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# Investing Through Bias: How Financial Literacy Moderates the Impact of Cognitive and Emotional Biases on Investment Choices

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**ABSTRACT:** This study aims to analyze the effects of nine cognitive biases and six emotional biases on investment decisions among young investors, while examining the moderating role of financial literacy. Employing an associative design with a quantitative descriptive approach, this research surveyed 100 investors aged 18–30—categorized as the youngest investor segment by the Indonesia Central Securities Depository (KSEI)—residing in Denpasar. Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with a Moderated Regression Analysis (MRA) approach. The findings reveal that both cognitive and emotional biases negatively affect investment decisions. Moreover, financial literacy significantly moderates the impact of cognitive biases but is ineffective in reducing the influence of emotional biases. These findings offer valuable implications for designing more targeted financial literacy programs aimed at minimizing behavioral distortions in investment decision-making, particularly among young investors.

**KEYWORDS:** Cognitive Bias, Emotional Bias, Investment Decision, Financial Literacy

## INTRODUCTION

Young investors, typically aged in their twenties to early thirties, tend to exhibit more aggressive investment preferences. They often favor growth-oriented and speculative financial instruments (Gitman et al., 2017, p. 49). While such strategies offer the potential for high returns, they also carry higher risks. Moreover, young investors represent a dominant and dynamic demographic segment, heavily influenced by technology and characterized by more impulsive psychological tendencies and greater risk tolerance. At the same time, they generally face financial instability, posing unique challenges compared to older investors when navigating capital market dynamics (Qosidah & Purnama, 2025).

However, this investment aggressiveness among young investors is not always supported by adequate financial literacy. The Organisation for Economic Co-operation and Development (OECD, 2023) reported that individuals aged 18 to 29 generally possess low levels of financial literacy, with a tendency to make impulsive and less prudent financial decisions. This gap between investment boldness and financial understanding increases their vulnerability to losses, particularly in volatile markets.

Supporting the OECD's findings, several studies have demonstrated that age and psychological factors influence investment decisions. Senda et al. (2020) found that young investors often make less cautious decisions, potentially resulting in lower profitability compared to older investors. Similarly, Dewi & Wiagustini (2022) noted that young investors tend to exhibit higher risk tolerance. Research by Rahman & Gan (2020) in Malaysia also revealed a significant impact of behavioral factors on investment decisions among young investors. A study by Candraningrat et al. (2018) focusing on investors in Bali—most of whom were young—also emphasized the critical role of individual behavior in the decision-making process.

These findings illustrate the pivotal role of psychology and behavior in investment decision-making, which lies at the core of behavioral finance (Pompian, 2021, p. 4). Behavioral finance theory emerged to analyze psychological biases often overlooked in traditional financial theories (Candraningrat et al., 2018). Kahneman and Tversky (1979) emphasized the importance of psychological characteristics in financial decision-making. Behavioral finance identifies the psychological elements that drive investor behavior and investigates the behavioral biases influencing individual decision-making (Darmayanti et al., 2022). Such biases frequently lead to irrational investment choices and suboptimal outcomes (CFA Institute, 2022, p. 26).

Behavioral finance generally classifies biases into two categories: cognitive biases and emotional biases (Pompian, 2021a, p. 27). Darmayanti et al. (2022) further explain that behavioral finance explores both cognitive factors (mental processes) and emotional factors affecting financial planning and investment decisions. Cognitive biases reflect systematic errors in statistics, information

processing, or memory, leading to flawed reasoning and analysis (Pompian, 2021, p. 27). For example, individuals may fail to update probabilities accurately, misjudge available information, or face information overload. The CFA Institute (2022, p. 67) identifies several key cognitive biases—such as conservatism, confirmation bias, representativeness bias, illusion of control, hindsight bias, anchoring bias, mental accounting, framing bias, and availability bias—that can distort investment decisions.

In contrast, emotional biases stem from emotional reactions rather than analytical thinking. These biases often lead decision-makers to stubbornly adhere to their initial positions, ignoring better alternatives (Zaleskiewicz & Traczyk, 2020, p. 128). Emotional biases can cause impulsive decisions that overlook broader consequences (Yuningsih, 2020, p. 4). The CFA Institute (2022, p. 67) highlights emotional biases such as loss aversion, overconfidence, self-control bias, status quo bias, endowment effect, and regret aversion, all of which can hinder rational financial decision-making and effective wealth management.

Research by Özen & Ersoy (2019) analyzed behavioral tendencies from both cognitive and emotional perspectives. Their findings identified common behavioral finance biases that reduce investment rationality, including cognitive biases such as mental accounting and framing bias, and emotional biases such as overconfidence and regret aversion. However, not all cognitive biases are equally relevant across all contexts. For instance, Hossain & Siddiqua (2022) found that only loss aversion had a significant impact on irrational investment decisions. While overconfidence bias remained influential, its effect was insignificant in their study. These varying results emphasize the need to consider demographic and contextual factors, as demonstrated by Syarkani & Alghifari (2022), who found a significant positive impact of overconfidence bias on investment decisions.

In addition to cognitive and emotional biases, several studies suggest that financial literacy also plays a crucial role in shaping investment decisions, potentially explaining inconsistent findings in previous research (Dewi & Wiagustini, 2022). According to Indonesia's Financial Services Authority (POJK No. 76/POJK/07/2016), financial literacy refers to the knowledge, confidence, and skills that influence individuals' financial behavior and decision-making, leading to improved financial well-being.

Baihaqqy & Sari (2020) state that financial literacy can positively influence investment decision-making. It is commonly used to mitigate the negative effects of behavioral finance biases and enhance financial decision quality (Lie & Wiagustini, 2020). Munisamy et al. (2022) describe financial literacy as comprising three dimensions: financial knowledge, financial attitude, and financial behavior, a model aligned with the OECD (2023) framework. Zaleskiewicz & Traczyk (2020, p. 91) further argue that individuals with higher financial literacy are better at managing money, participating in stock markets, and preparing for retirement. Therefore, financial literacy is seen as a potential moderating factor in the relationship between behavioral biases—both cognitive and emotional—and investment decisions.

Several studies affirm this role of financial literacy. Rasool & Ullah (2020) concluded that higher financial literacy reduces behavioral biases among investors. Sartika & Humairo (2021) found that financial literacy mitigates the impact of emotional biases, specifically overconfidence, on investment decisions, a finding also supported by Ahmad & Shah (2020). Financial literacy has also been shown to moderate the effects of cognitive biases such as conservatism, mental accounting, and framing bias (Özen & Ersoy, 2019). However, some studies report differing results. For example, Wendy (2021) found that financial literacy did not mitigate the impact of conservatism bias, while Baker et al. (2019) reported that it had no effect on overconfidence bias.

In summary, much of the existing literature has consistently found negative effects of both cognitive and emotional biases on investment decisions. However, many prior studies only examined a limited number of biases without distinguishing between cognitive and emotional categories, despite their distinct characteristics. Additionally, the moderating role of financial literacy remains inconclusive across different studies.

**LITERATURE REVIEW AND HYPOTHESIS**

Behavioral finance identifies psychological elements within investors and examines behavioral biases experienced by individual investors (Darmayanti et al., 2022). Cognitive bias, as one of the key biases in behavioral finance, relates to an individual's capacity to process and comprehend information (Yuningsih, 2020, p. 3). Such biases result from basic statistical errors, information processing flaws, or memory distortions, which can lead to deviations from rational investment decisions (Pompian, 2021a, p. 27). Investors are not always rational. Baker et al. (2019) found that certain cognitive biases, such as mental accounting and representativeness bias, influence investment decisions among investors in India. Similarly, Ogunlusi & Obademi (2021) reported a significant negative relationship between cognitive bias and investment decisions in Nigeria. Ani & Özarı (2020) also identified a negative correlation between cognitive biases and investment decisions. However, a contrasting finding was reported by Septian et al. (2022), who observed that heuristic-based cognitive biases positively affect investment decisions by enhancing decision-making efficiency.

H1: Cognitive bias negatively affects investment decisions.

Behavioral finance posits that every individual possesses psychological biases that can hinder rational decision-making, often resulting in suboptimal investment decisions and poor investor performance (Kadhum & Saidi, 2022). Emotional bias refers to biases driven by instinct or intuition, often arising from emotional reasoning. Emotional biases are associated with irrational investment decisions (Pompian, 2021a, p. 27). Emotional dominance in decision-making can lead to impulsive choices without adequate consideration of the consequences (Yuningsih, 2020, p. 4). Akinkoye & Bankole (2020) found that emotional biases such as loss aversion, overconfidence, and regret aversion significantly affect suboptimal investment decisions. Pradhana (2018) similarly identified that emotional biases, including overconfidence, illusion of control, regret aversion, and status quo bias, have a significant impact on investment decisions. Ahmad & Shah (2020) also found a negative association between overconfidence bias and investment decisions, supported by Rahman & Gan (2020). However, other studies yielded mixed results, with biases such as loss aversion (Pradhana, 2018) and endowment effect (Armansyah, 2022) showing no significant impact on investment decisions.

H2: Emotional bias negatively affects investment decisions

Financial literacy is widely recognized as an effective approach to enhancing the quality of investment decision-making. It is defined as the knowledge, skills, abilities, and confidence necessary to make sound financial decisions (Zaleskiewicz & Traczyk, 2020, p. 91). Financial literacy enables investors to improve their financial decision-making quality and overall financial well-being (Garg & Singh, 2018). Upadana & Herawati (2020) found that financial literacy positively influences investment decisions. Similarly, Weerawansa & Morage (2019) reported that financial literacy moderates the relationship between behavioral biases and investment decisions. However, Wendy (2021) found that financial literacy did not effectively reduce the impact of conservatism bias—a type of cognitive bias—on investment decisions.

H3: Financial literacy positively moderates the relationship between cognitive bias and investment decisions

Financial literacy refers to the ability to process financial information and make personal financial decisions (Yuningsih, 2020, p. 37). Individuals with high financial literacy are better equipped to reflect on short-term and long-term goals and apply their knowledge to achieve financial objectives (Zaleskiewicz & Traczyk, 2020, p. 91). Previous studies have shown that higher levels of financial literacy generally lead to better investment decision-making (Safryani et al., 2020). Ahmad & Shah (2020) highlighted the role of financial literacy in mitigating the negative effects of overconfidence—a type of emotional bias—on investment decisions. However, other studies, such as those by Novianggie & Asandimitra (2019) and Baker et al. (2019), found no significant moderating effect of financial literacy on emotional biases. Despite such mixed findings, theoretical perspectives suggest that financial literacy has a positive moderating effect, reducing the impact of emotional biases on investment decisions.

H4. Financial literacy positively moderates the relationship between emotional bias and investment decisions

## METHODS

This study is an associative research that aims to analyze the effects of cognitive and emotional biases on investment decisions among young investors in Denpasar, Bali, with financial literacy serving as a moderating variable. The variables examined in this study include cognitive bias, emotional bias, financial literacy, and investment decision-making. A quantitative descriptive method was employed, with a survey used as the primary data collection technique. The research was conducted in 2025, targeting a sample of individual investors aged 18 to 30 years residing in Denpasar, Bali. Data were analyzed using SEM-PLS to test the moderating role of financial literacy in the relationships between the studied variables.

## RESULT AND DISCUSSION

*Inner Model*

The evaluation of this model can be assessed through several indicators, one of which is the coefficient of determination ($R^2$). To measure the predictive power of the structural model in SEM-PLS analysis, the R-square ($R^2$) value is utilized. According to the criteria proposed by Chin & Wynne (1999), as cited in Rahadi (2023, p. 122), an R-square value close to 0.67 is considered strong, 0.33 as moderate, and 0.19 as weak. The R-square values in this study are presented in the following table:

**Table 1. R-Square**

| Variable | R-Square |
|---|---|
| Investment Decision (Y) | 0.369 |

Primary Data, 2025

In the context of Chin & Wynne's criteria, an R-square value of 0.369 can be classified as indicating moderate predictive power. Based on the statistical analysis, it can be concluded that an R-square value of 0.369 demonstrates the model's moderate ability to explain the variance in Investment Decisions (Y). Although this R-square value does not reflect a strong predictive capability, it suggests that approximately 36% of the variance in Investment Decisions (Y) can be explained by the variables in the model, namely Financial Literacy (M), Cognitive Bias (X1), Emotional Bias (X2), and the interaction between Financial Literacy and Cognitive Bias (M × X1). Thus, the model in this study shows a moderate capacity to explain the relationships among these variables. The remaining 64% of the variance may be attributed to other factors not included in this study or to more complex influences.

*Hypothesis Testing*

Hypothesis testing in this study was conducted by analyzing the Original Sample Estimates (O) to determine the direction of relationships among the observed variables. The testing utilized the Moderated Regression Analysis (MRA) technique, estimated through Structural Equation Modeling–Partial Least Squares (SEM-PLS) (Ghozali, 2014, p. 177).

The following criteria were applied for hypothesis evaluation:

- A hypothesis is rejected if the t-statistic is less than 1.96 or if the p-value (significance level) exceeds 0.05.
- Conversely, a hypothesis is accepted if the t-statistic exceeds 1.96 or the p-value is less than 0.05.

The full results of the hypothesis testing are presented in the corresponding tables attached to this study.

**Table 2. Hypothesis Testing**

| Hypothesis | Original sample (O) | Sample mean (M) | P values | Result |
|---|---|---|---|---|
| M -> Y | 0.453 | 0.463 | 0.000 | Accepted |
| X1 -> Y | -0.228 | -0.251 | 0.040 | Accepted |
| X2 -> Y | -0.165 | -0.170 | 0.036 | Accepted |
| M x X1 -> Y | 0.254 | 0.254 | 0.007 | Accepted |
| M x X2 -> Y | -0.059 | -0.065 | 0.569 | Rejected |

Primary Data, 2025

The results of this study indicate that financial literacy has a positive and significant influence on investment decisions among young investors in Denpasar, Bali. The path coefficient from financial literacy to investment decisions was recorded at 0.453 with a p-value of 0.000, indicating strong statistical significance. This suggests that the higher the level of financial literacy possessed by young investors, the better the quality of their investment decisions. This finding aligns with previous research by Safryani et al. (2020) and Garg & Singh (2018), which emphasized that financial literacy enhances the ability to make sound financial decisions, ultimately improving financial well-being. Moreover, this result reinforces the theoretical framework that positions financial literacy as an essential factor in fostering rational and effective investment behavior.

Conversely, cognitive bias demonstrated a negative and significant effect on investment decisions, with a path coefficient of -0.228 and a p-value of 0.040. This finding suggests that higher levels of cognitive bias among young investors are associated with poorer investment decisions. The cognitive biases assessed in this study include nine types: conservatism, confirmation, representativeness, illusion of control, hindsight, anchoring, mental accounting, framing, and availability biases. Among these, conservatism bias emerged as the most dominant, with the highest loading factor of 0.792. This indicates that young investors tend to rely heavily on initial information and are reluctant to update their beliefs even when presented with new, more accurate data.

This result is particularly relevant given the demographic characteristics of the respondents—primarily Generation Z investors, who are known for their rapid information processing but limited investment experience. Their tendency to anchor on initial information without critical reassessment increases their susceptibility to conservatism bias. These findings are consistent with prior studies by Özen & Ersoy (2019), Weerawansa & Morage (2019), and Sharma & Kumar (2022), which also reported the negative effects of cognitive biases on investment decision-making. Hence, this study strongly supports Hypothesis 1 (H1), confirming the detrimental impact of cognitive biases on investment decisions and reinforcing the behavioral finance theory, which emphasizes the role of psychological factors in financial decision-making.

Similarly, emotional bias also showed a negative and significant influence on investment decisions, with a path coefficient of -0.165 and a p-value of 0.036. This confirms that emotional biases impair the quality of investment decisions among young investors. Six types of emotional biases were evaluated: loss aversion, overconfidence, self-control bias, status quo bias, endowment effect, and regret aversion. The most prominent among these were status quo bias (loading factor 0.910) and

endowment bias (loading factor 0.909), followed by loss aversion (0.884). These findings indicate that young investors exhibit a strong tendency to maintain the status quo, overvalue owned assets, and exhibit high fear of losses.

Such tendencies may be attributed to the psychological traits of young investors, who often seek psychological comfort, avoid change, and exhibit strong emotional sensitivity, despite their digital savviness. These results are consistent with studies by Pradhana (2018), Ahmad & Shah (2020), Akinkoye (2020), and others, which showed that emotional biases can significantly impair investment decisions. Consequently, this study supports Hypothesis 2 (H2), confirming the negative impact of emotional biases on investment decisions and highlighting the importance of emotional regulation for young investors to achieve more rational and effective investment outcomes.

In terms of moderation effects, the interaction between financial literacy and cognitive bias displayed a positive and significant moderating role, with a path coefficient of 0.254 and a p-value of 0.007. This suggests that higher financial literacy enhances young investors' ability to mitigate the negative effects of cognitive biases on investment decisions. Notably, financial literacy also had a direct positive effect on investment decisions, indicating its role as a quasi-moderator—acting both as a direct predictor and a moderator. Among the dimensions of financial literacy, financial knowledge emerged as the strongest, with higher average loading factors than financial attitude and behavior. This indicates that financial knowledge plays a crucial role in counteracting cognitive biases.

These findings corroborate prior research by Safryani et al. (2020), Garg & Singh (2018), Weerawansa & Morage (2019), and Ahmad & Shah (2020), all of which emphasized the importance of financial literacy in improving investment decision-making and moderating the adverse effects of cognitive biases. Therefore, this study provides robust support for Hypothesis 3 (H3), underscoring the critical role of financial literacy in promoting rational decision-making and reducing the negative impacts of cognitive biases.

However, the interaction between financial literacy and emotional bias was found to be insignificant in this study, with a path coefficient of -0.059 and a p-value of 0.569. This suggests that financial literacy does not effectively moderate the influence of emotional biases on investment decisions. Emotional biases are inherently more difficult to correct than cognitive biases, as they stem from emotional impulses and intuition rather than logical reasoning. This explains why financial literacy alone may not be sufficient to alter emotionally-driven decision patterns. This finding is consistent with studies by Novianggie & Asandimitra (2019) and Baker et al. (2019), which also found no moderating effect of financial literacy on emotional biases.

Interestingly, financial attitude—the dimension most conceptually related to emotional biases—had the lowest average loading factors among the financial literacy dimensions, suggesting its limited role in moderating emotional influences. As a result, financial literacy in this study acts as a predictor moderator—having a direct effect on investment decisions but lacking significant interaction with emotional biases. Thus, Hypothesis 4 (H4) is not supported. These findings imply that other factors beyond financial literacy may be needed to effectively mitigate the negative impacts of emotional biases on investment decisions.

**CONCLUSION**

This study found that both cognitive and emotional biases have significant negative effects on investment decisions among young investors. Cognitive biases—such as conservatism, confirmation, representativeness, illusion of control, hindsight, anchoring, mental accounting, framing, and availability—were shown to disrupt rational decision-making, leading to suboptimal investment outcomes. Similarly, emotional biases—including loss aversion, overconfidence, self-control bias, status quo bias, endowment effect, and regret aversion—also negatively affect investment decisions. However, financial literacy plays a critical role in mitigating the negative impact of cognitive biases by helping investors better understand financial matters and avoid common reasoning errors. In contrast, financial literacy was found to be ineffective in reducing the influence of emotional biases, suggesting that additional strategies beyond financial literacy may be needed to address these emotional factors in investment decision-making.

*Managerial Implication*

The findings of this study offer important managerial implications for financial institutions, investment advisors, and policymakers. Efforts to improve financial literacy programs should focus on enhancing investors' cognitive skills, particularly in recognizing and mitigating cognitive biases, as these have been shown to significantly affect investment decisions. Training programs should emphasize financial knowledge and critical thinking to strengthen rational decision-making among young investors. However, since financial literacy alone is not sufficient to reduce emotional biases, investment service providers may need to integrate behavioral coaching, emotional regulation strategies, or tailored advisory services to address emotional influences on investment behavior effectively. This dual approach can help investors, especially those in younger age groups, make more objective and prudent investment decisions.

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