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# Financial Knowledge and Financial Literacy at the Household Level

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# Aim: To Learn More About the Relation of Cognition and Numeracy to Financial Knowledge, and How Each Affects Retirement Wealth.

- Some questions and a few surprising answers.
  - Is knowledge of pensions influenced by pension wealth? YES
  - Is knowledge of pensions and Social Security influenced by cognition, and especially numeracy? NO
  - Does knowledge of pensions influence *retirement saving outside of pensions and Social Security*? NO
  - Is the relationship between numeracy and *wealth held outside of pensions and Social Security* influenced by pension knowledge? NO

# Procedure

- Construct measures of pension knowledge, cognition and wealth from HRS data.
- Analyze the relation of measures of knowledge of pensions and Social Security to measures of cognition, especially numeracy.
- Analyze the relation of measures of knowledge of pensions and Social Security, and cognition, to retirement wealth.

# Relevant Previous Empirical Findings

- Greater numeracy is associated with increased wealth held outside of pensions and Social Security.
  - (Lusardi and Mitchell, 2006; Banks and Oldfield, 2007; McArdle, Smith and Willis, 2009).
- Pensions are not a substitute for other types of retirement wealth. Most with pensions do not reduce saving in other forms due to pension coverage or as pension values increase.
  - (Cagan, 1965; Katona, 1965; Gustman and Steinmeier, 1999)

# Pension Wealth, Pension Knowledge, and Wealth Outside of Pensions

- Cagan and Katona suggest that pensions teach covered workers the need for retirement saving.
  - This is their explanation of why wealth outside of pensions is not reduced as the value of pensions increases, income constant.
- Causation likely runs from pension wealth to pension knowledge, not the other way around.
  - 2/3's of pension wealth of those in their early and mid-fifties is in defined benefit plans, which are not affected by saving behavior of covered workers.
  - A history of changing DB plans, and wage premia paid to those with pensions, reduce the likelihood early boomers chose their jobs because of pensions.

# Our Expectations

- Knowledge of pensions and Social Security should influence other forms of retirement wealth of those approaching retirement age.
  - Pensions and Social Security account for 1/2 their wealth.
- With numeracy influencing wealth outside of pensions, and pension knowledge influencing wealth outside of pensions, we would expect to find important interactions between numeracy and pension knowledge in shaping retirement wealth.

# Data: Early Boomer Cohort of the Health and Retirement Study

- Members of couple households with at least one respondent ages 51 to 56 in 2004.
- Household wealth with and without pensions and Social Security
- Observations are for respondents. Household wealth is attributed to individuals.

# Measures of Cognition

- Numeracy: sum of the number of correct answers
  - Take 10 percent of a thousand.
  - Calculate one fifth of two million.
  - Ten percent interest compounded over two years.
  - Numeracy ranges from 0 to 3.
- TICS (Telephone Interview of Intact Cognitive Status) questions.
  - Serially subtract 7 from 100
  - Count backward (from 20 to 1).
  - The range for TICS is from 0 to 7.
- Word Recall: recall of a list of words
  - Sum of correct answers to immediate and delayed word recalls.
  - Ranges between 0 and 10.



# Measures of Pension and Social Security Knowledge

- **Indicators of Plan Type**

- R says DK plan type.
- R & firm agree: on all plan types; plan is DB; plan is DC.
- R and firm disagree in specified ways.

- **Indicators of Retirement Age**

- R says DK for: ER age for DB; ER age for DC; NR age for DB.
- R and Firm agree on ER age; agree on NR age.

- **Indicators of Plan Value**

- R says DK for DB value at: normal retirement age; expected retirement age.
- R and Firm agree on expected DB benefits.
- R says DK- DC balances; with or w/o brackets.
- R says DK- SS benefits at ER age; at NR age.

# Notes

- Subsamples of the population used for analysis vary with the measure of pension or Social Security knowledge being analyzed.
  - E.g., when investigating knowledge of the account balance in a DC plan, the sample is limited to those with a DC pension.
- Main findings are not affected by the differences in population base associated with different measures of pension and Social Security knowledge.
- Coefficients reported below are estimated with robust regression, and include covariates listed in the paper.

# Table 1: Marginal Effects of Numeracy on Pension & SS Knowledge

Red = incorrect sign; Green = correct sign and significant

Dependent Variables	Numeracy	(absolute z)
<b>A. Indicators of Plan Type</b>		
DK plan type	0.026	(2.31)
R & firm agree on all plan types	-0.039	(2.07)
R & firm agree plan is DB	0.010	(0.33)
R & firm agree plan is DC	-0.005	(0.16)
R reports DB & firm reports DC	0.006	(0.94)
R reports DC & firm reports DB	0.013	(1.15)
<b>B. Indicators of Retirement Age</b>		
DK- ER age for DB	-0.010	(0.65)
DK- NR age for DB	0.005	(0.52)
DK- ER age for DC	-0.011	(0.63)
R and Firm agree on ER age	0.071	(1.42)
R and Firm agree on NR age	-0.032	(0.66)
<b>C. Indicators of Plan Value</b>		
DK- NR benefits for DB	-0.018	(0.41)
DK- XP benefits for DB	-0.033	(0.43)
R and Firm agree on expected DB benefits	-0.017	(0.76)
DK- DC balances	-0.008	(0.20)
DK after brackets in DC balances	0.007	(1.25)
DK- SS benefits at ER age	0.019	(1.07)
DK- SS benefits at NR age	0.032	(1.80)

# Table 1: Marginal Effects of Pension Wealth on Pension Knowledge:

Red = incorrect sign; Green = correct sign and significant

Dependent Variables, Indicators of	Pension/ DB/DC Wealth	(absolute z)
<b>A. Plan Type</b>		
DK plan type	0.032	(1.44)
R & firm agree on all plan types	0.164	(2.92)
R & firm agree plan is DB	-0.025	(0.29)
R & firm agree plan is DC	-0.057	(0.48)
R reports DB & firm reports DC	-0.022	(1.36)
R reports DC & firm reports DB	-0.133	(2.96)
<b>B. Retirement Age</b>		
DK- ER age for DB	-0.062	(1.16)
DK- NR age for DB	-0.003	(0.10)
DK- ER age for DC	-0.197	(2.20)
R and Firm agree on ER age	0.448	(2.99)
R and Firm agree on NR age	0.177	(1.22)
<b>C. Plan Value</b>		
DK- NR benefits for DB	-0.284	(1.82)
DK- XP benefits for DB	-0.330	(1.44)
R and Firm agree on expected DB benefits	0.201	(4.31)
DK- DC balances	0.075	(0.77)
DK after brackets in DC balances	0.017	(1.41)
DK- SS benefits at ER age	0.068	(1.09)
DK- SS benefits at NR age	-0.009	(0.15)

## Table 2: Marginal Effects of Pension and Social Security Knowledge on Household Wealth, Excluding Pensions and Social Security

Measures of cognition not included in regression; pension knowledge included.

Independent Pension Knowledge Variables	Coefficient for Pension/SS Knowledge Variable	t- statistic
<b>A. Indicators of Plan Type</b>		
DK plan type	-24.88	(0.74)
R & firm agree on all plan types	14.97	(0.63)
R & firm agree plan is DB	25.95	(1.04)
<b>B. Indicators of Retirement Age</b>		
DK- ER age for DB	<b>67.62</b>	(2.53)
DK- NR age for DB	<b>48.57</b>	(1.60)
<b>C. Indicators of Plan Value</b>		
DK- NR benefits for DB	<b>46.67</b>	(2.14)
DK- XP benefits for DB	<b>26.74</b>	(0.92)
R and Firm agree on expected DB benefits	<b>-15.99</b>	(0.51)
DK- DC balances	-26.92	(1.04)
DK- SS benefits at ER age	<b>11.01</b>	(0.85)

## Table 2: Marginal Effects of Pension Wealth on Household Wealth (Excluding Pensions and Social Security)

Pension wealth included in regression, measures of cognition excluded.

Independent Pension Knowledge Variables	Coefficient for Pension Wealth Variable	t-statistic
<b>A. Indicators of Plan Type</b>		
DK plan type	0.226	(10.36)
R & firm agree on all plan types	0.180	(6.29)
R & firm agree plan is DB	0.139	(2.95)
<b>B. Indicators of Retirement Age</b>		
DK- ER age for DB	0.116	(2.91)
DK- NR age for DB	0.105	(2.66)
<b>C. Indicators of Plan Value</b>		
DK- NR benefits for DB	0.118	(2.93)
DK- XP benefits for DB	0.103	(2.60)
R and Firm agree on expected DB benefits	0.170	(2.95)
DK- DC balances	0.355	(10.77)
DK- SS benefits at ER age	0.248	(9.54)

## Table 3: Marginal Effects of Measures of Cognition and Current Pension on Household Wealth Excluding Pensions and Social Security

(Measures of financial knowledge not included in regressions)

Independent Variables	Coefficient on Cognition	t-statistic
<b>Financial R</b>		
TICS	-6.17	(1.49)
Word Recall	-9.45	(2.42)
Numeracy	26.54	(3.23)
<b>Non-Financial R</b>		
TICS	-4.04	(0.99)
Word Recall	11.45	(2.86)
Numeracy	15.56	(1.69)
<b>Covered Worker</b>		
Current Pension Wealth	0.139	(6.92)

**Table 4: Marginal Effects of Measures of Cognition on Household Wealth Excluding Pensions and Social Security**  
**Measures of pension knowledge included in regression.**

	(1)	(2)	(3)	(4)	(5)	(6)
<b>Financial R</b>						
TICS	-4.73 (0.77)	-8.18 (1.40)	-9.22 (1.57)	-9.36 (1.13)	-4.47 (0.81)	-7.89 (1.66)
Word Recall	0.41 (0.07)	-5.59 (1.01)	-5.05 (0.91)	10.26 (1.23)	-11.93 (2.34)	-9.79 (2.21)
Numeracy	26.37 (2.11)	29.91 (2.54)	31.64 (2.68)	19.55 (1.09)	33.50 (3.21)	30.94 (3.34)
<b>Non-Financial R</b>						
TICS	-3.51 (0.56)	-6.41 (1.15)	-7.15 (1.27)	-0.37 (0.04)	-6.54 (1.19)	-4.49 (0.98)
Word Recall	9.23 (1.56)	14.16 (2.55)	14.78 (2.65)	9.37 (1.12)	10.16 (1.92)	11.06 (2.53)
Numeracy	29.07 (2.11)	7.91 (0.62)	8.68 (0.68)	36.34 (1.95)	22.06 (1.85)	16.69 (1.65)
<b>Current pension/DB/DC wealth</b>	0.120 (4.34)	0.049 (1.37)	0.045 (1.26)	0.107 (1.92)	0.251 (7.96)	0.156 (6.39)



# Table 4: Marginal Effects of Pension Knowledge on Household Wealth Excluding Pensions and Social Security

Cognition and pension wealth included in regression.

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
DK-Plan Type	-20.88 (0.40)	-	-	-	-	-
R and Firm Agree on All Plan Types (Wider Restriction)	10.52 (0.40)	-	-	-	-	-
R and Firm Agree Plan is DB	10.07 (0.42)	-	-	-	-	-
DK-ER Age for DB	-	36.80 (1.52)	-	-	-	-
DK- expected DB benefit	-	-	62.66 (1.46)	-	-	-
R & firm agree on expected DB benefits	-	-	-	-28.80 (0.95)	-	-
DK-DC Balances	-	-	-	-	-64.44 (1.79)	-
DK-ER Age for DC Plan	-	-	-	-	-21.42 (1.14)	-
DK- SS Ben at ER age	-	-	-	-	-	7.64 (0.50)
DK- SS Ben at NR age	-	-	-	-	-	-3.39 (0.21)

# *Findings*

- The more valuable the pension, the more knowledgeable are covered workers about their pensions.
  - Causality is more likely to run from pension wealth to pension knowledge than the other way around.
- Most measures of cognitive ability, including numeracy, are not significant determinants of pension and Social Security knowledge.
- Standardizing for incomes and other factors, a pension of higher value does not substitute for other forms of wealth.
  - Counting pensions in total wealth, those with more valuable pensions save more for retirement, *ceteris paribus*.
- There is no evidence that wealth held outside of pensions is related to knowledge of pensions.
- Numeracy does not influence wealth in whole or in part by affecting financial knowledge of one's pension plan, where financial knowledge of the pension then influences other decisions about retirement saving.

# ***Questions Raised by Our Findings***

- Those with pensions accumulate higher retirement wealth because higher pension wealth does not substitute for nonpension saving. So why doesn't knowledge of pensions and Social Security influence retirement saving?
- Why isn't greater numeracy associated with increased knowledge of pensions and Social Security?
- What is the channel through which numeracy affects wealth accumulated for retirement, income constant? What calculations or behavior does numeracy affect that are not ultimately reflected in pension or Social Security knowledge?
- Without further information on how numeracy affects wealth, how best can we use the apparently robust numeracy-wealth relation in designing policies that are aimed at increasing retirement saving?

# Additional Slides

## Appendix Table 2: Descriptive Data Regarding Pension Coverage and Pension Knowledge, Couple Households, Health and Retirement Study, Early Boomer Cohort, in 2004

	All	Males	Females
Part A: Indicators of Employment, Coverage, Plan Type, Matched Employer and Social Security Data			
Total	3418	1708	1710
Number Employed	2510	1325	1185
% Employed	73	78	69
Number Reporting Current Pension	1520	801	719
Percent Reporting Current Pension	61	60	61
Number Reporting Matched Employer Pension	639	280	359
Percent Reporting Matched Employer Pension	42	35	50
Percent (of R with current pension) Reporting DB/comb	49	50	48
Percent (of R with current pension) Reporting DC/comb	71	73	68
Number with Matched Social Security Data	2068	1029	1039
Percent with Matched Social Security Data	61	60	61
Number Expecting Social Security benefit	2647	1292	1355
Percent Expecting Social Security benefit	77	76	79

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	All	Males	Females
Part B: Indicators of Pension Knowledge			
Percent (of R with current pension) Reporting DK Plan Type	3	2	3
Number Firm and Respondent Report of Plan Type Agree ((broader restriction)	565	248	318
Percent (of R with matched pension) Firm and Respondent Report of Plan Type Agree (broader restriction)	90	89	89
Number Firm and Respondent Report of Plan Type Agree (narrower restriction)	170	68	102
Percent (with matched pension) Firm and Respondent Report of Plan Type Agree (narrower restriction)	27	24	28
Percent (of R with matched pension) Reporting DB/comb with Matched DB/comb	58	59	56
Percent (of R with matched pension) Reporting DC/comb with Matched DC/comb	49	48	48

## Appendix Table 2: Descriptive Data Regarding Pension Coverage and Pension Knowledge, Couple Households, Health and Retirement Study, Early Boomer Cohort, in 2004

	All	Males	Females
Percent with DB/comb Reporting DK on Early Retirement Age	9	7	12
Percent with Matched DB/comb Agreeing on Early Retirement Age (On Diagonal)	41	45	37
Percent with DB/comb Reporting DK on Normal Retirement Age	7	5	10
Percent with Matched DB/Comb Agreeing on Normal Retirement Age (On Diagonal)	34	37	32
Percent (of R with DB/comb) with DB Reporting DK on Expected Retirement Age	5	4	7
Percent (of R with DB/comb) Reporting DK on Normal Retirement Benefits*	42	34	52
Percent with DB/Comb Reporting DK on Expected Retirement Benefits**	40	31	51
Percent with Matched DB Agreeing on Benefits at Expected Retirement Age (On Diagonal)***	18	20	16
Percent (of R with DC/comb) Reporting DK on Early Retirement Age	13	10	18
Percent (of R with DC/comb) Answering DK on Account Balance	34	30	39
Percent (of R with DC/comb) Answering DK after Brackets on Account Balance	11	10	12

Appendix Table 2: Descriptive Data Regarding Pension Coverage and Pension Knowledge, Couple Households, Health and Retirement Study, Early Boomer Cohort, in 2004

	All	Males	Females
Part C: Indicators of Social Security Knowledge			
Percent (R expecting SS benefits) Reporting DK on Early Retirement Benefit****	37	28	45
Percent (R expecting SS benefits) Reporting DK on Normal Retirement Benefit****	32	23	40



# Measures of Cognition

- Numeracy
  - The measure of numeracy is the sum of the number of correct answers to three questions, asking for calculations involving compound interest, fractions and probability. One question asks for the calculation of how many people out of 1000 would be sick if there were a ten percent chance of contracting a disease. Second, if there were five winners of a lottery offering a \$2 million prize, what will each receive? Third, with \$200 in a saving account earning 10 percent interest per year, what will be in the account at the end of two years? Numeracy ranges from 1 to 3.
- TICS
  - Two “TICS” (Telephone Interview of Intact Cognitive Status) questions are used here. They rate a person’s ability to serially subtract 7 from 100, and to count backward (from 20 to 1). Backward counting equals 2 if the respondent could correctly count at the first try. Otherwise it equals zero. The Series 7 value is the sum of correct answers to any of the questions in the series. The range for TICS is from 0 to 7.
- Word Recall
  - Word recall refers to an individual’s recall of a list of words, using the average of the sum of correct answers to the immediate and delayed word recalls. It ranges between 0 and 10.