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Challenges in Millennials Investment Decision: A Study of Behavioural Biases

Muhammad Fatkhurrozi [a], Maulida Nurul Innayah [a*], Naelati Tubastuvi [a] and Mastur Mujib Ikhsani [a]

[a] Faculty of Economics and Business, Universitas Muhammadiyah Purwokerto, Indonesia.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This research aimed to analyze the effect of Cognitive Dissonance Bias, Overconfidence Bias, Herding Bias, Endowment Bias, and Confirmation Bias on the investment decisions of the millennial generation in the capital market.
Study Design: The sampling method used in this study was purposive sampling, which obtained 128 respondents.
Place and Duration of Study: The research was conducted with investors in Banyumas Regency.
Methodology: This research method uses the SEM (Structural Equation Modeling) analysis method with the Partial Least Square (PLS) approach. Each hypothesis is tested to understand the relationship between variables. To test the validity and reliability of research using an outer model. Hypothesis testing uses inner models.
Results: The results of this study showed that cognitive dissonance bias, overconfidence bias, and endowment bias have an effect on investment decisions. However, herding bias and confirmation bias do not affect investment decisions.

**Corresponding author: E-mail: maulidanurul@ump.ac.id;*

Conclusion: To increase investment opportunities, investors must pay attention to cognitive dissonance bias, overconfidence bias, and endowment bias because they can cause investment failure. Investors must also pay attention to information circulating in the media because analysis needs the latest information on investment transaction targets to avoid investment failure.

Keywords: Cognitive dissonance bias; overconfidence bias; herding bias; endowment bias; confirmation bias; investment decision.

1. INTRODUCTION

Every investor must be keen to have a better quality of life through their investments. Investment is a capital-raising action carried out by an individual at the moment with the aspiration to make a profit in the future [1]. In investing, investors always pay attention to the potential profits that can be obtained and carefully calculate any costs that have to be incurred during the investmen [2]. An investment decision is one policy in decision-making where an investor is faced with two or more options to obtain future profits from the invested capital [3].

Based on Table 1. The development of investors in the capital market started in 2021 and continues to experience an extraordinary increase in the number of investors until the end of 2023, namely increasing from 3,880,753 investors to 11,729,977 investors. This increasing phenomenon is greatly influenced by the active participation of millennial generation investors who are under 40 years old. can be seen in Table 2. The millennial generation dominates the number of investors in the capital market in Indonesia.

The millennial generation is the productive age with a vulnerable birth rate in 1982-2004 (19 years - 41 years) [5]. A characteristic feature of the millennial generation is that emotions such as anger, anxiety, and fear of something can affect their investment perspective, thus resulting in aggressive attitudes in the investment decision-making process [6]. The rapid dissemination of information, thanks to technological advances, can influence the millennial generation in the investment decision-making process [7]. Understanding finance is not always a key factor in making an investment decision; psychological conditions can also be a factor in determining an investment. Researchers are interested in studying the psychological factors (biases) important in determining the investment decision-making process.

Prospect theory is a concept that explains how investors make decisions when in situations of uncertainty [8]. This theory states that individuals do not always follow the norms of integrity theory in the face of risk and uncertainties; investors tend to consider psychological factors and unsure behaviour in rational decision-making [9]. Investors also tend to be involved in psychological and emotional factors when making investment decisions that can result in less rational investment behaviour. Behavioural bias is a representation of a psychological factor that emerges in the process of making investment decisions by an investor [10].

Behavioural bias can be defined as a variation in one's judgment of a situation that can result in a shift in perception of errors in judging an illogical condition and interpretation, often called irrational behaviour [11]. The impact of irrational behaviour arising from this biased behaviour can lead investors to make decisions that potentially adversely affect their investments. Many millennial investors tend to be aggressive in their investment decisions because they are influenced by psychological (biased) factors that ultimately impact their decisions in the investment world.

Several behavioural biases influence an investment decision, among others: cognitive dissonance bias, overconfidence bias, herding bias, endowment bias, and confirmation bias. Cognitive dissonance bias is when newly acquired information contradicts previously existing information, creating uncertainty about the understanding of previously acknowledged information [10]. Previous research by Ariska & Sugiyanto [12] and Hidayati et al. [13] found that cognitive dissonance bias influences investment decisions. Compared to previous studies that have been studied by Afriani & Halmawati [14] Novianggie & Asandimitra [15] Pradana, [16] and Setiawan et al. [17] found that cognitive dissonance bias does not influence investment decisions.

Table 1. Indonesian stock investor growth data

Single Investor Identification (SID)	Investor Growth					
	2021	2022	Jul-2023	Agt-2023	Sept-2023	2023-YTD
Capital market	3.880.753	7.489.337	10.311.152	11.420.074	11.581.533	11.729.977
Mutual Fund	3.175.429	6.840.234	9.604.269	10.694.228	10.852.684	10.994.091
Stock and other securities	1.695.268	3.451.513	4.439.933	4.888.910	4.948.772	5.029.218
Government bond	460.372	611.143	831.455	929.119	943.029	959.920

Source: PT Kustodian Sentral Efek Indonesia (KSEI) [4]

Table 2. Indonesian investor age data

Age	Percentage of the number of investors at each age	
	Agt-2023 (%)	Sept-2023 (%)
≤30	57,04	56,89
31-40	23,27	23,34
41-50	11,36	11,41
51-60	5,44	5,47
≥60	2,88	2,89

Source : PT Kustodian Sentral Efek Indonesia (KSEI) [4]

Overconfidence bias is an attitude of excessive confidence with a high degree of confidence in intuition, personal abilities, and knowledge in the decision-making process [17]. Earlier studies conducted by Addinpujoartanto & Darmawan [18], Ariska & Sugiyanto, [12] Rona & Sinarwati [19], Setiawan et al. [17] Supriadi et al. [3] and Theressa & Armansyah [1] found that overconfidence bias influences on investment decisions. According to previous studies by Afriani & Halmawati, [14] Purwanti & Seltiva [20] and Sukamulja et al. [2] overconfidence bias does not influence investment decisions.

Herding bias is the behaviour of investors who are inclined to follow the footsteps of other investors in making investments without undertaking fundamental analysis before, thus leading to the formation of inefficient markets [17]. In the results of previous studies that have been studied by Addinpujoartanto & Darmawan, [18] Afriani & Halmawati, [14], Armansyah, [21], Rona & Sinarwati, [19] and Theressa & Armansyah, [1], it was found herding bias influences on investment decisions. In comparison with previous research conducted by Setiawan et al. [17], it has been found that herding bias does not influence investment decisions.

Endowment bias is a tendency of investors who have an investment and value it more than investors who do not have it [22]. A previous study by Theressa & Armansyah, [1] found that endowment bias influences investment decisions. In comparison, the results of previous research that had been studied by Armansyah, [21] found that endowment bias did not influence investment decisions.

Confirmation bias is the unwillingness of investors to change the initial beliefs that have been made previously [23]. The results of previous research that had been studied by Armansyah [21], Elfahmi et al. [24], Husadha et al. [25] and Rose & Armansyah [23] found that confirmation bias influences investment decisions. However, a previous study by Nurvitasari & Rita [26] found that confirmation bias does not influence investment decisions.

This research is interested in developing research from [17], which investigates the influence of cognitive dissonance bias, overconfidence bias, and herding bias in investment decision-making by adding endowment bias and confirmation bias as it has proven to influence investment decisions [21]. Based on the description above, the researchers were interested in studying the influence of cognitive dissonance bias, overconfidence bias, herding bias, endowment bias, and confirmation bias on millennial investment decisions in capital markets.

2. LITERATURE REVIEW

2.1 Prospect Theory

The prospect theory was first introduced by Kahneman and Tversky [8]. Prospect theory is a decision framework that involves bias in evaluating prospects in situations of uncertainty [8]. Decisions made with the presence of risk can be seen as a choice between possibilities or opportunities. Prospect theory is an improvement of the theory of expected utility and the development of the finance behaviour theory that provides new alternatives related to financial behaviour. Prospect theory is one of the theoretical frameworks where decisions are taken in conditions of uncertainty [27]. This theory also affirms that a person always follows traditional financial norms in the face of risk and uncertainty instead of incorporating psychological (biased) factors and unsure behaviour to make rational choices [28]. It also applies to cognitive dissonance bias, overconfidence bias, herding bias, endowment bias, and confirmation bias, which are financial behaviours that can influence investment decisions for the millennial generation, which has a psychological condition that is constantly changing.

2.2 Cognitive Dissonance Bias on Investment Decision

Cognitive dissonance bias is when newly acquired information contradicts previously existing information, and it can create uncertainty about the understanding of previously acknowledged information [10]. Dissonance bias will occur when investors get new information that differs from previous information, making investors' decisions inappropriate as planned. According to the prospect theory, a person's or an investor's tendency to convince himself of the initial choice with the presence of new information received can lead investors to make irrational investments. By convincing themselves that the decisions they have learned and

understood from the start are better than the new information investors obtain, they can prevent investors from making the wrong decisions [10]. Previous research finds that biased cognitive dissonance positively influences investment decisions [12,13]. Based on previous explanations, the researchers presented the following hypothesis:

H1: Cognitive dissonance bias has a significant positive influence on investment decisions.

2.3 Overconfidence Bias on Investment Decision

Decision-making based on information can be reinforced by the heuristic bias that exists in the prospect theory. Heuristic bias explains that the foundation of a person in making a decision on circumstances or environments that are unpredictable is that investors will be more likely to behave irrationally when determining investment decisions. Overconfidence bias is an attitude of excessive confidence with a high degree of confidence in intuition, personal abilities, and knowledge in the decision-making process [17]. When an investor consistently overestimates himself and underestimates the judgment of others, overconfidence can lead to increased risk in decision-making. Some previous research finds that biased overconfidence bias influences investment decisions [18,12,19, 17,3,1]. Based on previous explanations, the researchers presented the following hypothesis:

H2: Overconfidence bias has a significant positive influence on investment decisions.

2.4 Herding Bias on Investment Decision

Herding bias is the behaviour of investors who are inclined to follow the footsteps of other investors in making investments without undertaking fundamental analysis before, thus leading to the formation of inefficient markets [17]. This behaviour reflects a condition in which an investor follows an action carried out by a number of other investors. Herding bias occurs when personal information or individual decisions are more influenced by public information about decisions taken by groups or individuals [29]. Investors are convinced that other partner investors have more accurate capabilities in making investment decisions, so investors tend to follow the tracks they are considered to have. Fearful behaviour will skip new unconfirmed information so that investors make irrational decisions, which belongs to one of the biases of prospect theory. Some previous research finds that herding bias has a positive influence on investment decisions [18,14,21,19,21]. Based on previous explanations, the researchers presented the following hypothesis:

H3: Herding bias has a significant positive influence on investment decisions.

2.5 Endowment Bias on Investment Decision

Biased endowment is the tendency of investors who have an investment and value it more than investors who do not have it [22]. Endowment bias can influence investors to retain investments they have (already purchased), so it can restrict investors from making decisions that give irrational choices [10]. Decision-making between investors and company owners is riskier in producing biased endowment effects that can affect investor behaviour [30]. The influence of a biased endowment that overestimates an investment will lead investors to make irrational decisions in the heuristic psychology in the prospect theory, better known as the term mind bias [16]. Previous research finds that endowment bias positively influences investment decisions [1]. Based on previous explanations, the researchers presented the following hypothesis:

H4: endowment bias has a significant positive influence on investment decisions.

2.5 Confirmation Bias on Investment Decision

Confirmation bias is a term that describes the investor's unwillingness to change an initial belief that has been made before [23]. Such bias can affect investors in decision-making. Before deciding to invest, investors will undertake several substantial considerations. This is because investments have two-time horizons to consider, namely the short-term and the long-term, aimed at ensuring the fulfilment of living well-being in the future. Biased confirmation can cause investors to look for information that confirms their belief about the investment they make [10]. Based on the prospect theory on biased confirmation behaviour in which investors convince themselves only on initial information and judgment and reject conflicting information, it will lead investors to make unreasonable investments. Some previous research finds that

confirmation bias positively influences investment decisions [21,24,25,23]. Based on previous explanations, the researchers presented the following hypothesis:

H5: Confirmation has a significant positive influence on investment decisions.

3. METHODS

3.1 Population and Sample

This research population includes millennial generation investors with accumulated experience in stock investment transactions in the capital market. The focus of this research will be aimed at active investors in the generation of millennials who invest stocks in capital markets with scope in the area of Banyumas district. It is based on the growth of millennium-generation investors, which recorded a significant increase of 10,07%, from 182,507 investors to 219,244 respondents. As noted in the Single Invest Identification (SID) by the Indonesian Central Securities Trust (KSEI) and by the Financial Services Authority (OJK) [31].

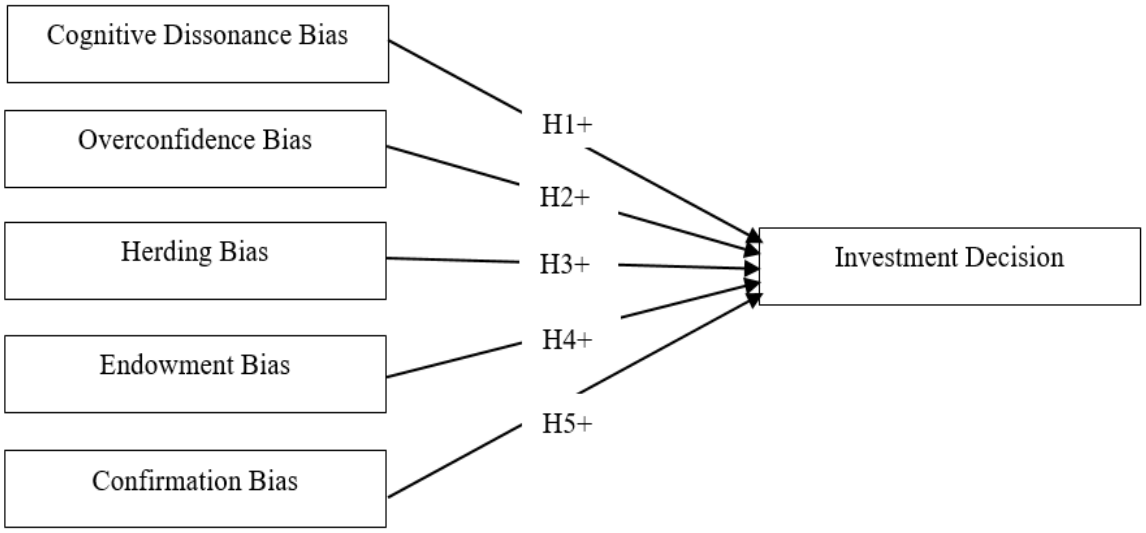

Fig. 1. Research framework

Table 3. Definition and measurement of variables

No.	Variable	Operational definition	Measurement
1.	Investment Decision	The individual's decision to invest their capital in one or more assets to gain future benefits [21	[21]
2.	Cognitive Dissonance	When newly acquired information contradicts existing information, causing mental or psychological discomfort [10]	[21,10]
3.	Overconfidence Bias	An unfounded belief in one's intuitive reasoning, judgment, and cognitive capabilities [10]	[21,10]
4.	Herding Bias	Investor behaviour that is inclined to follow investment decisions taken by other investors [21]	[21]
5.	Endowment Bias	Biased endowment is the tendency of investors who have an investment and value it more than investors who do not have it. [10]	[21,10]
6.	Confirmation bias	A selective perception that emphasizes ideas that affirm investor beliefs and rejects any value or information that contradicts investor's initial beliefs [10]	[21,10]

Source: Processed by researchers (2023)

This study uses primary data types through questionnaires distributed through Google Forms to respondents. The questionnaire contains questions that have been validated to obtain answers or answers relevant to the purposes of the research. The number of samples is determined based on the Roscoe theory formula. According to the Roscoe formula, in multivariate analysis (such as correlation or duplicate regression), the minimum sample number is calculated by multiplying 10 by the number of variables studied [32]. The study will target 120 respondents as samples, considering there are six variables. (5 independent variables and 1 dependent variable). Therefore, the minimum number of samples expected is 120 respondents (6 variables x 20) to achieve optimal results.

3.2 Variable Measurements

The definitions and measurements used in the variables Cognitive Dissonance Bias, Overconfidence Bias, Herding Bias, Endowment Bias, Confirmation Bias, and Investment Decisions are described in the table.

4. RESULTS AND DISCUSSION

4.1 Respondent Demographics

Data was obtained by disseminating a questionnaire of 128 respondents identified as active investors in capital markets located in the Banyumas district. According to Table 4, the largest number of respondents were women 76 respondents (59.40%) with the age range 30-35 in 59 respondents (46.10%), 52 respondents worked as entrepreneurs (40.60%), respondents with income in the range of Rs. 3.0000.000 - Rs. 6.000.000 totalling 57 respondents (44.50%).

4.2 Outer Model

Here are the outer test results of the model calculated using the SmartPLS 3.0 statistical tool:

4.2.1 Convergent validity

The variable indicator is valid when the outer loading value is > 0.7 [33]. Based on the graphical analysis presented in Fig. 2, it can be concluded that there is an item of the biased confirmation indicator (CB) with a value < 0.7, so the item must be deleted to meet the SmartPLS requirements. After the item of a biased confirmation indication (CB) that does not meet the requirements is removed, the results of all the indicators of the outer loading test have fulfilled the requirements so that it can proceed to the next stage.

4.2.2 Construct reliability and validity

Composite rehabilitation or composite reliability is used to see the alignment between instruments or variables in this study. Composite reliability is considered to meet the requirement if the value of each instrument or variable is > 0.7 [33]. Based on the data in Table 5, the entire instrument or the variable indicates a composite reliable value of > 0.7, so all variables are already qualified for compound reliability.

AVE is deemed to meet the validation requirement when the value is > 0.5 [33]. Based on data from Table 6, it can be concluded that the AVE value of each variable exceeds 0.5, so it is possible to conclude that all variables have met the discriminatory validity criteria.

4.3 Inner Model

Internal models are used to evaluate relationships between variables. Changes in R-Square values can be used to observe the impact of changes in relationships.

4.3.1 R-Square

R-Square (R^2 is a metric that measures the proportion of variation in the value of a dependent variable that can be explained by the variable affecting it. (independent). This metric is used to evaluate the quality of the model. R-Square (R^2) is divided into three categories: 0.67 for strong (substantial), 0.33 for moderate, and 0,19 for weak [33].

The data in Table 6 shows that the R-Square (R^2) value for investment decisions is 0.214, which belongs to the low category. Therefore, it can be concluded that the contribution of cognitive dissonance bias, overconfidence bias, and herding bias is 21.4% to investment decisions. The remaining 78.6% can be attributed to other variables not studied in this study.

4.3.2 Model FIT

The model fit test is used to determine whether a model fits the data. In the model fit test, it can be seen from the SRMN value of the model. The PLS model is stated to have met the criteria if the model fits the test value SRMN < 0.1 and the perfect model SRMN < 0.08 [33].

Table 4. Descriptive characteristics

Identity	Total	Percentage (%)
Gender		
Man	52	40.60%
Women	76	59.40%
Age		
19 - 25	28	21.90%
26 - 30	23	18%
31 - 35	59	46.10%
36- 41	18	14.10%
Job		
Entrepreneur	52	40.60%
Government Official	24	18.80%
Civil servant	25	19.50%
Student	25	19.50%
Private Employees	2	1.60%
Income		
<Rp. 1.000.000	6	4.70%
>Rp. 1.000.000 - <Rp. 3.000.000	32	25%
>Rp. 3.000.000 - <Rp. 6.000.000	57	44.50%
>Rp. 6.000.000	33	25.80%
How long have you been investing?		
< 1 Year	12	9.40%
>1 Year - <5 Year	71	55.50%
>5 Year - <10 Year	41	32%
> 10 Year	4	3.10%

Source: Processed by researchers (2023)

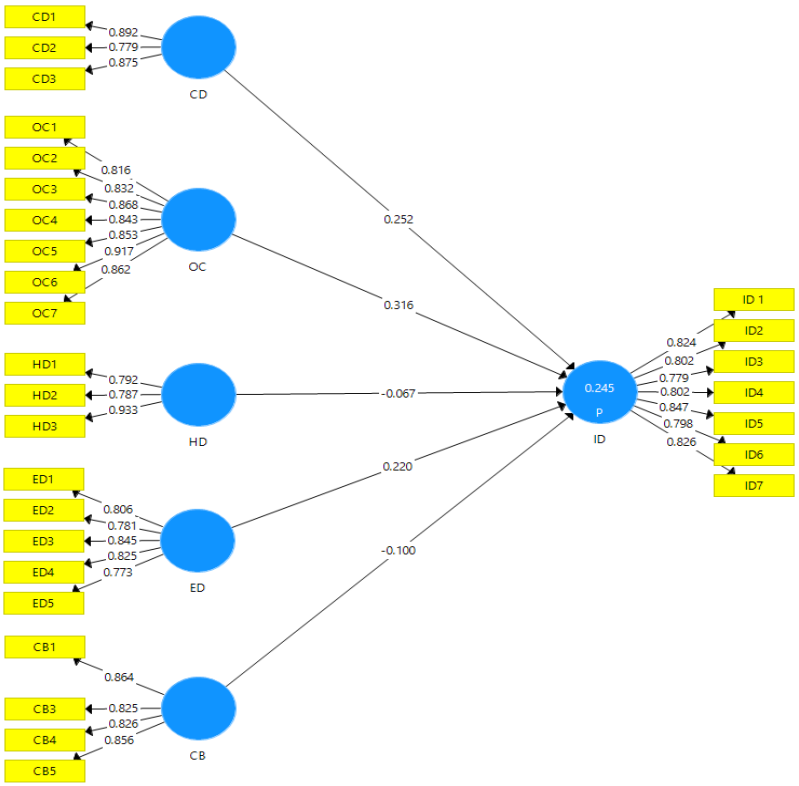

Fig. 2. Outer loading test results

Source: Processed by researchers (2023)

Table 5. Construct Reliability and validity

	Composite Reliability	Average Variance Extracted (AVE)
ID	0.931	0.658
CD	0.886	0.722
OC	0.951	0.734
HD	0.877	0.705
ED	0.903	0.650
CB	0.888	0.615

Source: Processed by researchers (2023)

Table 6. R-Square value

	R Square	R Square Adjusted
ID	0.245	0.214

Source: Processed by researchers (2023)

Table 7. Model FIT

	Saturated Model	Estimated Model
SRMR	0.079	0.079
d_ULS	2.722	2.722
d_G	1.328	1.328
Chi-Square	938.224	938.224
NFI	0.690	0.690

Source: Processed by researchers (2023)

Table 8. Path coefficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Conclusion
CD -> ID	0.252	0.255	0.106	2.385	**0.017**	Supported
OC -> ID	0.316	0.299	0.113	2.811	**0.005**	Supported
HD -> ID	-0.067	-0.034	0.098	0.687	0.492	Not Supported
ED -> ID	0.22	0.221	0.107	2.068	**0.039**	Supported
CB -> ID	-0.1	-0.09	0.103	0.965	0.335	Not Supported

Source: Processed by researchers (2023)

Based on Table 7, the results of the fit model test are 0.079 < 0.01 and 0.079 < 0.08. This means that it can be concluded that the structural model in this research is suitable or feasible.

4.3.3 Structural analysis model

Hypothesis testing using SmartPLS with the bootstrapping method, using 128 samples to refine data and test significant statistical coefficients of the path. The value of P Values will be a condition of acceptance of the hypothesis if P values are smaller than 0.5, the assumption is confined [33].

5. DISCUSSION

5.1 Hypothesis 1 Test Results

Based on the results of the hypothesis test in Table 8, hypothesis 1, which stated that cognitive dissonance bias influenced investment decisions, was endorsed. The bootstrapping test resulted in a P-value of 0.017 < 0.05. Thus, cognitive dissonance bias has a significant influence on the investment decisions of the millennial generation in capital markets. Therefore, this is consistent with the principle of prospect theory, in which an investor tends to behave irrationally when making investment decisions when the newly obtained information contradicts the previous information, thus raising doubts about the information already understood. In this study, respondents are dominated by women who have implicit characteristics and are also supported by the characteristic traits of the millennial generation, where emotions such as anger, anxiety, and fear of something can affect their investment prospects, thereby resulting in aggressive attitudes in the investment

decision-making process [6]. Previous studies reveal that women are careful in decision-making [34,35,36,37,38]. This study's results align with previous research by Ariska & Sugiyanto, [12] and Hidayati et al. [13] that stated that cognitive dissonance bias influences investment decisions.

5.2 Hypothesis 2 Test Results

Based on the results of the hypothesis test in Table 8, hypothesis 2 states that biased overconfidence influences the investment decision. The result of the bootstrapping test yielded a P-value of 0.005 < 0.05. Thus, overconfidence bias has a significant influence on the millennial generation's investment decisions in capital markets. Therefore, this is consistent with the principle of prospect theory, where an investor tends to be irrational in making investment decisions when he is too confident in their ability. So, the investor ignores the information spread across the media. It is also supported by the dominance of respondents whose job is to be private, where the characteristic of an expert is a firm belief in decision-making [39]. Excessive confidence can impact an investor's decision-making in the context of an investment, as it can pose a risk to the investment. Investors can only make decisions by considering fundamental investment factors, which could potentially jeopardize investment returns [19]. The results of this study are in line with previous studies conducted by Addinpujoartanto & Darmawan,[18], Ariska & Sugiyanto,[12], Rona & Sinarwati,[19], Setiawan et al. [17], Supriadi et al. [3] and Theressa & Armansyah, [1], which stated that overconfidence bias has a significant influence on investment decisions.

5.3 Hypothesis 3 Test Results

Based on the results of the test of the hypothesis in Table 8, hypothetical 3, which states that biased herding influences the outcome of an investment, is unconfirmed. The bootstrapping test resulted in a P-value of 0.492 > 0.05. Thus, herding bias does not influence the investment decisions of the millennial generation in capital markets. The information circulating in the various media does not make investors make decisions directly, but investors analyze first to choose the investment that will be beneficial to investors, which can behave rationally in making decisions without being influenced by other investors [17]. This study's findings align with previous research conducted by Setiawan et al. [17] which stated that bias herding does not influence investment decisions.

5.4 Hypothesis 4 Test Results

Based on the test results of the hypothesis in Table 8, hypothetical 4, which states that biased endowment influences investment decisions, is disproportionate. The result of the bootstrapping test yields a P-value of 0.039 < 0.05. Thus, the endowment biased has a significant influence on the millennial generation's investment decisions in capital markets. Therefore, this is consistent with the principle of prospect theory, in which an investor tends to be irrational when making an investment decision. This happens when an investor overestimates an investment because it is supported by existing experience, so it ignores information spread across the media. So, investors value an investment and will not sell it until they get the profit that the investor expects. Such rationality can be reasonably explained because investors have a high degree of confidence in their investments, which makes them very careful in decision-making [1]. This study supports the results of a previous study conducted by Peñón & Ortega [30] and Theressa & Armansyah [1] which stated that biased endowment influences investment decisions.

5.5 Hypothesis 5 Test Results

Based on the hypothesis test results in Table 8, hypothetical 5, which states that biased confirmation affects the investment decision, is unconcerned. The result of the bootstrapping test yields a P-value of 0.335 > 0.05. Thus, it can be concluded that bias confirmation does not influence the investment decisions of the millennial generation in the capital market. The millennial generation is very sensitive to the technological advances that exist, so investors in the millennial generation can easily obtain information from various media to carry out analyses of investments and avoid losses Nurvitasari & Rita [26]. This study's results align with previous research by Nurvitasari & Rita [26] which stated that bias confirmation has no influence on investment decisionsm [40].

6. CONCLUSION

The research finds that cognitive dissonance bias, overconfidence bias, and endowment bias influence investment decisions in capital markets. At the same time, biased herding and biased endowment do not influence investment decisions in the Banyumas region. The

limitations of this study were that it used only a few bias categories, among others, cognitive dissonance bias, overconfidence bias, herding bias, and confirmation bias. So, this research model only has a determination coefficient value of 0.245, which allows for other biased categories that influence investment decisions. Both of these studies were conducted only in the Banyumas region, so the results of this research could not be generalized more widely.

Further research is expected to add other bias categories to the research to see a more jealous picture of the influence of biased behaviour on investment decisions, such as recent bias (Armansyah, 2022). Further research can also expand the scope of research so that it can be generalized more widely. To increase investment opportunities, investors should pay attention to cognitive dissonance bias variables, overconfidence bias, and endowment bias, as they can lead to investment failure. Investors should also pay close attention to information constantly circulating in the media because analysis carried out without paying attention to up-to-date information about the target investment transactions can cause the failure of investments.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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