

How Your Understanding of Market Efficiency Determines Stock Performance – and Why Behavioral Bias Matters

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Abstract

Capital market efficiency is an important factor in stock trading activities in a capital market. With high market efficiency, stock prices in the capital market reflect the information available in the capital market. This study aims to determine how market players perceive the level of capital market efficiency in Indonesia and to determine its effect on the investment performance of capital market players. This study also examines the role of finance in stock investment performance. In addition, perceptions of capital market efficiency can cause behavioral bias in capital market players which can have a positive or negative impact on investment performance. This study used a quantitative approach and uses a questionnaire as a data collection method distributed to 220 students in Indonesia. The sampling method in this study is purposive sampling method. This study used perceptions of market efficiency, financial behavioral bias and investment performance as variables. The analysis technique used in this study is SEM PLS. The results of the study indicated that perceptions of market efficiency have a significant effect on stock investment performance among students. However, financial behavioral bias does not affect stock investment performance among students and financial behavioral bias does not mediate the relationship between perceptions of market efficiency and stock investment performance among students.

Keywords: perception of market efficiency, financial behavior, investment performance

1. Introduction

The stock capital market is vital in developing a country's economy. The stock capital market contributes to mobilizing people's savings by providing financial instruments to diversify wealth investments to minimize risk and increase the marginal productivity of invested capital (Estrada et al., 2010). The stock capital market can also influence the economic growth of a country because it can increase the allocation of resources, which can then accelerate the process of economic growth (Pagano, 1993). The stock capital market in Indonesia is experiencing quite good development, which shows a positive trend in the number of stock investors, namely from 2020 to 2022. The number of investors shows an increasing trend, from 3,880,753 investors in 2020 increasing continuously to 10,311,152 investors in 2022. Of these investors, the most significant proportion are Generation Z and millennials at 81.64 percent, with an asset value of IDR 144.07 trillion (Alvian, 2023). This large proportion of young investors shows that Generation Z and

millennials have the most significant potential for developing the stock capital market. Generation Z and millennials have advantages over previous generations, especially in mastering digital technology, so investing in the stock market should be easy for this generation.

The development of financial decision-making theory in the market has been directed into two main perspectives. It is assumed by traditional theory that investors act rationally (*homo-economicus*) when making financial choices, while it is stated by behavioral finance that investors are not always expected to behave logically (*homo-sapiens*). Support is provided by research for both perspectives, with various findings used to strengthen each assumption. Established theories such as the Efficient Market Hypothesis (Fama, 1970), Modern Portfolio Theory (Frijns et al., 2008), and the Capital Asset Pricing Model have been widely recognized as fundamental models for financial decision analysis. Studies have shown that efforts are generally made by investors to make rational financial choices (Kubilay & Bayrakdaroglu, 2016). The integration of risk and return in the financial decision-making process has been explored by more recent research (Kumari & Arora, 2015). Meanwhile, a different perspective is found in behavioral financial theory, which finds that psychological factors and feelings have an essential role in the financial decision-making process (Bakar & Yi, 2016), such as cognitive errors, "fundamental heuristics" and "psychological biases (Nofsinger, 2016), mental biases (Ising, 2007). These factors can give rise to behavioral biases in financial decision-making methods (Sahi, 2012), which can lead to decision-making, especially for investment decisions. They can influence investment performance (Shefrin, 2002).

These two different fundamental financial theories show that individuals have two sides of behavior that exist within the individual and shape behavior in decision-making. An excerpt from a statement from Meir Statman, PhD, Santa Clara University, states that individuals are rational according to standard financial principles. In contrast, individuals are expected according to financial behavioral principles (H. K. Baker, 2021). The results of previous studies show that individuals are neither entirely rational nor completely irrational. but sometimes also behave irrationally due to their limited level of rationality. Financial decisions can be influenced by past experiences and perceptions about making choices. Based on past experiences and their Perception of what might be optimal in a given situation (Lo, 2004). Rationality in decision-making is still owned by individuals in making financial decisions, but limited rationality will make individuals irrational. This study will examine the role of individual rationality and irrationality in making investment decisions in the stock capital market. Thus, past experience and Perception of situations that can provide the possibility of obtaining optimal results will likely be used in determining individual investment decisions in the stock capital market.

The component that forms financial decisions is the Perception of a situation that can provide the possibility of obtaining optimal results. This component reflects standard financial concepts that

assume that investors are rational. Investors will consider all information available in the capital market that is considered relevant to the performance of their stock investments. Based on the Efficient Market Hypothesis concept, it is proven that individuals/investors will consider all available information when making stock investment decisions. Perceptions of market efficiency that can influence individual investment decisions are still under discussion and are complicated to explain empirically. Many previous findings have been tested empirically using secondary data in the form of stock prices and information on company financial performance, which are considered determining factors for market efficiency (Statman, 1999). However, it still needs to be studied to study investors' perceptions of the level of market efficiency about stock investment decisions/investment strategies and the emergence of irrational behavioral biases that can determine the level of performance of their stock investments. This study will examine the role of individual investors' perceptions of market efficiency in stock investment decisions/determining investment strategies and financial behavioral biases that will determine investors' stock investment performance.

Based on these arguments, this research will examine the influence of perceptions about market efficiency on investment performance with financial behavioral bias as mediation. The session of this paper follows. The first section is related to the background of the study, the second section provides literature and hypothesis development, the third section provides materials and methods, the fourth section provides results and discussion, and the fifth section offers conclusions.

2. Literature Review

Investment. Investment is the process of investing money with the hope of future returns. The world of investing can vary, but you can become successful through research and keeping your head straight. Every investor wants to make optimal investment decisions (Sharpe, 1964). According to Merton (1987), optimal and rational investment decisions depend on prior financial knowledge. Standard finance assumes that people have complete information and always make rational decisions.

Efficiency Market Hypothesis. The concept of market efficiency is explained by Fama (1970) that financial markets are efficient (Sewell, 2011), which means that security prices remain at their fair value (Aguila, 2009). Market efficiency means that the prices of securities that dominate financial markets reflect all available information (Fuentes, 2011; Malkiel, 2003). So, it can be said that stock prices always reflect all available information, called an "efficient market" (Fama, 1997; Lo, 2007). According to Hayat et al. (2006), investors are considered rational, impartial, and consistent in an efficient market, making optimal investment decisions without psychological and emotional effects.

According to Ritter (2003), the efficient market hypothesis concept assumes that decision-makers and financial investors are rational and compete for abnormal profits and that security prices maintain their fundamental value due to competition between different profit-oriented investors. In addition, Shiller (2003) said that all investors integrate all available information in their decisions so that prices can be considered as the best for the actual investment. However, we cannot stick to the rational behavior theory because humans are influenced by their emotions, beliefs, and moods. So, they cannot remain rational for an extended period, so an extension of traditional financial theory is needed (Shah et al., 2012).

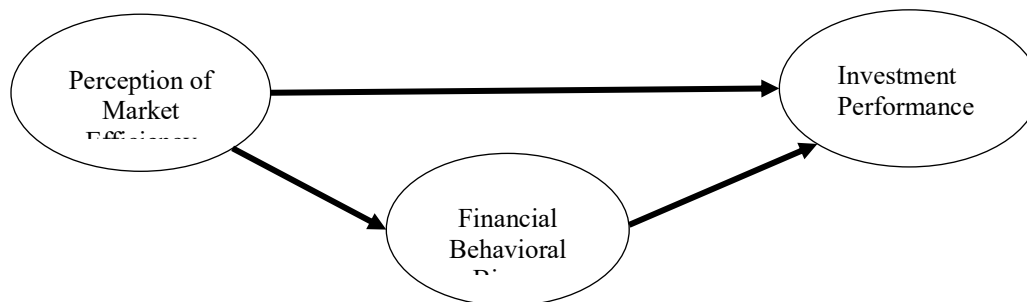
Financial Behavior. The concept of behavioral finance assumes that investment decisions can be irrational due to imperfect information (Bikhchandani et al., 1992) which results in limited rationality (Pompain, 2006), anomalies (Ajmal et al., 2011), fundamental heuristics (Baker & Nofsinger, 2010), psychological biases (Baker & Nofsinger, 2002) or behavioral biases (Shefrin, 2007) and psychological accounts of investors' mental status play a key role in understanding irrational decision making.

According to cognitive theory, cognitive biases and heuristics can cause individuals to make less rational decisions (Bazerman, 1998; Baron, 1998). Heuristics are called "rules of thumb" that lead to cognitive biases. Bazerman et al. (1984) argued that cognitive biases are personal beliefs that help individuals face difficult decisions. Irrational considerations are mental shortcuts decision-makers use to make decisions quickly in complex and uncertain situations (Barnes, 1984; Ritter, 2003). According to Tversky and Kahneman (1973), systematic errors occur due to these heuristics and biases, leading to adverse outcomes (Barnes, 1984). Many researchers in economics argue that heuristic biases can influence financial decision-making and forecasting of financial variables, such as income or material benefits (Debondt & Thaler, 1990; Klein, 1990; Abarbanell & Bernard, 1992).

The impact of perceived market efficiency as a reflection of investors' rationality in the decision-making process and financial behavioral bias as a reflection of investors' irrationality in the investment decision-making process or preparing stock investment strategies, which can then determine the investment performance of individual investors. The novelty of this research is by enriching the perspective of investor behavior in making investment decisions or developing investment strategies based on the principle of rationality and considering irrational behavioral biases as a consequence of limited levels of financial literacy and perceptions of market efficiency so that there is a possibility of determining stock investment performance.

The novelty of this research is described in the form of a research model as follows:

Figure 1. Research Model



3. Research Method

Data Collection, Questionnaire Development, and Sample. This study uses a quantitative approach. The research data used is primary data. Primary data was obtained from a survey using a questionnaire. Furthermore, respondents for this study were taken using a non-probability method and several criteria, so a purposive sampling technique was used. The respondents in this study were university students who owned shares in publicly traded companies.

Methods. Three stages of research will be carried out; the first is to carry out a pilot test or pre-test on a small sample before testing it on the research sample. Second, the questionnaire instrument uses a validity test by calculating the loading factors and a reliability test indicated by the high Cronbach's Alpha. Third, carry out a survey on the research sample by filling in a questionnaire and testing the model using the PLS method.

Variable Measurement. This research uses the stock investment performance variable as the dependent variable, the financial literacy variable, perception of market efficiency behavioral bias as independent variables as mediating variables. The variable Perception of market efficiency is measured using proxies from (21) and (22), which consist of the possibility of accessing information related to past rates of return, information available in the public, access to unique/private information, and investment returns alone. Currency represents compensation for risk that consistently beats average market returns without taking on above-average risk. Measurement of financial behavioral bias is divided into two categories, namely planning and action. Financial planning behavioral biases include Budgeting score (Planning), Planning old age expenditure score (Planning), Planning unexpected expenditure score (survey conducted by the World Bank in August 2013 regarding "Why Financial Capability is important and how surveys can help") (Planning). Meanwhile, action financial behavior bias includes Excessive spending score (Action), Welfare level in average value (Action), Monitoring spending score (Action), and Savings score (Action).

Investment performance measurements are taken from research and Ha, 2011. Responses were given using a five-point Likert scale ranging from very unlikely to very likely. Respondents were asked to rate their respective investment performance using a five-point Likert scale ranging from no risk to very risky. Measurement of investment strategies (growth) based on financial and productivity benchmarks according to research Eniola and Entebang, 2015. Financial benchmarks include net income, gross income, and return on investment. Meanwhile, productivity benchmarks include labor, capital, and operational efficiency.

4. Finding and Discussion

Test Outer Model. The outer model test is used to measure the validity and reliability of the model because the indicators used are reflective. This model analysis specifies the relationship between latent variables and their indicators. This measurement consists of convergent validity tests, discriminant validity, and construct reliability (composite validity and Cronbach alpha). The results of the convergent validity test show that all indicators in the three research constructs (Market Efficiency Perception/X1, Financial Planning Behavior Bias/Z1, and Investment Performance/Y) meet the validity requirements with loading factors above the minimum limit of 0.700. For X1, the indicators "Understanding Access to Information on Rate of Return" (0.853) and "Understanding Investment Strategy" (0.833) have a very strong relationship, while Z1 is consistently supported by three financial planning indicators (Budgeting = 0.811, Retirement Expenditure = 0.808, Unexpected Expenditure = 0.816). In construct Y, "Investment Decision Satisfaction" is the strongest indicator (0.896), even higher than the composite value of investment performance itself (0.864). The high values of all these loading factors prove that the research instrument has very good convergent validity, meaning that each indicator accurately measures the theoretical construct it represents and the data produced is reliable for further analysis.

Discriminant validity is tested to ensure that each item used as a measurement instrument can be better predicted by the intended latent variable than by other latent variables in the model. High correlations between different construct measures are avoided. In this study, the discriminant validity of an item is considered good if the loading value on the formed construct is higher than the cross-loading value on other constructs.

The results of the discriminant validity test through cross-loading analysis of three latent constructs indicate that Perceived Market Efficiency (X), Financial Behavior Bias (Z1), and Stock Investment Performance (Y). This test aims to ensure that each indicator has the highest loading value on its construct compared to other constructs. As a result, all indicators show higher loading values on their original constructs: indicators PEP1–PEP5 on X, PK1–PK7 on Z1, and KI1–KI3 on Y. For example, PK3 has a loading of 0.985 on Z1, much higher than X (0.595) and Z3 (0.428), and KI3

has the highest loading on Y (0.896) compared to X and Z1. This finding confirms that all indicators meet the criteria for discriminant validity because they can distinguish their constructs accurately without overlapping with other constructs.

Another method to measure discriminant validity is known as the Fornell-Lacker Criterion, where the square root of the AVE of each construct is compared with the correlation between the latent constructs. In this approach, it is suggested that the AVE value exceeds 0.5, indicating that more than 50% of the indicator's variance can be explained by its construct. In Table 4, it has been shown that the discriminant validity has been tested using the Fornell-Lacker Criterion, where the square root of the AVE (in bold) was found to be greater than the correlation between the latent constructs. Thus, the discriminant validity is declared to have been met by the constructs of perceived market efficiency (X), financial behavioral bias (Z1), and investment performance (Y).

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Construct reliability testing measures the reliability between blocks of indicators in the research model. Reliability testing can be done in two ways: Composite Reliability and Cronbach's Alpha. Reliability tests are carried out to prove the instrument's accuracy, consistency, and precision in measuring the construct. Cronbach's Alpha is a reliability test carried out to strengthen the results of composite reliability. The construct measuring instrument is declared reliable if the composite reliability and Cronbach alpha values are more significant than 0.70. The results of the construct reliability test are shown in Table 5 below.

Based on the results of the determination coefficient test, it is known that the Perception of Market Efficiency variable has an R-Square value of 0.514 against Financial Behavior Bias, which indicates that 51.4% of the variability in financial behavior bias can be explained by the perception of market efficiency. Meanwhile, against Investment Performance, the same variable has an R-Square of 0.566, which means that 56.6% of the variation in investment performance can be explained by the perception of market efficiency. Both R-Square values are in the moderate category, indicating a sufficient level of explanatory relationship between the independent and dependent variables.

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All latent variables in this study have value composite reliability And Cronbach's $\alpha > 0.7$, so all variable constructs of financial literacy (X1), perception of market efficiency (X2), financial behavior bias (Z2), and investment performance (Y) have met the reliability requirements. Table 1 shows the profile of respondents in this study.

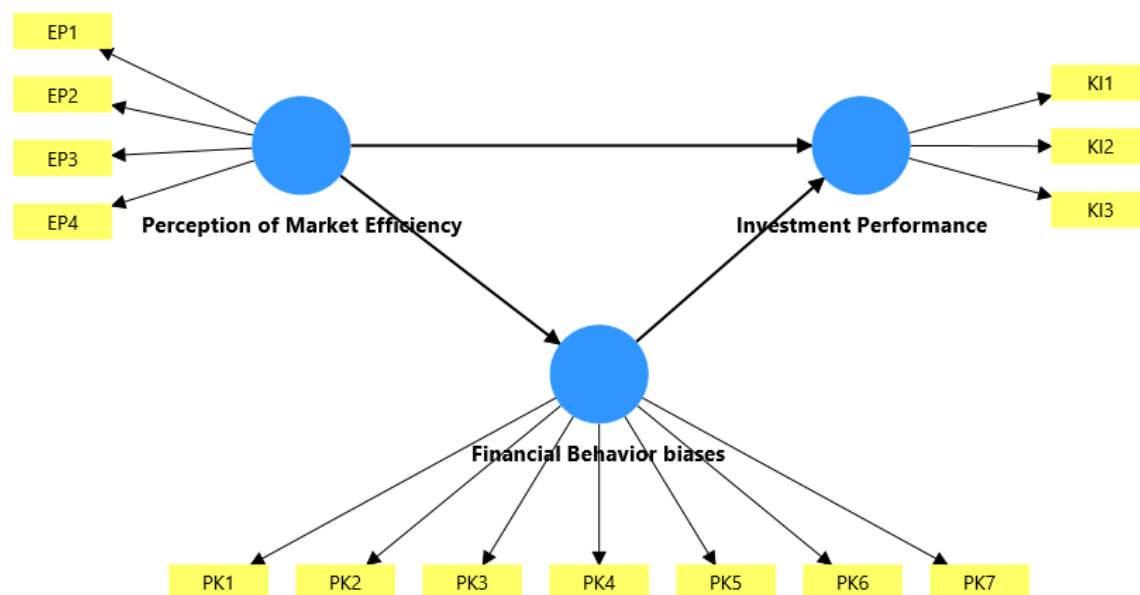
Table 1. Respondent Profile

Profiles	Percent
Old	
20 years	10.91
21 years old	60.91
22 years old	8.74
Other (18, 19, 23-28, 34, 36, 38)	19.44
2. Gender	
Men	62
Female	38
3. Education	
D3	0.9
D4	0
S1	92.8
S2	4.5
Other	1.8
4. Income	
$\leq$ Rp.2,000,0000	25.3
> IDR 2,000,000 – IDR 4,000,000	35.3
> Rp. 4,000,000 – Rp. 6,000,000	22.2
> IDR 6,000,000 – IDR 8,000,000	11.3
> Rp. 8,000,000	3,2
Other	2.7
5. Source of Income	
Alone	21.7
Parent	44.3
Themselves and Parents	32.6
Other	1.4
6. Finance Education	
Yes	83.3
No	16.7

Based on gender, respondents were dominated by men at 62% compared to women at only 38%. Based on educational level, respondents were dominated by S1 at 92.8%, followed by Masters at 4.5%. Based on age, respondents were dominated by 21-year-olds at 60.91%, then 20-year-olds at 10.91%, and 22-year-olds at 8.74%. Meanwhile, those aged 24 years were the least at 0.91%. Based on income, respondents were dominated by income between > 2,000,000 and 4,000,000, amounting to 35.3%. Second place is income $\leq$ 2,000,000 at 25.3%. The third place is income > 4,000,000 – 6,000,000. Based on source of income, the source of income dominated by respondents came from parents at 44.3%. Own and parents' sources of income are in second place at 32.6%. The least is the source of income at 21.7%. Based on participation in financial training, respondents were dominated by those who had already attended training, seminars, workshops, or courses related to investment management, amounting to 83.3%.

Test the Inner Model. Testing of the structural model (inner model) was carried out to evaluate the model's accuracy level in the research as a whole, which was formed through several variables and their indicators. Evaluation of the structural model is carried out through several approaches, including determinant coefficient (R-Square or R²), Predictive relevance (Q-Square or Q²), and Goodness of Fit (GoF).

Figure 1. Structural Equation Model (SEM)



The coefficient of determination (R-Square or R²) shows the strength or weakness of the influence that the dependent variable has on the independent variable and also shows the strength or weakness of a research model. The R-squares value is concluded as a robust model if it is worth 0.75, a moderate model if it is worth 0.5, and weak if it is worth 0.25 (Ghozali & Laten, 2019). Table 7 explains the results of the coefficient of determination test.

Based on the results of the determination coefficient test shown in the table above, it is known that the Perception of Market Efficiency variable has an R-Square value of 0.514 against Financial Behavior Bias, which indicates that 51.4% of the variability in financial behavior bias can be explained by the perception of market efficiency. Meanwhile, against Investment Performance, the same variable has an R-Square of 0.566, which means that 56.6% of the variation in investment performance can be explained by the perception of market efficiency. Both R-Square values are in the moderate category, indicating a sufficient level of explanatory relationship between the independent and dependent variables. In comparison, other variables outside the research influence the other 43.4%. This value also means that the selection of risk efficiency perception variables, investment strategies, and financial behavior bias are said to be intermediate in predicting financial satisfaction.

The financial behavior bias variable value is 0.514, so it can be categorized as a moderate model. This value explains that perceptions of market efficiency can influence 51.4% of financial behavior variables, while other variables outside the research influence the other 48.6%. The financial behavior bias variable (action) value is 0.501, so it can be categorized as a moderate model. This value explains that 50.1% of financial behavior variables can be influenced by perceptions of market efficiency, while the other 49.9% is influenced by other variables outside the research. After getting the coefficient of determination R², the next step is to test the effect size to show the influence between variables, as shown in Table 2.

Table 2. Effect Size Test Results (f²)

Variable	Investment Strategy	Financial Behavior Bias (Planning)	Financial Behavior Bias (Action)	Investment Performance
Perception of Market Efficiency	0.257	1,059	1,006	0.091
Financial Behavior Bias				0,000
Investment Performance				

The result of effect size in this study showed f² value of 0.02 indicates that the latent variable predictor has a minor influence, a value of 0.15 indicates a medium influence, and a value of 0.35 indicates a significant influence at the structural level (Ghozali & Laten, 2019). The results of the effect size test, as in Table 8, show that the influence of the financial behavior bias variables, both planning and action, on investment performance obtained f² of 0.000 and 0.002, which means that there is almost no influence between the two. Meanwhile, Perception of market efficiency and have a negligible influence on stock investment performance. Meanwhile, in general, the f² value >0.02 on investment performance (Variable Y) indicates a minor influence at the structural level.

The results of the effect size test of the Perception of market efficiency on investment strategies have a medium influence with an f² value of >0.15. The results of the effect size test of perceived efficiency on biased financial behavior, both planning and action, have a significant or powerful influence with the f² value >0.35.

Q2 Predictive Relevance or predictive sample reuse is used to measure how well the observations can provide results for the research model. Likewise with R², if the Q2 value is closer to 1, the model will be said to be stronger. The calculation of the Q2 value in this study is shown in Table 3 below.

Table 3. Stone-Geisser Test Results (Q2)

Variable	SSO	SSE	Q ² (=1-SSE/SSO)
Perception of Market Efficiency	880	880	
Financial Behavior Bias (Planning)	660	441.111	0.332
Investment Performance	660	380,669	0.423

The results of predictive relevance testing based on Table 9 using the Q-Square value on the influence between variables obtained a Q2 value of more than 0 ($Q2 > 0$). Hence, the structural model developed in this research has medium predictive relevance.

The measurement value based on Goodness of Fit ranges between 0 (zero) to 1 (one). If the Goodness of Fit is close to 1 (one), the model is improving. The criteria for whether the research model is strong or weak based on the Goodness of Fit measurement according to Ghazali and Latan (2019) is 0.36 (GoF large); a value of 0.25 (medium GoF), and a value of 0.10 indicates (small GoF). The GoF test results are shown in Table 4 below.

Table 4. Goodness of Fit Test Results

Variable	AVE	R Square
Perception of Market Efficiency	0.662	
Financial Behavior Bias	0.659	0.514
Investment Performance	0.780	0.566
Average	0.688	0.551
Goodness of Fit (GoF)	0.597	

The results of formula calculations based on Tenenhaus et al. (2004) are as follows.

$$\text{GoF} = \sqrt{((\text{AVE})^- \times (\text{R}^2)^-)}$$

$$\text{GoF} = 0.616 \sqrt{(0.688 \times 0.551)}$$

The GoF test results obtained a value of 0.616, which means the value is close to 1 (one). The closer the value is to 1 (one), the better the model can be concluded to have better criteria, so that the structural model in general in this research has medium predictive properties that tend to be strong at 0.616 and can explain sufficient empirical data.

Hypothesis testing using statistical values in PLS is carried out using the resampling/bootstrapping method. The hypothesis can be accepted, or H_a is accepted if the p-value probability value is ≤ 0.05 (level of significance 5%) or the t-statistic value is $\geq t$ -table (1.96). Below in Table 5, the results of hypothesis testing are presented based on the path coefficient and t-statistics / p-value.

Table 11. Hypothesis Test Results

Hypothesis	Relationship between Variables	Path Coefficient	Stdev	T-Stat	P-value	Results	
H1	X1 -> Y	0.346	0.084	4,141	0,000	Significant	Accepted
H2	Z1 -> Y	0.279	0.117	2,389	0.017	Significant	Accepted
H3	X-> Z -> Y	-0.054	0.113	0.476	0.634	Not significant	Rejected

Increased individual perceptions of market efficiency can contribute to improved investment performance because market efficiency implies that stock prices correctly reflect available public information. Individuals who understand and trust market efficiency will be likelier to choose investments based on fundamental analysis and help select stocks at appropriate intrinsic value. Understanding market efficiency also helps individuals understand investment risks (Ding et al., 2019). Rational investment decisions are based on facts, manage risks better, and choose investments that suit risk profiles. Belief in market efficiency helps individuals develop confidence in long-term investment strategies so they are not tempted to overtrade. Understanding market efficiency also encourages individuals to monitor their investments effectively and ensure investments conform to market efficiency expectations (M. Baker & Wurgler, 2006). Belief in market efficiency builds discipline and confidence in investment strategies and can improve long-term investment performance. So overall, increasing perceived market efficiency helps individuals choose the suitable investments, better risk management, more rational decision-making, and ultimately improves investment performance (Ady, 2017) (Anarkulova et al., 2022)., hypothesis 1 is accepted.

Increasing the level of individual financial behavior bias does not always directly reduce investment performance; financial behavior bias can cause variations in investment results. Some bias-influenced decisions may produce better-than-expected outcomes, while others produce poor outcomes. Overconfidence bias motivates individuals to take risks and try bold investment strategies (Zahera & Bansal, 2018). Although behavioral biases can influence investment decisions, a good diversification strategy can help protect a portfolio from the negative impacts of decisions that may be influenced by these biases (H. K. Baker, 2021). So, it is essential to remember that the

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impact of behavioral finance biases on investment performance can be highly variable and complex. Risk management, self-awareness, learning from experience, and professional guidance are vital factors that can help overcome the potential negative impact of financial behavioral bias (Koesoemasari et al., 2022). Thus, hypothesis 3 is rejected.

A high level of financial behavior (action) bias in individuals only sometimes directly impacts the level of investment performance. When market conditions are growing or favorable, investors see their investment performance improve despite behavioral biases. Favorable market conditions compensate or hide the impact of optimal investment decisions. Apart from that, personal skill or luck allows investors to make profitable investment decisions so that a high level of financial behavioral bias does not hurt investment performance. Investors realize that behavioral finance bias is high, and investors can adopt more disciplined investment strategies. Awareness of bias and efforts to improve investment decisions can help improve performance. Thus, hypothesis 4 is rejected.

Increasing perceptions of market efficiency can positively impact investors' investment strategies. Perception of high market efficiency indicates confidence that stock prices and other assets reflect relevant market information. Investors who believe that the market is very efficient will reduce excessive analytical efforts to look for investment opportunities and focus more on assets that have been calculated by the market (Ady, 2017). Perceptions of market efficiency also encourage investors to understand better the importance of diversification to manage risk, choosing more passive investment strategies such as following market indices. (Nuryana, 2022). Increasing perceptions of market efficiency also encourage using fundamental analysis as necessary information in making investment decisions. Apart from that, investors who believe in market efficiency tend to avoid market timing efforts that are difficult to carry out consistently, preferring to use a long-term investment approach. Thus, hypothesis 5 is accepted.

Increasing individual perceptions of market efficiency can help reduce bias in financial behavior because market efficiency indicates that asset prices in the market reflect all publicly available information. (S. Nagalakshmi, 2019). Investment decisions are based more on rational analysis and available information than emotions, irrational assumptions, or inaccurate judgments. Perceptions of market efficiency can help reduce individual overconfidence in making investment decisions because individuals understand asset prices and avoid mistakes resulting from being too confident in their judgments. (Kasoga, 2021). Market efficiency also reduces the tendency of individuals to follow the masses (herding) regarding investment decisions. They consider more fundamental information and relevant market data before making investment decisions. Market efficiency also helps reduce the likelihood of individuals overreacting or underreacting to market events or new information. They tend to respond to information more wisely and proportionally,

avoiding mistakes in drastically changing their portfolio without proper consideration (Koesoemasari et al., 2022). So, a better understanding of market efficiency will help individuals avoid irrational behavior that will harm their finances in the long run. This understanding provides a more substantial basis for developing investment strategies based on objective analysis and publicly available information. Thus, hypothesis 6 is accepted.

Increasing the perception of market efficiency among investors can contribute to reducing the level of behavioral financial bias in investment decisions. Perceived market efficiency refers to the belief that asset prices in the market reflect all available information quickly and accurately. Investors are becoming more aware of the limited ability to predict market movements to reduce bias in financial behavior accurately. Perceptions of market efficiency can encourage investors to adopt long-term investment strategies, thereby helping to reduce the impact of impulsive or reactive decisions. In addition, investors who believe in market efficiency will tend to spread risk through diversification and rely on more objective fundamental analysis rather than emotional reactions to news or market movements, thereby reducing bias in financial behavior. Thus, hypothesis 7 is accepted.

Increasing the level of perceived market efficiency mediated by investment strategies can positively contribute to the level of investment performance because perceived market efficiency helps understand asset prices reflecting market information that is available quickly. Perceptions of market efficiency influence asset allocation decisions in investment portfolios (Mandagie et al., 2020).

Increasing the level of perceived market efficiency mediated by financial behavioral biases only sometimes increases the level of investment performance. Although market efficiency reflects that asset prices reflect all available information, financial behavior influenced by psychological biases and individual emotions can still influence investment decisions and portfolio performance. Market efficiency can provide insight into asset prices, but financial behavior is influenced by overconfidence, anchoring, confirmation bias, and loss aversion (S. Nagalakshmi, 2019). These biases drive investors to make decisions that are not always rational, even when they believe markets are efficient. In addition, perceptions of market efficiency only sometimes consider sudden changes in market information or sentiment, which can ultimately affect investment performance (Koesoemasari et al., 2022). There are also situations where information is not evenly distributed among market participants, or there are even attempts to manipulate the market, causing prices to reflect only some available information fully. Management of investors' emotions and psychology also results in suboptimal investment results and actions contrary to market efficiency (Ramadani et al., 2023). So, increasing financial literacy and understanding of market efficiency is essential in helping investors make better investment decisions. However, various

factors can influence investment performance, including psychology, market conditions, and new information that can influence investment behavior and decisions. Thus, hypotheses 9 and 10 are rejected.

5. Conclusion

Perceptions of market efficiency and investment strategies can improve students' investment performance in stocks, while financial behavior does not affect students' investment performance in shares. Perceptions of market efficiency improve students' stock investment strategies and reduce students' financial behavior bias in stock investments—and student stock investment performance. Meanwhile, behavioral financial bias does not mediate perceptions of market efficiency on student stock investment performance.

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