

The Influence of Behavior Biases on Investment Decisions Is Moderate by Financial Literacy Among Government Employees at The Republic of Indonesia's BPK

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Abstract

The purpose of the study is to examine the impact of behavioural biases (herding, mental accounting, and regret aversion) on investment decisions. The authors further examine the moderation effect of financial literacy in the relationship between behaviour biases and investment decisions. The study considered a cross-sectional research design. For this survey, the data have been collected through a structured questionnaire from 215 government officials of BPK RI. To analyse the validity and reliability, the Pearson correlation and Cronbach's alpha test have been taken into account respectively. For testing the hypothesis, hierarchical regression analysis has been used in the study. The results of the study reveal that research results also show that bias herding, mental accounting, and regrets on investment decisions have a positive and significant influence. Meanwhile, financial literacy on investment decisions has a negative and significant influence. Furthermore, herding bias is moderated by financial literacy on investment decisions and has a positive and significant influence. Meanwhile, mental accounting bias and regret aversion are moderated by financial literacy on investment decisions and have a negative and significant influence. Based on this present research finding, the study is more productive for the government officials and policymakers at the time of making an investment portfolio for the government officials based on their behavioural biases. The study recommends that investors need training programmes, workshops and seminars that enhance financial literacy and financial knowledge of government officials which helps them to overcome behavioural biases while making an investment decision. The current study aims to explore whether several behavioural biases can affect investment decisions. Moreover, the authors would like to examine whether these associations are moderated by financial literacy. In this sense, financial literacy might also play a substantial part in the prediction of investments. The current study might be of the first study that examines the moderation effect financial literacy amongst male and female investors.

Keywords Behaviour finance, Behaviour biases, Herding, Mental Accounting, Regre Averson, Disposition financial literacy, Investment decision.

INTRODUCTION

During the COVID-19 pandemic period, there are many indications that behavioral biases play an important role in investment decision making. Conventional financial theory considers individuals to be rational investors (Baker and Filbeck, 2013) in making investment decisions, they evaluate all available information, some researchers (Barber and Odean, 2008) reveal that investors act irrationally. There are several biases in human psychology (Hoffmann et al., 2010). Some behavioral biases that may emerge during this period include herding. Another behavioral bias effect phenomenon that may occur is regret aversion, such as the tendency to avoid making decisions that might cause regret in the future. During the post-pandemic period, some investors may become more careful and tend to choose investment strategies that are considered more conservative or safe to avoid potential regrets if the market experiences high volatility in government employees.



According to Renu Isidore R. and Christie P (2019), they state that regret aversion bias causes investors to postpone decisions which result in regret. Regrets that are detrimental to investors will monitor the price of shares that have been sold and tend to regret it if the price increases after the sale. Another behavioral bias effect is: mental accounting that occurs in Indonesia, such as the tendency to treat money or assets differently based on certain categories or "accounts", not as a single unit. During the post-pandemic period, government employees may engage in mental accounting by treating emergency money or long-term investments differently. For example, they may be more reluctant to use emergency money because it is considered "special savings" for specific emergencies. According to Renu Isidore R. and Christie P (2019), mental accounting causes investors to see every investment in terms of its value. Lin (2011) recommends that lack of technical ability is a result of behavioral biases and that a person can make appropriate investment decisions based on their abilities. Nicolosi et al. (2009) stated that, despite irrational behavior, individuals learn from their investment experiences. Research studies generally conclude that behavioral biases influence investment decisions and education is considered an important tool to overcome biases (Pompian and Wood, 2006) and behavioral biases can be handled using effective means (Pompian, 2012). Therefore, behavioral biases may occur differently according to their level of education. On this basis, I made my research with this title, The Influence of Behavioral Biases on Investment Decisions Moderated by Financial Literacy Among Employees According to Income Level (Take Home Pay) at the Financial Audit Agency. Based on the research background above, the formulation of the problem in this research is as follows,

- Does herding bias influence investment decisions among government employees according to income level?
- Does regret aversion bias influence investment decisions among government employees according to income level?
- Does mental accounting bias influence investment decisions among government employees according to income level?
- Does financial literacy influence investment decisions among government employees according to income level?
- Is financial literacy able to moderate the relationship between herding bias on investment decisions among government employees according to income level?
- Is financial literacy able to moderate the relationship between regret aversion bias on investment decisions among government employees according to income level?
- Is financial literacy able to moderate the relationship between mental accounting bias on investment decisions among government employees according to income level?

LITERATURE REVIEW

Behavior Biases Theory by Daniel Kahneman and Amos Tversky, 2007 refers to the human tendency to make irrational or suboptimal decisions due to emotional or psychological biases. In behavioral economics and finance literature, many behavioral biases

have been identified. Based on research by Anshita Bihari and Manoranjan Dash; Sanjay Kumar Kar; Kamalakanta Muduli; Anil Kumar; and Sunil Luthra (2022), concluded that behavioral biases play an important role in investors' cognitive thought processes. This creates a map of biased perceptions in investors' minds, thereby influencing irrational decisions. In this research, the author took three behavioral biases, namely: herding, regret aversion, and mental accounting. Herding theory refers to the tendency of individuals to follow the actions of the majority or group, without conducting in-depth independent analysis. In these situations, decisions are made not based on fundamental information or rational analysis, but rather out of a fear of missing out or a desire to "jump on the bandwagon." For example: if the market is in a bullish (upward) trend, one may tend to go with the flow and buy assets or shares that have risen in value. Malik and Elahi (2014) stated that herding bias has a significant effect on investor decisions. According to Maqsood Ahmad & Qiang Wu (2022), herding behavior has a positive influence on individual investor decision making. Regret aversion bias theory is that investors be afraid when making decisions as a result of the trauma of losses they have experienced in the past (Yohnson, 2008). Indicators for assessing regret aversion bias according to Ady & Hidayat (2019) include: (1) experience of losing investments; (2) Feelings of regret about investing in a stock or instrument; and (3) the impact of investment losses based on experience. Many researchers (Kengatharan and Kengatharan, 2014; Lim, 2012; Khan, 2017) found that aversion to regret can have a positive impact on the decision-making process.

Mental accounting theory according to Richard H. Thaler covers how people manage and respond to financial losses or gains. This understanding can impact investment decision making, where a person may pay special attention to certain aspects of their portfolio based on how they mentally categorize and view that money. According to Renu Isidore R. and Christie P (2019) show that there is a significant negative correlation found between annual income and bias: representativeness, loss aversion, availability and mental accounting. This means that investors with high annual income are more likely to show lower mental accounting bias. Likewise, investors with lower annual income tend to do the same, indicating a higher mental accounting bias. Mental accounting is the process of evaluating and differentiating your own money into various mental accounts (Thaler); this is known as your two-pocket theory. This bias was pointed out by Thaler. Chandra (2008) states that the investment decision process is influenced by mental accounting bias. Research concludes that this behavioral bias influences investment decisions, namely (Hon-Snir et al., 2012; Roth and Voskort, 2014). Therefore, research by Mohd Adil, Yogita Singh and Mohd. Shamim Ansari (2021) concluded that financial literacy can cause a large gap between behavioral biases and investment decisions. Financial literacy according to Annamaria Lusardi and Olivia S. Mitchell includes more than just knowledge, it includes the understanding and skills an individual needs to make good financial decisions and manage personal finances effectively.



METHOD

A cross-sectional research design has been considered in this study which aims at a collective quantitative exploration in examining the moderating influence of financial literacy in the relationship between behavioral biases and investment decisions of investors. This research uses primary data because according to Lin (2011), primary data more accurately imitates aspects of investor behavior regarding investment decisions compared to secondary data. In this research, the population used was government employees in Indonesia. The respondents considered were government employees at BPK RI. The author uses purposive sampling technique. The results obtained from this sample can provide sufficient evidence, 215 people were targeted to participate in filling out the questionnaire. Situation-based questions use Likert and SUM scales. The Likert scale used is 5 points ranging from 1 (strongly agree) to 5 (strongly disagree). To collect data, this research uses primary data obtained through questionnaires, then secondary data obtained from observations of literature studies through academic studies of books; journal scientific articles; credible documents and reports such as regulations and other OJK & financial websites. This research uses Partial Least Squares Structural Equation Modeling (PLS-SEM), a multivariate statistical analysis method that can handle various types of data, including data in the form of quantities or interval scales.

- a. Descriptive Statistical Analysis
- b. Instrument Test (Outer Model)
 - 1) Validity test
 - 2) Reliability test
- c. Measurement Model (Inner Model)
- d. Hipotesis Bootstrapping test.

RESULTS AND DISCUSSION

The results of the validity test for variables that have been processed using SmartPLS can be shown in the following table:

a) Validity Variabel

Table 1. Loadings factor

	Bias Herding	Bias Mental Accounting	Bias Regret Aversion	Investment Decisions	Financial Literacy	X1-Z	X2-Z	X3-Z	
Bias Herding * Financial Literacy						1.026			Valid
Bias Mental Accounting * Financial Literacy							0.809		Valid
Bias Regret Aversion *								0,973	Valid

Financial Literacy								
X1.1	0,892							Valid
X1.2	0,896							Valid
X1.3	0,728							Valid
X1.4	0,702							Valid
X1.5	0,864							Valid
X2.1			0,905					Valid
X2.2			0,781					Valid
X2.3			0,882					Valid
X3.1		0,853						Valid
X3.2		0,711						Valid
X3.3		0,763						Valid
X3.4		0,796						Valid
Y1				0,865				Valid
Y2				0,883				Valid
Y3				0,712				Valid
Z					1.000			Valid

Based on the table above, the results of the validity test on the Herding Bias, Mental Accounting Bias, Regret Aversion Bias, and Investment Decision variables show that all data has a calculated $r > r_{table}$, so the questions or indicators are declared valid. This shows that all variable items X1, X2, X3, and Y are declared valid. Meanwhile, variable Z is made binary/dummy because the answer is only 2, so it is not included in the model. Because the type is binary/dummy, the indicator's reliability is not measured.

b) Reliability

SmartPLS output results for composite reliability values can be shown in the following table:

Table 2. Reliability

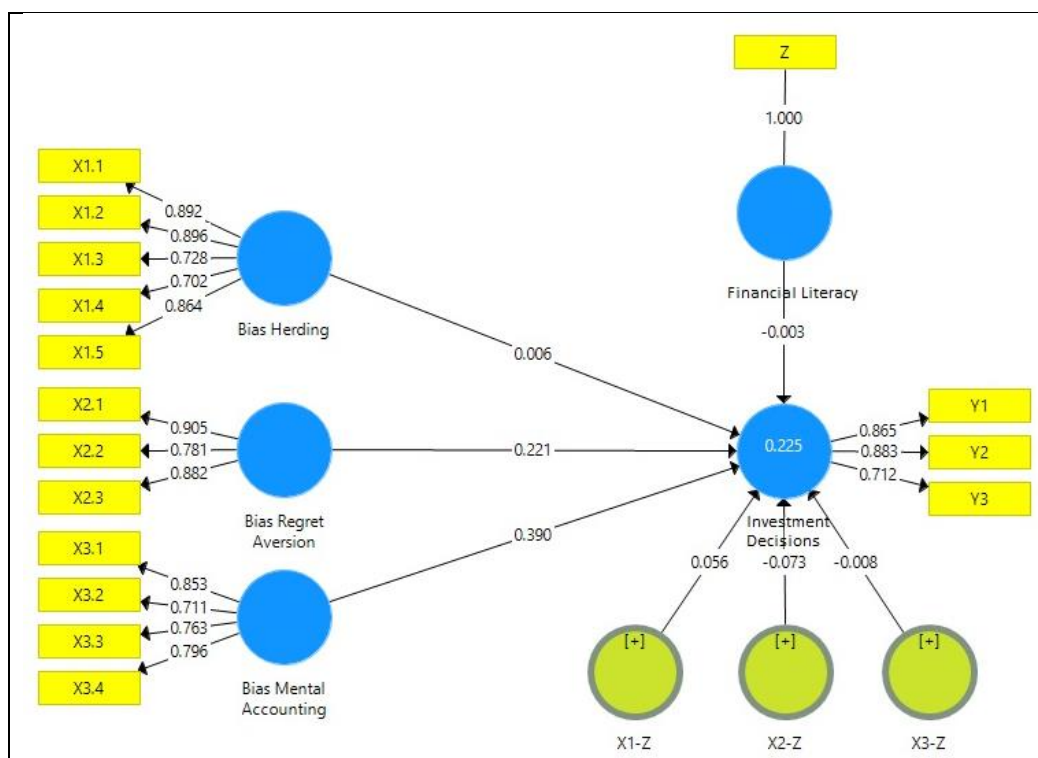
	Cronbach's Alpha	Rho_A	Composite Reliability
Bias Herding	0,88	0,942	0,911
Bias Mental Accounting	0,789	0,794	0,863
Bias Regret Aversion	0,82	0,820	0,893
Investment Decisions	0,757	0,759	0,863
Financial Literacy	1.000	1.000	1.000
X1-Z	1.000	1.000	1.000
X2-Z	1.000	1.000	1.000
X3-Z	1.000	1.000	1.000

So, it can be concluded that the construct has good reliability.



c) Outer Model

The measurement model for validity and reliability testing, the coefficient of determination of the model and the path coefficient of the equation model, can be seen in the following figure:



Picture 1. Image Outer Model Algorithm

d) Convergent Validity

This shows that variable indicators that have a loading factor value greater than 0.70 have a high level of validity, so they meet convergent validity.

e) Average Variance Extracted (AVE)

Latent variables can explain on average more than half of the variance of the indicators.

Table 3. Average Variance Extracted (AVE)

	Average Variance Extracted (AVE)
Bias Herding	0,674
Bias Mental Accounting	0,613
Bias Regret Aversion	0,736
Investment Decisions	0,678

Financial Literacy	1.000
X1-Z	1.000
X2-Z	1.000
X3-Z	1.000

From the data in the table above, it can be concluded that all variables have an AVE value > 0.5 , so all existing variables can be said to have good convergent validity. This means that the latent variable can explain on average more than half of the variance of the indicators.

f) Discriminant Validity

Discriminant Validity is the extent to which a construct is truly different from other constructs (the construct is unique).

Table 4. Validitas Diskriminan (HTMT)

	Bias Herding	Bias Mental Accounting	Bias Regret Aversion	Investment Decisions	Financial Literacy	X1-Z	X2-Z	X3-Z
Bias Herding								
Bias Mental Accounting	0,254							
Bias Regret Aversion	0,229	0,149						
Investment Decisions	0,163	0,527	0,329					
Financial Literacy	0,036	0,101	0,079	0,097				
X1-Z	0,055	0,064	0,148	0,019	0,126			
X2-Z	0,08	0,119	0,048	0,079	0,023	0,21		
X3-Z	0,157	0,042	0,04	0,05	0,164	0,27	0,216	

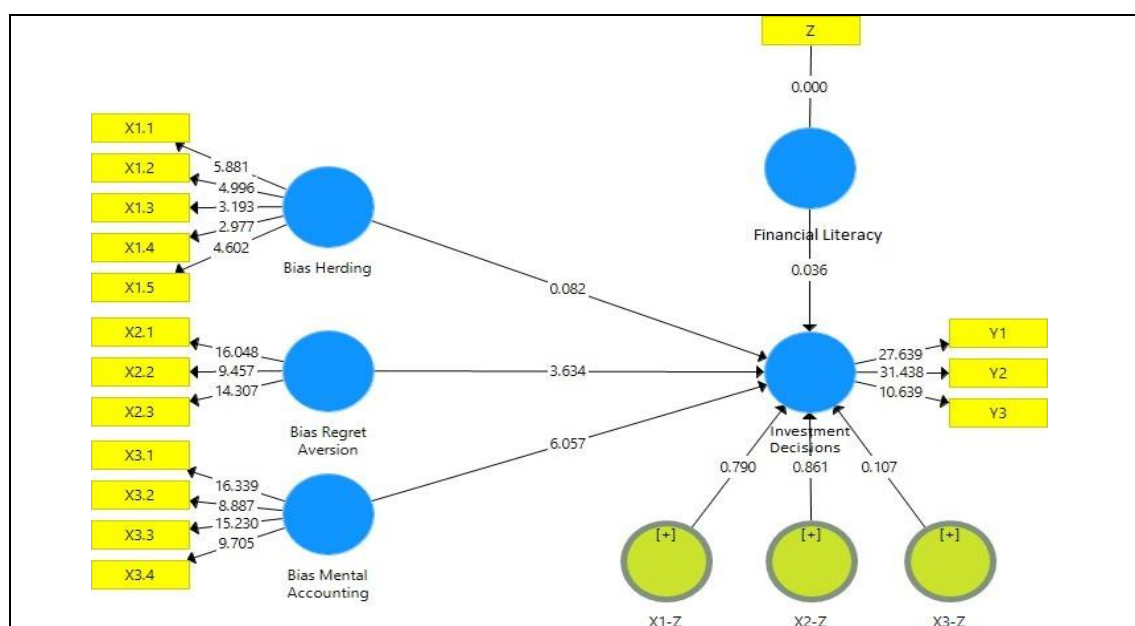
From the table above it can be concluded that all variables have an HTMT value < 0.90 , meaning that the discriminant validity is good, or is completely different from other constructs (the construct is unique).

g) Inner Model Test

After testing the outer model which has met, the next step is testing the inner model (structural model).

h) Path Coefficient

Seeing the significance of the influence between constructs can be seen from the path coefficient.



Picture 2. Image Outer Model Bootstrapping

i) *R-Square*

Table 5. *R-Square*

	R Square	R Square Adjusted
Investment Decisions	0,225	0,199

The conclusion from testing the R-Square value in Investment Decisions is that the Adjusted RSquare for the path model using moderating variables is 0.199. This means that the behavioral biases variable (herding, mental accounting and regret aversion) on financial literacy in explaining investment decisions is 19.9%, moderated by financial literacy. Thus, the model is classified as a weak (bad) model.

j) *F-Square*

Table 6. *F-Square*

	Bias Herding	Bias Mental Accounting	Bias Regret Aversion	Investment Decisions	Financial Literacy	X1-Z	X2-Z	X3-Z
Bias Herding				0,000				
Bias Mental Accounting				0,184				
Bias Regret Aversion				0,059				
Investment Decisions				0,000				
Financial Literacy				0,000				
X1-Z				0,004				

X2-Z				0,004				
X3-Z				0,000				

The conclusion from the F-Square test in the table above is:

1. The Herding Bias variable on investment decisions has a value of $F^2 = 0$. So there is a small effect of the exogenous variable on the endogenous variable.
2. The Mental Accounting Bias variable for investment decisions has a value of $F^2 = 0.184$. So there is a moderate/severe effect of the exogenous variable on the endogenous variable.
3. The Regret Aversion Bias variable on investment decisions has a value of $F^2 = 0.059$. So there is a small effect of the exogenous variable on the endogenous variable.
4. The Financial Literacy variable on investment decisions has a value of $F^2 = 0$. So there is a small effect of the exogenous variable on the endogenous variable. 5) Meanwhile, the variables herding, mental accounting, and regret aversion are moderated by financial literacy 0.004; 0.004; and 0. So there is a small effect of the exogenous variable on the endogenous variable.

k) Direct Effect

Table 7. Direct Effect

	<i>Original Sample (O)</i>	<i>Sample Mean (M)</i>	<i>Standard Deviation (STDEV)</i>	<i>T Statistics (O/STDEV)</i>	<i>P Values</i>
Bias Herding -> Investment Decisions	0,006	0,032	0,067	0,082	0,934
Bias Mental Accounting -> Investment Decisions	0,39	0,388	0,064	6.057	0,000
Bias Regret Aversion -> Investment Decisions	0,221	0,219	0,061	3.634	0,000
Financial Literacy -> Investment Decisions	-0,003	-0,005	0,07	0,036	0,971
X1-Z -> Investment Decisions	0,056	0,049	0,071	0,79	0,430
X2-Z -> Investment Decisions	-0,073	-0,064	0,084	0,861	0,390
X3-Z -> Investment Decisions	-0,008	-0,007	0,075	0,107	0,915

The conclusion from the direct effect values in the table above is as follows:



1. The herding bias variable on investment decisions has a path coefficient value of 0.006 and a P-Value of 0.934, meaning it has a positive and significant influence.
2. The mental accounting bias variable on investment decisions has a path coefficient of 0.39 and a P-Value of 0, meaning it has a positive and insignificant influence.
3. The regret aversion bias variable on investment decisions has a path coefficient value of 0.221 and a P-Value of 0, meaning it has a positive and insignificant influence.
4. The financial literacy bias variable on investment decisions has a path coefficient value of -0.003 and a P-Value of 0.971, meaning it has a negative and significant influence.
5. The herding bias variable moderated by financial literacy on investment decisions has a path coefficient value of 0.056 and a P-Value of 0.43, meaning it has a positive and significant influence.
6. The mental accounting bias variable moderated by financial literacy on investment decisions has a path coefficient value of -0.073 and a P-Value of 0.39, meaning it has a negative and significant influence.
7. The regret aversion bias variable moderated by financial literacy on investment decisions has a path coefficient value of -0.008 and a P-Value of 0.915, meaning it has a negative and significant influence.

Analysis of the results of this research is an analysis of the validity of concepts, ideas and previous research as shown by the results of previous research as well as behavioral patterns that need to be carried out to overcome them. Below there are seven main sections that will be discussed in the analysis of the results of this research as follows:

The Effect of Herding Bias on Investment Decisions The direct influence

Hypothesis concludes that herding bias has a significant effect on investment decisions. The herding bias variable on investment decisions has a path coefficient value of 0.006 and a P-Value of 0.934, meaning it has a positive and significant influence.

The Influence of Mental Accounting Bias on Investment Decisions The direct influence

Hypothesis concludes that mental accounting bias has no significant effect on investment decisions. The mental accounting bias variable on investment decisions has a path coefficient of 0.39 and a P-Value of 0, meaning it has a positive and insignificant influence.

The Effect of Averson's Regret Bias on Investment Decisions The direct influence

Hypothesis concludes that regret aversion bias has no significant effect on investment decisions. The regret aversion bias variable on investment decisions has a path coefficient value of 0.221 and a P-Value of 0, meaning it has a positive and insignificant influence.

The Influence of Financial Literacy on Investment Decisions The direct influence

Hypothesis concludes that financial literacy has a significant effect on investment decisions. The financial literacy bias variable on investment decisions has a path coefficient value of -0.003 and a P-Value of 0.971, meaning it has a negative and significant influence.

The effect of Herding Bias on Investment Decisions is moderated by Financial Literacy The direct influence

Hypothesis concludes that herding bias is moderated by financial literacy and has a significant effect on investment decisions. The herding bias variable moderated by financial literacy on investment decisions has a path coefficient value of 0.056 and a P-Value of 0.43, meaning it has a positive and significant influence.

The influence of Mental Accounting Bias on Investment Decisions is moderated by Financial Literacy The direct influence

Hypothesis concludes that mental accounting bias is moderated by financial literacy and has a significant effect on investment decisions. The mental accounting bias variable moderated by financial literacy on investment decisions has a path coefficient value of -0.073 and a P-Value of 0.39, meaning it has a negative and significant influence.

The influence of the Averson Regret on Investment Decisions is moderated by Financial Literacy The direct influence

Hypothesis concludes that the regret aversion bias is moderated by financial literacy and has a significant effect on investment decisions. The regret aversion bias variable moderated by financial literacy on investment decisions has a path coefficient value of -0.008 and a P-Value of 0.915, meaning it has a negative and significant influence.

CONCLUSION

The purpose of this research is to examine the behavioral factors that influence each investor's investment decisions based on demographic factors and to examine the relationship between behavioral biases (herding, mental accounting, and averson's regret) and investment decisions when investors choose to invest under the influence of moderator variable, namely financial literacy. The author has anticipated the theoretical background, through a fusion of behavioral finance literature.

Furthermore, it examines that investment decisions have a relationship with government employees' behavioral biases that influence financial literacy, and concludes that government employees with varying financial literacy and biases may also vary in the proportion of their investments and also summarizes that certain behavioral biases such as: mental accounting, and regret averson which are moderated by financial literacy have a negative and significant effect on investment decisions among government employees, while herding has a positive and significant effect.



The research results also show that bias herding, mental accounting, and regrets on investment decisions have a positive and significant influence. Meanwhile, financial literacy on investment decisions has a negative and significant influence. Furthermore, herding bias is moderated by financial literacy on investment decisions and has a positive and significant influence. Meanwhile, mental accounting bias and regret aversion are moderated by financial literacy on investment decisions and have a negative and significant influence.

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