

Measuring Risk Preferences: Re-examination of Grable & Lytton's 13-item Questionnaire

This paper re-examined Grable & Lytton's (1999) 13-item questionnaire assessing consumers' risk preferences. Reliability of the instrument was tested and factor analysis was conducted to examine the dimensions measured by the instrument. It was found that frame of the options and potential return had important effect on subjects' risk preferences. Significant differences were found in the risk preferences between the adult and the youth, which suggested the importance of investment experiences and knowledge.

Yali Yang, University of Georgia¹

Introduction

Extensive studies have been done in recent years to understand consumers' decision-making under risk. Some investigated the influence of consumers' risk preferences on their financial behaviors (Chang, Fan & Hanna, 1992; Godwin, 1998; Liao, 1994); others explored the socio-economic and demographic factors related to consumers' risk preferences (Grable & Joo, 1999; Grable & Lytton, 1998; Riley & Chow, 1992; Sung & Hanna, 1996). Most researchers used self-report questionnaires to measure consumers' risk preferences, and the others used asset allocation as the indicator of consumers' risk preferences. However, few researchers investigated the reliability and validity of these instruments.

Grable & Lytton developed a 13-item instrument to improve the one-item questionnaire in the SCF. Each choice was coded from 1 to 4, and higher points indicated higher level of risk tolerance, whereas lower points indicated lower level of risk tolerance. The total index score of each respondent was obtained by summing up the points the respondent scored on each item. A basic assumption, which made the total index score work, was that consumers held consistent risk preferences. If the consistent risk preference assumption is violated, the total index scores will be confusing and difficult to interpret. Although the dominant risk preference theory--expected utility theory supports the consistent risk preference assumption, many empirical studies and other theories showed that in many cases consumers risk preferences did change with different situations.

Theoretical Framework

Risk Preference Theories

The dominant theory concerning decision-making involving risk is expected utility theory proposed by Von Neumann & Morgenstern (1947). The main idea of this theory is that consumers will select the choice with the highest expected value. A consumer's risk preference can be represented by one of the three types of expected utility functions. Risk aversion preference is represented by a concave utility curve; risk-seeking preference is represented by a convex utility curve; risk neutral preference is represented by a linear utility function.

Friedman & Savage expanded the expected utility theory to explain the observation that low-income families were willing to purchase both insurance and lottery tickets. From this observation, an inconsistent risk preference utility function was proposed. This utility function has two parts. The first part is concave and the second part is convex. The reflection point is on the consumer's current wealth.

In Friedman & Savage's theory, the critical point for the risk preference reversal is the current wealth. Whereas in Fishburn's (1977) theory, the critical point for the reversal is the "target value". Risk is the function of deviation from target return and its impact on consumers' feelings when the return is below the target return by various amounts. Depending on circumstances and choice characteristics, target return can be zero profit, the return of risk-free investment, average market return, etc. The theory proposed that consumers were risk seeking before reaching the target value and risk averse after reaching the target value.

Law of diminishing marginal utility suggests that the negative impact on utility from a loss is larger than the positive impact on utility from the same amount of gain. Tversky & Kahneman (1979) found that people were risk averse on the gain side and risk seeking on the loss side. According to this finding, Tversky & Kahneman proposed prospect theory, which has an S-shaped utility function nearly symmetric around zero. The part on the gain side is less steep than the part on the loss side.

The Influence of Confidence and Knowledge

Some studies have investigated the role of psychological factors in decision-making. Langer (1979) found that familiarity and involvement would result in illusion of control. Heather & Tversky (1991) and Goodie (2003) also found that people tended to bet on things in which they had more confidence and knowledge even though they had no control over the outcome.

The purpose of this study is to re-examine the reliability of Grable and Lytton's 13-item questionnaire. In addition, the within-subject reflection effect was also examined to see whether the subjects reverse risk preferences on different domains (gain/loss) and different potential returns. An ANOVA was conducted to see whether there are significant differences in risk preferences between the adult and the youth, who have different investment experiences and knowledge.

Results

Sample and Instrument

Two samples were drawn, one from adult residents and one from undergraduates, in order to see whether there is a significant difference in risk preferences between the youth and the adult. Five hundred Athens-Clarke County residents were selected from the telephone book and the questionnaires were sent to them. Only 76 completed questionnaires were received with a response rate of 20.5% (undeliverable mail and those who were unable to do the questionnaires were left out). The questionnaires were also given to a convenience sample of 157 undergraduate students from an undergraduate class in the University of Georgia and the questionnaires were completed in a class setting.

The instrument used to measure consumers' risk preferences in this study is the 13-item questionnaire developed by Grable and Lytton. The coding was reversed in this study with higher scores indicating risk averse and lower scores indicating risk seeking.

Reliability Test

First, reliability of the instrument was tested. Although the sizes of the adult sample and student sample were substantially different, they both had relatively high reliability with Cronbach's alpha of over 0.70. However, the pattern of correlations was different in two samples. Items involving regular investment instruments such as stocks and bonds had higher correlations with total index scores in the adult sample than in the student sample. In contrary, items regarding general attitudes toward risk had higher correlations with total index scores in the student sample than in the adult sample.

Factor Analysis

In order to see whether three factors should be retained and if so, which items should be included in each factor, a factor analysis was conducted next. Three factors were retained in both the adult and student sample. However, the factor patterns in two samples were different. The most important factor in the adult sample included items involving regular investment instruments, and items about general attitudes toward risk were the second factor, which was the reverse of the factor pattern in the student sample.

Comparison between the Adult Sample and the Student Sample

An ANOVA was conducted on the combination of two samples to see whether adults and students responded differently to each item. Only 76 observations were randomly selected from the student sample and combined with the adult sample to complete the analysis on balanced data. The ANOVA results showed that although there was no statistically significant difference in the total index scores between two samples, two samples did express different risk preferences under different situations. Adults were more conservative than students when it came to investment in hard assets. However, adults were more risk seeking than students when it came to investment experiences and investment in stocks and bonds.

Reflection Effect and Inconsistent Preference

From examination of the response means and frequencies to each item, we could detect a sign of inconsistent risk preferences. Adults tended to be more risk seeking when they had investment experiences with the regular investment instruments but more risk averse when they were not familiar with the investment instruments. Students were more risk averse when dealing with regular investment instruments but more risk seeking when dealing with investment in hard assets.

A close look was taken at items in gain domain and loss domain to check the reflection effect. The frequencies and percentage of responses in these two items suggested that many subjects had changed risk preferences. This within-subject reflection effect was examined in both samples. In the adult sample, 42% of all subjects kept their preferences unchanged and 54% of all subjects were risk averse in the gain domain but risk seeking in the loss domain. Among those who did not change their preferences, half of the subjects were always risk seeking, while the other half were always risk averse. In the student sample, 52% of all subjects kept consistent risk preferences, while 40% of all subjects showed the reflection effect. Among those who did not change preferences, nearly 80% of them were risk seeking in both cases.

Will different probabilities and the amount of potential returns drive people to change their risk preferences? The comparison between two items, which both involved certain gains and different potential returns, can answer this question. Higher potential returns and moderate probabilities made 40% of adults and 24% of students change their risk preferences. There were only three such items in the questionnaire so the influence of different probabilities and returns could not be fully examined.

Discussion

Although the 13-item questionnaire had relatively high reliability, some items' correlations with the total index scores were very low. Since many subjects changed their risk preferences in some items, including these items caused confusing in coding and interpreting of the index scores. In addition, these items offset the scores subjects had in other items, thus made the total index scores concentrate in the middle instead of spreading out. Therefore, most subjects appeared to be risk neutral and their true risk preferences were covered up.

In this instrument, all options were coded according to their relative risk compared with other options within each item. This made the code of a certain option differ in different items. The change in relative risk and the number of total options would change the coding of a certain option. This made subjects' risk preferences being interpreted incorrectly. Therefore, it is very important to keep coding consistent throughout the instrument. Each option should be coded according to the risk embedded in the option itself instead of relative risk compared with other options.

The comparison among items in different domains and with different potential returns suggested that a separate instrument consisting of such questions should be used as a supplement of the 13-item questionnaire. This one should be designed to reveal what level of probability and potential return will trigger a change in risk preferences. The amount of return that triggers the change can also be interpreted as the "target return" that subjects want to achieve. The results also suggested that consumers might be willing to accept more risk if financial consultants point out investment choices offering consumers' target returns. Clearly identified target value will help consumers to understand all possible outcomes and the consequences better, thus help them to act rationally.

Since consumers change their risk preferences according to many factors, such as gain/loss domain, financial experiences, potential returns, etc. It is not reasonable for financial consultants to look at only the total index score. Instead, they should pay more attention to different items or subset of items to fully understand their clients' risk preferences. For example, if they want to know their clients' risk preferences in stocks and bonds, they need to look at the items involving these instruments. If they want to see whether their clients are sensitive to increases in potential returns, they need to catch the point that triggers the change of risk preferences. Only after fully understanding all aspects of consumers' financial risk preferences, researchers and practitioners could help consumers make rational decisions.

Acknowledgements

I would like to express my appreciation to Dr. Deborah Godwin for her guidance and suggestions during my research.

References

Chang, Y., Fan, X., & Hanna, S. (1992). Relative risk aversion and optimal credit use with uncertain income. American Council on Consumer Interest Proceedings (pp. 14-22). Columbia, MO: American Council on Consumer Interest.

Cox, J.D., & Munsinger, H.L. (1985). Bias in the boardroom: psychological foundations and legal implications of corporate cohesion. Law and Contemporary Problems, 48, 83-135.

Fishburn, P. C. (1977). Mean-risk analysis with risk associated with below target returns. The American

Economic Review, 67, 116-126.

Friedman, M., & Savage, L.J. (1948). The utility analysis of choices involving risk. Journal of Political Economy, 56, 279-304.

Godwin, D. D. (1998). Household debt quintiles: Explaining changes 1983-1989. Journal of Consumer Affairs, 32, 369-393.

Goodie, A. S. (2003). The effects of control on betting: Paradoxical betting on items of high confidence with low value. Journal of Experimental Psychology: Learning, Memory, and Cognition, V29 (4), 598-610.

Grable, J., & Joo, S. H. (1999). Factors related to risk tolerance: A further examination. American Council on Consumer Interest Proceedings (pp. 53-59). Columbia, MO: American Council on Consumer Interest.

Grable, J., & Lytton, R. H. (1998). Investor risk tolerance: Testing the efficacy of demographics as differentiating and classifying factors. Financial Counseling and Planning, 9 (1), 61-70.

Grable, J., & Lytton, R. H. (1999). Financial risk tolerance revisited: The development of a risk assessment instrument. Financial Services Review, 8, 163-181.

Heath, C., & Tversky, A. (1991). Preference and Belief: Ambiguity and competence in choice under uncertainty. Journal of Risk and Uncertainty, 4, 5-28.

Hershey, J.C., & Schoemaker, P. J. (1980). Prospect theory's reflection hypothesis: A critical examination. Organizational Behavior and Human Performance, 25, 395-418.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrica, 47 (2), 263-292.

Langer, E. J. (1975). The illusion of control. Journal of Personality and Social Psychology, v32 (2), 311-328.

Liao, S. (1994). Expectations for the future, attitudes toward credit and the use of consumer loans. American Council on Consumer Interest Proceedings (pp. 164-169). Columbia, MO: American Council on Consumer Interest.

McDougal, Y. B. (1995). Decision making under risk: Risk preference, monetary goals and information search. Personal and Individual Differences, 18 (6), 771-782.

Peterson, C. R., & Beach, L. R. (1967). Man as an intuitive statistician. Psychological Bulletin, 68, 29-46.

Pratt, J. W. (1964). Risk aversion in the small and in the large. Econometrica, 32 (1), 122-136.

Riley, W. B., & Chow, K. V. (1992). Asset allocation and individual risk aversion. Financial Analysts Journal, 48(6), 32-37.

Schneider, S.L., & Lopes, L.L (1986). Reflection in preferences under risk: Who and when may suggest why. Journal of Experimental Psychology: Human Perception and Performance, 12, 535-548.

Schooley, D. K., & Worden, D. D. (1996). Risk aversion measures: Comparing attitudes and asset allocation. Financial Services Review, 5(2), 87-99.

Sung, J., & Hanna, S. (1996). Factors related to household risk tolerance: An ordered probit analysis. American Council on Consumer Interest Proceedings (pp. 227-229). Columbia, MO: American Council on Consumer Interest.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. Science, 211, 453-458.

Von Neumann, J., & Morgenstern, O. (1947). Theory of games and economic behavior. Princeton, NJ: Princeton University Press.

Endnotes

¹ PhD student, Department of Housing and Consumer Economics, Email: yyang@uga.edu