

# The influence of cognitive biases on investor decision-making: the moderating role of demographic factors

Yofy Syarkani<sup>1</sup>, Erik Syawal Alghifari<sup>2\*</sup>

<sup>1</sup>Universitas Langlangbuana, Bandung, Indonesia

<sup>2</sup>Universitas Pasundan, Bandung, Indonesia

\*Corresponding author: [eriksyawalalghifari@unpas.ac.id](mailto:eriksyawalalghifari@unpas.ac.id)

---

## Article Info

### Article history:

Received : 2021-12-23

Accepted : 2022-01-08

Published: 2022-07-06

### JEL Classification Code:

G11, 016, G40

### Author's email:

[yofysyarkani@unla.ac.id](mailto:yofysyarkani@unla.ac.id)

[DOI: 10.20885/jsb.vol26.iss2.art5](https://doi.org/10.20885/jsb.vol26.iss2.art5)

## Abstract

**Purpose** – This study aims to see investor behavior in making investment decisions influenced by cognitive biases, namely overconfidence bias and the illusion of control bias, by looking at the situational factors such as age, gender, and education.

**Design/methodology/approach** – This study is conducted using a quantitative method by distributing a questionnaire. The questionnaires are measured using a 5-point Likert scale. The samples are taken from the population of individual investors in Bandung, West Java, with a number of 100 respondents.

**Findings** – The results of this study prove that: (1) Illusion of control bias has an influence on investors' decision-making, (2) Gender and education moderates the influence between the illusion of control bias on investor decision-making, (3) Age does not moderate the influence between the illusion of control bias on investor decision-making, (5) Overconfidence bias has an influence on investor decision-making, (6) Gender moderates the influence between overconfidence bias on investor decision-making, and (7) Age and education do not moderate the influence between overconfidence bias on investor decision-making.

**Research limitations/implications** – The population in this study is limited to individual investors in Bandung. Future studies can conduct research in a similar direction using other populations, or focusing on a certain population, to ensure the generalizability of the results.

**Practical implications** – Investors should be aware of cognitive biases while making decisions to invest. The biases can occur whether the investors realize it or not. Therefore, it would be useful for them to understand their cognitive biases so that investors can act rationally while making investment decisions.

**Originality/value** – This study fills the research gap from the previous studies by examining the differences of investors' decision-making based on demographic factors, which are used as the moderating variables.

**Keywords:** Investor decision-making, overconfidence bias, illusion of control bias, demographic factors.

---

## Introduction

Investor's behavior in investment decision-making has gained much attention since it is closely related to investment performance. The development in finance and investment literature indicates that there are different views of investor behavior. The traditional financial literature sees that investor acts rationally in choosing their investment (Misal, 2013) by using their thoughts to absorb information before taking acts in choosing an investment (Chen et al., 2015). This traditional view

sees that investment decisions in buying stocks or investments are based on clear information (Gunathilaka, 2014), such as risk, time, interest rate change, macro, and resources. Initially, the investors assume that they are not controlled by behavioral factors when making an investment decision (Markowitz, 2007). However, the studies and literature regarding finance keep developing, and it leads to the conclusion that investors' rationality is only an assumption in decision-making (Fieger, 2017; Mojtaba, 2016).

The literature on behavioral finance started to arise in 1980s, and it focuses on how investors behave in making decisions (Woldie et al., 2018). Currently, most investors are not using a rational approach in deciding to invest. This change occurs when the market information is not always perfect, and there is a poor track record of traditional finance in explaining financial market trends and stock movements (Musse, 2015). In behavioral finance, there is an understanding that personal, emotional, and psychological factors can influence investors' risk perception and behavior.

The results from previous studies have shown that some investors use an irrational approach in decision-making (Woldie et al., 2018; Charles & Kasilingam, 2016; Ritter, 2003) since they are influenced by psychological factors (Barberis, 2003; Kourtidis et al., 2011) and overconfidence bias (Barber & Odean, 2002). Regarding this, Charles & Kasilingam (2016) in his study also stated that some investors are less likely to take risks, while others are deliberately choosing high-risk investments. Therefore, studies related to investor behavior in choosing investment become relevant to be carried out.

Irrational decision-making can be influenced by biases that investors might perceive, such as overconfidence bias and the illusion of control bias. These biases can shape the cognitive profile, eventually influencing how investors collect and understand investment-related information (Sabir et al., 2019). The illusion of control bias is the tendency for people to overestimate their ability to control events. It is related to herding behavior because the individual might feel that others are making decisions based on relevant information (Pompian, 2011; Sabir et al., 2019). Overconfidence bias is related to excessive confidence owned by investors. This can lead to the unfounded belief of investors' reasoning, ability, and judgment about an investment.

The bias perceived by investors can also have an impact on excessive trading and poor performance (Barber & Odean, 2002). Currently, the hectic numbers of IDX investment galleries in universities have become an interesting phenomenon to be studied. In 2017, the investment galleries in universities have increased and reached 300 galleries (market.bisnis.com). The increasing number of investors in college students especially in West Java, is influenced by the tendency of irrational attitude in investing, which may be caused by the bias perceived by investors, and lead them to herding behavior (Tania et al., 2015). The increasing number of young investors in a college student is proven by Ariadi et al. (2015), who found that students show enthusiasm to learn about the type of investment.

This study attempts to understand the influence of overconfidence bias and the illusion of control in affecting investor decision-making. The authors also use demography as a moderating variable to see how certain factors can strengthen or weaken the relationship between bias perceived by investors and their decision-making. This study also fills the research gap addressed by Zahera & Bansal (2017) that there is a need to examine the different behavior of investors in determining their investment based on demography and seasonal factors. In this study, three demography factors are used as moderating variables: age, gender, and education.

## Literature Review and Hypotheses

### Overconfidence Bias and Investor Decision-making

Overconfidence bias is excessive confidence which is not necessarily true and is only based on intuition, judgments, and cognitive abilities (Pompian, 2012), or it can be interpreted that investors exaggerate their knowledge based on their positive experiences (Keswani, 2019). Overconfidence bias is caused by the belief that the information obtained can be used well because the investors believe that they have an accurate and appropriate analysis. However, it is only an illusion of knowledge and ability because of several reasons such as lack of experience and limited ability to interpret information (Baker & Nofsinger, 2002), or underestimating the risk (Keswani, 2019).

Overconfidence bias can affect investor behavior when they choose an investment. An investor who has just made two or three transactions often feels sure enough to make any investment decision. If many investors in the capital market have this overconfidence bias aggregately. The reaction that occurs in the market would be far from rational. In his study, Ditttrich et al. (2005) stated that overconfidence bias significantly influences investor decision-making. The results from Ady (2018) also showed that cognitive bias, including overconfidence bias, can affect an investment decision. An overconfident investor is not only making a wrong choice for themselves, but it will have a strong effect on the whole market. Investors tend to conduct overtrade as a result of the belief that they have better knowledge than others. The excessive confidence of an investor due to their ignorance, passivity, and lack of understanding of the performance of investment companies might cause them to underestimate the risk of an investment, thus resulting in a portfolio with bad performance.

The results of the study prove that overconfidence can have a significant and positive effect on investment decision-making. Everyone can become overconfident when their age and education increase (Qasim et al., 2019). Other studies have also proven that men are more confident than women, and their impact on decisions is significant (Baber & Odean, 2001).

The overconfidence bias has a significant positive effect on investment decisions (Kartini & Nahda, 2021), in their research it is known that students dominate the majority of respondents, so they are likely to have a high level of motivation and enthusiasm in investing. This should be noted for young investors who are particularly prone to overconfidence bias.

The results from previous studies have found that the tendency to have overconfidence bias in stock selection is influenced by demographic factors, which determine investor behavior. Warren et al. (1990) revealed that one's investment decision is not only based on the factor that they are following other's decisions but also on lifestyle and demographic characteristics. This factor includes gender, age, education, and investment time (Jain et al., 2020).

According to gender, investors are divided into males and females. Investor preferences based on gender are different; men are more risk-takers than women (Croson & Gneezy, 2009). The age level of the two sexes is also different. The investors are confident that they are educated. If an investor is confident, his trading frequency will also increase (Graham et al., 2009). Investors with more education have a lower disposition effect (Goo et al., 2010). Overconfidence increases when individuals have more education (Bhandari & Deaves, 2006; Deaves et al., 2010).

Osman (2015), in his study, revealed that men are braver in taking high-risk investment product because of their overconfidence compared to women. On the other hand, Sekkat & Veganzones-Varoudakis (2007) found that women tend to act more carefully and avoid risk than men. Aside from gender, age and education of investors are also believed to have a role in influencing their decision. The study from Christanti & Mahastanti (2011) mentioned that younger investor considers many other variables because they have not had many experiences. On the other hand, older or middle-aged investors do not consider as many because they already have many experiences in trading or investing. In addition, it is also found that investors with overconfidence biases are relatively 25 years old or older (Pompian, 2012). Lin (2011) has found that educated investors decide to invest based on their knowledge, ability, and self-confidence. In this regard, the higher an investor's education, the higher their self-confidence would be.

Based on these explanations, the hypothesis proposed in this study is:

H1 : Overconfidence bias has a positive influence on investor decision-making.

H1a: Gender moderates the influence between overconfidence bias on investor decision-making.

H1b: Age moderates the influence between overconfidence bias on investor decision-making.

H1c: Education moderates the influence between overconfidence bias on investor decision-making.

### **Illusion of Control Bias and Investor Decision-making**

The illusion of control bias is the tendency of a person to believe that they can control or at least influence results, while, in fact, they cannot (Pompian, 2012). According to Nofsinger (2005), there are several things that can drive investors to choose an investment, namely choice, order of results, familiarity, past success, information, and active involvement. The illusion of control bias can make

an investor perceive that they can control the external condition with their ability, while the condition in the external environment is outside of their control.

Regarding the illusion of control, successful investments in the past would also determine the investors' bravery to make an investment decision. Qadri & Shabbir (2014) conducted a study on this topic and found that illusion of control bias influences investor decision-making. Riaz & Iqbal (2015) also stated that illusion of control bias may cause investors to be overconfident in making the decision to invest. However, Labajova et al. (2021) in their study on the influence of illusion of control in the context of farm machinery investment in Germany, found that illusion of control bias does not influence investor decision-making, as the biases may be small and might not be appropriate in this particular setting.

According to Riaz & Iqbal (2015), an illusion of control and behavioral bias have similarities as individuals think that control and influence on outcomes can be done at any random events. Previous studies have proven that male investors tend to perceive an illusion of control bias more than female investors (Qadri & Shabbir, 2014). This is strengthened by Hsu et al. (2021), who stated that the behavioral bias in individual investors varies across gender and age and that it can be mitigated by financial literacy. Other demography variables, such as education, have also proven to affect the relationship between the illusion of control bias and investor decision-making. Educated farmers with high financial literacy are expected to understand the events they can control and those they cannot (Labajova et al., 2021).

Prosad et al (2015) examined demographic characteristics, including age, and gender against behavioral bias. They found that age and gender had a relationship with behavioral bias. Tekçe et al (2016) identified that overconfidence in controlling investment returns among individual investors declines with age. Lucia et al. (2010) tried to experiment to test the existence of the illusion of control, the results of the study found that there were variations in individuals who experienced the bias of illusion of control in making investment decisions. However, this phenomenon is present among both men and women.

The illusion of individual control bias overestimates one's own ability to achieve the desired results but in reality, the individual cannot achieve it and this illusion leads individuals to poor investment decisions (Rudski, 2004). Prospect theory reveals that several other biases influence individual investment decisions and lead to irrationality. Still, the effects of bias are not always of the same intensity as some empirical studies show that investment decisions can be made better based on a certain level of education due to having more knowledge. and information about financial issues (Ullah, 2015).

Based on these explanations, the hypothesis proposed in this study is:

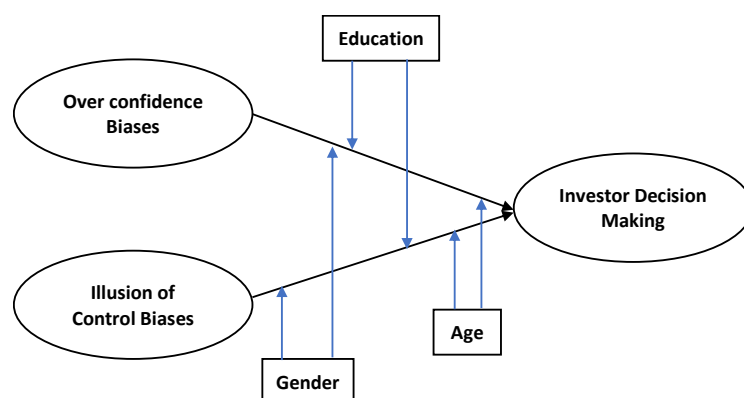
H2 : Illusion of control bias has a positive influence on investor decision-making.

H2a: Gender moderates the influence between illusion of control bias on investor decision-making.

H2b: Age moderates the influence between illusion of control bias on investor decision-making.

H2c: Education moderates the influence between illusion of control bias on investor decision-making.

Based on the relationship between variables that has been explained, the conceptual framework of this study is shown in Figure 1.



**Figure 1.** Conceptual Framework

## Research Methods

The research design in this study is survey research using a quantitative approach with the aim of measuring causal relationships. This study focuses on individual investors in the city of Bandung who invest in the IDX. To determine the number of representative samples, this study uses the advice of Hair et al. (2019), which is the number of indicators multiplied by five or ten. The number of indicators of the variables studied is 20 indicators, then the number is multiplied by 5. So the number of samples is 100 (5 x 20 indicators). The sampling technique used was accidental sampling with Partial Least Squares-Structural Equation Modeling (PLS-SEM) with SmartPLS 3.0.

## Variable Measurement

The measurement of each variable is developed based on the previous studies, with the details shown in Table 1.

**Table 1.** Operational Definition and Dimensions

Variable and Source	Definition	Dimensions
Overconfidence Bias (Kansal & Singh, 2018; Koo & Yang, 2018; Mishra & Metilda, 2015)	Feelings of being overconfident in one's abilities or knowledge in trading or investing.	1. Better than average 2. Self-attribution 3. Positive illusion 4. Planning Fallacy
Illusion of Control Bias (Nofsinger, 2005; Hönl et al., 2017; Sha & Ismail, 2021)	Very high belief in the ability to predict outcomes, but in fact, it is not.	1. Ignoring risk 2. Assuming everything is easy to be done 3. Assuming to be able of determining a decision result
Investor Decision-making (Scott & Bruce, 1995; Rasheed et al., 2018; Gambetti & Giusberti, 2019)	A complex process that includes an analysis of several factors and following several steps.	1. Rational 2. Intuitive 3. Dependent
Demography (Katper et al., 2019; Bashir et al., 2013; Vuong & Dao, 2012).	Characteristics of a population both in terms of size, structure, population distribution, and changes	1. Gender 2. Age 3. Education

## Results and Discussions

### Descriptive Analysis

The findings of this study identify that the respondents are dominated by male (53%) in the age group of 26-35 years old (66%), with the education level of bachelor (75%). More details are presented in Table 2.

**Table 2.** Demographic Characteristics

Characteristics	Frequency	Percentage
Gender		
Male	53	53%
Female	47	47%
Age		
18-25 years	3	3%
26-35 years	66	66%
36-45 years	29	29%
46-55 years	2	2%
Education		
High School or equivalent	6	6%
Bachelor's degree	75	75%
Master's degree	17	17%
Doctoral degree	2	2%

## Verificative Analysis

### Outer model evaluation

The results for the outer model evaluation for validity and reliability and path coefficient is presented in Figure 2 and 3.

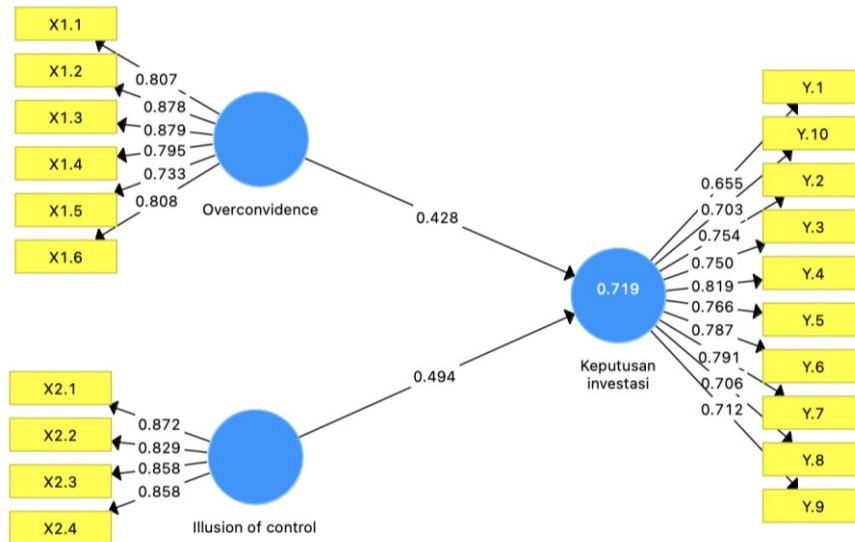


Figure 2. Results of Outer Model Evaluation

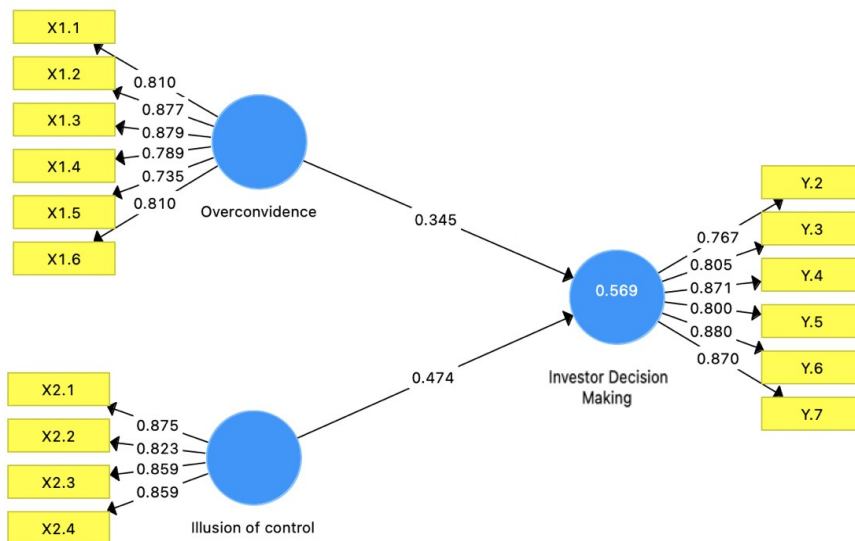


Figure 3. Final Output of Outer Model Evaluation

### Convergent Validity

Convergent validity is examined by checking the reliability or validity of the indicator in each item using the loading factor value. The limit of loading factor value used in this study is 0.7. In Figure 2, several indicators are dropped from the study because it does not meet the loading factor value limit, namely Y.1, Y.8, Y.9 and Y.10. After the indicators are dropped, it can be seen in Figure 3 that the indicators in each variable have loading factor value of  $> 0.70$  (valid). Therefore, the convergent validity are met.

### Discriminant Validity

The research model has good discriminant validity if the value of square root of Average Variance Extracted (AVE) of each construct is greater than each construct in the model. The results are shown in Table 3.

**Table 3.** Value of Square Root of AVE

	Illusion of Control Bias	Investor Decision-making	Overconfidence Bias
Illusion of Control Bias	<b>0,854</b>		
Investor Decision-making	0,712	<b>0,833</b>	
Overconfidence Bias	0,692	0,673	<b>0,818</b>

Based on Table 3, it can be known that the value of the square root of AVE is 0.854, 0.833, and 0.818, which are greater than the value of each construct, or that the value of the square root of AVE is > 0.5. It can be said that the outer model has good discriminant validity.

**Reliability and Average Variance Extracted (AVE)**

The reliability test can be seen from the value of Cronchbach's Alpha, Composite Reliability, and AVE. The construct is reliable if the value of AVE is > 0.50, *composite reliability* is > 0.70, and cronbach’s alpha is > 0.60. The output for SmartPLS for composite reliability is presented in Table 4.

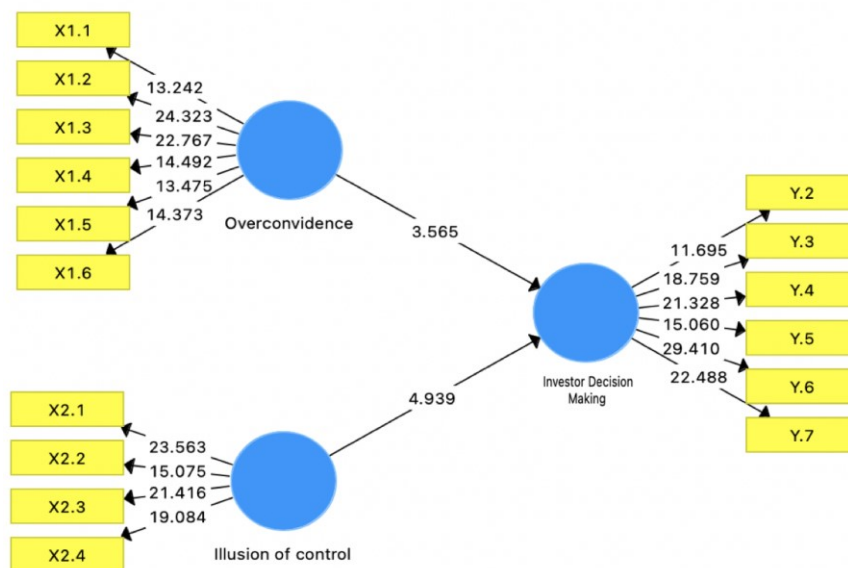
**Table 4.** Value of Cronbach's Alpha, Composite Reliability, and AVE

	Cronbach's Alpha	Composite Reliability	AVE
Illusion of Control Bias	0,877	0,915	0,730
Investor Decision-making	0,911	0,932	0,695
Overconfidence Bias	0,900	0,924	0,669

The results of SmartPLS output in Table 2 shows that all construct has the AVE value of > 0.50, composite reliability value of > 0.70, and Cronbach's alpha value of > 0.60. Therefore, it can be concluded that all constructs have good reliability.

**Inner Model Evaluation (Structural Model)**

Based on the results of the outer model evaluation, it is found that the model has meet the criteria. Based on this, an inner model test or structural model evaluation will be done by looking at the reliability value of indicator in the construct of dependent variable and path coefficient results from the t-statistic value. Another evaluation is done by looking at the value of Q<sup>2</sup> predictive relevance. It aims to understand the influence between variables through bootstrapping.



**Figure 2.** Initial Results of Inner Model Evaluation

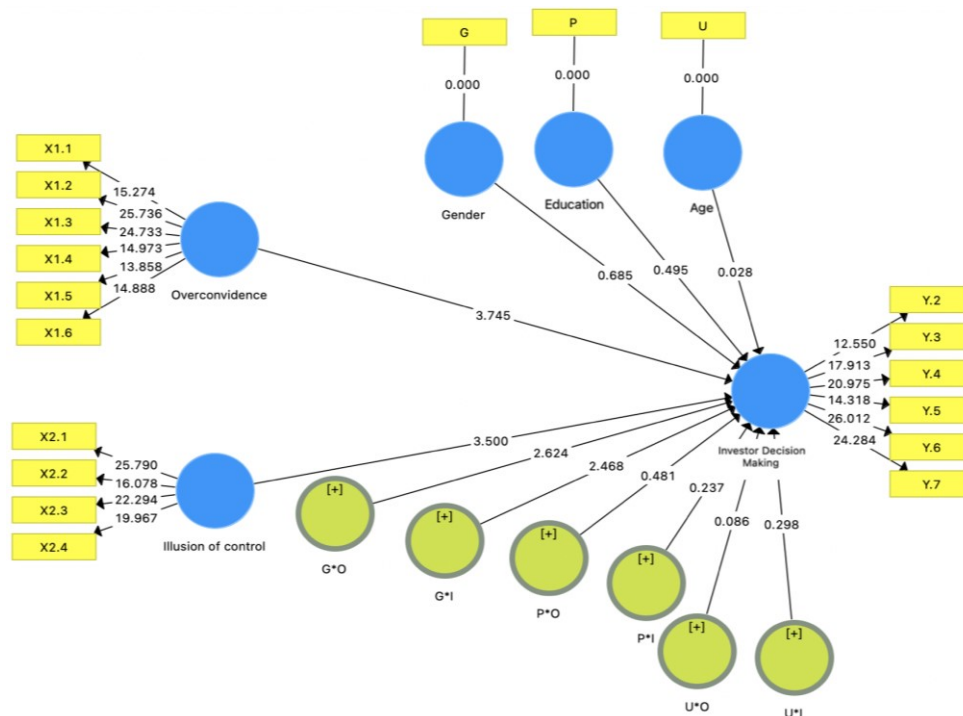


Figure 3. Results of Inner Model Moderation Evaluation

**Variance Analysis (R<sup>2</sup>) or Determinant Coefficient**

Determinant coefficient or variance analysis (R<sup>2</sup>) is aimed to understand whether the prediction model is good. The prediction model is good if the R<sup>2</sup> value is higher. The determinant coefficient value in this study is shown in Table 5.

Table 5. Value of Determinant Coefficient

	R Square	Details
Investor Decision-making	0,569	Model Moderate (Before the addition of moderating variable)
Investor Decision-making	0,613	Model Moderate (After the addition of moderating variable)

It can be seen in Table 5 that the model in this study has a good prediction model, whether before the addition of moderating variable or after the addition of moderating variable.

**Predictive Relevance Analysis (Q<sup>2</sup>)**

The fit model test is carried out through the Q<sup>2</sup> by looking at the value of Q-square, if the value of Q<sup>2</sup> is greater than zero, the model is good or fit. The estimation results can be seen in Table 6.

Table 6. Q-square Value

	SSO	SSE	Q <sup>2</sup> (=1-SSE/SSO)	Details
Investor Decision-making	600,000	378,577	0,369	Have a strong predictive relevance value (Before the addition of moderating variable).
Investor Decision-making	600,000	366,519	0,389	Have a strong predictive relevance value (After the addition of moderating variable).

In Table 6, it can be seen that the Q-square value for investor decision-making before and after the addition of moderating variable is 0.369 and 0.389. Therefore, it can be said that the model in this study is good enough to describe the reality and phenomenon that occurs in the field.



### Bootstrapping Evaluation

The assessment of the significance of the prediction model in the inner model evaluation can be seen from the value of p-value. If the p-value is > 0.05 or 5%, it means that the influence is not significant. If the p-value is < 0.05 or 5%, it means that the relationship has a significant influence. The results of hypothesis test are presented in Table 7.

**Table 7.** Results of P-Value (Bootstraping)

	Original Sample	T Statistics	P Values	Results	Conclusion
Overconfidence Bias → Investor Decision-making	0,411	3,500	0,001	Significant	H1 accepted
Gender x Overconfidence Bias → Investor Decision-making	0,282	2,624	0,009	Significant	H1a accepted
Age x Overconfidence Bias → Investor Decision-making	-0,011	0,086	0,932	Not Significant	H1b rejected
Education x Overconfidence Bias → Investor Decision-making	0,049	0,481	0,631	Not Significant	H1c rejected
Illusion of Control Bias → Investor Decision-making	0,425	3,745	0,000	Significant	H2 accepted
Gender x Illusion of Control Bias → Investor Decision-making	-0,257	2,468	0,014	Significant	H2a accepted
Age x Illusion of Control Bias → Investor Decision-making	0,043	0,298	0,766	Not significant	H2b rejected
Education x Illusion of Control Bias → Investor Decision-making	-0,028	0,237	0,813	Not significant	H2c rejected

### Discussion

The results of this study indicate that overconfidence bias significantly influences investor decision-making in a positive direction. The higher the overconfidence bias perceived by investors, the more often investors make investment decisions. Overconfident people believe that they are better at various skills than they really are (Hsu, 2021). Overconfidence in investing can lead to problems such as excessive trading, poorly diversified portfolio management, and larger risk accumulation (Merkle, 2017). Overconfidence overcomes the limited knowledge of investors on their investments, assuming that their decisions are always right. Research shows that individual investors in Bandung City tend to be overconfident in making investment decisions and are more confident in their own abilities in managing their funds than doing it through an investment manager. Based on this, overconfident investors can bear a greater risk in their decision-making in investing (McCannon et al., 2016).

The moderating role of gender as one of the demographic factors in the influence of overconfidence bias on investor decision-making has a significant positive influence, while age and education level do not show any significant effect in moderating the relationship between the variables. In this case, both men and women have a tendency to behave overconfidently (Mishra & Metilda, 2015). It is proven that gender has a role in strengthening the influence of overconfidence bias on investor decision-making. The majority of respondents in this study are male, as males usually have superior abilities in processing information and are better able to make judgments than women, so they have high self-confidence (Renerte et al., 2020). Barber & Odean (2001) show that men are more confident and trade more often than women. The level of overconfidence an investor expects to experience increases in the early stages of investing. Then, with more experience, he became more aware of his own abilities. An overconfident investor invests too aggressively, thereby increasing trading volume and market volatility while lowering his own expected profit.

Based on the research results, it is proven that the illusion of control bias positively influences investor decision-making. This means that if investors perceive the illusion of control

bias is high, then investors will make investment decisions more often. Under certain conditions, they often rely on their intuition and have great confidence in determining an outcome. The illusion of control bias is a very high belief in the ability to predict a result, but in fact not (Hsu & Chen, 2017; Metilda, 2015). The illusion of control is seen by several experts as dangerous for investors, mainly in decision-making, because of the tendency to believe that they can control or at least able to influence the results that they clearly cannot do. This study's results indicate that investors with an illusion of control bias will make investment decisions more often. Individual investors with this bias think that their skills are valuable and productive, consider themselves highly skilled, and can make the right decisions in various situations (Din et al., 2020).

The moderating role of gender as one of the demographic factors in the relationship between the illusion of control bias and investor decision-making has a significant negative influence. However, education and age do not significantly moderate the influence of illusion of control bias on investor decision-making. Unlike the case with the moderating role of gender in the influence of overconfidence bias on investor decision-making, in this case, gender tends to moderate negatively or weaken the influence of illusion of control biases on investment decisions. Gender roles can reduce the level of illusion of control bias in investing. In this regard, both men and women tend to be able to reduce their confidence control over their investment decisions related to information, obtaining investment returns and risks, consulting with fellow investors, and others.

The results of the study found that age and education did not moderate the effect of overconfidence bias and illusion of control on investor decision-making. With the younger age, the enthusiasm to know new things will be higher, making young investors vulnerable to behavioral bias, as shown in the demographic characteristics table, the most dominant age is age who is not young enough anymore so that with age maturity and has various experiences in Investing and being able to better control emotions will not be affected by these two biases. Furthermore, education is also not susceptible to these two biases, because the higher the level of understanding of education, the higher the investment. Investors with a high level of education tend to be risk-averse (Rajagopalan, 2014), so they know the risks they face and will be more careful in making investment decisions.

### **Theoretical Implication and Managerial Implication**

The theoretical implication of this study shows that the higher the overconfidence bias, the greater the investor's decision-making. This bias will have a stronger influence with the presence of gender. People who have high confidence invest more often, causing a lot of decisions to be made, which results in an increase in trading volume. The illusion of control bias will improve investor decision-making. This bias will be weakened by the presence of gender. Men or women are likely to be able to mitigate the effects of a lack of control over the likelihood of events occurring in the market on their investment decisions with information about investment returns and risks.

The practical implication of this study is that investors should be aware of cognitive biases, which include overconfidence bias and illusion of control bias while making decisions to invest. The biases can occur whether the investors realize it or not. Therefore, it would be useful for them to understand the kind of cognitive biases so that investors can act rationally while making investment decisions. In this study, it has been proven that educated investors in mature age are not exposed to these biases as they tend to think more rationally with their knowledge. However, regarding gender, there is still a need to pay attention to overcome these biases, especially overconfidence bias for both male and female gender.

### **Conclusion**

Several conclusions can be drawn based on the influence of overconfidence bias and illusion of control bias on investor decision-making with the moderating role of demographic factors. The first one is that both illusion of control and overconfidence bias influence investor decision-making. Second, gender positively moderates the influence of overconfidence bias on investor

decision-making but negatively moderates the influence of illusion of control bias on investor decision-making. Third, age and education do not moderate the influence of overconfidence bias and illusion of control bias on investor decision-making.

This study is still limited in several contexts, one of those are population. The population in this study is limited to individual investors in Bandung. Future studies can conduct research with similar direction using other populations, or focusing on a certain population, to ensure the generalizability of the results. There is also a need to develop other variables, dimensions, and indicators in accordance with the development of financial theory.

## References

- Ady, S. U. (2018). The Cognitive and Psychological Bias in Investment Decision-Making Behavior:(Evidence from Indonesian Investor's Behavior). *Journal of Economics and Behavioral Studies*, 10(1), 86-100.
- Ariadi, R., Malelak, M. I., & Astuti, D. (2015). Analisa hubungan financial literacy dan demografi dengan investasi, saving dan konsumsi. *Finesta*, 3(1), 7-12.
- Baker, K.H., Nofsinger, J.R. (2002). Psychological biases of investors. *Financial Services Review*, 11(2), 97-116
- Barberis, N., & Shleifer, A. (2003). Style investing. *Journal of financial Economics*, 68(2), 161-199.
- Bhandari, G. & Deaves, R. (2006). The demographics of overconfidence. *Journal of Behavioral Finance*, 7(1), 5-11.
- Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics*, 116(1), 261-292.
- Barber, B. M., & Odean, T. (2002). Online investors: do the slow die first?. *The Review of Financial Studies*, 15(2), 455-488.
- Bashir, T., Azam, N., Butt, A. A., Javed, A., & Tanvir, A. (2013). Are behavioral biases influenced by demographic characteristics & personality traits? Evidence from Pakistan. *European Scientific Journal*, 9(29), 1-17.
- Charles, A., & Kasilingam, R. (2016). Impact of selected behavioural bias factors on investment decisions of equity investors. *Ictact Journal on Management Studies*, 2(2), 297-311.
- Chen, H. L., Chow, E. H., & Shiu, C. Y. (2015). The informational role of individual investors in stock pricing: Evidence from large individual and small retail investors. *Pacific-Basin Finance Journal*, 31, 36-56.
- Christanti, N., & Mahastanti, L. A. (2011). Factors considered by investors in investing. *Journal of Theory and Applied Management*, 4(3), 37-51.
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic literature*, 47(2), 448-74.
- Deaves, R., Lüders, E. and Schröder, M. (2010). The dynamics of overconfidence: evidence from stock market forecasters. *Journal of Economic Behavior and Organization*, 75(3), 402-412.
- Din, S. M. U., Mehmood, S. K., Arfan Shahzad, I. A., Davidyants, A., & Abu-Rumman, A. (2020). The Impact of Behavioral Biases on Herding Behavior of Investors in Islamic Financial Products. *Frontiers in Psychology*, 11(February), 1-10.
- Dittrich, D. A., Güth, W., & Maciejovsky, B. (2005). Overconfidence in investment decisions: An experimental approach. *The European Journal of Finance*, 11(6), 471-491
- Fieger, J. (2017). *Behavioral Finance and Its Impact on Investing*. Senior Honors Theses, Liberty University.

- Gambetti, E., & Giusberti, F. (2019). Personality, decision-making styles and investments. *Journal of Behavioral and Experimental Economics*, 80(June), 14-24.
- Goo, Y.J., Chen, D.H., Chang, S.H.S. and Yeh, C.F. (2010). A study of the disposition effect for individual investors in the Taiwan stock market. *Emerging Markets Finance and Trade*, 46(1), 108-119.
- Graham, J. R., Harvey, C. R., & Huang, H. (2009). Investor competence, trading frequency, and home bias. *Management Science*, 55(7), 1094-1106.
- Gunathilaka, C. (2014). Financial Distress Prediction: A Comparative Study of Solvency Test and Z-Score Models with Reference to Sri Lanka. *IUP Journal of Financial Risk Management*, 11(3), 39-51.
- Hair Jr, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate Data Analysis (Eighth Edition)*. Hampshire: Cengage Learning.
- Hönl, A., Meissner, P., & Wulf, T. (2017). Risk attribution theory: An exploratory conceptualization of individual choice under uncertainty. *Journal of Behavioral and Experimental Economics*, 67(April), 20-27.
- Hsu, A. C., & Chen, H. S. (2017). Effect of Managers' Illusion of Control and Corporate Governance Structure on the Sensitivity of Investment Cash Flow. *International Journal of Economics and Financial Issues*, 7(3), 31-35.
- Hsu, Y. L., Chen, H. L., Huang, P. K., & Lin, W. Y. (2021). Does financial literacy mitigate gender differences in investment behavioral bias?. *Finance Research Letters*, 41(July), 101789.
- Jain, J., Walia, N. and Gupta, S. (2020). Evaluation of behavioral biases affecting investment decision-making of individual equity investors by fuzzy analytic hierarchy process. *Review of Behavioral Finance*, 12(3), 297-314.
- Kansal, P. & Singh, S. (2018). Determinants of overconfidence bias in Indian stock market. *Qualitative Research in Financial Markets*, 10(4), 381-394.
- Kartini, K., & Nahda, K. (2021). Behavioral Biases on Investment Decision: A Case Study in Indonesia. *Journal of Asian Finance, Economics and Business*, 8(3), 1231–1240.
- Katper, N. K., Azam, M., Karim, N. A., & Zia, S. Z. (2019). Behavioral biases and investors' decision-making: The moderating role of socio-demographic variables. *International Journal of Financial Engineering*, 6(03), 1950020.
- Keswani, S., Dhingra, V., & Wadhwa, B. (2019). Impact of Behavioral Factors in Making Investment Decisions and Performance: Study on Investors of National Stock Exchange. *International Journal of Economics and Finance*, 11(8), 80-90.
- Koo, J. H., & Yang, D. (2018). Managerial overconfidence, self-attribution bias, and downwardly sticky investment: evidence from Korea. *Emerging Markets Finance and Trade*, 54(1), 144-161.
- Kourtidis, D., Šević, Ž., & Chatzoglou, P. (2011). Investors' trading activity: A behavioural perspective and empirical results. *The Journal of Socio-Economics*, 40(5), 548-557.
- Labajova, K., Höhler, J., Lagerkvist, C.-J., Müller, J. and Rommel, J. (2021). Illusion of control in farmers' investment and financing decisions. *Agricultural Finance Review*, Vol. ahead-of-print No. ahead-of-print.
- Lin, H. W. (2011). Elucidating the influence of demographics and psychological traits on investment biases. *International Journal of Economics and Management Engineering*, 5(5), 424-429.
- Lucia, D., Brasilia, U. C. De, Tabak, B. M., & Brasilia, U. C. De. (2010). Illusion Of Control: Does Gender Matter?. *SSRN Elect*, 1–6.

- Markowitz, L. (2007). Structural innovators and core-framing tasks: How socially responsible mutual fund companies build identity among investors. *Sociological Perspectives*, 50(1), 131-153.
- McCannon, B. C., Asaad, C. T., & Wilson, M. (2016). Financial competence, overconfidence, and trusting investments: Results from an experiment. *Journal of Economics and Finance*, 40(3), 590-606.
- Metilda M. (2015). Role of illusion of control bias in herding behaviour. *Adarsh J. Manag. Res.* 8(1), 1-8.
- Merkle, C. (2017). Financial overconfidence over time: Foresight, hindsight, and insight of investors. *Journal of Banking & Finance*, 84(November), 68-87.
- Misal, D. (2013). A Study of Behavioral Finance and Investors' Emotions In Indian Capital Markets. *International Journal of Economics and Business Modeling*, 4(1), 206-208.
- Mishra, K. C., & Metilda, M. J. (2015). A study on the impact of investment experience, gender, and level of education on overconfidence and self-attribution bias. *IIMB Management Review*, 27(4), 228-239.
- Mojtaba. S. 2016. Behavioral finance: behavioral factor influencing investors decision-making. *Advanced social humanities and management*, 3(1), 1-6.
- Musse, O., Echchabi, A., & AbdulAziz, H. (2015). Islamic and conventional behavioral finance: A critical review of literature. *Journal of King Abdulaziz University: Islamic Economics*, 28(2), 237-251.
- Nofsinger, J. R. (2005). Social mood and financial economics. *The Journal of Behavioral Finance*, 6(3), 144-160.
- Osman, M., Chary, G. R., Balloli, S. S., & Haffis, S. (2015). Sustainable Land Use Diversification and Investment Potential in Peri-urban, Semi-urban and Rural Areas of Telangana State, India. *Indian Journal of Dryland Agricultural Research and Development*, 30(1), 24-34.
- Pompian, M. M. (2011). *Behavioral finance and wealth management: how to build investment strategies that account for investor biases* (Vol. 667). John Wiley & Sons.
- Pompian, M. M. (2012). *Behavioral finance and investor types: managing behavior to make better investment decisions*. John Wiley & Sons.
- Prosad, J.M., Kapoor, S. and Sengupta, J. (2015). Behavioral biases of Indian investors: a survey of Delhi-NCR region. *Qualitative Research in Financial Markets*, 7(3), 230-263.
- Qadri, S. U., & Shabbir, M. (2014). An empirical study of overconfidence and illusion of control biases, Impact on investor's decision-making: an evidence from ISE. *European Journal of Business and Management*, 6(14), 38-44.
- Qasim, M., Hussain, R. Y., Mehboob, I., & Arshad, M. (2019). Impact of herding behavior and overconfidence bias on investors' decision-making in Pakistan. *Accounting*, 5(2), 81-90.
- Rajagopalan, P. (2014). *Influence of Demographic Variables on the Personality Traits of Retail Investors – An Empirical Study*. 2(2), 1-25.
- Rasheed, M. H., Rafique, A., Zahid, T., & Akhtar, M. W. (2018). Factors influencing investor's decision-making in Pakistan: Moderating the role of locus of control. *Review of Behavioral Finance*, 10(1), 70-87.
- Renerte, B., Hausfeld, J., & Twardawski, T. (2020). *Gender, overconfidence, and optimal group composition for investment decisions*. TWI, Thurgau Institute of Economics at the University of Konstanz.

- Riaz, T., & Iqbal, H. (2015). Impact of overconfidence, illusion of control, self-control and optimism bias on investors decision-making; evidence from developing markets. *Research Journal of Finance and Accounting*, 6(11), 110-116.
- Ritter, R. J. (2003). Behavioral Finance. *Pacific Basin Finance Journal*, 2(14), 429-437.
- Rudski, J. (2004). The illusion of control, superstitious belief, and optimism. *Current Psychology*, 22(4), 306-315.
- Sabir, S. A., Mohammad, H., & Shahar, H. K. (2019). The role of overconfidence and past investment experience in herding behaviour with a moderating effect of financial literacy: evidence from Pakistan stock exchange. *Asian Economic and Financial Review*, 9(4), 480-490.
- Scott, S. G., & Bruce, R. A. (1995). Decision-making style: The development and assessment of a new measure. *Educational and Psychological Measurement*, 55(5), 818-831.
- Sha, N., & Ismail, M. Y. (2021). Behavioral investor types and financial market players in Oman. *The Journal of Asian Finance, Economics, and Business*, 8(1), 285-294.
- Sekkat, K., & Veganzones-Varoudakis, M. A. (2007). Openness, investment climate, and FDI in developing countries. *Review of Development Economics*, 11(4), 607-620.
- Tania, A, Zahidur, Jannatul, F, and Farhana (2015). Factors Influencing Investment Decisions in Capital Market: A Study of Individual Investor in Bangladesh. *European Journal of Economics, Finance and Administrative Sciences*, 71, 1450-2275.
- Tekçe, B., Yılmaz, N. and Bildik, R. (2016). What factors affect behavioral biases? Evidence from Turkish individual stock investors. *Research in International Business and Finance*, 37, 515-526
- Ullah, S. (2015). An Empirical Study of Illusion of Control and Self-Serving Attribution Bias, Impact on Investor' s Decision-making: Moderating Role of Financial Literacy. *Research Journal of Finance and Accounting*, 6(19), 109-118.
- Vuong, Q. D. H., & Dao, P. Q. (2012). An Empirical Study of Individual Investors' Behavioral Biases in the Vietnamese Stock Market. *Science and Technology Development Journal*, 15(1), 5-13.
- Warren, W. E., Stevens, R. E., & McConkey, C. W. (1990). Using demographic and lifestyle analysis to segment individual investors. *Financial Analysts Journal*, 46(2), 74-77.
- Woldie, A., Laurence, B. M., & Thomas, B. (2018). Challenges of finance accessibility by SMEs in the democratic republic of Congo: is gender a constraint?. *Investment management and financial innovations*, 15(2), 40-50.
- Zahera, S.A & Bansal, R. (2018). Do investors exhibit behavioral biases in investment decision-making? A systematic review. *Qualitative Research in Financial Markets*, 10(2), 210-251.