SELF-ASSESSMENTS OF RISK TOLERANCE
BY WOMEN AND MEN [1]

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Summary.—A convenience sample of 1,741 Internet users completed a 12-item financial risk-tolerance questionnaire. They also rated themselves on their tolerance for financial risk using a 4-point rating scale. The 12-item summated rating score was used to predict the self-rating. The residual between actual and predicted self-rating was compared by sex. The residual for males was positive, indicating that men tended to overestimate their proclivity for taking risks. Conversely, the residual for females was negative, suggesting that women underestimate their tolerance for risk. The relationship held when controlling for other factors linked to risk tolerance, i.e., age, household income, marital status, and education. It was also noted that risk tolerance was overestimated by younger respondents and those with a graduate education.

Risk Tolerance

Risk tolerance is defined as the willingness to engage in "behaviors in which the outcomes remain uncertain with the possibility of an identifiable negative outcome" (Irwin, 1993, p. 11). On the average, people who tolerate higher risk within their portfolios will tend over time to accumulate greater wealth than more risk averse individuals (Palsson, 1996). A number of investigators have addressed the question of why, compared to men, women earn lower returns on their investments (e.g., Arch, 1993; Bajtelsmit & Bernasek, 1996; Powell & Ansic, 1997; Sunden & Surette, 1998; Grable & Joo, 2004). One very plausible explanation for women's lower investment returns is the robust finding that men can tolerate higher financial risk than women (Zeff, Fremgen, & Martinez, 1994; Kohler, 1996; Byrnes, Miller, & Schafer, 1999; Grable, 2000; Karakowsky & Elangovan, 2001; Eckel & Grossman, 2002; Roszkowski, Delaney, & Cordell, 2004), and that men invest in higher yielding but riskier products.

Financial advisors can use a number of approaches to assess their clients' risk tolerance (van de Venter, 2006), but frequently investment decisions are simply based on an advisor's self-estimated tolerance for risk. As Moreschi (2005, p. 45) pointed out, "Understanding the factors that determine a person's level of risk tolerance is important for successful planning. Being able to identify which prospects are most likely to understand their

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own risk tolerance can facilitate this process." Moreschi reported that his preliminary data suggest that males are better at the task than are females. The reason for the difference has not been identified. But it is possible that sex stereotypes may come into play in the process (see Roszkowski & Grable, 2005b) and may influence women's self-estimate of their risk tolerance, leading them to believe that their risk tolerance is even lower than it actually is.

Issues related to poverty, financial well-being, and lifestyle satisfaction in retirement are linked, either directly or indirectly, with a person's tolerance for financial risk throughout the lifespan. Consequently, understanding sex differences in self-perceptions of risk tolerance has important implications for researchers and policy makers beyond the actual documented differences in risk tolerance between the two sexes (Byrnes, et al., 1999). This paper explored whether sex is a factor in how accurately an individual estimates his own risk tolerance. A tendency by women to underestimate, if noted in the data, could help explain why women often invest in lower risk products than is even warranted by their somewhat lower risk-taking proclivities.

Self-assessments of Financial Risk Tolerance

There is a growing body of research addressing how well people assess the risk-tolerance of others (e.g., Martin, 1987; Hsee & Weber, 1997; Siegrist, Cvetkovich, & Gutscher, 2002; Roszkowski & Grable, 2005a, 2005b), with some of these studies dedicated to understanding sex-stereotyping (e.g., Eckel & Grossman, 2002; Roszkowski & Grable, 2005b). However, there is less research examining how well people assess their own risk tolerance (see Hallahan, Faff, & McKenzie, 2004; Roszkowski & Grable, 2005a).

Only a few of the studies on self-assessment of personality and attitudes have considered financial risk tolerance. However, there is some indirect evidence suggesting that individuals may not assess their own risk tolerance very well relative to other personality characteristics (Chamorro-Premuzic, Furnham, & Moutafi, 2004). Those authors reported that individuals assessed their own anxiety but did less well when evaluating personality characteristics related to risk tolerance, such as impulsivity and excitement seeking. However, Roszkowski and Grable (2005a), studying the risk tolerance of financial planners and their clients, found that the correlations between self-estimated and actual risk tolerance were around .40, and relatively higher than the accuracy found in studies examining people's self-estimation of a variety of other personality characteristics, including agreeableness $(r = .27)$, impulsivity $(r = .06)$, straight forwardness $(r = .12)$, vulnerability $(r = .16)$, and excitement seeking $(r = .26)$ (see Furnham, 1990; Furnham & Rawles, 1999; Chamorro-Premuzic, et al., 2004; Furnham & Chamorro-Premuzic, 2004).

Unfortunately, their samples contained too few women to allow for an analysis of sex differences in self-perception of financial risk tolerance. The purpose of the present study was to extend the work of Roszkowski and Grable (2005a, 2005b) on self-assessment of risk tolerance by examining how well women and men assess their financial risk tolerance and whether there is a systematic bias in such estimates.

METHOD

Online Sample

Data were collected beginning in late 2002 and ending in late 2003 using an online survey that was widely advertised by faculty at several institutions, through U.S. Agriculture Extension publications, and references in personal finance textbooks. The sample consisted of 1,741 individuals ranging in age from 18 to 85 years. The majority of respondents (56.77%) were male. Respondents had a mean age of 33.7 yr. ($SD = 15.6$). Approximately 36% of respondents indicated being currently married, and about 50% were never married singles, with the remainder being widowed, living with a significant other, or living in another housing arrangement. The sample was generally well educated, with 27.6% having earned a Bachelor's degree, 19.2% holding a graduate degree; 8.6% with an Associate's degree, and 25.9% indicated having some college education, but no degree. The remainder had a high school or less education. The median household income fell in the range of $50,000 to $74,999.

Outcome Variable

Respondents were asked the risk-tolerance self-assessment question, "In general, how would your best friend describe you as a risk taker?" The choices of answers were (a) a real gambler, (b) willing to take risks after completing adequate research, (c) cautious, and (d) a real risk avoider. Responses to this self-rating were coded (a) = 4, (b) = 3, (c) = 2, and (d) = 1, with higher scores representing a higher risk tolerance. Almost 8% of respondents saw themselves as real gamblers (7.81%). The majority (52.58%) viewed themselves as being willing to take risks after completing "adequate" research. Of respondents 32.6% indicated that they were cautious, with 7% seeing themselves as risk avoiders.

Each respondent's risk tolerance was then measured using a 12-item risk-tolerance summated-rating scale based on a measure constructed by Grable and Lytton (1999). The scale consisted of multiple-choice items that require respondents to choose among outcomes which reflect different financial risk. Items in the scale assess attitudes and behaviors related to stock and bond investing, options and commodity investing, gambling, and risk avoidance. Examples of two items follow.

If you unexpectedly received $20,000 to invest, what would you do? (a) Deposit it in a bank account, money market account, or an insured CD. (b) Invest it in safe high quality bonds or bond mutual funds. (c) Invest it in stocks or stock mutual funds

In terms of experience, how comfortable are you investing in stocks or stock mutual funds? (a) Not at all comfortable. (b) Somewhat comfortable. (c) Very comfortable

The validity of the scale has been measured against objective criteria, including equity, cash, and bond holdings held by individuals, and correlations with the Federal Reserve's Survey of Consumer Finances risk-assessment item. Reliability estimates for the scale, as reported in the literature, have ranged from .70 to .89. In this study, scores on the 12-item scale ranged from 12 to 43, with a mean, median, and standard deviation score of 24.8, 25.0, and 5.2, respectively. Cronbach alpha for this sample was .77, deemed adequate for the purposes of exploratory research (Pedhazur, 1982).

Procedure

Ordinary least squares (OLS) multiple regression was applied to judge whether women and men differ in the self-assessment of risk tolerance. Data were coded as follows: women (1) and men (0). Age was measured and used at the interval level. Marital status was coded dichotomously, with those being married coded 1, otherwise 0. Five levels of household income were entered into the equation: (a) $25,000 to $49,999, (b) $50,000 to $74,999, (c) $75,000 to $99,999, and (d) greater than $100,000. The omitted category was $25,000 or less income. Likewise, four categories of attained education were used: (a) some college, (b) Associate's degree, (c) Bachelor's degree, and (d) graduate degree. The high school or less education was the omitted category. Possible curvilinear effects between risk tolerance and age were measured using age squared. Mean and standard deviation scores for each measure are shown in Table 1.

RESULTS

The differential prediction model was used to investigate the question (Linn, 1978). An ordinary least squares regression was first conducted to predict respondents' self-ratings on the 12-item scale. The mean predicted score was 2.6, with a standard deviation of .4. The model was statistically significant ($F_{1,739} = 534.23$, $p < .001$) with 23.50% of variance explained by the model. The residual value, defined as self-rating less predicted self-rating, was saved for each respondent. A positive residual can be interpreted to mean that a respondent overestimated his risk tolerance. Conversely, a negative residual indicates an underestimation of risk tolerance.

A *t* test was then performed to assess whether a significant difference in residual scores between women and men was evident. On the average, wom-

TABLE 1
Sample Descriptives For Women and Men: Percent

Variable	Women (n = 753)			Men (n = 988)		
	M	SD	n	M	SD	n
Self-assessed Risk Tolerance						
Real Gamblers	5.44	22.71	41	9.61	29.48	95
Willing After Research	46.88	49.94	353	56.93	49.54	562
Cautious	41.70	49.34	314	25.68	43.71	254
Risk Avoider	5.98	23.72	45	7.79	26.81	77
12-item Risk Scale, points	24.12	4.72		25.36	5.44	
Age, yr.	32.0	14.6		35.1	16.1	
Household Income						
< $25,000	29.75	45.75	224	26.19	43.99	259
$25,000 to $49,999	24.44	43.00	184	17.39	37.92	172
$50,000 to $74,999	21.12	40.84	159	19.01	39.26	188
$75,000 to $99,999	11.02	31.34	83	15.37	36.08	152
$100,000+	13.68	34.39	103	22.04	41.47	217
Marital Status						
Married	28.69	45.26	216	40.75	49.16	403
Single	51.13	50.02	385	49.75	50.03	491
Other	20.19	40.17	152	9.50	29.34	94
Education						
High School or Less	16.47	37.11	124	20.42	40.34	202
Some College	30.01	45.86	226	22.75	41.94	225
Associate's Degree	9.96	29.97	75	7.48	26.32	74
Bachelor's Degree	26.69	44.27	201	28.31	45.07	280
Graduate Degree+	16.87	37.47	127	21.03	40.77	207

en had a residual value of $-.05$. The mean residual value for men was .03. Although small, the difference was statistically significant ($t_{1,739} = 2.60$, $p < .01$, two-tailed) owing to the relatively large sample. These results suggest that, on average, women tended to underestimate their risk tolerance whereas men were more likely to overestimate their risk tolerance.

While the t test of mean residuals was useful in assessing the relationship between self-assessed and actual risk tolerance in a bivariate manner, a more rigorous multivariate test was applied next to study the relationship, holding other potentially confounding factors constant. Specifically, a multiple regression was conducted to predict residual values using the several independent variables in addition to sex: age, marital status, household income, education, and age squared (see Table 2). The inclusion of these factors within the regression model was based on a review of the literature which suggested positive relationships between risk tolerance and younger age (Coleman, 2003), with the possibility of curvilinear relationship, higher household income (Grable & Joo, 2004), being single (Yao & Hanna, 2005), and having high attained education (Chang, DeVaney, & Chiremba, 2004).

TABLE 2
SUMMARY OF REGRESSION ANALYSIS FOR VARIABLES PREDICTING RESIDUAL VALUE RISK TOLERANCE

Variable	B	$SE\ B$	β
Sex (1 = Women)	−.10	.03	−.08*
Age	−.01	.01	−.17†
Household Income			
$25,000 to $49,999	.06	.05	.04
$50,000 to $74,999	.06	.05	.04
$75,000 to $99,999	.04	.05	.02
$100,000+	.04	.05	.02
Marital Status (1 = Married)	.06	.04	.04
Education			
Some College	.07	.05	.05
Associate's Degree	.10	.06	.04
Bachelor's Degree	.06	.05	.04
Graduate Degree+	.14	.06	.08*
Age Squared	1.70E-008	.00	.01
Constant	.16	.05	

Note.—$R^2 = .03$. *$p < .01$. †$p < .001$.

Table 2 shows the results of the multiple regression. The model was statistically significant ($F_{12,1728} = 3.98$, $p < .01$), with sex, age, and having a graduate education significantly contributing to the prediction of residual values between actual versus perceived risk tolerance. Holding all other factors constant, women were more likely to underestimate their risk tolerance compared to men, although the effect size ($f^2 = .03$) was small (Newton & Rudestam, 1999). In addition, older respondents underestimated their risk tolerance. Persons with a graduate education were more likely to overestimate their risk tolerance.

DISCUSSION

Bajtelsmit and Bernasek (1996) raised the provocative question of why women and men engage in dissimilar financial behaviors. Most explanations have emphasized that a persons' risk tolerance is one of the primary factors influencing risk-taking behaviors and that women are generally more risk averse than men (Arch, 1993; Byrnes, *et al.*, 1999; Eckel & Grossman, 2002; Roszkowski, *et al.*, 2004; Roszkowski & Grable, 2005b). However, findings from this study suggest that sex differences in financial risk-taking behaviors may also be attributable, in part, to how women and men perceive themselves. In this study, both women and men systematically mis-assessed their financial risk tolerance, but in opposite directions: women tended to underestimate their risk tolerance, while men were more likely to overestimate their proclivity to take risks. In one sense, such behaviors may in fact reflect risk tolerance. In other words, men are willing to err on the side of thinking that they are more risk tolerant than is actually the case, whereas women are

more cautious and err on the side of considering themselves as less tolerant than they really are.

The small but apparent discord between actual risk-taking proclivities and self-assessed risk tolerance has both theoretical and practical implications. From a research perspective it would be useful to know to what extent the sex differences in the accuracy of the self-perceived risk-tolerance are the result of nature, i.e., biological, or nurture, i.e., socialization. The practice management implication is that self-estimates should not be taken at face value and used as the only indicator. Without more substantive information about their risk tolerance, women may choose investments lower in risk and produce lower returns than would be dictated by their actual risk tolerance.

Even though it was shown that women underestimate and men overestimate their respective risk tolerance, the difference was very small, equal to that of education. Age was a more influential variable on the accuracy of self-assessment. This implies that other factors probably play a much more significant role in determining under- and overestimation of risk tolerance. Potential explanatory variables for future research include personality constructs, such as self-esteem and locus of control (Arch, 1993).

A few words of caution are in order when interpreting the results of this study. First, data were collected using an Internet convenience sample. In general, the respondents were better educated and had higher household incomes than the national average. While the profile of respondents fits that of a sample of Internet savvy users,[2] it would be useful in research to examine risk self-assessment using nationally representative samples. Second, the relatively small effect size related to sex and the other demographic factors used in this study suggests that other variables should be considered. Third, the form of the self-assessment question may elicit self-presentation responses that may differ for women and men. The question asked how the respondent's best friend perceived the respondent rather than how the respondent viewed self. Perhaps there is a sex difference in how one's friends perceive a respondent's risk tolerance. A replication of this study using a more direct self-assessment item is warranted to examine this possibility.

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