

How financial literacy affect risk preference: an evidence from Bandung, Indonesia

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Abstract. Financial literacy and risk preference become issues that attracting the attention of researchers. We analyse a survey that held in Bandung, Indonesia to measure financial literacy and study its relationship on risk preference through online questionnaire. We investigate the effect of financial literacy that measured by numeracy, inflation, interest compounding, time value of money, and money illusion into set of questions that represent risk appetite indicators. As results, financial literacy shows significance relation into risk preference at 5%. Moreover, four demography factors are added for control variables in this research. Age and gender shows significance relation at 1% while marital status and formal education is not effective to affect risk preference.

Keywords. financial literacy; financial product; risk appetite; risk perception; risk preference

Abstrak. Literasi keuangan dan preferensi risiko menjadi topik yang menarik perhatian peneliti. Kami menganalisis hasil survei yang diadakan di Bandung, Indonesia, untuk mengukur literasi keuangan dan mempelajari hubungannya dengan preferensi risiko melalui kuesioner online. Kami menyelidiki pengaruh literasi keuangan yang diukur dengan kemampuan berhitung, inflasi, bunga majemuk, nilai waktu uang, dan ilusi uang ke dalam serangkaian pertanyaan yang mewakili indikator preferensi risiko. Hasilnya, literasi keuangan menunjukkan hubungan yang signifikan terhadap preferensi risiko pada 5%. Selain itu, empat faktor demografi ditambahkan untuk variabel kontrol dalam penelitian ini. Usia dan jenis kelamin menunjukkan hubungan yang signifikan pada 1% sedangkan status perkawinan dan pendidikan formal tidak efektif untuk mempengaruhi preferensi risiko.

Kata kunci. literasi keuangan; persepsi risiko; preferensi risiko; produk keuangan; selera risiko

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INTRODUCTION

Background

People have become more active in financial markets and market participation level has been increased, accompanied and promoted as well by the advent of more financial institution. According to Financial Service Authority in Indonesia (OJK), on their press release SP 58/DHMS/OJK/XI/2019, index of financial literacy and financial inclusion in Indonesia improved from 29.7% and 76.19% 2016 to 38.03% and 76.19% in 2019, beyond the expectation that set by presidential regulation number 82 in 2006 which is 75%. However, some of the

financial products and services are more advanced and difficult to access and understand, such as stock market that has low participation in Indonesia.

By looking at the statistic above given by OJK, there is a huge gap between the level of inclusion and literacy in Indonesia. The question, are people in Indonesia well-informed to make financial decision? How this gap can be explained? Many studies confirmed that people are illiterate financially even for the simple principles of finance (Lusardi & Mitchell, 2007; Hilgert et al., 2003). Quick development of financial products without any formal education toward it resulting

high level of financial inclusion without proper financial literacy. Lack of financial knowledge given by formal institution makes people need to assume more responsibility for their own decision on finance.

Financial literacy in recent years has gained the interest from various groups in developing countries, especially for the government. According to Financial Service Authority (OJK) in the same press release that mentioned above, financial literacy showed as the one of priority agenda on the recent years. The importance on increasing the financial literacy come due to factors including the economics factors, complexity of financial markets, and development of financial products (Bashir et al., 2013).

The problem of lacked financial knowledge must be solved since existing studies shown that lack of financial literacy is likely to have problems with debt (Lusardi & Tufano, 2009). Financial literacy helps people to improve their level of understanding of financial things that leads them to process financial information and make proper decision on personal finance. However, people's preference on financial decision sometimes did not drives by rational reason, they can only have bounded rationality (Bondt et al., 2008). There are many factors such as psychological, socio cultural, environment, and risk preferences that affect financial decision behaviour.

This study will discover the relation between financial literacy that representing logical thinking with risk preference that representing financial decision. Is there any relation of people financial knowledge on their risk preference? It will make two contribution to the existing literature. First by gives sight to government in which sector of literacy that can be improved to reduce the gap between financial literacy and financial inclusion. Second, as reference to financial institution on how they choose

marketing strategy to sell their products or services to customer.

This paper is organized as follows: in section II, we provide our data and method of analysis. In section III, we show the result of the empirical work. Lastly, in section IV we conclude our results and give some recommendation for the future research.

Financial literacy

Financial literacy defined as the ability of person to make appropriate decision in managing their decision on personal finance (Deng et al., 2013). Financial literacy has been studied from different perspectives around the globe. Beal & Delpachitra (2003) examines financial literacy of Australian student by looking at financial education at the school level, the result of the study shows lack of financial literacy as the reason of low financial education at the school level. Altamimi and Kalli (2009) discover how financial literacy affecting investment decision in the financial markets in UAE, investor on UAE also has low financial literacy and the result says significant relationship between financial literacy and investment decision.

However, there only few researches that give information on both financial literacy with the variables that related to financial decision making on investment. To start this study, we look at Lusardi and Mitchell press on Oxford university Press that questions to aimed basic financial knowledge including interest compounding, inflation, and risk diversification, the finding is financial illiteracy is found on particularly among specific population, such as women, elderly, and people with lower education. This result is predicted as elder people has lower inclusion toward financial product. It similar with the result by Hilgert & Hogarth (2002). Chen and Volpe (2002) dealt with gender issue by states women have less information than man for this reason, they say women less literate.

However, Wagland (2009), Kindle (2010), Joo & Grable (2004) has different result, they say that there is no correlation between gender and financial literacy. Previous researcher also linked investment decision with level of education. Yao et al. (2011) found no relation between investment and level of education, while Gilliam (2011), Brown & Taylor (2007) state that education level is the factors on financial decision.

There are a lot of version on how people measuring financial literacy. Financial Service Authority in UK (2006) divided financial literacy into four which are budget, expenditure, products, and information. Widdowson and Hailwood (2007) measuring financial literacy by asking specifically about basic computer ability, understanding the financial decision on yields and risk, familiarity with basic financial management concept, knowing the channels for consultation and assistance, and the ability to understand the content of suggestion questions. Lusardi and Mitchell (2008) asking three to measure financial literacy which are interest compounding, inflation, and risk diversification. Stango and Zinman (2009) only rely with a question.

This measurement of financial literacy become crude. Hence, we make adjustment into the most comprehensive measures of financial literacy as well as an evaluation of the quality of the literacy data. This study improves substantially upon previous study by considering Van Rooij et al. (2011) that measure financial literacy into two parts, basic and advanced literacy questions. In set of basic literacy questions, there are five questions that will be used in this research which are numeracy (ability to process basic numerical concept, quantitative estimations, probability, and ratios (Cokely et al., 2012)), interest compounding (interest calculated on the initial principal, which include interest from previous period of time), inflation (increase on general price level of goods

and services in period of time), time value of money (concept of money that has different value with different time), and money illusion (human cognitive bias to think money in nominal, rather than real. Purchasing power at previous point in time).

Moreover, to get better understanding on how financial literacy affect risk preference, we have formulated questions that provide information to assess the direct causality between financial literacy and risk preference.

Risk Preference

Most people think that risk is equal with loss while return is associated with profit. This misperception happened because risk is subjective according to Garland (2003). Risk for a person could be different with other. Risk itself can be described as a function of profit and loss (Aren & Zengin, 2016; Elmiger & Kim, 2003; Finucance et al., 2000). Perception of risk is influenced by many factors, such as logically reason and cognitively reason. However, most of the previous research agreed that cognitive and emotional dimension influence into the decision making (Hillson & Webster, 2005; Olsen & Cox, 2001).

Risk preference associated with many variables. Yao et al. (2011), Grable & Roszkowski (2007), Friedberg & Webb (2006), Barber & Odean (2001) linked risk preference with gender. The result, all researchers above did not find any evidence that gender affected to risk perception, except Barber & Odean that proving men take riskier decision than women.

The measure of risk preference used in existing studies are different. In this study, we use 7 questions from Paeswark & Riley (2010), Aren & Zengin (2016) that used fourteen question to describe risk preference. Our measurements are activity preferences, long of investment preferences, investment portion preferences, profit and

loss tolerance, financial scenario preferences, financial instrument preferences and investment decision.

RESEARCH METHODOLOGY (data, research & methodology)

Data

This paper uses questionnaires that we send to 433 citizens of Bandung, Indonesia through online questionnaire. Survey used in this research to achieve a wide range of sampling (Saunders et al., 2007). The research questionnaire is formed in a way to discover the relation between financial literacy and risk

preference. Questionnaire is divided into three parts, the first part contains four demography questions, second part consist five questions of financial literacy, and last part contain seven risk preference questions. Of the subjects surveyed, the aged of the respondents in our sample varies from 19 to 65 years old (mean age is 35), 68.4% is in the group 40 years and under. 49.7% are men and 50.3% are women. 75.1% are bachelor graduates, 15.9% master and doctoral graduates. For the complete demography, provided on the table 1.

	Number	%
Gender		
Men	215	49.7
Female	218	50.3
Age		
40 and below	296	68.4
Above 40	137	31.6
Education		
High school	14	3.2
Diploma	25	5.8
Bachelor	325	75.1
Master and doctoral	69	15.9
Marital status		
Single	126	29.1
Married	307	70.9

Table 1. Demography

Methodology

Based on the objective of this research, establishing an operational definition of variables associated with this

study is essential to have accurate measurement results and avoid bias and error in achieve the objective.

Variable	Question	Indicator	Code
Financial Literacy	Suppose you had 1000 in a savings account and the interest rate was 2% per year. After 1 years, how much do you think you would have in the account if you left the money to grow?	Numeracy	Num
	If the interest rate on your savings account was 1% per year and inflation was 2% per year. At the end of 1 st year, how much would you be able to buy with the money in this account?	Inflation	Inf

Variable	Question	Indicator	Code
	Suppose you had 1000 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?	Interest Compounding	Int
	Assume A inherits 10,000 today and B inherits 10,000 3 years from now. Who is richer because of the inheritance?	Time Value of Money	Tvm
	Suppose that in this year, your income has doubled and prices of all goods have doubled too. How much will you be able to buy with your income?	Money illusion	Mil
Risk Preference	Which sport do you like?	Activity Preferences	Rpr
	If you decide to invest, how long the investment will be take?	Long of Investment Preferences	
	If you decide to invest, how many percent of your assets that will be invested?	Investment Portion Preferences	
	How you can tolerate profits and losses?	Profit and Loss Tolerance	
	Which scenario do you prefer?	Financial Scenario Preferences	
	Choose the most suitable investment product?	Financial Instrument Preferences	
	If your investment product loss 25%, what will you do?	Investment Decision	
Demography	How old are you? (in years)	Age	Age
	What is you gender?	Gender	Gdr
	Are you married or ever married?	Marital Status	Mst
	What is you last education degree?	Education	Edu

Table 2. Variables and indicators

We use multivariate regression model to discover the relation between financial literacy and risk preference.

$$\begin{aligned}
 Rpr = & \alpha_0 + \beta_1 Num + \beta_2 Inf \\
 & + \beta_3 Int + \beta_4 Tvm \\
 & + \beta_5 Mil + \beta_6 Age \\
 & + \beta_7 Gdr + \beta_8 Mst \\
 & + \beta_9 Edu + \epsilon_i
 \end{aligned}$$

RESULTS AND DISCUSSION

Validity and reliability test

The construct of measurement validity was evaluated using the inter-item correlation analysis. The internal consistency of each variables is tested by calculating the Cronbach's alpha values. Validity and reliability test are concepts that used to evaluate the quality of the research. Indication of one high quality

research is based on how the technique or method can be consistent and accurate to measured. This test become important for quantitative research.

Variable	No	Measurement	Validity prob	Reliability Cronbach's α
Financial Literacy	1	Numeracy	0.00***	0.925
	2	Inflation	0.00***	
	3	Interest Compounding	0.00***	
	4	Time Value of Money	0.00***	
	5	Money Illusion	0.00***	
Risk Preference	6	Activity Preferences	0.00***	0.891
	7	Long of Investment Preferences	0.00***	
	8	Investment Portion Preferences	0.00***	
	9	Profit and Loss Tolerance	0.00***	
	10	Financial Scenario Preferences	0.00***	
	11	Financial Instrument Preferences	0.00***	
	12	Investment Decision	0.00***	

Table 3. Validity and reliability test results

All tested measurements show significant value for the validity test at 1%. The Cronbach's alpha for performance and financial inclusion variables was good (> 0.8).

Assumption test

Normality test

Based on Pearson (1965) not all populations are normal. This led to the development of tests for the normality on the sample. Recent contributions to the normality are the omnibus tests proposed by Pearson et al. (1977), the coordinate-dependent and invariant procedures described by Cox & Small (1978), and Jarque-Bera (1980) test. We used Jarque-Bera test to check normality of the sample. With H_0 : Residuals are normally distributed and the rejection criterion $\rho < 0.05$, hence by looking at Appendix 1, ρ_{test} is 0.064028 which is greater than 0.05 so H_0 is accepted. This set of data are normally distributed.

Heteroscedasticity

Heteroscedasticity is a systematic change in the spread of the residuals over

the range of measured values. It is a problem because ordinary least squares (OLS) regression assumes that all residuals are drawn from a population that has an exact variance. It found by Godfrey (1978) and Breusch & Pagan (1979) and Breusch-Pagan-Godfrey test will be used in this research.

With H_0 : Residuals are homoscedasticity and the significance level $\rho < 0.05$, hence by looking at Appendix 2, ρ_{test} is 0.5234 which is greater than 0.05 so H_0 is accepted. This set of data are homoscedasticity.

Multicollinearity

Multicollinearity refers to a situation in which two or more indicator in a multiple regression model are highly linearly related. When a multiple regression model is specified, multicollinearity amongst the predictor variables is possible. Multicollinearity can inflate the variance amongst the indicators in the model. Hypotheses that specify testing the effects of interaction before examining main effects have appeared

under the framework of analysis of variance (Robinson & Schumacker, 2009) These inflated variances are dilemmatic in regression because some variables add very little or even no new information to the model (Belsley, Kuh & Welsch, 1980). To avoid that, we performed multicollinearity test using variance inflation factors test suggested by Stine (1995) and Freund et al. (2003).

With H_0 : Indicators do not have correlation with each other. The rejection criteria centred VIF > 10, hence by looking

at Appendix 3, all indicators centred VIF are lower than 10 so H_0 is accepted. It means all indicators do not have correlation with each other.

How financial literacy affect risk preference

With the aim of this study is to know how risk preference differentiate by indicators of financial literacy, multivariate regression was conducted. The results of the analysis showed in the table below.

	Probability	Coefficient
Numeracy	0.5188	-0.1601
Inflation	0.5815	0.1262
Interest Compounding	0.0374**	0.4442
Time Value of Money	0.9500	-0.0136
Money Illusion	0.0168**	0.6047
Age	0.0003***	-0.0463
Gender	0.0000***	-1.1167
Marital Status	0.2004	-0.3443
Education	0.8077	0.0425

(***) and (**) indicate significance at the 1% level and 5% level, respectively.

Table 4. Multivariate regression results 1

By looking at the results above, there are four indicator that has an effect to risk preferences. Interest compounding and money illusion significance at 5%, while age and gender significance at 1%.

Moreover, to get a robust conclusion, we added another regression formula by accumulate all financial literacy indicators and regressed with risk preference. The results are reported in the following table.

	Probability	Coefficient
Financial Literacy	0.0240**	0.1848
Age	0.0001***	-0.0495
Gender	0.0000***	-1.0752
Marital Status	0.1776	-0.3614
Education	0.8253	0.0385

(***) and (**) indicate significance at the 1% level and 5% level, respectively.

Table 5. Multivariate regression results 2

Similar result has been found in both regressions. Financial literacy significance at 5% while age and gender significance at 1%. The results showed that financial literacy affecting on risk appetite. People with higher financial literacy level in fact has more, riskier

financial product, such as stock (Van Rooij et al., 2011).

In previous research, they consider demographics such as age, education, gender, marital status, and number of children (Guiso et al., 2002; Campbell, 2006). Van Rooij et al. (2011) added a

dummy with retirement account, self-employment, income and quartiles of wealth. In this research, we used age, gender, marital status and education.

Age shown significance toward risk preference with negative direction, means elder people less likely to choose riskier investment than younger. Hurd (1990) showed that differential mortality between richer and poorer household affecting the large proportion of riskier asset. It linear with Agnew et al. (2003) and Bellante & Gren (2004) that conclude age is a significance factor on risk preference on investment decision and younger people are more likely to choose risk than elder.

Gender has significance on risk preference in this study with negative coefficient, we put code 0 on men and 1 for women. Hence, men intended to have riskier decision than women. It similar with the result of Haliassos & Bertaut (1995), Grable (2000), Bernasek & Shwiff (2001), Weber et al. (2002).

On the contrary, there is no significant difference between married and single personal's risk preference. It similar with (Aren & Zengin, 2016) that said there is no correlation between marital status and risk intention. Formal education also found as the non-significance factor on risk appetite. Christiansen et al. (2008) said that economic education has more to control financial literacy than formal education. An addition, the fact that respondents can learn by doing by looking at the current

literacy more effective than attend formal education on understanding financial that effecting risk preference.

CONCLUSION

In this research we investigated whether financial literacy is effective factor on determining individual's risk preferences using multivariate regression. When we considering financial literacy, that measures five simple knowledge and calculation skill, we found that people with higher score on financial literacy are disproportionately more likely to taking more risk. Significant relationship between financial literacy and risk appetite has been identified. Considering individual who well financial literate has more knowledge to understand the concept of risk, which says with higher risk comes higher return.

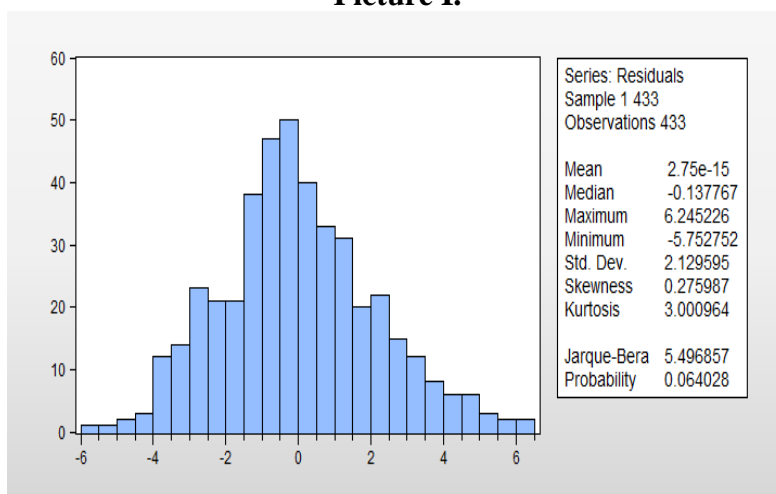
Based on demography information age and gender shows significance relation between financial literacy and risk preference. Younger people are more intention toward risk than elder people and men are more tend to take risk than women. However, marital status and formal education shows no affection toward risk preference.

This research could be referred to increase the level of participant on stock market or other risky financial products in Indonesia. Future research can add more variable such as income, non-formal education, and number of children to discover its effect on risk preference.

APPENDIX

Appendix 1. Normality test using Jarque-Bera test.

Picture I.



Appendix 2. Heteroscedasticity test using Breusch-Pagan-Godfrey test.

Picture II.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.896731	Prob. F(9,423)	0.5281
Obs*R-squared	8.106699	Prob. Chi-Square(9)	0.5234
Scaled explained SS	7.740310	Prob. Chi-Square(9)	0.5605

Appendix 3. Multicollinearity test using Variance Inflation Factors.

Picture III.

Variance Inflation Factors
Date: 06/16/20 Time: 15:01
Sample: 1 433
Included observations: 433

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.421902	39.44232	NA
NUM	0.061489	4.248249	1.108665
INF	0.052337	3.243073	1.093507
INT	0.045244	2.276051	1.051294
TVM	0.046845	2.528500	1.068627
MIL	0.063402	4.435162	1.116473
AGE	0.000164	21.17063	1.425448
GDR	0.044081	2.074784	1.030205
MST	0.072079	1.960850	1.390256
EDU	0.030432	12.96993	1.058332

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