

A Review of the Psychology of Risk Taking Behavior for Individual Investors

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Abstract

This paper reviews the extensive literature within psychology and behavioral finance in order to outline the psychological underpinnings of investor risk behavior. Its objective is to provide a comprehensive understanding of the factors that influence risk propensity in investment markets. It provides an enumeration of influential factors that play a role in understanding an individual's propensity for risk including psychological biases, personality characteristics, demographic and socio-economic factors. Such a list should be valuable, not only to researchers in behavioral finance, but also to practitioners interested in improving trading skills and recruitment practices.

I. Introduction

Although the psychology of risk has been studied extensively (cf. Ricciardi 2004 and Barberis & Thaler 2002; Hunton, J., McEwen, R., and Bhattacharjee, S. 2001), there is still controversy surrounding the influences that shape an individual's inclination toward risk. Why do such stark contrasts exist among individual investors with regard to risk-tolerance and risk-management strategies? What is it that allows certain investors to assume risk with such a high degree of confidence, while others, with an equal knowledge of the investments, are highly risk averse in their capital allocation decisions? Of equal importance, what factors are endemic to psychological risk propensity in the market?

In order to explore such questions, the focus of this paper revolves around the psychological underpinnings of individuals in the domains of risk and investment decision-making. This paper outlines the underlying factors that contribute to the risk-related behaviors that often debilitate investors, resulting in undesirable or inadequate return on investment. In an attempt to contribute to this growing field of research, the paper presents reviews the relevant literature and comments on the implications of such research. The literature review centers on research from articles on the psychology of trading.

The structure of the paper is as follows. This first section defines the topic while the second section provides the salient definitions, concepts and models of risk that have been identified in previous studies. The next sections highlight the important factors that need to be taken into account when assessing the psychology of risk. The initial thrust of these sections includes the psychological obstacles prevalent in the field of investor psychology followed by an examination of the various demographic and socioeconomic factors that have been correlated with risk propensity. An assessment of different investor categorizations complements these sections. Finally, recommendations for future research conclude the paper.

II. Defining Risk

The concepts of both risk and risk tolerance have been defined in different ways depending on the source. However, consistencies and similarities characterize the majority of

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these definitions. There are subtle distinctions that lie between the theoretical frameworks of traditional finance and the more recently developed behavioral models. These models attempt to assess an individual's propensity and tolerance for risk. Risk taking can be considered any behavior that has a significant degree of uncertainty associated with the extent of loss or gain in the outcome (Rosenbloom, 2003). In terms of investment risk tolerance, Grable, Lytton and O'Neil (2004) describe the concept as a willingness to engage in behaviors whereby the outcomes are uncertain and withhold the possibility of a negative outcome. Investment risk tolerance can be divided into four elements: propensity, attitude, capacity (in the form of financial capability to incur risk), and knowledge (Corter and Chen, 2006).

III. Theoretical Models

The literature on financial risk tolerance is heavily skewed toward economic theory, whereby the explanation of risk revolves around the concept of risk aversion (Chaulk, Johnson and Bulcroft, 2003). Risk aversion is often measured as the ratio of risky assets to wealth (Chaulk et al., 2003). Such traditional theories suggest that judgments are used to establish the attitudes impacting financial decision-making and behavior, thereby assuming that individuals' financial risk propensity is developed through rational thought while utilizing the laws of probability (Grable et al., 2004).

Variance measures originated in the Subjective Expected Utility Model (SEU), which proposes that risk aversion is the result of diminishing marginal utility of wealth (Olsen and Cox, 2001). Prospect theory is an alternative model of financial risk tolerance contending that decisions are considered in relation to an individual's accumulated wealth position. The contention is that increases in wealth lead to an increase in risk tolerance (Chaulk et al., 2003). However, prospect theory takes variation into account when considering the 'mental accounting' of losses and gains and proposes that losses are perceived with twice the significance as gains (Chaulk et al., 2003).

From a macroeconomic perspective, the majority of modern finance theories conceptualize risk as an internal attribute of an asset (Olsen and Cox, 2001). However, these types of approaches to variability of return exclude psychologically derived assumptions of how individuals perceive uncertainty (Olsen, 2008). Olsen and Cox (2001) argue that an asset that 'feels' risky to one investor may not be categorized or 'felt' as such by another owing to unique life experiences and differences in social, cultural, and economic circumstances. Research in behavioral fields has indicated that traditional models may be insufficient in explaining financial risk attitudes, as individuals are not purely logical and rational (Grable et al., 2004).

Behavioral finance models treat risk as a multi-dimensional perception (Olsen, 2008). Risk tolerance is conceptualized as a subjective construct that is the product of a perceptive, judgmental, and psychologically bias process (Chaulk et al., 2003). Financial risk tolerance is, therefore, defined as a psychological component of decision-making in the context of financial uncertainty (Chaulk et al., 2003). In terms of emotion, variability of outcomes in and of itself is considered to be neutral. When investors claim to detest uncertain returns, it appears that what they detest, and what acts as a motivator, is the emotion of fear associated with incurring losses (Olsen and Cox, 2001). The motivating force is not the variability itself but is instead the associated emotion. Therefore, *risk* aversion is really *loss* aversion. Behavioral finance has

significant relevance as this field aims to identify the behavioral biases frequently displayed by individual investors and to design strategies (Mittal and Vyas, 2008).

The field of neuroscience has also offered valuable insights into the domain of behavioral research by presenting an explanation of investor behavior based on different decision processes located within systems of the brain (Peterson, 2007). The characteristics and motivations driving these decision processes are closely integrated with emotion. Activating one of these neural mechanisms leads to a shift in risk preferences. For instance, activation of the NAcc, a particular brain region, has been shown to precede both risky choices and risk-seeking behavior. However, activation of the anterior insula, the brain region responsible for the second decision processing system, precedes both riskless choices and highly risk-averse behavior (Peterson, 2007). Neuroscience evidence suggests that both processes must be simultaneously functioning for an individual to make appropriate investment decisions that involve an optimal degree of risk (Olsen, 2008).

IV. The Multi-Dimensional Nature of Risk

Just as the realms of risk definition and risk tolerance are highly debated in the literature, so are the domains of assessing and predicting individual financial risk tolerance. Such a task is highly complicated due to its obscure, multi-dimensional nature, as previously outlined (Grable et al., 2004; Morse, 1998). Grable et al. (2004) argued that risk attitude, like other attitudes, can be influenced by numerous factors and that risk tolerance is adaptable and easily manipulated. Sevdalis and Harvey (2007) illustrated the influence of context on investment behavior. More specifically, if the context of an investment is manipulated and made to appear highly salient, investors are more likely to choose investment decisions that minimize risk. Individuals' own self-evoked investment contexts can also manipulate investment risk preferences (Sevdalis and Harvey, 2007).

V. The Role of Investor Psychology in Risk

Throughout the literature, the role of investor psychology as a factor influencing the perception of risk and investment decisions has rapidly increased. A component of investor psychology that has received much attention by both researchers and practitioners is the role of psychological obstacles in investor risk taking (Kiev, 2002). Kahneman and Riepe (1998) have referred to biases in judgment and decision-making as cognitive illusions. The authors indicate that the objective of learning about cognitive illusions is to enhance the skill of recognizing instances in which a particular type of error or bias may be likely, in order to mitigate the influence of illusions.

a. Psychological and Cognitive Biases

In investments, important decisions are considered to be a choice between various gambles since the outcomes of alternative options, as well as the probabilities of outcomes, are rarely known in advance (Kahneman and Riepe, 1998). Individuals tend to formulate judgments about the probabilities of outcomes, assign values to these outcomes and combine individual beliefs and values in the construction of preferences about risky alternatives. As investment decisions are made in situations characterized by complexity and uncertainty, there tends to be a dependence on both fixed rules and intuition. The latter plays a crucial role in most financial and investment decisions (Kahneman and Riepe, 1998).

Biases of judgment are displayed in numerous forms, including overconfidence, optimism, hindsight, and over-reaction to chance events. Optimism is believed to be a powerful bias as it leads individuals to underestimate the likelihood of negative outcomes beyond one's control (Kahneman and Riepe, 1998; Kiev, 2002). Optimists are prone to what is termed 'illusion of control', whereby the degree to which one controls personal fate is highly exaggerated. Optimists are likely to underestimate the role of chance in human matters and inaccurately perceive *games of chance* as *games of skill* (Kahneman and Riepe, 1998). Hindsight also acts as an influential bias. Psychological evidence indicates that individual investors can seldom reconstruct, after the fact, what they believed the probability of an event to be before it occurred. Due to this hindsight bias, market events that expert analysts did not anticipate often appear to have been inevitable after they have occurred. If the event had indeed been predictable, it would have led numerous individuals to alter their trading behavior, which would influence the behavior of the markets themselves (Kahneman and Riepe, 1998). Individuals who are regularly exposed to market events are quite familiar with this line of reasoning, but even still, the allure of interpreting past events persists.

The cognitive bias of over-reaction to chance events also plays an important role in understanding the psychology of risk-taking. Individual investors tend to be easily manipulated into perceiving a causal regularity in random sequences of events. This is a natural tendency as the human mind is a pattern-seeking device being biased to the notion that a causal factor is present in any significant sequence of events (Kahneman and Riepe, 1998). This psychological tendency causes investors to perceive trends that are non-existent and to take action on this severely flawed intuition.

b. Errors of Preference

Kahneman and Riepe (1998) indicate that errors of preference are an important component of investor psychology and are appropriate in the analysis of investment decisions and risk-related behavior. Such errors arise either from mistakes in the assignment of values to potential outcomes or from unsuitable combinations of probabilities and values (Kahneman and Riepe, 1998). These errors of preference play an integral role in understanding the way in which individuals use stochastic processes to evaluate risk in financial assets. The theory of rational choice indicates that prospects characterized by uncertainty should be evaluated by a weighted average of the utilities of potential outcomes with each outcome weighted by its probability. However, individuals have a tendency to exhibit non-linear weighting of probabilities and deviate from the principle of probability weighting in a systematic manner (Kahneman and Riepe, 1998). Individuals have a tendency to overweight low probabilities and underweight high probabilities. The latter is especially prominent in investments. This preference error highlights what is known about investors in situations of risk and uncertainty. An individual's inclination toward non-linear weighting of probabilities helps explain why long shots are preferred to other gambles of equal expected value. Long shots appear as attractive alternatives since the low probabilities of winning are significantly overweighted. Most individuals will consider a 1% chance of winning \$1000 to be more attractive than a \$10 reward. Generally, this type of non-proportional probability weighting attracts individuals to both lottery tickets and insurance policies.

Another error of preference that is evident in individual investors is the tendency to be

influenced by the emotions associated with gains and losses, rather than focusing on the more crucial goal of maximizing the utility of wealth (Kahneman and Riepe, 1998). There are two characteristics of the value function that are essential in understanding an individual investor's risk propensity and decision-making approach. First, the function is steeper for losses than for gains. This concept is referred to as loss aversion, as was previously outlined. Second, the two branches of the function are described by a mathematical relationship, which implies a certain result that Kahneman and Riepe (1998) refer to as *near-proportionality of risk attitudes*. Loss aversion is characterized by the sharp asymmetry between the values that individuals place on gains and losses that aids in the explanation of decision-making in finance.

VI. The Influence of Demographic, Socio-Economic, and Personality Factors

Although investor-related psychological factors play a significant role in understanding the financial risk propensity and decision-making ability of individual investors, it is postulated that demographic, socio-economic, and personality characteristics should also be taken into account in order to determine how these factors influence an individual's risk tolerance (Grable, 2000). The literature reveals that variables such as gender, age, personality, culture, ethnicity and occupation among others, can significantly influence an individual's level of investment risk tolerance (Chaulk et al., 2003; Filbeck et al., 2005; Mittal and Vyas, 2008; Olsen and Cox, 2001).

With respect to gender, a prominent belief is that males often take greater risks than females (Grable, 2000). This assumption is consistent with the extant literature that postulates women tend to be more risk averse than men in their financial decisions. Both genders perceive and respond to risk differently as outlined in Chaulk et al. (2003), Felton, Gibson, and Sanbonmatsu, 2003. Olsen and Cox (2001) suggest that, even when comparing professionally trained investors, female investors tend to emphasize risk attributes, such as ambiguity and potential loss, more significantly than their male colleagues. Felton et al. (2003) and Olsen and Cox (2001) have suggested that gender differences in risk propensity are rooted in biological and evolutionary factors. From a biological perspective, Zuckerman (1994) notes that females have higher levels of the enzyme monoamine oxidase, which impedes sensation seeking and heightens risk aversion tendencies. Socio-cultural perspectives are often quoted as an explanation for females' more conservative investment behavior, based on the perception of lower confidence in female investors, due to the inherent masculine nature of the investment arena (Olsen and Cox, 2001).

When assessing age as a determinant of investor risk propensity, contradictory findings have been identified. On the one hand, increasing age has been correlated with a decline in risk tolerance as demonstrated by Chaulk et al. (2003) and Grable (2000). On the contrary, other researchers suggest a positive relationship between age and investment risk tolerance, with explanations based on the assumption that, all else equal, age is a proxy for wealth as identified in Chaulk et al. (2003). A more complicated relationship between age and risk tolerance has been identified, which indicates that risk tolerance increases with age until the period five years prior to retirement, at which point the direction of the relationship reverses. Then risk tolerance begins to decrease with age (Filbeck, Hatfield and Horvath, 2005). Given the conflicting evidence, researchers have yet to identify an empirically sound relationship between age and investment risk tolerance.

Several personality dimensions have also been linked to investors' level of risk propensity. Filbeck et al. (2005) outlines how researchers have used the Myers-Briggs Type Indicator (MBTI) to measure the strength of individuals' preferences on four dimensions (extroversion-introversion; sensing-intuitive; thinking-feeling; judging-perceiving). The results have indicated that certain personality traits are correlated with individual risk tolerance. Aside from the MBTI, a different personality factor that has been linked to individual risk propensity in the field of investments is the Type A-Type B personality profiles. Conclusions indicate that individuals characterized as Type A personalities displayed increased risk-taking capability compared to their Type B counterparts.

Race and ethnicity have also been identified as a determinant of financial risk tolerance (Yao, Gutter and Hanna, 2005; Zinkhan and Karande, 1990). Yao et al. (2005) in examining investment risk tolerance between different ethnic backgrounds in American households found that Caucasian individuals tend to have an increased tolerance for risk in investment decision making. Caucasians, on average, held a significantly higher proportion of equity investments, while African-Americans held a higher proportion of low-yield financial assets. However, explanations behind the influence of race on investment choice include the fact that African-Americans and Caucasians may have different perceptions of investment instruments and investment risk, due to differences in the available choices, as well as the cultural belief system regarding these choices (Yao et al., 2005). Another explanation relates to the fact that Caucasian households, on average, have a higher access to financial information and investment options than do African-Americans. Lastly, Yao et al. (2005) demonstrate that marketing of financial products is often targeted toward Caucasians which may help explain why African-American individuals tend to have a lower risk tolerance in the investment arena and display lower levels of participation in the financial markets.

There are additional other demographic and socio-economic factors that are believed to influence investors' psychological trading tendencies and propensity for risk. According to Chaulk et al. (2003), family structure was identified as having an impact on investment risk propensity. More specifically, the presence of children in the household was associated with lower risk tolerance in financial decision-making, suggesting that households with children require higher levels of security in the return on investment (Chaulk et al., 2003). Occupation has also been considered a determinant of risk tolerance. Individuals in occupations such as small business entrepreneurs, independent professionals and self-employed consultants displaying, on average, a higher propensity for risk in investment decisions than individuals in occupations such as doctors, lawyers, and teachers (Mittal and Vyas, 2008). Additional factors, such as increased levels of income and education are also associated with higher risk tolerance, although discrepancies exist within the literature (Grable, 2000; Nagpal and Bodla, 2009).

VII. Segmentation and Categorization of Investors

Although the various demographic, socio-economic, and psychological characteristics discussed in previous sections have significant predictive value for risk propensity and investment behavior, these factors are also be used to differentiate investors as risk-tolerance or risk-taking (Grable, 2000; Keller and Siegrist, 2006).

Previous research has examined the differentiation of researchers on the basis of risk

propensity. Mittal and Vyas (2008) classify individuals into distinct personality types, and investigate the relationship between demographic factors and investment personality displayed by the investor. An attempt was made to measure correlation between this relationship and level of risk tolerance, as well as the preferred choice of investment products among these different categories of investors. The results of the study revealed four dominant investment personality types: casual, technical, informed, and cautious (Mittal and Vyas, 2008).

Nagpal and Bodla (2009) also clustered individual investors into categories based on dominant characteristics and identified three distinct categories based on demographics and investment risk propensity termed as aggressive, moderate, and conservative investors. The findings indicate that each cluster of individuals varies significantly with respect to expected rate of return on investments. Investors in these categories also differ in the realm of time perspectives for investments, with aggressive and conservative investor groups preferring a long-term strategy, and moderate investors inclined towards a more short-term vision. The typologies presented by Mittal and Vyas (2008) and Nagpal and Bodla (2009) are just two such examples with other investor categorizations evident in the literature.

VII. Conclusion and Future Research

Exploring the psychology of risk is highly significant as an investor's trading methods are beneficial or limiting, conscious or unconscious; there is a psychology behind each investor's risk-taking methods (Kiev, 2002). Given the psychological underpinnings of risk-related decision-making in investments, it is important to have a comprehensive understanding of the factors that influence risk propensity.

In light of these implications, the necessity of gaining insight into investment behavior and psychological risk tendencies is of paramount importance. From an individual perspective, investors can use this type of research to better improve investment decision-making by increasing awareness to emotional and cognitive weaknesses that have been identified in the literature. As Kiev (2002) suggests, what differentiates successful from unsuccessful investors is the capacity to maintain an appropriate level of risk despite psychological stress responses and emotional reactivity that is often triggered by the uncertainty of the marketplace. From an organizational perspective, such findings can be valuable both as a recruitment measure and a customer-oriented marketing tool, as illustrated in the previous section. Such research offers valuable insights into why certain investors may be psychologically predisposed to favor a particular set of investment products which can be dependent on the individual's personality, and demographic and socio-economic orientation (Olsen, 2007).

Understanding an individual's investment risk tolerance is an intricate process, with numerous multi-dimensional, interactive elements at play. Despite the amount of literature, there remains much to be learned about the role of psychology as a determinant of risk propensity and investment behavior. The nature of relationships between risk tolerance and the various factors that have been identified need to be more fully explored.

A number of limitations were identified throughout the literature in this field of research. For instance, a number of the studies assessing the influence of different variables on an individual's financial risk tolerance used high-school and college students as the subjects of the

research experiment (Felton et al., 2003; Sevdalis and Harvey, 2007), which may not be the ideal sample of participants when assessing risk propensity in the context of investor behavior. The environment in which these participants were assessed was often highly superficial, which could be problematic when considering the external validity of such research studies. Another identified limitation was the use of risk measurement tools that lack both validity and predictive value (Chaulk et al., 2003). Thus, in the absence of highly reliable and valid risk measurement tools, researchers should incorporate more than one measure of subjective risk in experimental studies.

Longitudinal studies could offer valuable insights into this field of research. Chaulk et al. (2003), among others, have indicated that investors' propensity for risk has a tendency to change throughout the distinct life cycle stages. Historical and generational effects have the potential to influence how individuals perceive expectations about financial losses and gains within family stages, thereby influencing tolerance for risk. Therefore, research experiments could aim at exploring financial risk propensity through different life stages to assess why and how such changes in risk behavior take place. Researchers should also consider assessing investor risk propensity on a more global scale by expanding the scope of cross-cultural studies. Such research can be highly valuable, given the continual rise of both globalization and cultural diversity in the business community.

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