

REVISITING INVESTOR BEHAVIOUR IN RISKY INVESTMENT DECISION MAKING

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ABSTRACT: The number of studies into behavioral finance has increased during the last two decades. However, literature about how behavioral factors determine risky investment decisions still needs to be reviewed from the behavioral finance theory point of view. This paper deals with behavioral research in finance and some aspects of investor behavior when making investment decisions about risky assets. Library research was conducted and then presented using a descriptive form of theoretical exposure. Based on the perspectives of the prospect theory, the literature reviewed in this paper provides results about individuals' financial literacy, risk tolerance, and personality in determining motivation to choose risky investments. The conclusions show that behavioral finance exists, and people may be irrational when making investment decisions about risky assets.

Keywords: Financial Literacy; Risk Tolerance; Personality; Risky Investment Decisions; Prospect Theory

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INTRODUCTION

A risky investment decision is an individual's decision to invest in a risky market or asset. Investment preferences are the investment instruments that individuals specifically choose, and risk-taking can vary according to the situation at risk (Weber et al., 2002; McCarty, 2000). This paper will emphasize the behavioral research in finance that examines some literature about certain aspects of investor behavior when making risky investment decisions. The observed behavioral factors are financial literacy (investors' behavior concerning their financial attitudes, knowledge, and behavior), risk tolerance (investors' preference for risk), and personality (the personal characteristics of investors). Knowledge of behavioral finance and its integration can lead to good results for investors and financial advisors.

Two conflicting theories explain investor behavior in decision-making (Table 1). Theories in traditional finance have addressed how investors and markets should behave. The normative model of traditional financial theory becomes the basis of the efficient market hypothesis, stating that market participants receive all accurate information and process it rationally. The efficient market hypothesis also explained that the market is fully efficient because the current security price already reflects all the information available in the market. Therefore no additional information can be used to generate abnormal returns.

Traditional finance considers humans to be in the context of homo-economicus, a simple model of human economic behavior based on the principle of perfect self-interest, full of rationality, and having complete information, which then influences the individual's economic decisions. The traditional view in finance is based on classical decision theory, which assumes that rational decision-making evaluates all possible outcomes and optimal choices are those with the highest expected utility (Pompian, 2006).

Table 1. Traditional vs. Behavioral Finance

Traditional Finance Theory	Behavioral Finance Theory
The normative theory says that reasonable people should act in a certain way.	A positive theory of descriptive models about what people act.
Investors and the market are assumed to be perfectly rational because they have perfect self-control.	Investors can be irrational because they have limits to their self-control.
Cannot incorporate changes in risk attitude due to gains and losses.	Allows for changes in risk attitude depending on the nature of the prospect.

Source: Author's Elaboration

Behavioral finance theory explains how investors behave in investment decision-making. Investor's behavior in investment decision-making has been widely discussed in the financial literature, and most of those research does not explicitly discuss risky investment decisions (W. De Bondt et al., 2014; Pak & Mahmood, 2015; Sadiq & Khan, 2019; Sattar et al., 2020; Subramaniam & Velnampy, 2017; Van Rooij et al., 2011). Investors will always be faced with investment options. If it is associated with a trade-off between risk and return, the option to invest in riskier assets can be aimed at higher profit expectations. Thus, it is necessary to peer down what influences an investor's choice to invest in a risky asset. Hence, an opportunity for further literature review within this field has emerged.

LITERATURE REVIEW

One of the traditional finance theories about decision-making is the perspective of the expected utility theory, which was first developed by Von Neumann & Morgenstern (1944). The expected utility theory is a normative model of rational choice. Expected utility theory explains rational decision-making in risky situations. The assumption is that one has complete information about all possibilities to evaluate his options between various options and choose one that can maximize expected utility. The expected utility hypothesis is flexible enough to describe different behaviors in uncertain situations.

However, this hypothesis has a significant drawback: it is difficult to find realistic probabilities for calculating expected utility. For example, define the probability of return on an asset class such as bonds, equities, alternative investments, or even single security. This return depends, among other things, on economic factors such as the economy itself, monetary policy, innovation, growth, and the behavior of other stakeholders (Hens and Meier, 2015).

Another perspective, the prospect theory, criticized the expected utility theory for not explaining why people are interested in insurance and also gamble, which is full of uncertainty (Kahneman & Tversky, 1979). The prospect theory begins with the debate that the expected utility theory cannot fully consider the decision-making observed in risk situations. This debate is based on empirical evidence that people often behave according to the expected utility theory. The expected utility theory cannot combine changes in people's attitudes to risk (risk attitude). The prospect theory allows changes in people's risk attitudes, depending on the form of the prospect. The prospect theory may explain why people make different choices in situations with identical finishes (Barberis & Thaler, 2003).

The prospect theory also discusses the psychological aspect of decision-making through a descriptive (positive) approach that empirically captures the

behavior. The prospect theory assumes that individuals' decisions are rarely based on outcomes but subjectively perceived welfare changes resulting from those outcomes (Ackert & Deaves, 2010; Hens & Meier, 2015). The loss value is weighted more heavily (steeper in the curve-shaped "S" carries a horizontal line). The acquisition value is weighted lower (flatter in curve "S" above the horizontal line). For example, someone will feel more loss if they lose \$500 than profit if they make \$500. In other words, the sadness quality is more felt than the joy quality.

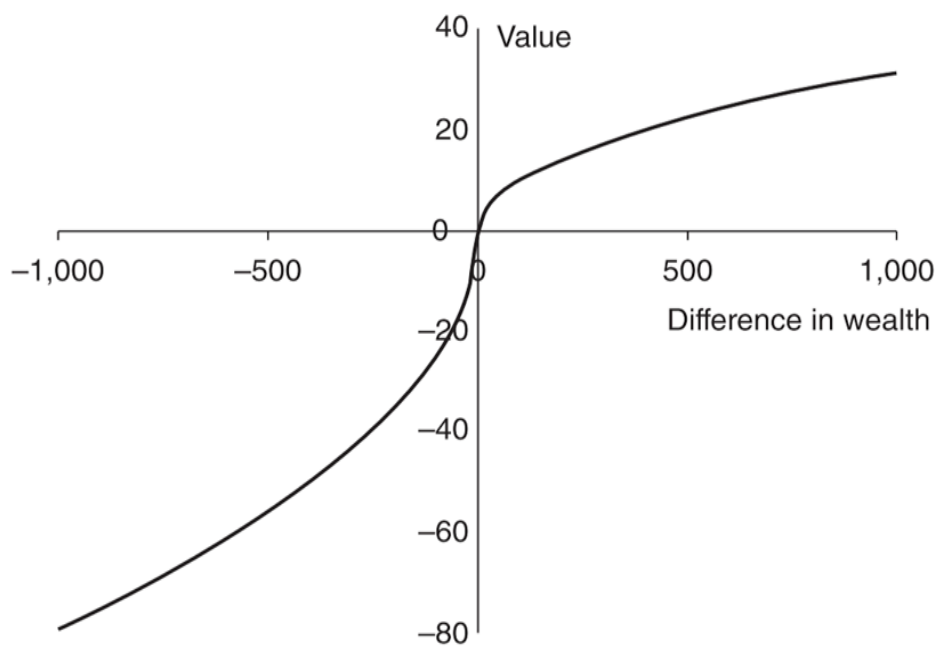


Figure 1. The difference in Wealth for Gain and Looses (Prospect Theory)
Source : Baker & Ricciardi (2014)

The prospect theory points out that people may become irrational when making decisions, and there is an asymmetry that investors show in the face of profits and losses (Kalayci & Basdas, 2010; Olsen, 1997). Dissatisfaction with losses outweighs the satisfaction with profit (Figure 1). In this theory, it is stated that people have an irrational tendency to be more reluctant to risk profit (gain) than loss (loss), or they are often said to be loss averse (reluctant to face losses). When a person is faced with making a substantial profit or a possible loss, then the person will choose to avoid risk (called risk aversion) by choosing the substantial profit. In contrast, if a person is faced with a definite loss option or the probability of losing the profit, then the person tends to dare to face the risk by choosing the probability of losing the profit (called risk-seeking). In other words, investors will try to get a more certain profit but will dare to take risks if faced with a loss situation (Kahneman & Tversky, 1979).

Prospect theory and its development, called the cumulative prospect theory (Tversky and Kahneman, 1992), is the foundation for behavioral finance. Cumulative prospect theory indicates additional features, such as using cumulative decision making, covering decision issues under risk and uncertainty and mixed outcomes; formulation of the function of profit and loss gap; and an introduction to reduced sensitivity and loss aversion.

Kahneman and Tversky (1979) and Tversky and Kahneman (1992) divided the selection of alternatives conducted by investors into two stages. The first stage involves determining alternative options (prospects) and involves a mental representation, then recognizing and selecting the most appropriate alternative. The steps of this alternative determination activity affect the order of preference. The second stage evaluates the edited leads and final options, which are the highest-rated leads. The evaluation phase implies an assessment of the overall value of each option alternative, which is characterized as prospective value.

Markowitz (1952) built the concept of risk measurement using standard return deviation and stated that investors tend to choose investments that provide high average returns with low risk. In contrast, prospect theory pays attention to investment losses and concludes that investors tend to avoid risk. If the investor is willing to assume a certain amount of risk, then the investor should have the opportunity to get a more significant profit from the amount of risk borne. So investors who have a higher risk tolerance are generally willing to assume the more significant risk because they expect a higher return on investment.

Prospect theory assumes loss aversion and framing merger, i.e., if two related events occur, one has the option of treating them as separate events or as one (integration). For example, if a person is investing in two types of risky investment instruments. One instrument generates a profit while the other gives a loss, then the investor will combine the results of both investments and focus on the net results. If the net yield is positive, the profit has occurred, and focusing on this will satisfy the investor. However, if the investor separates the results from the two investments, then, on the one hand, the investor will feel disappointed. On the other hand, the investor will feel satisfied (Tversky and Kahneman, 1992).

Risky investments are an individual's decision to invest in a market or risky asset (Ortner et al., 2017). Individuals may have an irrational preference for high volatility or risky stocks. Like the risk appetite, an individual's preference for risk can depend on whether the investor is in the domain of loss or profit, as mentioned in the prospect theory. Risk-averse investors choose government securities, blue-chip dividend stocks, investment-level corporate bonds, and even deposit certificates. In contrast, risk seekers tend to choose or form high-risk investment portfolios that are believed to have the potential to reap high profits (Grinblatt & Keloharju, 2000; Pompian, 2012). Some high-risk investment

strategies include creating a concentrated portfolio that focuses only on investing in one sector or industry, such as technology. Another strategy for high-risk portfolios is when investors are not looking for long-term investments but looking for high volatility and capitalizing on the momentum when the trend is up (Wang & Xu, 2015).

The concept of financial decision-making has long been dominated and explained by the traditional financial theories with the idea that investors are always rational in maximizing their utility. Nevertheless, the effectiveness of these theories in describing risk-taking behavior among individual investors is questionable. This study conducted a literature review to investigate investment decision-making in the context of risk related to behavioral factors. The perspective of behavioral finance can provide another way to understand an investor's financial decisions by identifying the psychological element in an investor and its influence on investment decision-making. The field of investor behavior includes the behavioral finance micro, which examines the behavior of individual investors' biases that distinguish them from the rational actors who exist in the assumptions of the classical economic theory (Ackert & Deaves, 2010; Baker et al., 2017; Baker & Ricciardi, 2014; Pompian & Longo, 2004). Behavior examines the cognitive factors (mental processes) and affective (emotional) problems expressed by individuals, financial experts, and traders while they are involved in financial planning and managing investments.

METHODOLOGY

The purpose of the literature review is to get a theoretical and empirical basis so that researchers can better understand the problem being studied adequately. This literature review describes the theories, findings, and other research materials from several library sources like articles and books manually read using the Mendeley app. This qualitative research collected data from 73 scientific papers and literature related to the research objects related to financial literacy, risk tolerance, investor personality, and risky investment decisions. The literature referred to in this paper was published between 1979 and 2021. Various literature items were collected through digital trusted databases such as Scopus, Science Direct, Emerald, and Google Scholar. The results of the library study were then presented in descriptive form, in the form of a theoretical exposure and the related empirical research results.

RESULT AND DISCUSSION

Per several studies in *behavioral finance*, investors' factors can predict their investment decision and performance. An investor's failure to obtain expected investment performance is often due to his irrational financial behavior's constraints (Pompian, 2012). *Behavioral finance* addresses the issue of decision-

making in uncertain and risky situations.

Over the years, a few researchers into financial markets and personal finance have conducted studies relating to making risky financial decisions (Aydemir & Aren, 2017; Kannadhasan, 2015; Sitkin & Pablo, 1992; Sitkin & Weingart, 1995; Viscusi et al., 2011). The prospect theory can explain investor behavior during investment decision-making in the context of risk. When considering investments in risky assets, the investor will make an alternative determination of the options (prospects) and involve their mental representation, then recognize and choose the most suitable alternative. We find three variables related to investor behavior from the literature to which mental representation in the alternative selection process can be attributed. Those variables related to the personal characteristics of the investor, including how extensive his/her financial literacy is (Aren & Zengin, 2016; Arianti, 2018; Awais et al., 2016; A Lusardi, 2015; Pradita & Wiwik, 2019; Van Rooij et al., 2011), how risk-tolerant he/she is (Grable, 2000; Grable & Lytton, 1998; Kannadhasan, 2015; Pak & Mahmood, 2015; Perveen et al., 2020), and the personality of the investor (Akhtar et al., 2018; Durand et al., 2008; Gambetti & Giusberti, 2019; Grable, 2000; Nga & Ken Yien, 2013; Pompian & Longo, 2004). In those works of literature, there are still different conclusions. Further discussion regarding the effect of these variables on risky investment decisions will be explained below.

Financial Literacy and Risky Investment Decision

Financial literacy is a person's ability to process financial information and make informed decisions about financial planning, wealth accumulation, debt, and pensions (Lusardi et al., 2009; Lusardi & Mitchell, 2011). Knowledge, skills, and financial literacy influence a person's attitude and behavior and improve the quality of his/her decision-making and financial management (Adomako & Danso, 2014; Kusumaningrum et al., 2019). Financial literacy capabilities are related to managing money and making sound financial decisions (Owusu et al., 2019).

Financial literacy, or financial knowledge, is not dependent on an individual's level of education (Aydemir & Aren, 2017; Delafrooz & Paim, 2011; Mandell, 2009) A person may be highly educated but may not know any critical financial concepts, such as the time value of money, stocks, bonds, and risk diversification. On the other hand, a person may be less well-educated, but if he/she is used to facing some financial issues, then he/she may understand them better than a more highly educated person.

Financial literacy integrates the attitudes, awareness, skills, knowledge, and behavior necessary to make efficient financial decisions and ultimately allows individuals to achieve their financial goals (Atkinson & Messy, 2012; Sabri & MacDonald, 2010) Financial literacy also impacts portfolio decisions. When

making investment decisions, those investors who are faced with either risky or risk-free investment options can seek information and consider the financial advice offered by certain parties. Financial literacy is one of the necessary elements for financial decision-making (Awais et al., 2016; Calcagno et al., 2017).

Financial literacy is a form of human capital specifically related to the knowledge and skills regarding personal finance (Huston, 2010). Individuals with financial literacy are more likely to participate in the financial markets because they have more information about the stock markets (Anwar et al., 2017; Van Rooij et al., 2011; Weerasekara et al., 2019; Zhang, 2014). With increasing levels of knowledge about financial information and the increasing ability to analyze that information, investors better understand how to improve their investment performance and make riskier investments to get higher returns by efficiently managing their investments (Awais et al., 2016; Lima et al., 2020).

Various studies have shown a positive influence between financial literacy and risky investment decisions. In contrast to the findings of a positive relationship between financial literacy and risk-taking, Claudia & Nuryasman (2019), Aydemir & Aren (2017), and Peach & Yuan (2017) found that there was no direct influence between financial literacy and risky financial decisions.

Financially literate individuals are more willing to accept financial risks because they can better understand the basic principles of financial risk. They also anticipate possible performance variations over time and recognize the benefits of taking more financial risks to achieve their long-term financial goals (Finke & Guillemette, 2016). However, individuals who do not know much about stocks, the investment theory, or standard deviation math usually do not know how much risk they are taking by investing in stocks. Financial literacy, particularly knowledge of certain concepts such as diversification, is one of the strongest predictors of share ownership (Van Rooij, Lusardi & Alessi, 2012).

Risk Tolerance and Risky Investment Decision

Investment decisions relate to the *current* commitment of money or other resources in the expectation of reaping *future* benefits; thus, the investment decisions taken by a person will determine his/her financial condition in the future (Bodie et al., 2018). Therefore alternative investment selections will involve assessing each investment's risk and return (Aslanidis et al., 2021; Chiang & Zhang, 2018; Falkenstein, 2011). If the investor expects a certain profit level, then the investor should be prepared to take risks due to uncertainty. From a traditional financial perspective, it is said that investors will make rational decisions, starting with receiving information and then managing the information according to Bayes' theorem. Then under the expected utility theory, investors will maximize their utility (Ackert & Deaves, 2010).

Risk tolerance is the amount of risk a person is willing to accept to achieve the stated goal or the maximum amount of uncertainty a person is willing to

accept when making a financial decision (Grable & Roszkowski, 2007; Roszkowski et al., 2005; Grable, 2000; Grable & Lytton, 1998). In some literature, risk tolerance has the same meaning as risk aversion, even if it is in the opposite direction (Aren & Hamamci, 2020; Aydemir & Aren, 2017; Claudia & Nuryasman, 2019; Weber & Milliman, 1997). Cordell (2002) argues that risk tolerance should be separated into risk capacity and attitude. Risk capacity is a more objective risk that includes age, income, and financial stability, while risk attitude is a more subjective step that combines investor emotions. Rozkowski et al. (2005) acknowledged Cordell's perspective (2002) but focused only on the subjective aspects of the concept of risk tolerance.

Individuals with a high-risk tolerance will make riskier investment decisions, e.g., investing in stocks and derivatives; people with a low-risk tolerance will likely prefer bonds and bank deposits. Some researchers have found a significant link between investment and the attitude toward risk (Warneryd, 1996; Keller and Siegrist, 2006). Similarly, some studies have found a significant and positive link between a high-risk tolerance and the preference for risky assets (Hariharan et al., 2000; Corter and Chen, 2006; Aren and Zengin, 2016). In addition to these findings, some studies have not found a link between risk-taking and investment preferences (Aydemir & Aren, 2017; Aren and Aydemir, 2014). One of the reasons is that risk-taking is part of the nature of the person's character, McCarty (2000). Selim & Canikli (2019) confirm these findings and show that risk-taking may vary according to the investment instruments.

Personality and Risky Investment Decision

Some researchers in behavioral finance have developed conceptual frameworks by taking insights from another psychological discipline: personality psychology, to explain the reasons for variations in each investor's trading behavior when they choose to obtain information from different sources. Van Witteloostuijn and Muehlfeld (2008) show that investor personality traits such as locus control, maximizing tendencies, disposition of regret, self-monitoring, sensation-seeking, type-A personality, and type-B personality are associated with trading behavior. In recent years, the investor's personality and other psychological variables have begun to be used more frequently to evaluate risk aversion and investment options, as well as their impact on investment performance (Akhtar et al., 2018a, 2018b; Aren & Hamamci, 2020; Davis & Runyan, 2016; Durand et al., 2008; Gambetti & Giusberti, 2019; Sadiq & Khan, 2019; Tauni, Sadiq & Khan, 2019, 2017). Personality traits and other psychological variables have also begun to be frequently used for the risk-taking analysis of investment options. They can be used to explain anomalies such as bubbles in the stock market (Aren, 2020; Oehler et al., 2018).

The big-five personality factor model is the dominant paradigm in

personality research (De Bortoli et al., 2019). The five personality factor model, sometimes called the big five personality traits, summarizes personality using five higher sequences of personality actors: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience/intellect. Individuals who have a personality dominated by extraversion and openness to experience prefer to make risky decisions. In contrast, those with agreeableness, conscientiousness, and neuroticism personalities are usually reluctant to accept the risk. They are less interested in taking more significant risks in their investment decisions, (Akhtar & Das, 2020; Mayfield et al., 2008; Lommen et al., 2010; Becker et al., 2012; Niszczoła, 2014).

Empirical findings produced in the last ten years, from a behavioral finance perspective (Ahmad & Shah, 2020; Akhtar & Das, 2019; Aren & Canikli, 2018; Durand et al., 2013; Khan et al., 2019; Sattar et al., 2020), have reinforced the theory that investment decision-making is influenced by various psychological factors such as personality factors, emotions, feelings, as well as cognitive errors (Barber & Odean, 2001, 2005; Barberis & Thaler, 2003; De Bondt et al., 2004; De Bondt & Thaler, 1995; Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). These findings essentially show that investors are not entirely rational in their investment decision-making, refuting the principles that exist in traditional finance.

The decision to invest in risky assets represents a form of human risk-taking behavior attributed to the investors' personalities. In the behavioral finance literature, several studies have modeled investor trading behavior based on insights taken from personality psychology (Davis & Runyan, 2016; Durand et al., 2008; Gambetti & Giusberti, 2019). Personality can be attributed to the investor's trading behavior, in which case the investor's personality can affect the choice and yield of his/her investment. Personality helps to describe and distinguish people and explain what motivates their actions and choices.

Extraversion refers to a person's level of activity, the interaction of choice, need for stimulation, and capacity for joy. Someone with a high level of extraversion is more sociable, active, optimistic, fun-loving, and talkative, whereas someone with a low level of extraversion is aloof and calm. Investors with this personality type are more likely to take risks to profit. Individuals with high agreeableness are trusting, altruistic, kind, empathetic, and helpful. A person with low agreeableness, on the other hand, is cynical, rude, suspicious, uncooperative, irritable, and even manipulative, vindictive, and cruel. Individuals with agreeable personalities avoid risk. (Baker and Ricciardi, 2014; Gambetti and Giusberti, 2019; Akhtar and Das, 2020).

Conscientiousness is defined as the degree of organization, control, perseverance, and motivation toward goal-directed behavior. A person with high awareness is diligent and has a strong sense of self-control. Low conscientiousness leads to laziness, aimlessness, hedonism, looseness, and carelessness (Doraisamy et al., 2011). This personality type makes deliberate

decisions and avoids rash risk-taking, so choose low-risk investments. The level of emotional stability of a person is referred to as neuroticism. Individuals with high neuroticism are more likely to experience psychological distress, including adverse effects such as anger, hostility, depression, and anxiety. This personality type is known for being withdrawn and risk-averse (Baker and Ricciardi, 2014).

The active search for and appreciation of experiences for one's benefit is referred to as openness to experience. People with high openness to experience have ideas and values that are imaginative, curious, and open to new ideas and values. The active search for and appreciation of experiences for one's benefit is referred to as openness to experience. People with high openness to experience have ideas and values that are imaginative, curious, and open to new ideas and values. Those who are less open to experience, on the other hand, tend to be conventional and dogmatic in their beliefs and attitudes, organized in their ways, and emotionally unresponsive. Investors with this personality are more willing to take risks (Baker dan Ricciardi, 2014; Gambetti dan Giusberti, 2019; Akhtar dan Das, 2020).

Individuals with a dominant extraversion and openness to experience personality prefer to make risky decisions. In contrast, personalities agreeableness, conscientiousness, and neuroticism have a reluctance to accept risk and are therefore less interested in taking higher risks in their investment decisions (Akhtar dan Das, 2020; Mayfield et al., 2008; Lommen et al., 2010; Becker et al., 2012; dan Niszczota, 2014). The big-five personality traits are associated with investor trading behavior. Personality helps to describe and differentiate people and explain what motivates their actions and choices, including choices in investing (Durand et al., 2008). Investment decisions in risky assets represent a form of human behavior in risk-taking and can be attributed to investors' personalities. Several studies have modeled investor trading behavior in behavioral finance literature based on insights drawn from personality psychology.

FURTHER STUDY

In this paper, we have reviewed some of the literature that discusses the attitudes and behavior of investors when making risky investment decisions, using the perspectives of behavioral finance and the prospect theory as the basis. Behavioral finance can explain the influence of some aspects of an investor's behavior in making risky investment decisions. Experimental behavioral factors are financial literacy (investor behavior concerning his or her financial attitudes, knowledge, and behavior), risk tolerance (investor preference for risk), and personality (personal traits of investors). Financially literate individuals are more interested in risky assets because they can better understand the basic principles of financial risk. Risk tolerance also affects risky investment behavior because

investors willing to accept higher risks tend to be interested in making riskier investments. Personality can also influence an investor's motivation and investment options, including choosing risky investments.

There are still few empirical research results that observe investment decision-making being related to riskier alternatives, so more research is needed to reach better conclusions about what influences investors to make risky investment decisions. The limitation of this literature review is that it only used a simple literature review. This can be developed into a systematic literature review using a more comprehensive source reference, examining more factors, and employing tools like Vos-viewer.

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