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# Behavioral Biases in Investment Decision-Making

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***Abstract:*** This study delves into the profound impact of behavioral biases on investment decisions and provides valuable insights into methods for counteracting or surmounting these biases. Specifically, it focuses on four prevalent behavioral biases: loss aversion, endowment bias, framing bias, and overconfidence bias, examining how these biases can lead to potential investment mistakes or risks. To mitigate the influence of behavioral biases, the study proposes several strategies. Firstly, it emphasizes the importance of sourcing information from multiple perspectives and cross-referencing data to avoid reliance on biased or limited sources. Objective evaluation of one's skills and knowledge is also highlighted as a crucial step in reducing biases. Leveraging professional advice or feedback can provide an external perspective and help investors make more rational decisions. Furthermore, the study suggests that regular portfolio review and adjustments are essential to address biases and adapt to changing market conditions. Additionally, proactive visualization of potential outcomes can aid in mitigating biases by promoting a more realistic assessment of risk and reward. The study concludes that behavioral biases play a pivotal role in investment decisions. To bolster investment performance and satisfaction, investors are encouraged to comprehend and rectify these biases.

***Keywords:*** loss aversion, endowment bias, frame deviation, overconfidence

## 1. Introduction

Investment decision refers to the process of how investors choose the most suitable investment scheme when facing different investment opportunities. Investment decision involves the comprehensive analysis and evaluation of investment objectives, risk preferences, expected returns, market conditions and other factors, as well as the allocation and adjustment of investment portfolio [1]. Behavioral deviation refers to the psychological and behavioral tendency that investors show in investment decisions that are inconsistent with rational expectations, which reflects investors' irrational beliefs, emotions, preferences, and habits [2].

Understanding the importance of behavioral deviation in investment decision-making is helpful for investors to improve their self-cognition and avoid or reduce the negative impact of irrational behavior on investment results. Behavioral deviation may cause investors to ignore or misunderstand market information, be overconfident or overcautious, follow the crowd or be opinionated, chase gains and losses or cling to costs, thus affecting investors' expected returns, risk tolerance and satisfaction [3]. Behavioral bias may affect people's investment decisions and make them make choices that are not in line with their own interests or goals. For example: Loss aversion may cause

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people to hold on to or avoid stocks they already own, thus missing out on better investment opportunities or increasing their own investment losses.

Framing bias can cause people to be influenced by how information is presented, to overlook or underestimate the content and quality of information, or to make choices that are risky and inappropriate for them. Overconfidence bias may cause people to overestimate their ability and knowledge, thus ignoring or underestimating the uncertainty and volatility in the market, or overtrading, underestimating risks, ignoring diversification, and other behaviors. In order to reduce the influence of behavioral bias on people's investment decisions, the following measures can be taken: Such as obtaining and comparing information from multiple perspectives and sources, rather than relying on a single or limited piece of information; Objectively analyzing and evaluating your own abilities and knowledge, as well as the risks and opportunities that exist in the market, without being influenced by your own emotions or biases. Seek professional advice or feedback to avoid cognitive difficulties or emotional distress, and learn from the experience and strategies of other successful investors; Regularly review and adjust their portfolio, according to market changes and their own needs, timely sell underperforming or unsuitable stocks, and buy stocks with good performance or potential; Visualize potential outcomes and consequences, and review your decision-making process and outcomes from a future perspective, as well as possible mistakes or risks.

## 2. Loss Aversion

Loss aversion refers to the asymmetry of people's evaluation of loss and gain in decision-making, that is, people's reaction to loss is stronger than that of equivalent gain, so they tend to avoid the choice that may lead to loss [3]. Loss aversion is an important concept in behavioral finance, which reflects people's irrational preferences and emotional influences. Loss aversion is common in everyday life, such as: When investing, people may be more inclined to choose low-risk and low-return investment projects rather than high-risk and high-return investment projects, because they do not want to take the risk that they may lose money, even though they may make more money [4]. When working, people may be more inclined to maintain the status quo rather than seek new opportunities or challenges, because they do not want to give up the security and stability they already have, even though they may have better development and income [5]. Loss aversion will affect people's assessment and attitude towards risk, making people show inconsistent and non-linear responses when facing different types and degrees of risk. Generally speaking, when the risk is low, people will show the tendency of risk aversion, that is, they would rather choose a certain return than an uncertain return, even if the expectation of the latter is higher; When the risk is high, people will show a risk-seeking tendency, that is, they would rather choose uncertain losses than certain losses, even though the former has a higher expectation [5].

This asymmetry and nonlinear risk preference is contrary to the rational model in traditional economics which assumes that people have fixed and linear risk preferences. Tom et al conducted a neuroeconomic experiment to explore the neural basis of loss aversion in investment decision-making. They had participants make a series of binary investment decisions in a functional magnetic resonance imaging (fMRI) scanner, each involving a certain gain or loss, and a certain probability of gain or loss. They found that participants' level of loss aversion was positively correlated with their level of risk aversion, i.e., the higher the level of loss aversion, the higher the level of risk aversion. They also found that participants had higher levels of activity in areas of the brain associated with pain and negative emotions (such as the dorsolateral prefrontal cortex, dorsomedial prefrontal cortex, and insula) when faced with loss than when faced with gain and that this difference was positively correlated with their level of loss aversion. These results show that loss aversion is an emotion-based cognitive bias, which can affect people's perception and response to risks, and thus affect people's investment decisions [6]. Genauck et al studied the role of loss aversion in different types of value

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decisions, including risk decisions, time decisions, and social decisions. They found that loss aversion was strongest in risk decisions and weaker in time and social decisions. They also found that loss aversion was negatively correlated with activity levels in brain regions associated with reward anticipation, such as the ventral striatum [7].

## 3. Endowment Bias

Loss aversion and endowment effect are two closely related behavioral finance concepts, both of which reflect people's asymmetric evaluation of loss and gain. Loss aversion refers to the fact that people react more strongly to losses than to equivalent gains, so they tend to avoid choices that may lead to losses [8]. The endowment effect means that people value the goods or information they own or feel they own more than the goods or information they do not own or feel they own, so they tend to keep the goods or information they own or feel they own and are not willing to exchange or give up [9]. The endowment effect is often explained as a byproduct of loss aversion, that is, due to loss aversion, when faced with a decision, people pay more attention to what they may lose rather than what they may gain [8]. The endowment effect and loss aversion may lead to a common irrational behavior in investment decisions, that is, holding stocks for a long time because they are of high value. This behavior manifests itself in investors' excessive adherence to stocks they already own, even if they no longer fit their investment objectives or risk appetite or have lost value or losses. Investors may perceive their holdings to be more valuable than the rest of the market because they feel an emotional attachment and sense of belonging to their holdings (the endowment effect). Investors may also fear missing out on future gains by selling stocks, or admitting they made a bad decision (loss aversion). Such behavior may cause investors to miss out on better investment opportunities or increase their own investment losses. Another irrational behavior associated with the endowment effect and loss aversion is the difficulty in shedding underperforming assets. This behavior manifests itself in investors' excessive avoidance of stocks that have lost value or lost money, even if they have no hope or potential. Investors may think their stocks have a chance of bouncing back because they are reluctant to admit that they made a bad call when they bought them (the endowment effect). Investors may also be afraid of realizing a loss on a sale or missing out on a possible future rally because they are unwilling to face the pain and regret of a loss (loss aversion). Such behavior can cause investors to prolong their losses or miss out on better investment opportunities.

To mitigate the impact of the endowment effect and loss aversion in investment decisions, investors can adopt the following strategies: Evaluate the real value and risk of your own stocks objectively, rather than judging based on your own feelings or prejudices [10]. Regularly review and adjust your portfolio, selling underperforming or unsuitable stocks and buying stocks with good performance or potential according to market changes and your needs. Seek professional advice or feedback to avoid getting into cognitive difficulties or emotional distress and learn from the experience and strategies of other successful investors [9].

## 4. Frame Deviation

Frame bias means that people are affected by the way information is presented in decision-making, that is, people react differently to the same information under different positive or negative frames [11]. In other words, people's decisions are influenced by how the information is presented rather than its content. Frame bias is a kind of cognitive bias or thinking error, which reflects people's asymmetrical evaluation of loss and gain and risk preference. In general, when presented with a positive frame of information, people tend to choose the risk-averse option; When information is presented in a negative frame, people tend to choose the risk-seeking option [12].

Information presentation and perception play an important role in decision-making because they affect people's understanding and evaluation of information. Information presentation refers to the source, format, language, order, quantity, and other characteristics of information, which determine how information is transmitted and received. Information perception refers to people's interpretation and memory of information, which is affected by people's knowledge, experience, emotion, motivation, and other factors. There is an interaction between information presentation and perception, that is, information presentation will affect information perception, and information perception will, in turn, affect information presentation [13]. Frame bias is a kind of cognitive bias caused by the interaction between information presentation and perception, which leads to different responses to the same information under different frames. Frame bias can be seen in different situations. When doctors present treatment options to patients, they can use a positive or negative frame to describe the effects of treatment. For example, a doctor could say that a procedure has a 90% survival rate (positive frame) or a 10% mortality rate (negative frame). Although the two statements express the same facts, patients may be more inclined to choose the treatment plan presented in the positive frame [10]. When merchants market a product or service to consumers, they can use a positive or negative framework to describe the characteristics of the product or service. For example, a merchant could say that beef is 80 percent lean (positive frame) or 20 percent fat (negative frame). Although the two statements express the same facts, consumers may be more inclined to buy products presented in a positive frame [10]. When politicians give speeches or policies to the public, they can use a positive or negative frame to describe their own positions or actions or those of their opponents. For example, a politician can say that he or she has taken tough measures to protect national security (positive frame), or that an opponent has taken aggressive actions to undermine the international order (negative frame). Although the two statements express the same facts, the public may be more inclined to support the political figure presented in a positive frame [11].

Prospectus is a document that introduces the basic situation, financial condition, business strategy, risk factors, and other information of a company to potential investors. It is a legal document that a company must provide when it carries out an initial public offering (IPO). Prospectus has an important influence on investors' decision-making because it is the main channel for investors to obtain and evaluate company information. However, the prospectus may also have frame bias, that is, the company may selectively present or emphasize certain information, or use positive or negative language to influence investors' perceptions and expectations of the company [12]. There are many studies that support the idea that framing bias exists in prospectuses and influences investor behavior, such as Chen et al studied the effects of language used in prospectuses on investor sentiment and perception, and the impact of these effects on IPO pricing and market performance. They found that positive language used in prospectuses increases investors' expectations of a company's future earnings and growth, which improves IPO pricing and market performance; The negative language used will lower investors' expectations of the company's future earnings and growth, thus lowering IPO pricing and market performance [14]. Li and McInish examined the impact of risk disclosure language used in prospectuses on investor behavior, and the impact of these effects on IPO pricing and market performance. They found that the risk disclosure language used in the prospectus can affect investors' perception of a company's risk level and earnings potential, and thus affect IPO pricing and market performance; Moreover, this influence is related to the positive or negative framework of risk disclosure language, that is, the positive framework will improve IPO pricing and market performance, while the negative framework will reduce IPO pricing and market performance [15]. Ragozzino and Reuer examine the impact of uncertainty language used in prospectuses on investor behavior, and the impact of these effects on IPO pricing and market performance. They found that uncertainty language used in prospectuses can increase investors' uncertainty about the company's future performance and risks, thus reducing IPO pricing and market performance.

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Moreover, this influence is related to the positive or negative frame of uncertain language, that is, the positive frame will reduce the negative impact of uncertainty, while the negative frame will aggravate the negative impact of uncertainty [16]. To overcome the frame bias in investment decisions, investors can adopt the following strategies: Obtain and compare information from multiple perspectives and sources rather than relying solely on the information provided in the prospectus [13]. Analyze and evaluate the true value and risks of the company objectively, not influenced by the language or framework used in the prospectus [14]. Seek professional advice or feedback to avoid getting into cognitive difficulties or emotional distress and learn from the experience and strategies of other successful investors [12].

## 5. Overconfidence

The overconfidence bias is when people have a false and misleading assessment of their own abilities, knowledge, or talents, in which they think they are better than they are. In short, this is an arrogant belief, which can be a dangerous deviation and is very prevalent in behavioral finance and capital markets [12]. This article will give a detailed look at the overconfidence bias and its implications in finance and investment. Overconfidence bias is a kind of cognitive bias or thinking error, which belongs to psychology and behavioral economics. The overconfidence bias can cause people to overestimate their understanding of financial markets or specific investments or ignore data and expert advice. This often leads to an attempt to consistently beat the market by making riskier investments [17].

The overconfidence bias is usually associated with the following phenomena. Overtrading: An overconfident investor may believe that he or she can accurately predict market movements and thus frequently buy and sell assets in the hope of higher returns. However, such behavior often causes investors to bear higher transaction costs, such as commission, tax, slip point, etc., thus reducing their net income [12]. Underestimating risk: Overconfident investors may believe they can control or avoid risk, thereby ignoring or underestimating the uncertainty and volatility that exist in the market. Such behavior often leads investors to be overly optimistic about their investment decisions instead of taking a prudent and rational attitude [17]. Ignoring diversification: Overconfident investors may think they can pick out the best or most promising assets and concentrate on a few types or industries. Such behavior often leads investors to increase their investment risks because they do not diversify risks effectively or take full advantage of the diversification opportunities offered in the market [12].

The overconfidence bias is caused by the different psychological mechanisms people use to process information and make decisions. Here are some mechanisms that help explain the overconfidence bias: Self-attribution: People tend to attribute success to their own abilities or efforts and failure to external factors or luck. This tendency can lead people to have an unrealistically positive evaluation of their own performance, thus enhancing their self-confidence [12]. Confirmation bias: People tend to seek out or value information that is consistent with their beliefs or assumptions while ignoring or questioning information that is inconsistent with their beliefs or assumptions. This tendency will lead people to have excessive trust in their own judgment, thus reducing their own criticism and openness to information [17]. Hallucinatory control: People tend to think that they can influence or control events or outcomes that are not actually under their control. This tendency will lead people to overestimate their own abilities and ignore some unpredictable or uncontrollable factors [12].

In order to overcome the overconfidence bias in finance and investing, investors can adopt a number of strategies: For example, obtaining and comparing information from multiple perspectives and sources, rather than relying solely on one's own knowledge or experience [17]. Objectively analyze and evaluate your own abilities and knowledge, as well as the risks and opportunities that exist in the market, without being influenced by your own emotions or biases. Seek professional

advice or feedback to avoid getting into cognitive difficulties or emotional distress and learn from the experience and strategies of other successful investors [17].

## 6. Conclusion

In conclusion, behavioral biases significantly impact investment decisions, often leading investors towards irrational or inefficient choices that may detrimentally affect their wealth and welfare. Loss aversion and endowment effect can compel investors to cling to or shun stocks they currently own, potentially causing them to overlook better investment opportunities or inflate their investment losses. Framing bias can skew investors' perceptions based on the presentation of information, leading them to neglect or undervalue the substance and quality of information, or to make choices that do not align with their risk profile. Overconfidence bias can cause investors to overestimate their abilities and knowledge, leading to a disregard or underestimation of market uncertainties and volatility. This could result in overtrading, underestimating risks, and neglecting the importance of diversification among other ill-advised practices. Therefore, it is imperative for investors to continuously examine and comprehend the origins and repercussions of behavioral biases and learn how to mitigate or overcome these biases. Moreover, it is advisable to gather and compare information from a variety of perspectives and sources, rather than relying solely on limited information. Investors should objectively analyze and evaluate their own skills and knowledge, along with the risks and opportunities in the market, free from personal emotions or biases. Seeking professional advice or feedback can help avoid cognitive obstacles or emotional distress, and learning from the experiences and strategies of successful investors can be invaluable. Regular portfolio reviews and adjustments are recommended, allowing for the timely selling of underperforming stocks and the purchasing of well-performing or promising stocks, according to market fluctuations and personal needs.

## References

[1] *Bihari, A., Dash, M., Kar, S. K., Muduli, K., Kumar, A., & Luthra, S. (2022). An analysis of behavioural bias affecting investment decision-making: a network cluster based conceptual analysis for future research. International Journal of Industrial Engineering and Operations Management, 4(1/2), 19-43.*

[2] *Kumar, S., & Goyal, N. (2015). Behavioural biases in investment decision making – a systematic literature review. Qualitative Research in Financial Markets, 7(1), 88-108.*

[3] *The Decision Lab. Loss aversion. Retrieved from https://thedecisionlab.com/biases/loss-aversion*

[4] *Investopaper. (2020). What is loss aversion? How it affects decision making process? Retrieved from https://www.investopaper.com/news/what-is-loss-aversion-how-it-affects-decision-making-process/*

[5] *Sokol-Hessner, P., & Rutledge, R. B. (2019). The psychological and neural basis of loss aversion. Current Directions in Psychological Science, 28(1), 32-38.*

[6] *Tom, S. M., Fox, C. R., Trepel, C., & Poldrack, R. A. (2007). The neural basis of loss aversion in decision-making under risk. Science, 315(5811), 515-518.*

[7] *Genauck, A., Huys, Q. J., & Heekeren, H. R. (2020). Loss aversion in value-based decision making. Current Opinion in Behavioral Sciences, 31, 1-8.*

[8] *The Decision Lab. Endowment effect. Retrieved from https://thedecisionlab.com/biases/endowment-effect*

[9] *St. Louis Fed. (2022). The endowment effect. Retrieved from https://research.stlouisfed.org/publications/page1-econ/2022/04/01/the-endowment-effect*

[10] *Scribbr. (2022). What is the framing effect? Definition and examples. Retrieved from https://www.scribbr.com/research-bias/framing-effect/*

[11] *Framing effect (psychology). Retrieved from https://en.wikipedia.org/wiki/Framing_effect_%28psychology%29*

[12] *Corporate Finance Institute. (2019). Overconfidence bias - definition, overview and examples in finance. Retrieved from https://corporatefinanceinstitute.com/resources/capital-markets/overconfidence-bias/*

[13] *Wall Street Mojo. Framing bias - definition, explained, example, how to overcome? Retrieved from https://www.wallstreetmojo.com/framing-bias/*

[14] *Chen, J., Jiang, F., & Lobo, G. J. (2019). The impact of language on IPO prospectus readability and initial returns. Journal of Business Research, 104, 579-591.*

DOI: 10.54254/2754-1169/46/20230330

*[15] Li, X., & McInish, T. H. (2016). The information content of risk-factor disclosures in IPO prospectuses. Review of Quantitative Finance and Accounting, 46(4), 781-804.*

*[16] Ragozzino, R., & Reuer, J. J. (2011). Uncertainty, organizational design, and attention allocation in the multinational enterprise. Journal of International Business Studies, 42(5), 622-639.*

*[17] Schwab Funds. (2021). Fundamentals of behavioral finance: Overconfidence bias. Retrieved from https://www.schwabassetmanagement.com/content/overconfidence-bias*