WEALTH, FINANCIAL LITERACY AND BEHAVIORAL BIASES IN JAPAN: THE EFFECT OF VARIOUS TYPES OF FINANCIAL LITERACY

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INTRODUCTION

- A growing literature documents that measured financial literacy levels around the world are alarmingly low, even in economically advanced countries (Bucher-Koenen, Lusardi, Alessie and van-Rooij, 2014).
- With life expectancy increasing globally, the responsibility of accumulating sufficient savings for retirement shifting from employers to employees, and the increasing sophistication and complexity of financial products, these low levels of financial literacy may lead to significantly lower levels of well-being via poor economic decisions.

LITERATURE REVIEW

- Burgeoning research on the measurement of financial literacy and its effects on household financial behavior.
  - van Rooij, Lusardi and Alessie (*JFE*, 2011) show that people with low financial literacy are much less likely to participate in the stock market.
  - van Rooij, Lusardi and Alessie (*Economic Journal*, 2012) document a positive relationship between financial literacy and household wealth.
  - Anderson, Baker and Robinson (*JFE*, 2017) show that financial literacy is positively related to financial planning and precautionary saving, with *perceived* financial literacy being more important than actual financial literacy.

LITERATURE REVIEW(CONT'D)

- Van Rooij, Lusardi & Alessie (*Economic Journal*, 2012) highlight two possible channels through which FL might facilitate wealth accumulation.

1) FL → stock market participation → wealth

- A high level of FL lowers the costs of gathering and processing information and reduces barriers to investing in the stock market.
- Individuals with high financial literacy are more likely to hold stocks.
- They have an opportunity to exploit the risk premium on equity investments than those with low financial literacy.
- Doing so might contribute to the positive effect of FL on wealth accumulation.

LITERATURE REVIEW(CONT'D)

2) FL → retirement savings plan → wealth

- If consumers want to save but simply lack the discipline to do so, planning may help consumers to control their consumption (Ameriks, Caplin, and Leahy, 2003).
- Developing a savings plan is a complex task because one needs to collect and process a lot of information such as investment returns and pensions benefits (Lusardi and Mitchell, 2007)).
- Individuals with higher level of FL are able to develop a savings plan.
- Doing so might contribute to higher level of wealth accumulation.

COUNTERARGUMENT

1) FL → stock holdings

- Individuals with a low level of FL might hold stocks easily without thinking deeply.
- Individuals with a high level of FL are cautious and might not hold stocks.

2) Retirement savings plan → wealth

- If individuals cannot calculate how much they should save for retirement and cannot develop a savings plan, they might feel more anxious about retirement and might accumulate more wealth rather than those who can develop a savings plan.

◆Therefore, it is ambiguous whether or not FL increases wealth accumulation, *a priori*.

CONTRIBUTIONS OF THIS PAPER

1) In addition to considering financial literacy as a uni-dimensional variable, we also decompose it into 5 sub-components comprising different types of financial literacy.
   - This analysis enables us to identify which aspects of financial literacy are especially important in the Japanese context.
   - This is useful from a policy perspective on the optimal design of financial education and training programs to improve financial literacy.

CONTRIBUTIONS OF THIS PAPER

2) While controlling for other determinants of wealth such as age, income and education, we also consider the impact of several variables suggested by behavioral economics (over-confidence, self-control, myopia, loss-aversion, risk-aversion, and herding)

3) Use data from Japan's first large-scale national survey on financial literacy.

DATA

Financial Literacy Survey 2016

- Japan's first large-scale questionnaire survey
- Conducted by the Central Council for Financial Services Information in Japan, with the aim of evaluating the financial knowledge and decision-making skills of Japanese adults.
- Administered online to 25,000 individuals aged between 18 and 79 who were randomly chosen in proportion to Japan's current demographic structure from registrants of *Intage* Inc.
- Feb. 29, 2016-March 17, 2016
- Sample selection: Missing values for some of the variables included in the regression
- Final sample: 15,298 observations

FL(DEPOSITS LITERACY)

Q18) Suppose you put 1 million yen into a savings account with a guaranteed interest rate of 2% per year. If no further deposits or withdrawals are made, how much would be in the account after 1 year, once the interest payment is made? Disregard tax deductions. Answer with a whole number.

1.02 million yen	71%
The amount other than 1.02 million yen	11%
Don't know	18%

FL(DEPOSITS LITERACY)

Q19) Then, how much would be in the account after 5 years? Disregard tax deductions. Choose only one answer.

1. More than 1.1 million yen: 48%
2. Exactly 1.1 million yen: 20%
3. Less than 1.1 million yen: 12%
4. Impossible to tell from the information given: 10%
5. Don't know: 11%

FL(RISK LITERACY)

Q21_3) Please indicate whether you think the following statements are true or false. Choose one answer for each item

"An investment with a high return is likely to be high risk"

True: 80%

False: 3%

Don't know: 17%

FL(RISK LITERACY)

Q21_4) Please indicate whether you think the following statements are true or false. Choose one answer for each item

"Buying a single company's stock usually provides a safer return than a stock mutual fund"

True: 6%

False: 52%

Don't know: 42%

FL(INSURANCE LITERACY)

Q25) Which of the following statements on the basic function of insurance is appropriate? Choose only one answer.

1. Insurance is effective when a risk occurs with high frequency, causing a large loss 7%

2. Insurance is effective when a risk occurs with low frequency, causing a large loss 52%

3. Insurance is effective when a risk occurs with high frequency, causing a small loss 4%

4. Insurance is effective when a risk occurs with low frequency, causing a small loss 7%

5. Don't know 30%

FL(INSURANCE LITERACY)

Q26) When a 50-year-old man reviews his life insurance policy (whole life insurance) after his children have become financially independent, which of the following statements is appropriate? Suppose that other circumstances have not changed. Choose only one answer.

1. He should consider increasing the death benefit 13%
2. He should consider decreasing the death benefit 57%
3. There is no need to review the policy in particular 12%
4. Don't know 18%

FL(DEBT LITERACY)

Q21_2) Please indicate whether you think the following statements are true or false. Choose one answer for each item.

"When compared, a 15-year mortgage typically requires higher monthly payments than a 30-year loan, but the total interest paid over the life of the loan will be less."

True 74%

False 7%

Don't know 20%

FL(DEBT LITERACY)

Q30) Which of the following statements on mortgages is appropriate? Choose only one answer.

1. It is far less costly to continue living in a rented house for your whole life than buying a house with a loan 5%

2. Mortgages can be repaid by either the equal payment method or the equal principal payment method, but the total repayment is the same for both methods 4%

3. Mortgages are offered with either a floating interest rate or a fixed interest rate, and those with a fixed interest rate are always more advantageous than those with a floating interest rate 5%

4. In order to decrease the total mortgage repayment, it is effective to prepare as much down payment as possible and make advanced repayments to the extent possible 57%

5. Don't know 28%

FL(DEBT LITERACY)

Q31) Suppose you owe 100,000 yen on a loan and the interest rate you are charged is 20% per year compounded annually. If you didn't pay anything off, at this interest rate, how many years would it take for the amount you owe to double? Choose only one answer.

1. Less than 2 years 3%
2. At least 2 years but less than 5 years 46%
3. At least 5 years but less than 10 years 17%
4. At least 10 years 3%
5. Don't know 30%

FL(DEBT LITERACY)

Q22) If interest rates rise, what will typically happen to bond prices? Choose only one answer.

1. They will rise 24%
2. They will fall 28%
3. They will stay the same 6%
4. There is no relationship between bond prices and the interest rate 10%
5. Don't know 33%

FL(INFLATION LITERACY)

Q20) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? Choose only one answer.

1. More than today 4%
2. Exactly the same 8%
3. Less than today 62%
4. Don't know 26%

FL(INFLATION LITERACY)

Q21_1) Please indicate whether you think the following statements are true or false. Choose one answer for each item

"High inflation means that the cost of living is increasing rapidly"

True 67%

False 8%

Don't know 25%

BEHAVIORAL VARIABLES: MYOPIA

- The key idea behind myopia is to capture present-biased preferences in which one places extra value on more immediate awards.
- Choose from a scale of 1 to 5 where 1 means 'agree' and 5 means 'disagree'. "If I had the choice of (1) receiving 100,000 yen now or (2) receiving 110,000 yen in 1 year, I would choose (1), provided that I can definitely receive the money".
- We define the variable "myopia" as the difference between 5 and the answer to the question above, so that a higher value is associated with a greater degree of myopia.

BEHAVIORAL VARIABLES: HERDING

- "Herding" captures the notion that a person prefers to follow others in making a financial decision, rather than making an independent decision.
- Choose from a scale of 1 to 5 where 1 means 'agree' and 5 means 'disagree'. "*When there are several similar products, I tend to buy what is recommended as the most selling product, rather than what I actually think is a good product*"
- We define the variable "herding" as the difference between 5 and the answer to the question above, so that a higher value is associated with a greater degree of myopia.

BEHAVIORAL VARIABLES: SELF-CONTROL

- "Self-control" encapsulates the degree to which a person makes deliberate and well thought-out decisions rather than deciding impulsively.
- Choose from a scale of 1 to 5 where 1 means 'agree' and 5 means 'disagree'. *Choose from a scale of 1 to 5 where 1 means 'agree' and 5 means 'disagree'. "Before I buy something I carefully consider whether I can afford it".*
- We define the variable "Self-control" as the difference between 5 and the answer to the question above, so that a higher value is associated with a greater degree of self-control.

BEHAVIORAL VARIABLES: OVERCONFIDENCE

- We measure the variable "over-confidence" as the difference between "subjective financial literacy" and "objective financial literacy"
- A high value of the "over-confidence" variable reflects that there is a big gap between the respondent's perception of their own financial literacy and their actual level of financial literacy, reflecting more over-confidence.

BEHAVIORAL VARIABLES: LOSS AVERSION

- "*Suppose that, if you invested 100,000 yen, you would either get a capital gain of 20,000 yen or a capital loss of 10,000 yen at 50% probability. What would you do? Choose only one answer. 1. I would invest, 2. I would not invest*".
- We define "loss-aversion" to be a dummy variable which takes the value 1 if the respondent chooses option 2 in the question above, and 0 otherwise.
- Risk Aversion: "*How much do you agree or disagree that the following statement applies to you personally? Choose from the following scale of 1 to 5. "I am prepared to take a risk when saving or making an investment*"

ESTIMATION MODEL

Model 1)

Household financial wealth

=a+b(Financial literacy)+c(Behavioral economics variables)+d(Household characteristics)+u

Model 2)

Household financial wealth

=a+b1(Deposits literacy)+b2(Risk literacy)

+b3(Insurance literacy)+b4(Debt literacy)

+b5(Inflation literacy)+c(Behavioral economics variables)+d(Household characteristics)+u

- Behavioral economics variables

myopia, self-control, loss aversion, risk aversion, herd, over-confidence

- Household characteristics

Gender, age, employment status, education level, household income, and the area in which the respondent lives

TABLE 1: SUMMARY STATISTICS

Variables	Obs	Mean Score	Std. Dev.	Min	Max
Wealth					
Wealth (10,000 JPY)	15,298	823.42	904.94	0	2,500
Financial literacy					
Financial Literacy	15,298	6.95	3.48	0	12
Deposits Literacy	15,298	1.19	0.80	0	2
Risk Literacy	15,298	1.33	0.74	0	2
Insurance Literacy	15,298	1.09	0.82	0	2
Debt Literacy	15,298	2.06	1.28	0	4
Inflation Literacy	15,298	1.29	0.81	0	2

TABLE 2: OLS RESULTS

OLS		
	OLS(1)	OLS(2)
	Wealth	Wealth
Financial Literacy	196.86***	
	(6.92)	
Deposits Literacy		209.00***
		(11.22)
Risk Literacy		180.73***
		(12.07)
Insurance Literacy		191.16***
		(11.36)
Debt Literacy		195.33***
		(9.42)
Inflation Literacy		211.43***
		(11.50)

TABLE 2: OLS RESULTS

OLS		
	OLS(1)	OLS(2)
	Wealth	Wealth
Myopia	-56.28***	-56.25***
	(3.94)	(3.94)
Self-control	-40.60***	-40.44***
	(6.16)	(6.16)
Loss Aversion	-83.97***	-84.34***
	(15.71)	(15.71)
Risk Aversion	-32.87***	-32.93***
	(5.29)	(5.29)
Herd	-7.72	-7.76
	(5.85)	(5.85)
Over-confidence	165.90***	166.18***
	(6.99)	(6.99)
Observations	15,298	15,298
R-squared	0.36	0.36

ENDOGENEITY PROBLEM

➢ Simultaneity

- Individuals with more wealth might acquire much more financial knowledge through investments in financial assets. As a result, the OLS coefficient of FL could be biased.

➢ Omitted variable

- FL might be related to some unobserved variables that also affect wealth accumulation. For example, unobservable "ability" might have a positive effect not only on wealth but also on the level of FL. In that case, the OLS coefficient of FL could be biased upwards.

ENDOGENEITY PROBLEM (CONT'D)

➢ Measurement error

- There is a possibility that people answer FL questions without thinking deeply.
- FL defined in this paper might be a noisy measure of the actual financial knowledge.
- The coefficient of FL could be biased toward zero.

◆ The direction of bias cannot be predicted *a priori*.

◆ To address this issue, we use an IV approach.

INSTRUMENTS FOR FINANCIAL LITERACY

- Financial education offered by a school or college you attended, or a workplace where you were employed (Dummy Variable)
- Number of newspapers in circulation in each prefecture divided by the population of the prefecture.
- We also use the average prefectural-level financial literacy as instruments for the 5 sub-components of financial literacy.

TABLE 3 (IV-GMM ESTIMATES)

	GMM	
	GMM(1)	GMM(2)
	Wealth	Wealth
Financial Literacy	291.24***	
	(46.73)	
Deposits Literacy		660.12***
		(251.71)
Risk Literacy		514.36***
		(160.21)
Insurance Literacy		46.74
		(180.63)
Debt Literacy		413.67***
		(136.18)
Inflation Literacy		170.55
		(227.72)

TABLE 3 (IV-GMM ESTIMATES)

	GMM	
	GMM(1)	GMM(2)
	Wealth	Wealth
Myopia	-52.60***	-48.52***
	(4.35)	(5.56)
Self-control	-46.47***	-45.08***
	(6.84)	(7.70)
Loss Aversion	-53.45**	-20.68
	(21.93)	(31.29)
Herding	-8.35	-21.10**
	(5.90)	(9.28)
Overconfidence	257.90***	328.42***
	(45.60)	(77.56)

Variable	Channel & Expected Sign of Coefficient	Actual Sign
Overconfidence	1. Overconfident individuals take excessive risks and trade too frequently →lowers wealth → expect negative coefficient. Statman et al (2006); Barber and Odean (2001); Grinblatt and Keloharju (2009). 2. Overconfident individuals participate more actively in stock market and earn risk premium → increases wealth → expect positive coefficient. Xia et al (2014) 3. Reverse Causality: Higher wealth causes greater overconfidence → expect positive coefficient	positive & significant
Myopia	Myopic individuals have higher current consumption, so they save less and accumulate less wealth → expect negative coefficient	negative & significant
Herding	Individuals who follow the herd are less likely to make independent decisions, and more likely to get caught in short-term fads and market bubbles → lowers wealth → expect negative coefficient	negative

Variable	Channel & Expected Sign of Coefficient	Actual Sign
Self-Control	1. Individuals with more self-control can better stick to budgets and avoid impulsive expenditures → raises wealth → expect positive coefficient 2. Reverse Causality: Higher wealth causes greater overconfidence, and higher overconfidence causes less self-control → expect negative coefficient	negative & significant
Loss Aversion	Loss aversion can cause people to cling on to losing investments and sell winning investments too quickly, thereby leading to unbalanced and sub-optimal portfolios → lowers wealth → expect negative coefficient	negative

CONCLUSIONS

- Controlling for many determinants of wealth and taking account of endogeneity problems of FL, we found that FL increases the amount of wealth
- Different types of financial literacy have differential impacts on wealth. Deposits literacy, risk literacy, and debt literacy have a much greater impact on wealth accumulation relative to insurance literacy and inflation literacy.
- With respect to the design of financial education, focusing on deposits literacy, risk literacy, and debt literacy may be important in the Japanese context.