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Does Miscalibration of Financial Risk Tolerance Describe Portfolio Holdings?

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Introduction

The idea that sometimes investors mis-calibrate their willingness to take risk has been examined intermittently over the past two decades. The concept of miscalibration is closely associated with the notion of overconfidence (Nosic and Weber, 2010) and is commonly thought of as an over- or underestimation bias (Grable et al., 2009). A study by Hallahan et al. (2004) illustrates how miscalibration is generally estimated. They asked a sample of investors to complete a test designed to uncover a test-taker's willingness to engage in financial risk-taking behavior. They also asked the test-takers to estimate their risk tolerance using a stated risk-preference measure. When they compared the two, Hallahan and associates noted that 73% of test-takers underestimated their risk tolerance, 23% overestimated their risk tolerance, and 4% were accurate (i.e., risk-tolerance scores were calibrated). Their research showed that miscalibration is likely a widespread occurrence.

Risk-tolerance miscalibration can have serious ramifications for those engaged in financial decision-making. Odean (1999) and Pan and Statman (2012) noted overconfident investors take more risk when allocating investment assets. When someone is overconfident, the worry is that their portfolio allocation will exceed their true willingness to take a risk, increasing the possibility that they will sell at a loss when portfolio volatility exceeds their comfort or preference level. By extension, those who exhibit underconfidence are more likely to invest

conservatively. When someone allocates in a way that falls below their true risk tolerance they may not accumulate enough wealth to fund goal achievement. The ideal situation is one in which an investor matches their portfolio allocation choices to their risk tolerance. When this occurs, the investor will be less subject to altering their portfolio in light of changing economic volatility. Our purpose with this paper is to extend the current literature by showing how miscalibration is associated with subsequent period portfolio choices.

Analysis

To address our purpose, we collected data in October 2020 and again in March 2021 from the same 408 investors. Data were gathered using a Qualtrics questionnaire that was distributed by Dynata. The sample was relatively diverse, with study participants representing the types of people who are actively engaged in making financial and investment decisions.

Study participants were asked to answer two risk-tolerance assessments at the first survey. The single-item risk-tolerance assessment from the Survey of Consumer Finances (SCF) was utilized to gauge investors' stated risk tolerance. The question reads as follows:

Which of the following statements comes closest to the amount of financial risk that you are willing to take when you save or make investments?

1. Not willing to take any financial risk.

2. Take average financial risk expecting to earn average returns.

3. Take above-average financial risk expecting to earn above-average returns.

4. Take substantial financial risk expecting to earn substantial returns.

Survey participants were also asked to complete a 13-item propensity risk-tolerance scale published by Grable and Lytton (1999). The scale's Cronbach's alpha was .76. The risk tolerance of participants fell into the middle range of the propensity scale, whereas stated risk tolerance was lower (i.e., below average to none). No differences in sample characteristics and variables were observed between the first and the second survey. At the second survey, participants were asked to indicate the approximate percentage of their savings and investments held in stocks and other risky assets. Additionally, the following participant characteristics were assessed and used as control variables: self-identified gender, age, marital status, home-ownership, self-identified race/ethnicity, household income, wealth status, and education.

A differential regression technique was utilized to address the notion of miscalibration. Scores from the propensity measure (i.e., a scale that was hypothesized to be a more accurate measure of a participant's risk tolerance) were used to predict categories of risk tolerance from the SCF item. An ordinal regression was used at this stage of the analysis to predict category membership. Predicted scores were saved for each survey participant. These scores were then subtracted from each participant's SCF-stated risk-tolerance score. Using this procedure, a positive score indicates an overestimation of risk tolerance. A negative score indicates an underestimation of risk tolerance, whereas a score of zero represents accuracy between the two assessments (i.e., no miscalibration). Participants were then recoded into one of three categories: (a) those who underestimated their risk tolerance; (2) those who exhibited accuracy when estimating their risk tolerance; and (3) those who overestimated their risk tolerance.

Predicted risk tolerance was slightly lower than stated risk tolerance. Whereas 94 participants stated that they had no tolerance for financial risk, and 21 stated they had substantial risk tolerance, when evaluated against scores from the propensity scale, fewer participants were predicted to have no risk tolerance. No participants were predicted to have substantial risk tolerance. Approximately 50% of participants exhibited accuracy between their stated risk tolerance and their risk tolerance when measured with the propensity scale. Among the others, 28% were observed to overestimate their risk tolerance, whereas 22% underestimated their risk tolerance.

We then grouped study participants into one of three classifications (a) underestimation (i.e., a negative score), (b) accurate (i.e., a score of 0), and (c) overestimation (i.e., a positive score). Those who underestimated their risk tolerance were found to hold less of their portfolio in equities (31.06%; SD = 25.99%). Those who overestimated their risk tolerance held more equities (42.44%; SD = 28.10%). Those whose scores were calibrated held equities between the extremes (33.50%; SD = 26.90%).

An ANOVA test was then conducted to determine where differences existed among the calibration categories. No difference in equity holdings was noted between those classified as underestimating their risk tolerance compared to those who were accurate in their assessment of their risk tolerance; however, those classified as overestimating their risk tolerance were found to hold more equities. Given these findings, the classification variable was recoded dichotomously so that 1 = risk-tolerance overestimation, otherwise 0. This dichotomous variable was then used in a Tobit regression model, along with the control variables, where the outcome variable was subsequent period equity holdings. In alignment with the previous tests, those who were classified as overestimating their risk tolerance were found to hold more equities. Household income, wealth status, and education were also found to be positively associated with subsequent equity holdings.

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Conclusion

According to Broihanne et al. (2014), overconfidence—what is described in this study as an overestimation bias—arises primarily because overconfident investors tend to misjudge probabilities, exhibit too much optimism, believe they can control outcomes, and assume they make better investment and financial decisions compared to others. In our study, approximately 50% of participants estimated their risk tolerance accurately (i.e., their stated risk tolerance matched their estimated risk tolerance). Approximately 22% of participants exhibited an underestimation miscalibration, whereas about 28% overestimated their risk tolerance. Those who overestimated their risk tolerance were observed to hold more equities in their portfolios compared to those who either underestimated or accurately estimated their risk tolerance. Higher levels of household income, wealth, and education were also found to be positively associated with subsequent-period equity holdings.

The danger associated with risk-tolerance miscalibration can be significant. Using historical data from 1928 through 2021, we estimated that the portfolio return and standard deviation for someone with *average* risk tolerance is approximately 7.74% and 10.42%, respectively. The return and standard deviation for someone who instead believes they have an above-average risk tolerance is 12.52% and 18.99%, respectively. The return and standard deviation for those who believe they have a below-average risk tolerance is 5.94% and 7.23%, respectively. It is obvious that overestimation results in a substantial increase in portfolio risk, whereas underestimation dampens returns. Either outcome can result in problematic goal outcomes.

When viewed holistically, our results show that miscalibration of risk tolerance can be used to explain subsequent-period investment choices. We encourage researchers and those in the financial advisory community to seek ways to help financial decision-makers accurately account for their willingness to take risks. Doing so may help those who overestimate their risk tolerance make choices that expose them to less market volatility. Similarly, new approaches to financial education may help those who underestimate their risk tolerance understand the necessity of bearing losses when attempting to meet future financial goals.

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