

Do Investors who overestimate financial risk tolerance have higher portfolio risk than those who do not?

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Objective

For a financial planner, the accuracy of a client's financial risk tolerance (FRT) is a key factor in determining suitable investment recommendations. For the well-being of a client, it is important for a financial planner not only to assess his or her client's risk tolerance accurately but also to ensure that an assessment outcome agrees with a client's perception of risk tolerance (Lucarelli & Brighetti, 2011).

Current literature suggests that higher risk tolerance means having more risky assets in the portfolio (or having higher portfolio risk); lower risk tolerance means the opposite (Gilliam & Grable, 2010). How about people who overestimate or underestimate their risk tolerance? Or What happens when someone intentionally inflates their risk tolerance? The conventional assumption is that investors who overestimate may also have higher portfolio risk (Roszkowsky & Davey, 2010). Contrary to the current assumption, we argue that overestimation of risk tolerance does not lead to higher portfolio risk. Relying on subjective measures of risk tolerance that is not aligned with valid and reliable psychometric measures may lead to sub-optimal risk in portfolio.

The purpose of the study is to compare portfolio risk undertaken by the investors who make an estimation error in risk tolerance to those who do not make estimation errors. Although some investors systematically miss-assess their financial risk tolerance—some overestimate while others underestimate, nevertheless, investors who accurately assess their risk tolerance are more likely to hold riskier portfolios than those who overestimate their risk tolerance.

Significance

In this study, we tested a hypothesis that people who overestimate their risk tolerance do not have higher portfolio risk compared to those whose risk tolerance is consistent (that is, their subjective and psychometric risk tolerance matches). We argue that when making decisions on investment allocation choices, an investor should strive to be well calibrated. That is, an investor should try to match one's subjective risk tolerance to the psychometric risk tolerance. We hope that financial advisors will focus on a valid and reliable psychometric measure of risk tolerance for making their recommendations.

Method

Data

Data for this study were obtained from a cross-sectional data gathering project facilitated by the University of Missouri (http://pfp.missouri.edu/research_IRTA.html). This data collection site allows individual investors to assess the Grable-Lytton risk tolerance scale for free. The study used data covering the period 2017 to 2018. The 60,378 respondents completed the survey. Respondents with an incomplete survey were eliminated. This sample was delimited to only those respondents whose asset allocation adds to 100%. Data were further delimited to respondents older than 25 years as younger respondents were thought to be less likely to hold investment assets and retirement accounts (Glumov 2013). After the two delimitations, the sample size was 12,416. The dataset was checked for duplication of IP addresses. No duplication of IP addresses was noted.

Measure

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Dependent Variable. The dependent variable was portfolio risk. Respondents were asked to indicate whether they currently owned investable assets, and if yes, what percent of their total investment portfolio was invested in each of the four categories: (a) cash, such as savings accounts, certified deposits, or money market mutual funds; (b) fixed-income investments, such as corporate bonds, government bonds, or bond mutual funds; (c) equities, such as stocks, stock mutual funds, direct business ownership, or investment real estate (not including a personal residence); and (d) other, such as gold or collectibles. We used portfolio allocation information to measure portfolio risk (PR) following a procedure proposed by Corter and Chen (2006).

Procedure

Risk Tolerance Estimation Error. We measured estimation bias with The Differential Prediction Model (Linn, 1978). Moreschi (2005), Gilliam and Grable (2010), Grable and Roszkowski (2007), and Grable et al. (2009a) used a similar method to estimate risk tolerance estimation error by regressing subjective risk tolerance score against psychometric risk tolerance score. Because of the ordinal coding of the subjective risk tolerance question, an ordered logistic regression model was used to predict each respondent's subjective risk category from psychometric risk tolerance scores. The model was statistically significant (LR chi-square: 191.35, p-value: 0.0000). A test of the proportional odds assumption for the psychometric risk tolerance score indicates that this assumption is upheld ($p=0.0163$) at $\alpha=1\%$.

Hypothesis testing with Regression Analysis

Finally, a Tobit model censored regression analysis was used to examine the relationship between estimation bias groups and PR scores controlling for demographic variables and reliance on professional advice as the PR variable was censored between zero and 0.2. Three broad estimation bias categories—(a) Underestimating; (b) Calibrated, and (c) Overestimating—were used as independent variables in the analysis. The calibrated group with an estimation error score of zero was used as the reference category.

Results

The results show support for our argument that overestimation of risk tolerance does not lead to a higher risk in the portfolio. The overall Tobit model was significant ($F = 25.05$, $p < 0.001$). There was a significant relationship between estimation error groups and PR scores. Investors with matching predicted SRT and observed SRT (i.e. Calibrated) held significantly riskier assets in their portfolios than investors whose predicted and observed self-rating did not match (underestimating or overestimating) (Table 2).

Female respondents had significantly lower PR scores than male respondents. Respondents from all age groups had significantly higher PR scores than the reference category (those who were 25 to 34 years of age). None of the marital status groups was significant. None of the educational status categories was significant. Income groups above \$50,000 had significantly higher PR scores than respondents with income less than \$25,000. Respondents who sought professional financial advice had significantly higher PR scores than the respondents who did not. This finding suggests that financial advisors may be using their professional expertise to evaluate their clients' risk attitudes in a way that optimizes portfolio risk. Respondents who do not have investment assets had significantly lower portfolio risk.

Conclusions

The purpose of this study was to determine the degree to which estimation error is associated with an investor's portfolio risk. A differential prediction technique was utilized to guide the measurement of estimation bias scores and the development of subsequent groups—overestimation, underestimation, and calibrated. These estimation bias groups were then used to test differences in portfolio risks. The results of the analyses suggest that estimation error—both over and under—led to decrease in portfolio risk. We found support for our argument that overestimation bias does not lead to higher risk in portfolio

rather presence of this error results in reduction of risk. We found that calibrated investors have significantly higher risk in their portfolio.

The findings from this study add to the literature that has developed over the past two decades showing the influence of financial risk tolerance has on economic behavior (e.g., Grable and Roszkowski 2007; Corter & Chen, 2006). The results of this study are important in showing that estimation bias likely does impact the way some people evaluate risky financial situations. Calibration of risk tolerance appears to have a profound influence on the risk taken in portfolio. When estimation error is present, the allocation of a portfolio can differ from what experts generally describe as an optimized allocation. More research is needed to determine what the long-term ramifications of holding lower risk portfolios might have on wealth accumulation, but it is reasonable to conclude that estimation error may be associated with lower lifetime wealth accumulation.

This study also found that respondents who sought professional advice had higher PR scores than those who did not. In other words, respondents who sought and used professional advice were likely to hold riskier assets in their portfolio. This finding supports previous reports that indicated a significant association between professional help and portfolio allocation in portfolios likely exists. For example, Winchester, Huston, and Finke (2011) found that individuals who used a financial advisor were more likely to maintain their portfolio during a recession.

Out of balanced subjective and psychometric risk tolerance assessments may lead to errors in financial decision making. The role of calibration in shaping risk attitudes may influence other financial decisions. While the results from this study speak only to investment decision making, the possibility that estimation bias alters other types of behavior is worthy of future study. People whose risk tolerance is shaped, in part, by estimation bias may be overly cautious in terms of borrowing, lending, and saving behavior.

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Table 1: Descriptive Statistics

Variable label	Mean
Portfolio Risk	0.1011
	Percent
Estimation Error	
Consistent	63.79%
Overestimation	10.16%
Underestimation	26.05%
Gender	
Male	63.86%
Female	36.14%
Age	
25-34	45.4%
35-44	24.96
45-54	15.02
55-64	9.05%
65-74	4.28%
75 and over	1.29%
Marital status	
Never married	27.16%
Living with significant other	10.99%
Married	51.01%
Separated or Divorced	8.25
Widowed	0.89
Shared living arrangements	1.7%
Education	
Less than High School	0.73%
High School	3.64
College	13.42
Associate Degree	8.25
Bachelor's Degree	34.84
Graduate Degree	39.13
Income	
Income <25k (ref)	9.7
Income 25k – 49K	16.98
Income 50k -74K	20.53
Income 75K – 99k	15.12
\$100,000 or greater	37.67
Financial Decision	
I or someone in my household	67.64
Rely on Professional	17.27
No Investment Asset	15.09

Table 2: Tobit Regression Analysis of the Association between Estimation Bias and PR Scores

Dependent Variable: Portfolio risk		
	B	t-value
(Constant)	0.0829***	3.06
Calibrated (ref)		
Overestimation	-0.0176***	-2.63
Underestimation	-0.0081*	-1.95
Male (Ref)		
Female	-0.0234***	-5.84
Age 25-34 (ref)		
Age 35-44	0.0126*	2.46
Age 45- 54	0.0338***	5.93
Age 55- 64	0.0321***	5.34
Age 65- 74	0.0299***	3.86
Age over 75	0.0362**	1.87
Not Married (ref)		
Married	-0.0033	-0.67
Separated/Divorced	-0.0082	-0.98
Widowed	-0.0201	-1.00
Living Together	0.0097	1.38
Shared Living	0.0091	0.62
Less than High School (Ref)		
High School	0.0218	0.76
College	0.0045	0.17
Associate Degree	-0.0198	-0.73
Bachelor's Degree	0.0135	0.51
Graduate Degree	0.0118	0.44
Income <25k (ref)		
Income 25k – 49K	0.0019	0.25
Income 50k -74K	0.0125	1.58
Income 75K – 99k	0.0185**	2.34
\$100,000 or greater	0.0297***	3.98
Professional Advice		
I or someone in my household (ref)		
Rely on Professional	0.0110*	2.34
No Investment Asset	-0.0987***	-13.89

*p < 0.05. **p < 0.01. ***p < 0.001. b-values are unstandardized