How do Education and Investment Experience Moderate the Association Between Overconfidence and Investment Decisions?

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Abstract. This study investigates how education level and investment experience moderate the association between overconfidence and investment decision. We used a quantitative cross-sectional research design. Data was collected from 149 individual investors in the Indonesian Stock Exchange through an online questionnaire. Moderated Regression Analysis (MRA) was employed to test hypotheses. The findings emphasize that overconfidence significantly influences investment decisions, irrespective of investors' education and investment experience. Interestingly, education's direct impact on decisions is limited; however, it appears to enhance overconfidence, potentially leading to more irrational choices due to increased investors' overconfidence. In contrast, investment experience acts as a buffer against investment decisions, highlighting the value of accumulated insights. Additionally, the study reveals that investment experience moderates the relationship between overconfidence and investment choices. These results align with behavioral theory, illuminating the intricate interplay of human behavior in financial decision-making. The study offers insights for policymakers and financial institutions, underlining the need for customized interventions to strengthen financial literacy and recognize the intricate interplay of experience and overconfidence biases.

Keywords: Investment decision; overconfidence; education level; investment experience; Indonesian Stock Exchange.

1 Introduction

Traditional finance theories assume that individual investors act rationally by considering all available information when making investment decisions [1]. Proponents of fundamental theories like the Efficient Market Hypothesis (EMH) assert that markets are largely efficient [2]. Efficient markets characterize investors as logical or rational, impartial, and consistent individuals who make ideal decisions without being swayed by psychological or emotional factors [3], [4]. This leads to the Efficient Market Hypothesis (EMH), suggesting that no investor can consistently outperform the market due to share prices already reflecting all information [5] [3]. Within EMH, stocks trade at fair prices, making it improbable to buy

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undervalued stocks or sell at inflated values due to market efficiency. The sole path to outperform lies in risky investments [2].

However, this rational investor assumption is at odds with reality. Investor behavior often defies rationality, markets are seldom perfect, and share price fluctuations surpass information updates [4], [6], [7]. This discrepancy is illuminated by the understanding that individual investors frequently deviate from rationality, undermining market perfection. Studies by [8] have revealed that investors often act irrationally. Behavioral biases play a significant role in investors' decisions, particularly in stock selection, leading to suboptimal investment performance [9], [10], [11]. Behavioral finance shows why individuals react diversely to situations and how their varied decision-making styles impact financial markets [3], [5]. Behavioral finance suggests that psychological and emotional factors lead to deviations from rational behavior [6], [11]–[15]. Pompian defines behavioral biases as the inclination to make unwise investment decisions due to mental decline [16]. Experts posit that behavioral biases hinder rational decisions, negatively influencing investment choices, performance [4], and market efficiency [3]. Recent research in behavioral finance has unveiled a variety of behavioral biases that impact investors' decisions [17], [16], [18]. According to experts in behavioral finance, everyone possesses these behavioral biases, which hinder them from making rational decisions and can result in unfavorable outcomes in investment decisions, ultimately affecting investors' performance negatively [18]. Additionally, intuitive thinking, judgments, and choices can also influence the soundness of financial decisions or lead to irrational behavior [19], [3], [4], [6], [12], [15], [20].

Several theories have emerged to clarify the intricate relationship between behavioral biases and investment decisions. The prospect theory and bounded rationality theory are two prominent frameworks in this regard. The prospect theory, initially formulated by Kahneman and Tversky [21], proposes that individuals don't base their decisions solely on the final outcomes but rather on the comparison between gains and losses. This perspective involves establishing reference points, which serve as benchmarks for decision-making by assessing gains and losses relative to these reference points. As a result, investors assign different values to gains and losses based on these reference points [21]. On the other hand, the theory of bounded rationality, first introduced by Herbert Simon in 1955, asserts that decision-makers are limited in their ability to make entirely rational choices due to inherent constraints, such as the limited availability of information, cognitive constraints within the mind, and the time constraints under which decisions are made [4], [6], [22]. Consequently, even decision-makers with intentions of optimal choices are compelled to settle for satisfactory decisions within the confines of their data processing and cognitive capacities. To navigate these limitations, individuals employ heuristics, or cognitive shortcuts, which can inadvertently lead to systematic judgment errors. While such heuristics facilitate decisions that meet a certain level of satisfaction, they do not necessarily maximize utility [4], [6].

Overconfidence, categorized as a heuristic bias, is employed by investors ostensibly to mitigate potential losses in unpredictable scenarios [5], [15]. The investors' tendency to be overconfident has been extensively studied and has become a focal point in behavioral finance [16]. Various dimensions of overconfidence have been explored, such as overestimating personal knowledge, believing one's abilities to surpass others (better-than-average effect), or an inflated perception of control over future events (illusion of control) [23]. However, the use of overconfidence heuristics by individual investors often leads to diminished technical expertise and reasoning

capacity, culminating in erroneous judgments. Consequently, these irrational decisions detrimentally impact investment performance [4], [12], [18].

Behavioral finance scholars argue that overconfidence heuristics substantially impact financial decision-making. This impact extends to the projection of financial variables, such as earnings or profits, and can even shape the behavior of financial markets [24], [25], [4]. For instance, Hoffmann et al. [26] discovered that investors who engage in fundamental analysis tend to exhibit overconfidence, frequent trading, and higher risk propensity [13]. Lin suggests biases contribute to a deficiency in technical skills and proposes informed decision-making based on individual capabilities in the Taiwanese stock market [27]. Nicolosi et al. observe that individuals learn and adjust their behavior from their irrational investment choices, and additional investment experience makes them better at assessing their abilities and subsequently enhances their investment performance [28].

Furthermore, a growing body of literature highlights the importance of education and investment experience in investment decisions. It underscores the importance of education and investment experience in mitigating investors' heuristic bias [28], [29], [30], [31]. Research has suggested that individuals with higher education levels may be more aware of their cognitive biases, including overconfidence, and more capable of critically assessing information. Higher education can provide a foundation for better decision-making by promoting analytical thinking and a cautious approach [31]. It does not guarantee that higher education eliminates overconfidence, but it can potentially enhance individuals' ability to recognize and mitigate its effects [30], [31]. Investment experience also can play a significant role in reducing overconfidence bias. As individuals gain more exposure to financial markets and investment decision-making, they become more aware of the complexities and uncertainties involved [28]. Experienced investors may have learned from successes and failures, leading to a more balanced and realistic perspective [28], [31]. Over time, they might develop strategies incorporating lessons learned from past decisions. Therefore, having sufficient financial knowledge and experience empowers individuals to discern and select appropriate heuristics from their adaptable repertoire [4].

In conclusion, the synergy between education and investment experience holds significant potential in mitigating the effect of overconfidence on investment decisions. Investors who are well-educated and possess hands-on experience tend to exhibit improved awareness of the boundaries of their knowledge and their ability to foresee outcomes accurately. This enhanced awareness often leads to a greater inclination to seek advice, conduct thorough research, and adopt disciplined decision-making approaches. However, it's essential to recognize that while education and experience contribute to reducing overconfidence, they aren't a complete remedy. Cognitive biases are deeply rooted in human psychology and can affect individuals across all levels of education and experience. Nonetheless, a strong educational foundation and practical experience provide a valuable framework for recognizing and effectively managing these biases. Therefore, the primary goal of this study is to illuminate the potential of education and experience in countering the effect of overconfidence bias on investment decisions. By exploring how these two factors interact within investment decision-making, this research aims to contribute to a deeper understanding of effective strategies for improving decision-making outcomes.

2 Literature review

2.1 Investment Decision

Investment involves utilizing available resources to acquire assets to secure greater future benefits. In the capital market context, these assets typically encompass financial instruments like securities. Assessing the success of investments is determined by the returns yielded by an investment portfolio, which can comprise various assets. Every investor aspires to make optimal investment decisions, and rational investment choices depend on advanced financial understanding or knowledge and access to relevant information [4], [22].

In traditional finance theories, individual investors are assumed to possess complete information and consistently make rational decisions [1]. Rational decision-makers use reasoning and logic to optimize decisions [29]. When investors engage in rational decision-making, they undertake a sequence of steps, including identifying demand, conducting information searches, evaluating alternatives, and ultimately arriving at investment decisions that align with reason [29]. However, in practice, investors often deviate from this logical process due to the constraints of having limited information. Behavioral finance challenges this assumption by proposing that imperfect information, bounded rationality, anomalies, heuristics, and various psychological and behavioral biases frequently exert influence on investment decisions [19], [3], [4], [6], [12], [15], [20]. These psychological factors can lead to irrational decision-making. Cognitive biases and heuristics are thought to play a role in decision-making that is less than entirely rational, with cognitive biases representing personal beliefs that assist individuals in navigating complex decisions [6], [11]–[15]. Both biases and heuristics serve as mental shortcuts that decision-makers employ to simplify complex and uncertain situations, ultimately influencing the outcomes of their decisions. These heuristics and biases give rise to systematic errors, which can harm the results of decisions [32]. The discussion of heuristics in prior research strongly implies that these mental shortcuts can significantly influence investors' investment decisions [4].

2.2 Heuristics

Heuristics are tactics that steer the process of seeking information and adjust how a problem is portrayed to simplify the discovery of solutions [4]. Initially, heuristics were seen as valuable ways to find answers to issues that couldn't be addressed solely through logic and probability theory [17], [32]. However, the definition of heuristics evolved. Researchers define heuristics as strategies, methods or other mental shortcuts that intentionally ignore certain information to make decisions faster, more efficiently, and potentially more accurately than complex methods [3], [4]. In the finance literature, individuals and groups, including business professionals and finance practitioners, employ heuristics as mental shortcuts to arrive at solutions or streamline decision-making in various complex and uncertain situations [32]. Heuristics are valuable tools for efficiently making sense of the real world's complexities, all while reducing cognitive burden. Investors often employ these heuristics to speed up decision-making compared to the more time-consuming and analytically demanding process of rational decision-making, which involves exhaustive information analysis. While heuristics can be helpful when time and information are limited, they can also lead to systematic errors in judgment [32]. These systematic errors in judgment are known as cognitive biases and fall into three primary categories: availability heuristic, anchoring and adjustment, and representative heuristic [32].

However, using heuristics can impair technical knowledge and reasoning abilities, leading to irrational decisions that negatively impact investment performance. Overall, using heuristics in decision-making aims to reduce mental effort but can result in various behavioral biases.

2.3 Overconfidence bias

The extensive literature on overconfidence has been extensively examined, particularly concerning its impact on financial decision-making, with a primary focus on financial markets and the behavior of traders. Overconfidence is an unjustified level of confidence in an individual's intuitive reasoning, judgment, and cognitive abilities [16]. When individuals overrate their knowledge, skills, and experiences, it constitutes overconfidence [11], [33], [4], [34]. Psychological studies have shown that overconfidence causes individuals to overestimate their capabilities and knowledge. Many individuals tend to overvalue their shortcomings while undervalue their strengths, which is a clear manifestation of the overconfidence bias [4]. Overconfidence can persist because individual investors often fail to adjust their initial assessments even when presented with new information, resulting in an erroneous sense of certainty in their judgments [4]. Consequently, overconfident investors tend to overestimate the accuracy of their valuation abilities, relying more on their signals while disregarding public signals when making investment decisions [4].

Moore and Healy have identified three distinct attributes that characterize individuals influenced by the overconfidence bias: overestimation, over-placement, and over-precision [35]. Overestimation entails individuals excessively emphasizing their actual abilities, performance, perceived level of control, or prospects for success. This includes tendencies to overrate their performance, perceive an elevated level of control, overestimate the likelihood of success, and hold inflated self-assessments of their capabilities. Over-placement, on the other hand, manifests when individuals believe they are superior to others, often rating themselves as better than the average person. Lastly, over-precision refers to investors who exhibit excessive certainty about the accuracy of their beliefs or demonstrate unwarranted confidence in their judgments, often disregarding the associated risk factors linked to their investment decisions [35], [36]. Within this domain, three critical outcomes of overconfidence have been extensively studied. Firstly, overconfidence tends to result in excessive trading [36], [9]. Secondly, it contributes to heightened volatility [37], and thirdly, it leads to a combined pattern of both under and overreaction to information [23], [38]. Moreover, in corporate finance, overconfidence has significant implications, such as overinvestment or a preference for debt financing [23].

2.4 Overconfidence and investment decisions

Previous research indicated that overconfidence bias significantly impacts investors' decision-making [4], [10], [15], [18], [31]. Investors affected by overconfidence bias often tend to underestimate risks, overestimate expected profits, lack effective portfolio diversification, engage in excessive trading, and ultimately achieve lower profits or returns compared to the broader market [14], [39]. Research has highlighted that investors' tendency to overestimate their ability to predict trends often leads to inaccurate forecasting [6]. Excessive trading on stock exchanges tends to result in suboptimal returns for traders [39]. Overconfident investors also tend to engage in excessive trading due to their unwarranted confidence in their skills, leading to lower returns than their rational counterparts [4]. In a study focused on investment decision-

making in an emerging market, Metawa et al. found that overconfidence bias significantly impacted investors' financial decisions in the Egyptian stock market [31]. Similarly, Jain et al. identified the overconfidence bias, among eight other behavioral biases, as significantly influential in the decision-making of individual investors [15], [20].

Additional support for the influence of the overconfidence bias on investors' investment decisions is found in numerous studies. In a more contemporary study, Pikulina et al. propose that the level of overconfidence among investors regarding their investment knowledge plays a significant role in influencing their investment behavior [34]. The study suggests that when investors exhibit a high degree of overconfidence in their understanding of investments, it tends to lead to excessive investment activity. Conversely, when investors lack confidence in their investment knowledge, they tend to underinvest [34]. Interestingly, the study also indicates that investors with moderate confidence tend to make more accurate investment decisions. This research highlights the intricate relationship between overconfidence and investment behavior, showing how varying confidence levels can impact the extent and accuracy of investment activities. Investors who exhibit overconfidence tend to select inappropriate or risky investment strategies and engage in excessive trading, ultimately adversely affecting their investment returns.

> H1. There is a positive and significant impact of investor overconfidence on investor investment decisions in the Indonesian Stock Exchange

2.5 The moderating effect of education and investment experience on the impact of overconfidence and investment decisions

Previous research has identified that the tendency towards overconfidence bias in investment decisions or selecting stocks is not only a matter of individual choice but is also influenced by various demographic factors that shape investor behavior [4]. Specifically, these factors include characteristics such as education and investment experiences, which play a significant role in shaping the decision-making process. For instance, an individual's investment decisions are influenced not only by the tendency to follow the decisions of others but also by their demographic attributes, particularly their educational background and previous investing experiences [15], [20].

Investors with a higher education level often exhibit confidence in their abilities, particularly in financial decision-making [4]. This confidence can have tangible effects on their investment behavior [5], [33]. For example, when investors feel confident in their abilities, their trading frequency tends to increase [26], [34], [38]. This implies that educated investors may engage in more frequent trading due to overestimating their skills and knowledge. Interestingly, the relationship between education and overconfidence is complex. While education can enhance an individual's knowledge and analytical skills, it can also contribute to overconfidence bias. Research suggests that overconfidence tends to increase with higher levels of education [12], [27], [29]. This implies that educated individuals may become more confident in their abilities, leading to a tendency to overestimate their knowledge and potentially make less rational investment decisions.

The influence of investment experience on the relationship between overconfidence and investment decisions has been highlighted in previous research [37], [38], [34], [31]. Glaser and

Weber observed that investors who perceive their investment skills and past performance as above average tend to trade more frequently, implying that initial confidence could drive increased trading activity [31]. Nonetheless, investment experience plays a pivotal role, as the impact of overconfidence may decrease over time, signifying a moderating effect. Early career traders tend to overestimate their trading success, leading to initial overconfidence [37]. However, this overconfidence diminishes as traders accumulate experience, indicating how investment experience moderates the initial overconfidence [37]. The study conducted by Lin and Shiu provides empirical evidence that frequent bidders in the stock market tend to anticipate lower returns due to their aggressive bidding and potential overestimation of IPO firms in the Taiwan stock market [40]. This suggests that novice investors might exhibit overconfidence in their trading decisions, which could be alleviated through investment experience. Hilary and Menzly's study unveils that analysts initially experiencing success in accurate forecasting tend to become overconfident due to their achievements [41].

However, this initial overconfidence often leads to underperformance in subsequent predictions. This pattern implies that experience could mitigate overconfidence, resulting in more accurate forecasting. Lastly, Pikulina et al.'s recent experimental paper suggests that strong overconfidence in investment knowledge can lead to excessive investment, while a lack of confidence results in underinvestment [34]. Moderation comes into play when investors exhibit moderate confidence, highlighting how varying confidence levels impact investment decisions. These studies consistently reveal that investment experience moderates the relationship between overconfidence and investment decisions. As investors amass experience, they tend to become more self-aware, fostering a more balanced and informed decision-making approach that can counteract the detrimental effects of overconfidence.

> H2a. There is a significant impact of investor's education level on investor investment decisions in the Indonesian Stock Exchange
> H2b. There is a significant impact of investor's investment experience on investor investment decisions in the Indonesian Stock Exchange
> H3a. Investor's education level moderates the impact of investor overconfidence on investor investment decisions in the Indonesian Stock Exchange
> H3b. Investor's investment experience moderates the impact of investor overconfidence on investor investment decisions in the Indonesian Stock Exchange

3 Methodology

The study employed a quantitative cross-sectional research design to investigate how education and investment experience moderate the relationship between overconfidence bias and investment decisions among Indonesian investors. The study utilized a self-administered questionnaire distributed to individual investors in the Indonesian Stock Exchange. The questionnaire consisted of 23 items measuring investors' overconfidence and investment decisions. The items were developed based on previous research conducted by Metawa et al. [31]. Respondents rated their agreement with each statement on a six-point Likert scale. After data cleaning, 149 valid responses were used for analysis. The study was conducted through an online survey method, enabling access to a geographically dispersed population and potentially

reducing social desirability bias [42]. The online approach allowed for anonymity, possibly encouraging more candid responses [42].

Moderated Regression Analysis (MRA) was employed to analyze the data [43]. MRA assesses how moderator variables, such as education and investment experience, influence the relationship between independent variables (overconfidence) and dependent variables (investment decisions). The interaction terms between overconfidence and education and investment experience were examined to determine if they significantly influenced the relationship. If significant, the magnitude and direction of this influence were assessed through coefficients of the interaction term.

The demographic characteristics of the respondents were collected to provide a descriptive overview of the sample (see Table I). The data indicated 77 (51.7 percent) male and 72 (48.3 percent) female investors. The age distribution showed that 73 investors (49 percent) were less than 25 years old, 40 investors (26.8 percent) were in the age group of 25-40 years, and 36 investors (24.2 percent) were in the age group of 40-55 years. The education level of the participants revealed that 106 investors (71.1 percent) had a bachelor's degree, 30 investors (20.1 percent) had a Graduate-level education, and eight investors (5.4 percent) had a Doctoral-level education, with the remaining having a College Diploma-level education. In terms of investment experience, 21 investors (14.1 percent) had more than ten years of experience, 30 investors (21.1 percent) had 6-10 years of experience, 32 investors (21.5 percent) had 1-5 years of experience, and 66 investors (44.3 percent) had less than one year of experience.

Table 1. Characteristics of Respondents

Characteristics	**Frequency**	**Percentage**
Gender		
a. Male	77	51.7
b. Female	72	48.3
Age		
a. < 25 years	73	49.0
b. 25 - < 40 years	40	26.8
c. 40 - < 55 years	36	24.2
Education	5	3.4
a. College Diploma	106	71,1
b. Bachelor's degree	30	20.1
c. Graduate Degree	8	5.4
d. Doctoral Degree		
Investment Experience		
a. <1 year	66	44.3
b. 1 - 5 years	32	21.5
c. 6 – 10 years	30	20.1
d. > 10 years	21	14.1

Source: Research findings, 2023

4 Result and discussion

We employed partial least squares structural equation modeling (PLS-SEM) with Smart PLS software (version 3.3.8) to assess the suggested model. This choice was made because of our exploratory objectives and our study's limited number of constructs and indicators [44]. The analysis encompassed both a measurement model and a structural model.

4.1 Measurement Model

The initial evaluation of the measurement model involved an assessment of convergent validity, which investigates how a measure demonstrates a positive correlation with other measures assessing the same construct [44]. Convergent validity was gauged through factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR) [44] (refer to Table 2). An acceptable guideline for outer factor loadings is typically established at 0.7 or higher. Nevertheless, indicators with very low outer loadings (below 0.40) should permanently be removed from the construct [44]. AVE is recommended to be no less than 0.5 [44]. Indicators that met these criteria were retained for subsequent analysis, whereas those with factor loadings below the acceptable threshold were eliminated from the construct [44].

Table 2 shows that the analysis revealed that all items in the constructs displayed satisfactory factor loadings except for five items within the investment decision construct (TechA1, TechA3, TechA4, TechA5, TechA13). After removing these items with low factor loadings, all constructs achieved acceptable Average Variance Extracted (AVE) values: investment decision (0.554) and overconfidence (0.501). Moreover, the Composite Reliability (CR) values exceeded the recommended threshold of 0.7 [44], indicating a strong level of internal consistency for each construct: investment decision (0.097) and overconfidence (0.888). Composite reliability is considered more robust than other measures of internal reliability, such as Cronbach's alpha, as it provides more accurate values [44]. These three indicators collectively suggest that all constructs exhibited high convergent validity.

Table 2. Measurement model

Variables	Item	Convergent Validity			
		Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
Investment Decision	TechA10	0,744	0,882	0,907	0,554
	TechA11	0,625			
	TechA12	0,738			
	TechA2	0,574			
	TechA6	0,768			
	TechA7	0,789			
	TechA8	0,849			
	TechA9	0,824			
Overconfidence	Overcon1	0,597	0,869	0,888	0,501
	Overcon2	0,722			
	Overcon3	0,762			
	Overcon4	0,802			

	Overcon5	0,624
	Overcon6	0,742
	Overcon7	0,667
	Overcon8	0,722

Subsequently, we examined the constructs' discriminant validity (DV), assessing the degree to which a construct genuinely stands apart from other constructs based on empirical criteria [44]. The evaluation of discriminant validity was conducted using the Fornell-Larcker criterion. According to this criterion, each construct's Square Root Average Variance Extracted (AVE) should surpass its highest correlation with any other construct [44]. The outcomes presented in Table 3 indicated that the correlations between constructs were lower than the respective square root values of AVE. This observation signifies satisfactory discriminant validity in the measurement model, confirming that each construct is distinct from the others to an acceptable extent.

Table 3. Discriminant Validity Testing Results

	Education	Experience	Investment Decision	Overconfidence
Education	1,000			
Experience	0,383	1,000		
Investment Decision	0,008	-0,140	0,744	
Overconfidence	0,060	0,129	0,367	0,708
Overconfidence*Education	0,218	0,019	0,066	0,040
Overconfidence*Experience	0,021	-0,087	-0,211	-0,188

Square Root Average Variance Extracted shown on the diagonal

4.2 Structural Model

Before assessing the structural model, we conducted a variance inflation factor (VIF) test to examine the potential collinearity among the study's construct indicators. VIF values above five typically suggest collinearity among predictor constructs. Ideally, VIF values should be around three or lower [44]. As displayed in Table 4, all predictor construct values were below 5, confirming the absence of any collinearity.

Table 4. Outer VIF Values

Items	VIF
Education	1,000
Experience	1,000
Overcon1	1,367
Overcon2	2,186
Overcon3	1,838

Overcon4	2,570
Overcon5	1,637
Overcon6	2,238
Overcon7	1,822
Overcon8	1,273
TechA10	2,253
TechA11	1,560
TechA12	2,134
TechA2	1,348
TechA6	2,376
TechA7	2,918
TechA8	3,051
TechA9	2,621

We adhered to the guidelines for evaluating the structural model as outlined in [44]. Fig. 1 displays the outcomes of the structural model. To assess the significance of the path coefficients and the validity of the proposed model, we examined the signs and statistical significance of these path coefficients using 5,000 bootstrap samples [44]. The findings from the analysis of the structural model are detailed in Table 5.

Table 5. The results of the structural model analysis

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
Education -> Investment Decision	0,057	0,049	0,079	0,720	0,472
Experience -> Investment Decision	-0,225	-0,225	0,089	2,541	0,011
Overconfidence -> Investment Decision	0,354	0,395	0,090	3,929	0,000
Overconfidence*Education -> Investment Decision	0,086	0,073	0,077	1,107	0,269
Overconfidence*Experience -> Investment Decision	-0,194	-0,168	0,104	1,873	0,062

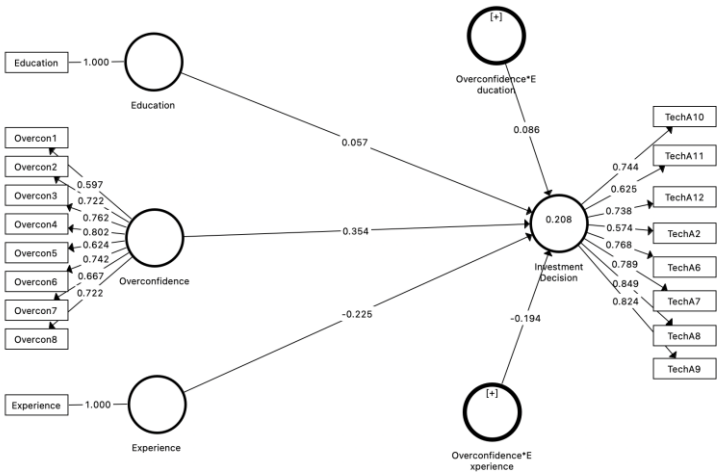

Fig. 1. Structural Model

Table 5 displays the results of the proposed hypotheses. The findings indicate a positive and significant relationship between overconfidence and investors' investment decisions ($\beta = 0.354$; $t = 3.929$; $p < 0.001$), supporting H1. However, H2a, which suggests a positive relationship between investors' education level and investment decisions, was not supported ($\beta = 0.057$; $t = 0.720$; $p = 0.472 > 0.050$), leading to its rejection. On the other hand, H2b, which posits a negative relationship between investors' investment experience and investment decisions, was supported ($\beta = -0.225$; $t = 2.541$; $p = 0.011 < 0.050$). Regarding the moderation hypotheses, H3a suggesting that investors' education level moderates the relationship between overconfidence and investment decisions was not supported ($\beta = 0.086$; $t = 1.107$; $p = 0.269 > 0.050$), resulting in its rejection (see Fig. 2). Conversely, H3b, which proposes that investors' investment experience moderates the relationship between overconfidence and investment decisions, was supported ($\beta = -0.194$; $t = 1.873$; $p = 0.062 < 0.100$), as depicted in Fig. 3.

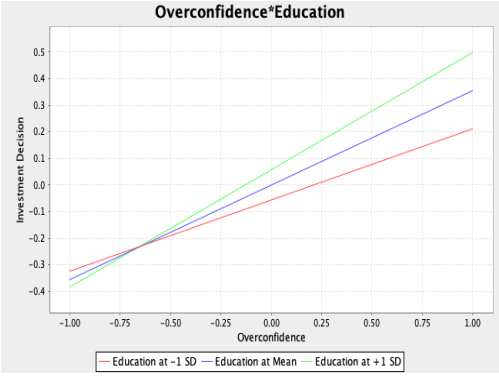

Fig. 2. Moderation effect of education

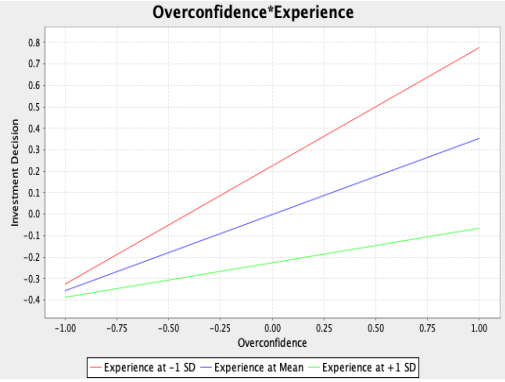

Fig. 3. Moderation effect of investment experience

The first hypothesis examines that investor overconfidence significantly and positively influences their investment decisions in the Indonesian Stock Exchange. The analysis reveals a substantial and affirmative correlation between investor overconfidence and their decision-making concerning investments within the Indonesian Stock Exchange. In simpler terms, this study provides strong evidence that investors who participate in the Indonesian Stock Exchange tend to exhibit high levels of confidence or an inclination to overestimate their knowledge, expertise, and experience in making investment decisions. When they possess this confidence, they are more inclined to take risks by investing their funds in various options. This tendency often leads to excessive trading, increased market volatility, and overreactions to information. Consequently, this unwavering confidence can drive them to make less rational decisions in their investment endeavors. These findings align with prior research by scholars like Metawa et al., who suggested that overconfidence may encourage investors to take on excessive risks, potentially resulting in heightened market volatility [31]. Furthermore, overconfident investors tend to adopt aggressive investment strategies, which can potentially yield higher returns due to their willingness to accept more substantial risks [34]. Numerous other studies have also supported the idea of overconfidence's impact on investment decisions [15], [20], [18]. The positive relationship observed here suggests that investors with overconfidence tendencies tend to exhibit courage in taking risks and making investments [18]. They lean towards embracing risk and are more likely to make numerous investment decisions. Therefore, the findings of the first hypothesis align with the conclusions drawn from earlier studies on this subject.

The findings also reveal that investors' education level was positively and insignificantly related to investors' investment decisions in the Indonesian Stock Exchange. The results imply that education can enhance an individual's knowledge and analytical skills, access to information, ability to manage risk effectively, better financial literacy, and encourage long-term perspective on investment, leading to more balanced, well-informed, and rational investment choices. However, this study's relationship between education level and investment decisions is not statistically significant. The lack of a significant direct impact of education on investment decisions among investors could be attributed to the heterogeneous nature of investors' educational backgrounds, particularly the absence of a strong presence of financial education. In such cases, where investors do not possess a substantial financial educational foundation, their education might not significantly shape their investment decisions [31]. This suggests that factors beyond education might be more influential in guiding their investment choices.

Interestingly, these findings deviate from the outcomes of a study conducted by Metawa et al., which identified a positive and significant relationship between the level of investor education and investment decisions within the Egyptian stock market [31]. This divergence could be attributed to financial education in the latter study, leading investors to leverage their education for more informed investment decision-making. The implication here is that fostering financial education could enhance the capacity of investors to utilize pertinent information effectively when making investment decisions. Consequently, policymakers might prioritize improving financial education programs to equip investors with the knowledge and skills necessary for prudent investment decision-making. This way, investors can better understand financial markets, risk assessments, and other relevant factors influencing their investment choices.

Additionally, the findings suggest that investors' education level does not play a moderating role in the relationship between overconfidence and investment decisions. In simpler terms, the extent of an investor's education does not change or influence the way overconfidence impacts their investment choices. This suggests that regardless of their educational background, the impact of overconfidence remains consistent in guiding how investors make their investment decisions. Despite the lack of statistical significance in the moderation effect, it's worth noting that the observed direction of influence of investors' education level in moderating the relationship between overconfidence and investment decisions is positive. This indicates a tendency for higher education levels to enhance overconfidence's impact on investment decisions. However, in the current study, the strength of this influence does not reach a statistically significant level. It's worth considering that while education can enhance an individual's knowledge and analytical skills, it can also contribute to overconfidence bias. This implies that individuals with more education might become more confident in their abilities, which could lead to an inclination to overestimate their knowledge and subsequently make less rational investment decisions. Consequently, investors tend to trade more frequently when they feel confident in their abilities. This implies that educated investors might engage in more frequent trading due to overestimating their skills and knowledge.

Finally, the study's results disclose that investors' investment experience is negatively and significantly related to investors' investment decisions in the Indonesian Stock Exchange. The findings imply that as investors' investment experience increases, their investment decisions tend to be more cautious or conservative. In other words, the results suggest that investors with greater investment experience tend to make well-considered and prudent choices when engaging in investments within the Indonesian Stock Exchange. This cautious approach might stem from their accumulated knowledge, insights from past investment activities, and a better understanding of the associated risks and potential gains [25], [28], [31]. Moreover, the findings also reveal that investors' experience does serve as a moderator in the relationship between overconfidence and investors' investment decisions. This implies that the extent of an investor's experience in the investment can modify or influence how overconfidence affects their investment decisions. This finding aligns with previous research that has identified investment experience as a moderating factor in the relationship between overconfidence and investment decisions. Gervais and Odean support this idea by noting that traders in their early careers often overestimate their trading success, leading to overconfidence [37]. As experience accumulates, this overconfidence tends to diminish, indicating how investment experience moderates initial overconfidence [37]. This suggests that novice investors might display overconfidence in their trading choices, which could be mitigated by increasing investment experience. Hilary and

Menzly's study indicates that analysts who initially experience success in accurate forecasting can become overconfident due to their achievements [41]. Nevertheless, it's worth noting that this initial overconfidence frequently leads to poorer performance in subsequent predictions, suggesting that experience may aid in reducing overconfidence and improving the accuracy of forecasts. In summary, the study's findings offer valuable insights into the role of investment experience as a moderator in the relationship between overconfidence and investment decisions.

5 Conclusion

The study delved into the intricate effect of investor overconfidence, education level, investment experience, and investment decisions within the Indonesian Stock Exchange. The investigation unraveled a tapestry of insights contributing to understanding how these factors interact and influence investment choices. The study's primary findings underscored the potent impact of overconfidence on investment decisions. Regardless of investors' educational backgrounds or levels of investment experience, overconfidence emerged as a consistent factor influencing investors' investment decisions in the Indonesian Stock Exchange. This revelation sheds light on the universality of overconfidence as a behavioral bias affecting decision-making across diverse investor profiles. While education is often seen as a critical influencer of the decision-making process, this study revealed a nuanced perspective. While education's direct influence on investment decisions was limited, it emerged as a potential enhancer of the impact of overconfidence. Highly educated investors tended to exhibit a stronger overconfidence bias, suggesting that their confidence in their abilities might contribute to irrational choices. This highlights the importance of understanding how education interacts with psychological biases in shaping investment behavior. Investment experience, on the other hand, emerged as a mitigating force against impulsive decisions. Experienced investors exhibited a trend towards more cautious and prudent choices. This finding underscores the value of accumulated knowledge and insights from past investment ventures in guiding decision-making, suggesting that seasoned investors navigate the risks and potential gain with greater understanding.

Additionally, the study unveiled that investment experience moderates the relationship between overconfidence and investment decisions. This phenomenon underscores how experience can temper the impact of overconfidence, potentially leading to more measured choices. The study's results provide empirical support for these behavioral finance theories by demonstrating how overconfidence, education, and experience interact to shape investment decisions in ways that may deviate from traditional rational models. They emphasize the dynamic and multifaceted nature of the factors influencing investor choices, underscoring the significance of overconfidence and the complex interactions between education and experience. As the financial landscape evolves, policymakers and financial institutions can draw upon these findings to design targeted interventions. Strengthening financial education or financial literacy initiatives and acknowledging the intricate interplay of experience and psychological biases could aid investors in making more informed and rational investment decisions [10], [18]. This study sheds light on the factors that shape investment decisions, enriching our comprehension of the complex web of human behavior within finance.

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