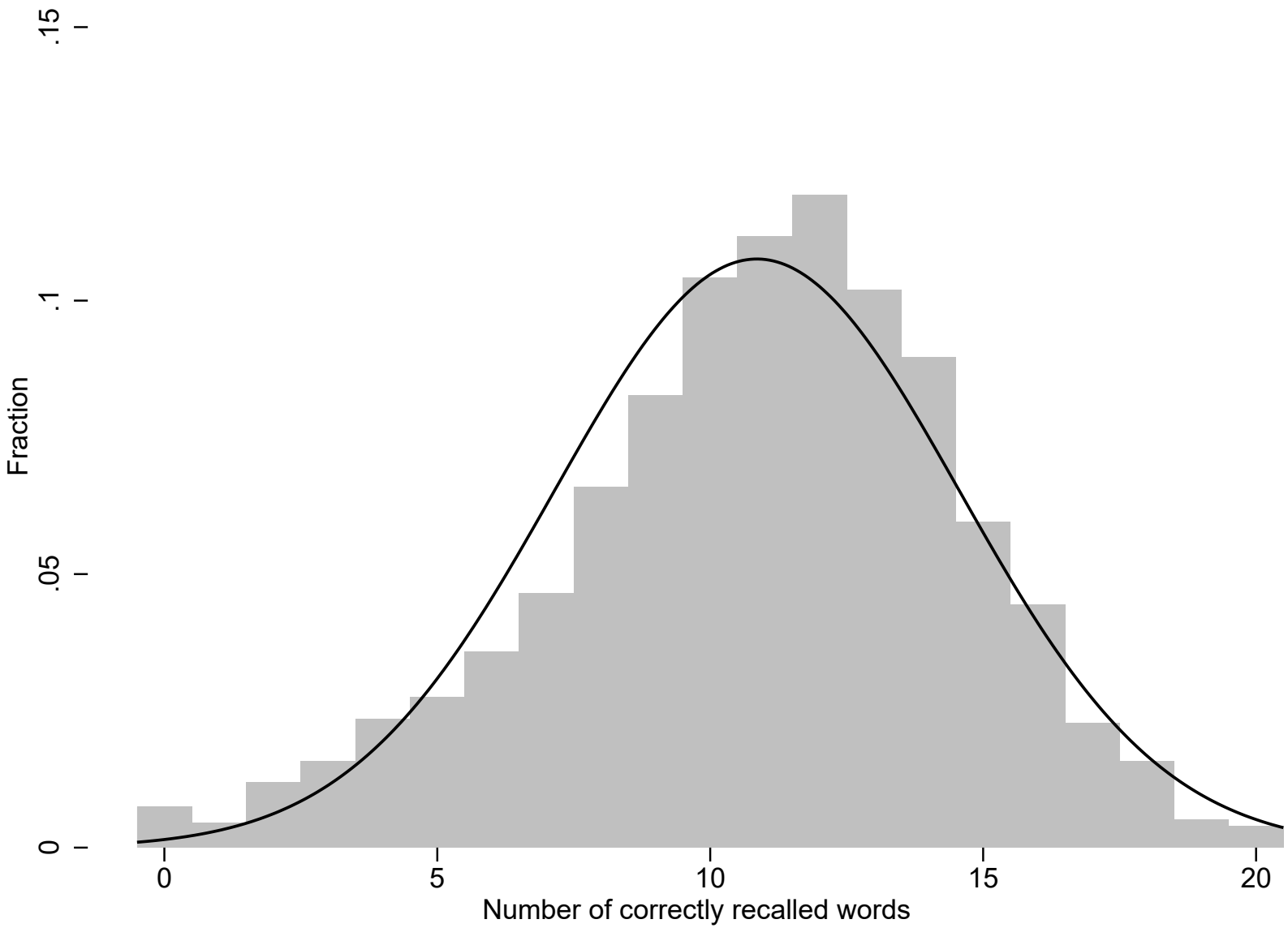
"A useful next step for this literature would be to examine how portfolio allocation is affected by cognitive decline." – Chandra et al. (2020)

Data

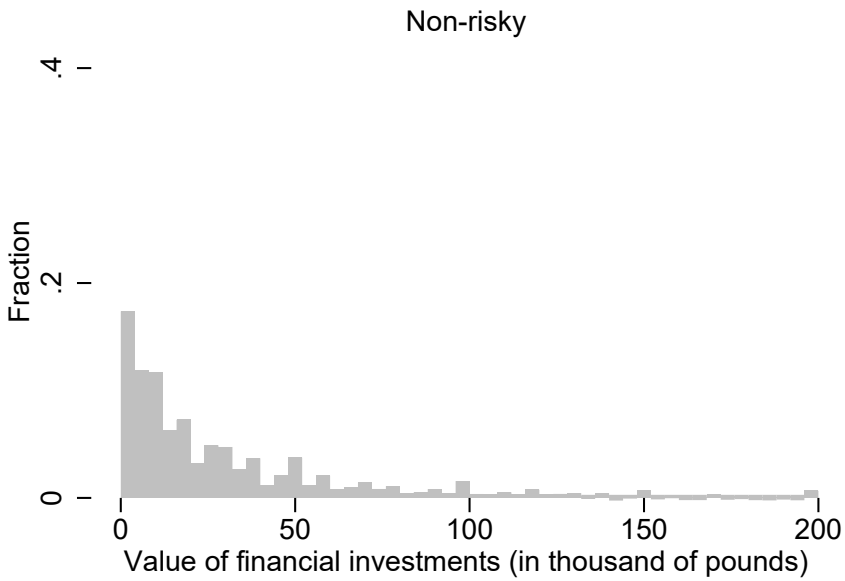
English Longitudinal Study of Ageing (ELSA)

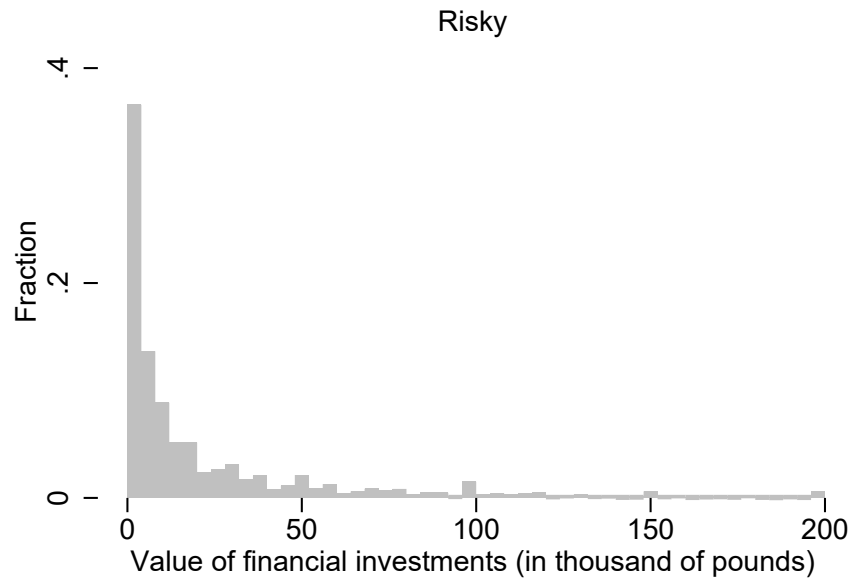
- Longitudinal ongoing study including large sample of UK adults (50+ & spouse regardless of age) $\rightarrow$ Individuals age 40 to 89
- Information regarding cognitive status of individuals each wave $\rightarrow$ 10 words immediate and delayed memory recall
  - Continuous cognition (0-20 correct answers)
  - Categorical cognition $\rightarrow$ Low cognition (0-5 correct answers), medium cognition (6-14), high cognition (15-20)
- Detailed information wealth and finances
  - Risky & non-risky financial investments
  - Extensive (0,1) and intensive (continuous) margin

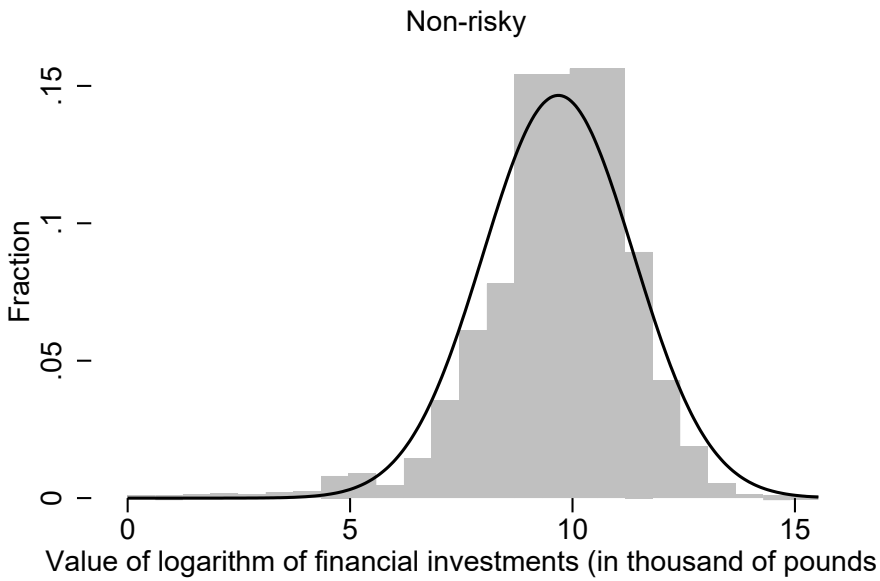
Distribution cognition

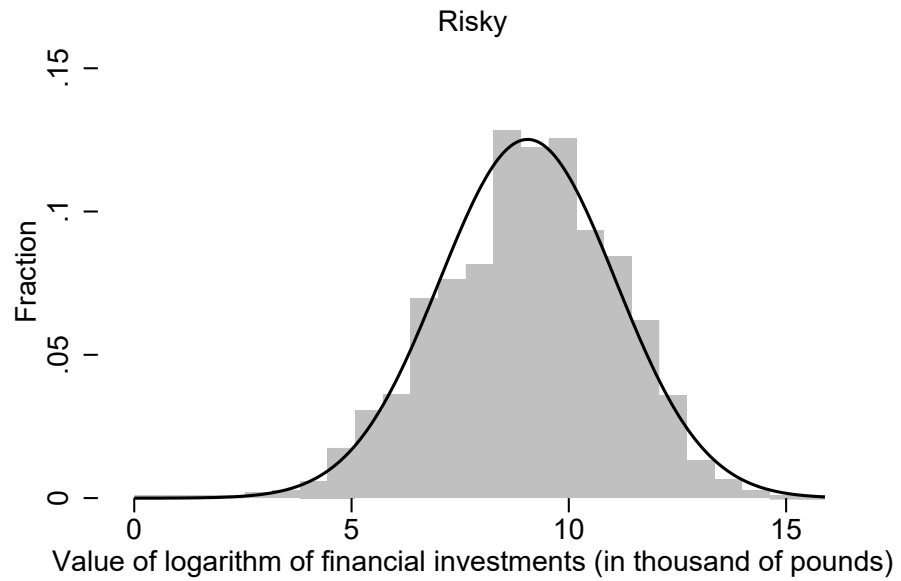


Financial investments outcomes

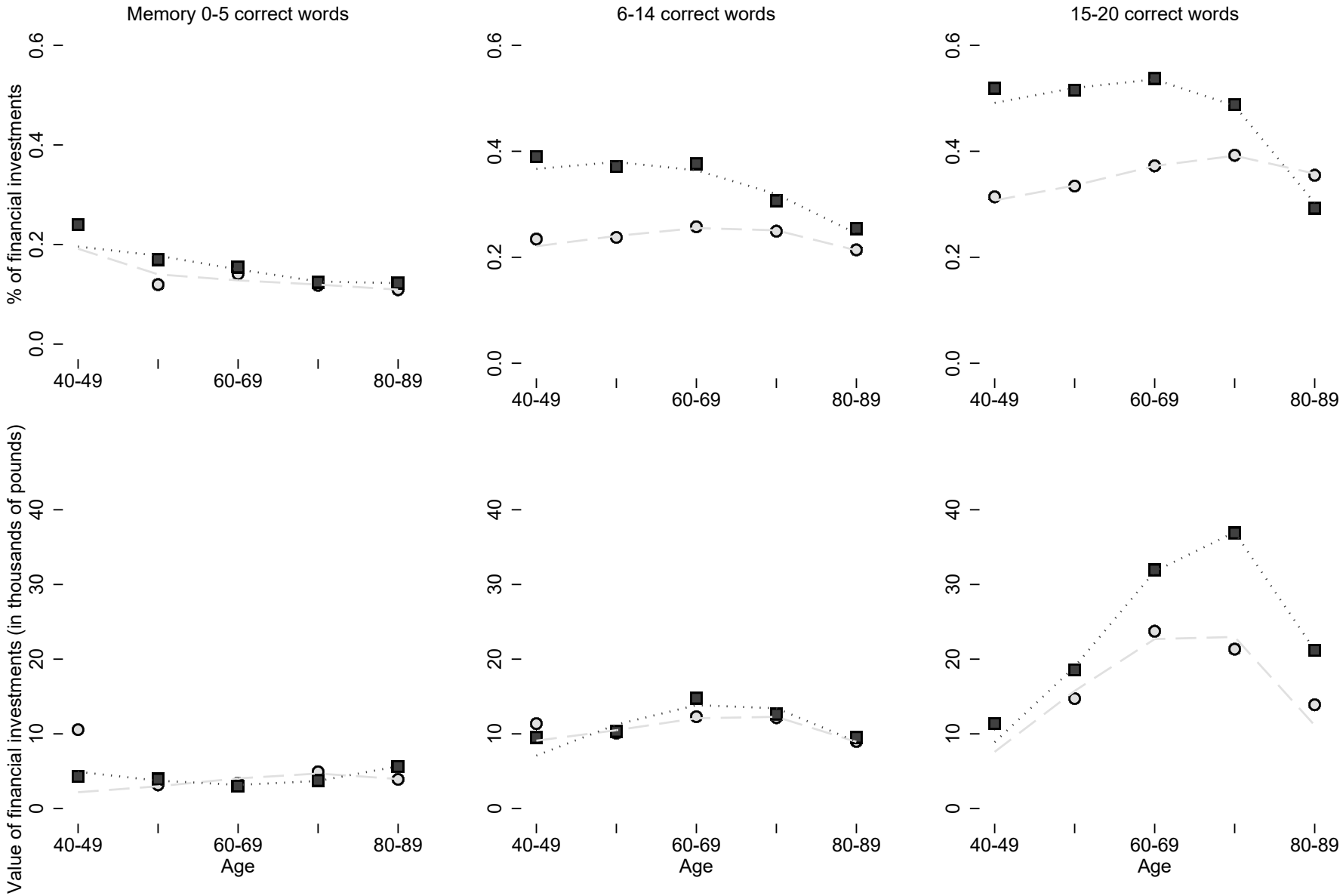








Descriptives



Methodology

$$Y_h = \beta_0 + \beta_1 Mem_h + \beta_2 X'_h + \epsilon_h \tag{1}$$

$$Y_{ht} = \alpha_i + \beta_1 Mem_{ht} + \beta_3 X'_{ht} + \epsilon_{ht} \tag{2}$$

$$\begin{aligned} Y_h = \beta_0 + \beta_1 Mem_h + \beta_2 ln(FTSE)_h + \beta_3 Mem_h * ln(FTSE)_h \\ + \beta_4 X'_h + \beta_5 X'_h * ln(FTSE)_h + \epsilon_h \end{aligned} \tag{3}$$

- $Y \rightarrow$ Financial investments
- $Mem \rightarrow$ Cognition (continuous and categorical)
- $X' \rightarrow$ Control variables (demographics, time FE, education, wealth – *physical and housing wealth*, health – *life expectancy and every having experienced health conditions*)
- $ln(FTSE) \rightarrow$ Logarithm of the FTSE

Results - Cognition and financial investments

VARIABLES	(1)	(2)	(3)	(4)	(5)
Panel A - Holds non-risky financial investments (0, 1)					
Memory	0.019***	0.019***	0.012***	0.010***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Panel B - Logarithm of non-risky financial investments (continuous)					
Memory	0.057***	0.049***	0.025***	0.020**	0.020**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Panel C - Holds risky financial investments (0, 1)					
Memory	0.030***	0.024***	0.014***	0.010***	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Panel D - Logarithm of risky financial investments (continuous)					
Memory	0.088***	0.091***	0.060***	0.049***	0.047***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Demographics	NO	YES	YES	YES	YES
Time FE	NO	YES	YES	YES	YES
Education - Labour	NO	NO	YES	YES	YES
Wealth	NO	NO	NO	YES	YES
Health	NO	NO	NO	NO	YES

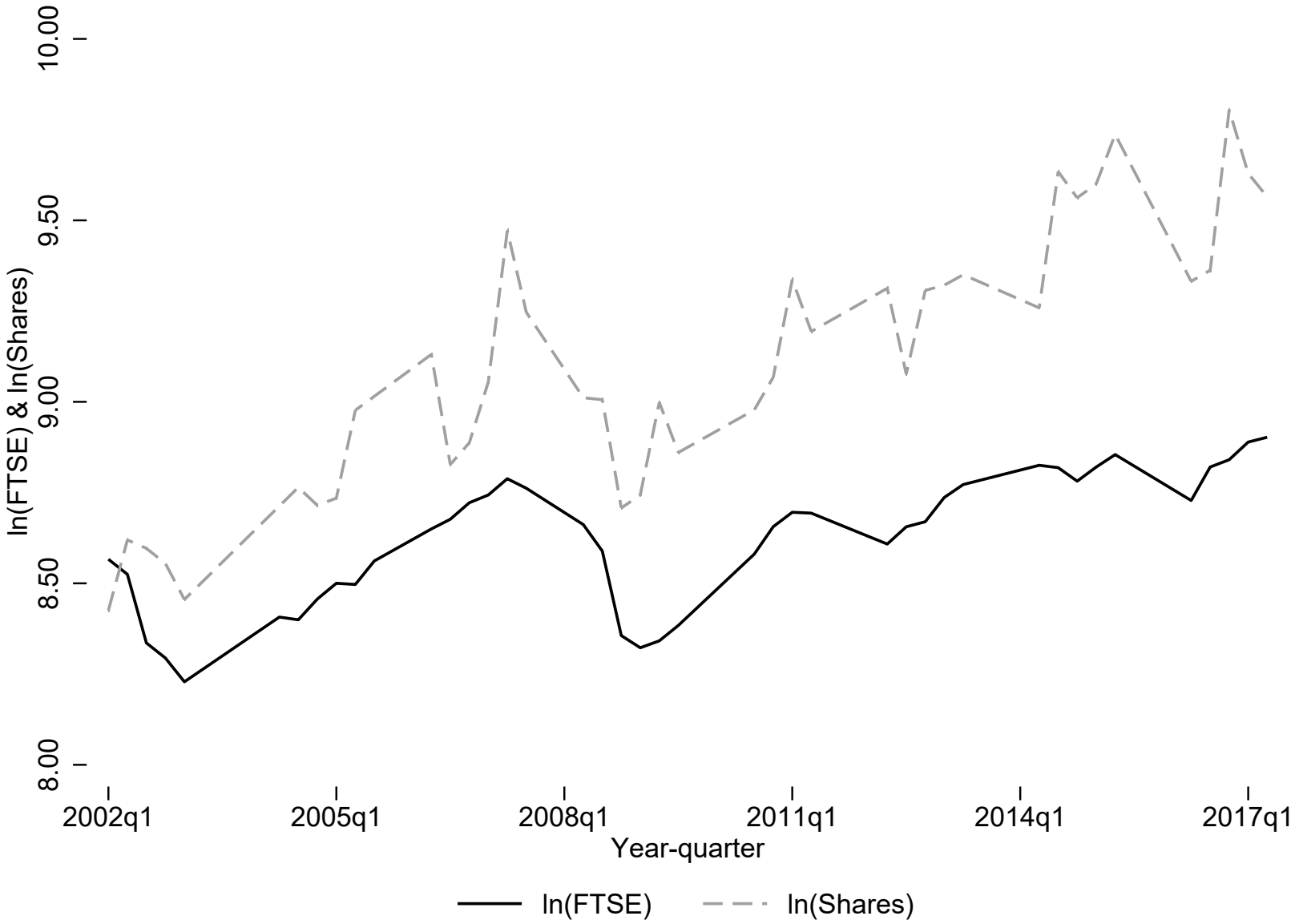
Results - Cognitive deterioration and financial investments

VARIABLES	(1) Holds non-risky financial investments (0,1)	(2) Logarithm of non-risky financial investments (continuous)	(3) Holds risky financial investments (0,1)	(4) Logarithm of risky financial investments (continuous)
Panel A				
Memory	0.001	0.003	0.001*	0.015
	(0.001)	(0.011)	(0.001)	(0.010)
Panel B				
Mem. 0-5 correct words	-0.007	0.157	-0.029***	-0.378**
	(0.010)	(0.179)	(0.009)	(0.174)
Mem. 6-14 correct words	-0.009	0.028	-0.013**	-0.057
	(0.007)	(0.061)	(0.006)	(0.058)
Mem. 15-20 correct words				
Baseline category				
Observations	54,152	7,374	54,152	8,676
Number of HHds	16,997	3,922	16,997	4,377
Mean waves HHd	3.186	1.880	3.186	1.982
HHds FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Mean outcome	0.306	9.764	0.369	9.054

Results - Cognitive deterioration and financial investments

VARIABLES	(1) Holds risky financial investments (0,1)	(2) Logarithm of risky financial investments (continuous)
Panel A - Age 40-64		
Memory	-0.000	-0.003
	(0.001)	(0.016)
Panel B - Age 40-64		
Mem. 0-5 correct words	0.024	-0.306
	(0.017)	(0.497)
Mem. 6-14 correct words	-0.011	-0.049
	(0.008)	(0.079)
Mem. 15-20 correct words - Baseline category		
Panel C - Age 65-89		
Memory	0.002**	0.027*
	(0.001)	(0.014)
Panel D - Age 65-89		
Mem. 0-5 correct words	0.004	-0.403**
	(0.015)	(0.204)
Mem. 6-14 correct words	-0.002	-0.049
	(0.012)	(0.090)
Mem. 15-20 correct words - Baseline category		
Controls	YES	YES
HHds FE	YES	YES

Results - Reactions stock market fluctuations



Results - Reactions stock market fluctuations

	(1)	(2)	(3)
Panel A - Holds risky financial investments (0, 1)			
Memory	0.009***	0.009***	0.009***
	(0.001)	(0.001)	(0.001)
ln(FTSE) - Avg. 3 months (Demeaned)	0.051	0.051	-0.180*
	(0.043)	(0.043)	(0.105)
ln(FTSE) - Avg. 3 months (Demeaned) * Mem. - (Demeaned)		-0.009***	-0.005
		(0.003)	(0.003)
Panel B - Logarithm of risky financial investments (continuous)			
Memory	0.046***	0.046***	0.044
	(0.009)	(0.009)	(0.009)
ln(FTSE) - Avg. 3 months (Demeaned)	1.011**	1.005**	-2.940**
	(0.471)	(0.475)	(1.290)
ln(FTSE) - Avg. 3 months (Demeaned) * Mem. - (Demeaned)		0.006	0.068
		(0.044)	(0.047)
Controls	YES	YES	YES
ln(FTSE)*W'	NO	NO	YES

Discussion

- Rational for individuals to disinvest risky financial investments when suffering cognitive decline $\Rightarrow$ Rational not necessary optimal
- *Kim et al. (2019)* $\Rightarrow$ Cognition strongly improves the quality of financial advice. More cognitively able seek financial help from professionals, not family members or "free" financial advice
- Solution: Provide specialized assessment to elderly individuals when suffering cognitive deterioration for managing their financial investments $\Rightarrow$ Rebalance their risky and non-risky financial investments

Thanks! Questions?