



# Financial Literacy and Behavioral Bias of Individual Investors: Empirical Research in Indonesia

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**Abstract.** Financial literacy and behavioural biases are critical factors that influence investment-decision making individual investors. This study aims to identify financial literacy relationships and behavioural biases (overconfidence, representativeness, and illusion of control) which can lead to irrational behaviour in investment decision making. The population in this research data is individual investors who are on Java. Based on the purposive sampling method, the sample was 83 respondents through a questionnaire. The data obtained, passed the validity test, reliability test, classical assumption test, and multiple regression analysis to test the hypothesis. Hypothesis testing concludes that financial literacy has a negative effect on behavioural biases, meaning increasing financial literacy, so individual investors are increasingly objective in making investment decisions, and will reduce behavioural biases.

**Keywords:** Demographic Characteristics · Financial Literacy · Behavioural Biases · Investment Decisions · Individual Investors

## 1 Introduction

Investment decisions are individual policies in choosing alternative investments made by investors in the hope of achieving profits in the future (Pradikasari and Isbanah 2018). The rapid development of the investment world makes the role of financial literacy very important. Financial literacy is something that is needed by everyone to be able to apply the priority scale in managing their finances because with good financial literacy, they will be able to manage the financial condition of their business properly and correctly. According to Otoritas Jasa Keuangan (2017), financial literacy is an activity to increase knowledge, skills, and beliefs that affect people's attitudes and behavior. Financial literacy owned by the public, especially investors, is expected to be able to help in making investment decisions that are appropriate and on target.

The National Financial Literacy Survey (SNLK) conducted by the Financial Services Authority (OJK) in 2019 showed that Indonesia's financial literacy index increased by 8.33% from 29.7% in 2016 to 38.03% in 2019. The financial inclusion index also increased from 67.8% in 2016 to 76.19% in 2019 (Financial Services Authority 2019).

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However, Indonesia's financial inclusion index of 76% is still relatively low when compared to ASEAN countries, such as Thailand at 82%, Malaysia at 85%, and Singapore at 86% (Alika 2020). Therefore, financial literacy needs to be improved in the hope that people can be wiser in making investment decisions.

Rasool and Ullah (2020) concluded that there is a negative relationship between financial literacy and the behavioral bias of individual investors in Lahore. That is, an increase in financial literacy leads to the possibility of reduced behavioral biases faced by investors. Dhar and Zhu (2006) explains the negative relationship of financial literacy to disposition bias. Takeda et al. (2013) concluded that there is a positive relationship between financial literacy and *overconfidence* which means that investors with high literacy levels tend to lack confidence, and vice versa (Adil et al. 2021).

Based on previous research, the influence of financial literacy on behavioral bias is not all positive because it depends on the bias factor that is used as the object of study. Without financial literacy, investors will not be able to make complex investment decisions and it will be difficult to mitigate the behavioral biases that investors face.

However, to identify the true relationship between financial literacy and behavioral bias, this study was conducted to illustrate empirical evidence related to the relationship. So, this study focuses on measuring financial literacy, identifying possible behavioral biases, and knowing the relationship between financial literacy and behavioral biases of individual investors on the island of Java.

## 2 Method

The research method used in the research is a quantitative research method through a causal approach to prove the causal relationship through the influence that arises between dependent and independent variables. The data source uses primary data because it will provide more accurate and *real-time* data compared to secondary data.

The measurement of overconfidence is carried out with a discrete proposition, by which the subject is advised to answer a series of questions and express their confidence for each question that their answer is correct (Michailova 2010). The calibrated respondent is neutral. The second proxy uses a dummy variable, which is 1 if the score is positive, and is worth 0 if it is not. Behavior bias representativeness and illusion of control using 3 statement items using the Likert Scale. Bias Score = % confidence - % correct answer.

Regression analysis is used to examine the relationship between financial literacy and behavioral bias of individual investors. This regression is repeated for each bias. The regression model is shown as follows:

$$y(\text{Bias}) = b_0 + b_1(\text{Financial Literation}) + b_2(\text{Sex}) + b_3(\text{Age}) + b_4(\text{Marriage Status}) + b_5(\text{Formal Education}) + b_6(\text{Working status}) + b_7(\text{Income}) + b_8(\text{Investment Preference}) + b_9(\text{Investment Duration}) + e_1$$

### 3 Results and Discussion

Based on the data collected, most respondents were women representing 56.6 percent of the total sample. Age variables showed 34 respondents aged 17–20 years and 49 respondents aged 21–30 years. Based on the latest education, as many as 64 respondents from high school, 8 respondents from D1/D2/D3, 10 respondents from Bachelor, and 1 respondent from Postgraduate. In addition, 90.4 percent of the respondents to this study were students, 6 percent were self-employed, and 3.6 percent had jobs outside the category. The complete frequency table of demographic variables is presented by Table 1.

Based on Table 2 it can be seen that the highest mean value in the financial literacy variable is the first statement item related to money management, which is 4.69. This shows that investors agree that good management can help in making long-term and short-term planning. Meanwhile, the highest mean value in the representativeness variable is the third statement item of 4.18, meaning that investors tend to avoid investing in companies with a history of poor earnings. In the illusion of control variable, the highest mean value is the first and third statement items. This shows that investors tend to choose their own investments and rely on their abilities to determine their own success. Table 3 shows that with an increase in financial literacy, the likelihood of bias in investment decisions decreases. The highest level of bias was detected in the illusion of control with an average value of 12.90. Meanwhile, the lowest level of bias is indicated by an overconfidence bias with an average of -0.0029.

#### Hypothesis Test

The ANOVA test was performed with overconfidence as a dependent variable to ensure the test value of F. F-calculated value was 1.233 with a sig level.  $0.289 > 0.05$  it can be concluded that simultaneously the demographic and financial literacy variables have no effect on the overconfidence variable. In Table 4 model 1 it is known that the consistency value of the overconfidence variable is 0.872. Meanwhile, the value of the financial literacy regression coefficient is -0.005, meaning that the direction of the influence of financial literacy on overconfidence is negative. In addition, the value of sig. Financial literacy of  $0.442 > 0.05$  so that financial literacy does not affect overconfidence. Partially, financial literacy has no effect on overconfidence because the t-count value of  $-0.772 < t\text{-table is } 1.989$ . Regression analysis has shown that there is a negative relationship between financial literacy and overconfidence. That is, individual investors who have good financial literacy can overcome overconfidence bias.

In model 3, with representativeness as a dependent variable, it is known that the value of the financial literacy regression coefficient is 0.163, meaning that financial literacy has a positive effect on representativeness bias. Based on the sig value. Financial literacy obtained a value of  $0.001 < 0.05$  so that financial literacy has an influence on representativeness. Partially, the t-count value of  $3,385 > t\text{-Table } 1, 989$  shows that financial literacy affects representativeness. That is, an increase in financial literacy leads to the possibility of increasing the bias of representativeness faced by individual investors. The ANOVA test was also carried out and an f-count of 1.926 with a sig level was obtained.  $0.061 > 0.05$  then it can be concluded that simultaneously the demographic

**Table 1.** Demographic Variables

		Frequency	Percent
Sex	Men	36	43,4
	Women	47	56,6
	Total	83	100,0
Age	17–20	34	41,0
	21–30	49	59,0
	Total	83	100,0
Marriage Status	Married	2	2,4
	Single	81	97,6
	Total	83	100,0
Education	High school	64	77,1
	Vocational	8	9,6
	Undergraduate	10	12,0
	Master	1	1,2
	Total	83	100,0
Working Status	Student	75	90,4
	Entrepreneurship	5	6,0
	Others	3	3,6
	Total	83	100,0
Income	<Rp 500.000	51	61,4
	Rp 500.000 - Rp 3.000.000	27	32,5
	Rp 3.000.000 - RP 5.000.000	2	2,4
	>Rp 5.000.000	3	3,6
	Total	83	100,0
Investment Preference	Stock	47	56,6
	Mutual Fund	18	21,7
	Others	18	21,7
	Total	83	100,0
Investment Duration	<1 year	55	66,3
	1–3 year	20	24,1
	>3 year	8	9,6
	Total	83	100,0

**Table 2.** Descriptive Analysis of Questionnaire

Descriptive Statistics										
	STS	TS	N	S	SS	N	Minimum	Maximum	Mean	Std. Deviation
X1.1	0	1	3	17	62	83	2	5	4,69	,603
X1.2	0	0	3	28	52	83	3	5	4,59	,564
X1.3	1	0	9	32	41	83	1	5	4,35	,772
X1.4	1	4	17	31	30	83	1	5	4,02	,937
X1.5	1	1	8	27	46	83	1	5	4,40	,811
X1.6	0	0	2	27	54	83	3	5	4,63	,534
X1.7	0	0	6	31	46	83	3	5	4,48	,632
X1.8	1	5	25	29	23	83	1	5	3,82	,952
X1.9	5	6	41	20	11	83	1	5	3,31	,999
X1.10	0	2	21	42	18	83	2	5	3,92	,752
X1.11	0	1	5	36	41	83	2	5	4,41	,663
X1.12	1	4	25	27	26	83	1	5	3,88	,955
Valid N (listwise)						83				
Y2.1	0	8	18	38	19	83	2	5	3,82	,899
Y2.2	1	4	19	35	24	83	1	5	3,93	,908
Y2.3	0	3	17	25	38	83	2	5	4,18	,885
Valid N (listwise)						83				
Y3.1	0	0	11	29	43	83	3	5	4,39	,713
Y3.2	1	0	18	32	32	83	1	5	4,13	,838
Y3.3	0	0	12	27	44	83	3	5	4,39	,730
Valid N (listwise)						83				

Description: Strongly Disagree (STS); Disagree (TS); Neutral (N); Agree (S); Strongly Agree (SS).

variable and the financial constellation lite have no effect on the representativeness variable.

In model 4 shows the results of regression analysis with illusion of control as a dependent variable. It is known, the value of the coefficient of regression of financial literacy is 0.108. That is, the direction of the influence of financial literacy on the illusion of control is positive. Based on the sig value. Financial literacy of  $0.018 < 0.05$  so that financial literacy has an influence on the illusion of control. Partially, financial literacy affects the illusion of control because the t-count value is  $2,410 > t$ -table is 1,989. This

**Table 3.** Descriptive Statistical Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Overconfidence Proxy 1	83	-,60	,60	-,0029	,24585
Overconfidence Proxy 2	83	0	1	,52	,503
Representativeness	83	6	15	11,93	2,017
Illusion of Control	83	9	15	12,90	1,785
Financial Literacy	83	42	60	50,49	4,500
Sex	83	1	2	1,57	,499
Age	83	1	2	1,59	,495
Marriage Status	83	1	2	1,98	,154
Education	83	3	6	3,37	,744
Working Status	83	1	4	1,17	,601
Income	83	1	4	1,48	,722
Investment Preference	83	1	3	1,65	,818
Investment Duration	83	1	3	1,43	,666

shows that the increase in financial literacy leads to the possibility of increasing the bias of illusion of control that individual investor face in making investment decisions. However, simultaneously the demographic and financial literacy variables have no effect on the illusion of control variables because the f-count value is 0.968 with a sig level.  $0.474 > 0.05$ .

Control variables have an important role in regression analysis, so researchers find out the impact of demographic variables on behavioral bias. Based on the results of the f-calculation and the level of significance of the variables of sex, age, marital status, education, employment, income, preferred investment, and the length of investment are not significant to the variables of overconfidence, representativeness, and illusion of control of individual investors in Java Island. That is, demographic variables are not a limitation because individual investors have biases that will affect their behavior and it is difficult to avoid such biases. In accordance with the opinion of Kahneman and Tversky (1979) in Prospect's Theory, the behavior of individuals in making decisions is not always rational, does not always act in accordance with the standards of financial theory, and can be influenced by bias. The results of this study are in line with Natalia's research (2021) which states that demographic factors do not affect behavioral bias, namely overconfidence in stock investors. In the control variable, namely gender, it can be concluded that the average financial literacy of male respondents was 50.58 greater than that of female respondents of 50.43. In addition, male respondents also had a greater average behavioral bias than women. Based on age, the average financial literacy and behavioral bias was highest generated by respondents aged 21–30 years.

**Table 4.** Regression Result

	<b>Model 1</b> Overconfidence Proxy 1	<b>Model 2</b> Overconfidence Proxy 2	<b>Model 3</b> Representativeness	<b>Model 2</b> Illusion of Control
Financial Literation	-0.005 (-0.772)	0.012 (0.953)	0.163** (3.385)	0.108** (2.410)
Sex	-0.062 (-1.079)	-0.201* (-1.601)	-0.568 (-1.249)	-0.129 (-0.517)
Age	-0.012 (-0.197)	0.056 (0.462)	0.081 (0.176)	0.316 (0.732)
Marriage Status	-0.337* (-1.757)	-0.608 (-1.553)	1.713 (1.129)	0.065 (0.046)
Education	0.004 (0.096)	0.117 (1.483)	-0.074 (-0.245)	0.203 (0.719)
Working Status	0.080 (1.571)	0.101 (0.953)	-0.196 (-0.483)	0.142 (0.378)
Income	-0.009 (-0.186)	-0.099 (-1.023)	-0.416 (-1.126)	-0.197 (-0.572)
Investment Preference	0.001 (0.034)	0.015 (0.213)	0.159 (0.600)	-0.206 (-0.836)
Investment Duration	0.034 (0.794)	-0.030 (-0.336)	0.062 (0.183)	-0.299 (0.949)
Constant	0.082 (1.624)	0.990 (0.891)	1.814 (0.427)	6.514 (1.648)

## 4 Conclusion

The main objective of this study is to identify the relationship between the level of financial literacy that individual investors have and the level of behavioral bias on the island of Java that can result in irrational behavior in investment decision making. The research begins with demographic variables that state that demographic variables do not become limitations, individual investors have biases that will affect their behavior and it is difficult to avoid such biases. Based on demographics, male respondents and those aged 21–30 years dominated the average proportion of financial literacy and behavioral bias.

Analysis regression and *robustness test* shows that financial literacy negatively affects *overconfidence*. However, financial literacy has a positive effect on *representativeness* and *illusion of control*. The main hypothesis of the study was accepted and stated that financial literacy negatively affects behavioral bias, that is, the more financial

literacy increases, the more objective investors are in making investment decisions, and will reduce the behavioral bias of individual investors on the island of Java. Investors with high levels of literacy tend to lack confidence, and vice versa.

The coefficient of determination ( $R^2$ ) of regression is slightly lower which means that there are other factors that have a significant impact on the behavioral bias of individual investors. Therefore, the research results are expected to be used as consideration for subsequent researchers in adding insight and knowledge to become a reference for further research, as well as developing a research framework to be used as literature in the future. For investors, research can be used as a consideration in investing.

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