

Environmental and Biopsychosocial Factors Associated with Financial Risk Tolerance

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The effects of environmental and biopsychosocial factors on financial risk tolerance is analyzed. The research is premised on Irwin's (1993) risk-taking behavioral model. Findings from an OLS regression, using a sample of faculty and staff from two universities (N = 406), indicate that education, marital status, net worth, financial knowledge, and household income, as environmental factors, are related to financial risk tolerance. A significant biopsychosocial factor associated with financial risk tolerance is self-esteem. Findings from this study confirm Irwin's recommendation that further research should take into account both environmental and biopsychosocial factors when attempting to explain financial risk-tolerance attitudes.

Keywords: *Risk Tolerance, Financial Knowledge, Self-Esteem*

Introduction

The systematic examination of the factors related to financial risk tolerance, 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), has become an important research topic within the financial planning, psychological, and economics professions. As a result, over the past decade the academic community's and financial service profession's appreciation for and knowledge of financial risk tolerance has grown substantially.

Trone, Allbright, and Taylor (1996) indicate that measuring a person's financial risk tolerance is difficult because risk tolerance, as a multidimensional attitude, is an elusive concept that appears to be influenced by a number of predisposing factors. An issue that remains relatively unanswered within the literature involves identifying the multidimensional factors that influence a person's financial risk tolerance. The purpose of this paper is to expand on previous academic efforts to better understand the determinants of financial risk tolerance, using environmental and biopsychosocial factor classifications as the basis of the research. Specifically, findings from a test designed to determine the effects of demographic, socioeconomic, and psychosocial variables on financial risk tolerance are reported here. This paper expands most specifically on Irwin's (1993) contribution to risk-attitude assessment. It is hoped that this paper will prompt a reevaluation of the literature in a meaningful way so that those interested in the assessment and prediction of financial

risk tolerance can move closer to a "theoretical account that fuses psychological and economic insights" (Webley, 1995, p. 470) in the further understanding of risk-taking attitudes and behaviors.

Theoretical Perspective

There currently is a paucity of specific theory related to the assessment and prediction of *financial* risk tolerance (Hanna & Gutter, 1998). While theory related to financial risk tolerance is limited, theory associated with non-financial risk taking (e.g., drug and alcohol use and abuse) is more widely available. For example, Irwin (1993) presents a model of risk-taking attitudes and behaviors that has been used as the basis for many adolescent behavioral studies. Irwin concludes that there are a number of predisposing factors that influence risk-tolerance attitudes. Irwin classifies these predisposing factors into two categories: environmental and biopsychosocial factors. Examples of environmental factors include socioeconomic status, family situation, and social transitions. Irwin defines biopsychosocial factors to include characteristics such as age, gender, personality traits, birth order, and ethnicity.

This study adapts and simplifies Irwin's (1993) risk-taking behavioral model by testing only predisposing factors as determinants of risk-tolerance attitude. The simplified framework in Figure 1 uses environmental and biopsychosocial terminology to categorize predisposing factors that theoretically may influence a person's willingness to engage in risky financial behavior. Environmental factors include measurable

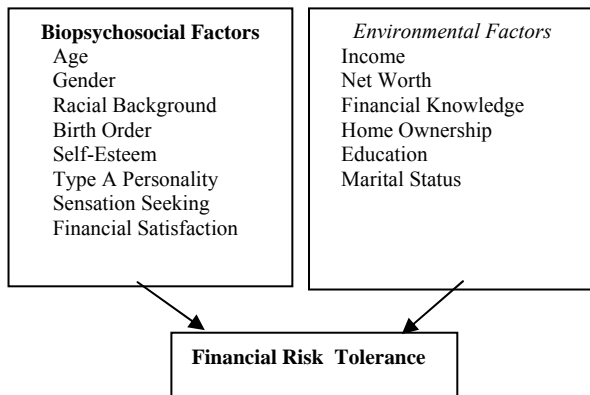
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individual and family financial attributes. Examples of environmental factors include income, net worth, and home ownership status. Biopsychosocial factors include aspects of an individual's life that reflect a subjective individual difference. Examples of biopsychosocial factors include traits that are the result of a person's social environment (e.g., birth order), as well as personal factors in which one has little control (e.g., racial background, age, and gender). Biopsychosocial factors may also include attitudes, beliefs, role modeling, psychosocial traits (e.g., personality and self-esteem), and developmental issues. These types of biopsychosocial factors are predisposing aspects of a person's life, meaning simply that they are inherent traits or personality dimensions over which a person has little or no initial control. The relationships between environmental and biopsychosocial factors and financial risk tolerance are presented in Figure 1.

What accounts for an individual's choice of action when faced with a risky financial situation? According to Roszkowski (1999) and others (e.g., Goodall & Corney, 1990), various factors contribute to one's attitude towards risk-taking choices. The literature, as discussed below, suggests that a person's biological makeup, demographic and socioeconomic profile, and psychological factors are of primary importance when answering this question (Horvath & Zuckerman, 1993).

Figure 1.
Determinants of Financial Risk Tolerance



Review of Literature

Factors Associated With Risk Tolerance

The assessment and prediction of financial risk-tolerance attitudes within the domain of financial counseling and planning involves, primarily, the use of demographic and socioeconomic factors (e.g., gender, age, marital status, ethnicity, income). The use of these variable types, rather than more diverse measures, may be related to the lack of developed application models of the principal factors affecting financial risk-tolerance attitudes and behaviors. Demographic and socioeconomic factors also tend to be more accessible to financial counseling and planning researchers due to the lack of specification and standardization of other predisposing factor measures in large databases.

Nonetheless, reported findings relating to environmental and biopsychosocial factors, and financial risk tolerance provide unique insights into risk-taking attitudes and behaviors. For example, Hawley and Fujii (1993-1994) and Kennickell, Starr-McCluer, and Sunden (1997) conclude that, in general, certain demographic and socioeconomic environmental characteristics (e.g., income) can predict risk tolerance. Sung and Hanna (1996) and Grable and Lytton (1998) concur. Sung and Hanna find gender, marital status, ethnicity, and education predict risk tolerance (see also Huston, Chang, & Metzen, 1997). Grable and Lytton find that education and gender predict risk-tolerance attitudes. Factors such as age also appear to be associated with financial risk tolerance. For example, Wang and Hanna (1997) observe that, contrary to popular opinion, risk tolerance increases with age.

Other factors that appear to influence a person's financial risk tolerance include environmental factors such as financial knowledge, and family situation (Roszkowski, 1999) and social development such as birth order (Sulloway, 1997), which is an example of a biopsychosocial factor. Xiao, Alhabeeb, Hong, and Haynes (2001) find that factors including age, race, and net worth affect risk-taking attitudes and behaviors. Previous findings suggest that financial risk-tolerance attitudes play a key role in the establishment of financial objectives and ultimately in the development of financial plans and strategies.

Multidisciplinary Studies of Risk Taking

The study of risk-taking attitudes and behaviors in general is multidisciplinary. The study of risk taking not associated directly with personal financial concepts is so large that nearly all researchers who study risk taking do so with little knowledge of risk assessment research conducted by financial counseling and planning professionals. For example, adolescent risk taking receives, by far, more research interest, funding, and overall attention than financial risk taking,

although both forms of risk taking share common theoretical roots (Caplan, 2000; Lopes, 1993; Wilcox, 1993).

Outside the professional sphere of financial services, psychologists, economists, sociologists, and others have a long history of testing factors related to risk-tolerance attitudes (Bell & Bell, 1993; Tigges, Riegert, Jonitz, Brengelmann, & Engel, 2000). Researches such as Wong and Carducci (1991) find positive relationships between certain biopsychosocial factors (i.e., sensation seeking and aggressiveness) and risk-tolerance attitudes. Others (e.g., Horvath & Zuckerman, 1993; Shelbecker & Roszkowski, 1998; Zuckerman, 1979) have described the role of other psychosocial characteristics (e.g., self-esteem and personality) as possible factors that have an impact on a person's risk-tolerance attitudes.

Take, for example, personality as a factor related to financial risk tolerance. Carducci and Wong (1998) describe personality in terms of Type A and Type B categorical behaviors. A Type A behavior tends to be characterized by "individuals who are hard driving and competitive, with an underlying tendency for hostility and aggressiveness" (p. 355). Type A characteristics are associated with the need to maximize achievement and the desire to take extended personal risks. Carducci and Wong find a correlation between being categorized as a Type A personality and the willingness to take financial risks in everyday financial situations.

Another biopsychosocial factor often associated with financial risk tolerance is birth order. Roszkowski (1999) noted that birth order appears to be related to risk taking. The firstborn and an only child tend to be less willing to take risks than later born children in the family. Roszkowski explains the phenomena as follows: "Parents exert greater control over the early life of the firstborn child and instill in him or her the need to be dependable and act responsibly. To the child, this means not taking unnecessary chances" (p. 167). Sulloway (1997) finds older children are less willing to accept high risks compared to younger siblings. He suggested that older children identify with parents and authority and support the status quo. Younger children, on the other hand, rebel against authority and tend to take more risks. A popular-press investigation of birth order on risk taking undertaken by Koselka and Shook (1997) confirmed that typical firstborn children tend to be dominant and less emotionally flexible compared to younger children who are seen as risk-taking mavericks. Although the relationship between birth order and risk-taking preferences is hypothesized in the literature, there is limited research on this topic. Lack of empirical research indicates that more research is needed to

determine if this variable explains a greater level of variance in risk taking propensities among individuals.

As suggested above, the study of risk tolerance is multidisciplinary. The general consensus among researchers suggests that future research devoted to the investigation of the effects of factors related to risk tolerance should use a combination of demographic, socioeconomic, social development, and family situation factors. Results from multidisciplinary research can then be used to develop a model for understanding the principal factors affecting financial risk-tolerance attitudes and behaviors.

Methodology

The purpose of this research is to test the effects of demographic, socioeconomic, and psychosocial variables on financial risk tolerance among college faculty and staff, using environmental and biopsychosocial factor classifications as the basis of the research (Figure 1). The intent of the test is to determine if environmental and biopsychosocial factors play a role in determining a person's tolerance for financial risk, and if confirmed, which factors appear to be the most important.

Data and Sample

The sample for this study is selected randomly from faculty and staff of two large universities. Data include responses from 460 faculty and staff (a 41.30% usable response rate). More than half of the respondents in this study (55%) are female. The average age of those responding is 43.20 years, and 63% of respondents are married. Almost 63% held an undergraduate degree or higher, and the majority (92%) are employed full time. Of those who are employed, 55% describe their occupation as professional, technical, or educational. The average household income of respondents is \$52,480, with a standard deviation of \$27,470. About 87% of respondents are White, with the remainder being African American/Black or Hispanic/Latino. The majority of respondents (72%) report owning their own home.

The dependent variable, financial risk tolerance, is measured using five Likert-type items (Table 1). A separate study was conducted to determine the validity of the 5-item risk scale; results are reported in the Appendix. The development of this five-item scale is based on four concepts of risk assessment as proposed by MacCrimmon and Wehrung (1986). First, items in the scale offer a reasonable degree of face validity. Second, when summed, the items provide for the derivation of risk. Third, the items are conceptually easy to answer, and fourth, the items and resulting scale offer ease of administration. The specific items used in the scale are derived from previous studies, including published reports by Malkiel (1994), Mellan

(1994), Pring (1993), Tobias (1978), and Yamauchi and Templar (1982). Respondents must choose from the following responses to each item: (a) strongly agree, (b) tend to agree, (c) tend to disagree, and (d) strongly disagree. Responses are coded as 1, 2, 3, or 4, respectively, and a summated score is generated for each subject. The average summated score for respondents is 12.86, with a standard deviation of 3.01. The median score is 13.00, with scores ranging from 5.00 to 20.00. Higher scores indicate increased risk tolerance. The coefficient alpha for the summated scale is 0.80.

Table 1
Financial Risk Tolerance Items (N = 406)

Item	Mean	SD
Investing is too difficult to understand.	2.34	0.82
I am more comfortable putting my money in a bank account than in the stock market.	2.37	0.74
When I think of the word "risk" the term "loss" comes to mind immediately.	2.49	0.94
Making money in stocks and bonds is based on luck.	2.66	0.87
In terms of investing, safety is more important than returns.	3.00	0.68

Independent variables include age, education, gender, marital status, ethnic/racial background, birth order, homeownership, and occupation. Age is measured at the interval level. Gender, marital status, education, birth order, ethnic/racial background, homeownership and occupation are dummy coded. Specifically, those who are male, married, first born, youngest, White/Caucasian, homeowners, held bachelor's degree or higher levels of education, and working in professional occupations are code 1, otherwise 0. Other variables, including financial satisfaction, household income, net worth, financial knowledge, self-esteem, and personality also are used. A description of these independent variables follows.

Financial satisfaction is measured using a 10-point anchored stair-step assessment. Respondents are asked to circle how satisfied they are with their present financial situation. Those who are not satisfied will be towards the lower steps. Those who are satisfied will be toward the higher steps. Previous research using this item indicates that response distributions corresponding to this measure are consistent and reliable (Porter & Garman, 1993). The mean score on the stair-step assessment is 5.37, with a standard deviation of 2.25 and a median of 5.00.

Household income is measured using 10 levels of annual gross income before taxes. The scale began at less than \$20,000 and increased in \$10,000 increments through \$100,000. Household income above \$100,000

is represented by 10 on the scale. The median response is 5.00, which represents a range between \$50,001.00 and \$60,000.00.

Net worth is measured indirectly by asking respondents the following question: "Suppose you are to sell all of your major possessions (including your home), turn all of your investments and other assets into cash, and pay all of your debts. Would you be in debt, break even, or have something left over?" Respondents indicate their response to this item by choosing from a scale of numeric choices, ranging from 1 to 10. Someone who selects 1 indicates being in serious debt, while someone who chooses 10 would have a significant amount of money left over (i.e., a positive net worth). A score of 5 is theoretically the break-even choice. The mean respondent score for this item is 7.79, with a standard deviation of 2.42. This mean score is interpreted to indicate that the average respondent would more than break even if all assets are sold and debt paid.

Financial knowledge is measured using 10 true or false statements (Table 2). Responses are coded as correct (coded as 1) or incorrect (coded as 0). Answers are then summed to create a financial knowledge score for each respondent. The mean and standard deviation scores for respondents to this summated quiz are

Table 2
Financial Knowledge Assessment Items (N = 406)

Item and Correct Response	Mean	SD
If you thought someone who loaned you money is not fair, you would ask the credit union for help. False	0.606	0.482
Both employees and employers pay into Social Security. True	0.890	0.314
High insurance deductibles lead to lower insurance costs. True.	0.733	0.443
The interest rate charged on major credit cards, like Visa, is set by the Federal government. False	0.894	0.308
A stock is an interest bearing security that pays interest at the discretion of a board of directors. False	0.601	0.490
A mutual fund is an investment company that raises money from shareholders and invests in securities. True	0.794	0.405
Over 20 years, you are more likely to make money than lose money in the stock market. True	0.859	0.348
During times of inflation it is more expensive to borrow money. True	0.847	0.361
Employees are responsible for all investment decisions within a 401(k) plan. True	0.314	0.465
Interest paid on credit cards is tax-deductible. False	0.934	0.248

Self-esteem is measured using 10 items originally developed by Rosenberg (1965) (Table 3). Subjects are asked to indicate their level of agreement with each item using the following scale: (a) strongly disagree, (b) tend to disagree, (c) tend to agree, and (d) strongly agree. Responses are coded as 1, 2, 3, or 4, respectively. As is the case with financial risk tolerance, a summated score is generated for each subject. Note that higher scores indicate a more positive subject self-esteem. The average score for respondents is 16.11, with a standard deviation of 4.66. The coefficient alpha for the summated scale is 0.89.

Table 3
Self-Esteem Items (N = 406)

Item	Mean	SD
At times I think I am no good at all. ^a	1.28	0.52
I take a positive attitude toward myself.	1.44	0.52
I feel that I'm a person of worth, at least on an equal basis with others.	1.44	0.65
I feel that I have a number of good qualities.	1.52	0.60
All in all, I am inclined to feel that I am a failure. ^a	1.60	0.58
I certainly feel useless at times.	1.66	0.67
I am able to do things as well as most other people.	1.69	0.64
I feel I do not have much to be proud of. ^a	1.78	0.85
I wish I could have more respect for myself. ^a	1.85	0.82
On the whole, I am satisfied with myself.	1.87	0.88

^a Item is reverse coded.

Two personality measures are used in this study: Type A/B personality and sensation seeking. Type A/B personality is measured with six questions adapted and modified from Eaker and Castelli (1988). Respondents are asked to circle a number, ranging from one to four, that best describe their personal trait. Responses of 1, 2, 3, and 4 correspond to not at all, somewhat, fairly well, and very well, respectively. The average Type A/B score is 14.72, with a standard deviation of 3.32. Higher scores represented a greater likelihood of exhibiting Type A personality traits. The coefficient alpha for the scale is 0.70.

Table 4
Type A/B Personality Assessment Items (N = 406)

Item	Mean	SD
Being bossy or dominating.	1.86	0.77
Having a strong need to excel (be best) in most things.	1.97	1.19
Usually feeling pressed for time.	2.18	1.11
Being hard driving and competitive.	2.30	0.88
Eating too quickly.	2.40	1.03
Upset when have to wait for anything.	2.45	0.97

Sensation seeking personality is assessed with five items (Table 5) adapted from Arnett (1994). As is the case when measuring Type A/B personality, respondents are asked to circle a number that best describes their trait. Higher scores indicate a willingness to engage in sensation seeking behaviors.

Table 5
Sensation Seeking Assessment Items (N = 406)

Item	Mean	SD
It's fun and exciting to perform or speak before a group.	2.65	0.95
I would prefer to ride the roller coaster or other fast rides at an amusement park.	2.71	0.88
I would like to travel to places that are strange and far away.	2.76	0.94
I think it's best to order something familiar when eating in a restaurant. ^a	2.77	1.10
If I have to wait in a long line, I am usually patient about it. ^a	2.89	0.88

^aItem is reverse coded.

The coefficient alpha for the scale is approximately 0.50. The average sensation seeking score is 10.16, with a standard deviation of 2.27.

Table 6 summarizes the measurement for the dependent variable and independent variables. The independent variables are separated into environmental and biopsychosocial factors to correspond with the framework in Figure 1 above.

Table 6
Summary of Variables (N = 305)

Variables	Coding	Mean	SD
<i>Dependent variable</i>			
Risk Tolerance	6 – 24	12.86	3.01
<i>Independent variables</i>			
<i>Environmental factors</i>			
Income	1 – 10	5.25	2.75
Education	1=college graduate	0.63	0.48
Net worth	1 – 10	7.79	2.42
Financial knowledge	1 – 10	7.51	1.45
Home ownership	1=own	0.73	0.45
Marital status	1=married	0.63	0.48
<i>Biopsychosocial factors</i>			
Age	18 – 72	43.20	11.67
Gender	1=male	0.45	0.50
Racial background	1=white	0.86	0.34
<i>Birth order (dummy variable)</i>			
First born	1=first born	0.29	0.45
Youngest	1=youngest	0.32	0.47
Self-esteem	10 – 40	16.11	4.66
Type A personality	6 – 24	14.72	3.32
Sensation seeking	5 – 20	10.16	2.27
Financial satisfaction	1 – 10	5.37	2.25

Data Analysis

An ordinary least squares multiple regression analysis was used to identify factors related to financial risk tolerance. Two steps were taken to assess possible high inter-correlations among the independent variables. First, variables were examined using a correlation matrix. This initial correlation diagnoses revealed that a possible collinearity constraint was present in the data in relation to education and occupation. The second step in the collinearity analysis involved separating an independent variable from the set, using it as a dependent variable, and conducting a regression. This step was repeated until each variable is used as a

dependent variable. Separate condition indices and eigenvalues were created using procedures in SPSS to test for multicollinearity among the variables. The high correlation between education and occupation was confirmed using these procedures (Hair, Anderson, Tatham, & Black, 1995). As a result, occupational status was removed from the analysis.

Results

Results from the multiple regression are shown in Table 7. Education, marital status, net worth, household income, financial knowledge, and self-esteem are significantly related to financial risk tolerance. All of these significant factors, except self-esteem, represent environmental factors. Self-esteem represents a significant biopsychosocial factor. Other environmental and biopsychosocial factors theoretically associated with financial risk tolerance are not significant.

As Table 7 indicates, education, net worth, household income, financial knowledge, and self-esteem are associated positively with risk tolerance. Specifically, those who have a bachelor's degree or higher level of education, as compared to the lower education group, and those who have a higher level of net worth, household income, financial knowledge, and self-esteem show higher levels of financial risk tolerance. Married respondents tend to exhibit lower levels of financial risk tolerance.

Table 7
Multiple regression results (N=305)

Variable	b	Beta.	t-test
Age	-0.002	-0.107	-1.733
Education (1 if college grad.)	0.870	0.141	2.599**
First born	-0.258	-0.040	-0.707
Youngest	-0.582	-0.094	-1.669
Gender (1 if male)	0.259	0.044	0.856
Marital status (1 if married)	-0.938	-0.151	-2.765**
Financial satisfaction	-0.001	-0.014	-0.215
Net worth	0.240	0.189	3.113**
Home ownership (1 if owner)	-0.478	-0.086	-1.414
Race/ethnicity (1 if white)	0.432	0.049	0.933
Household income	0.296	0.274	4.089***
Financial knowledge	0.356	0.169	3.208**
Self-esteem	0.007	0.116	2.058*
Type-A personality	-0.007	-0.081	-1.564
Sensation seeking	0.120	0.093	1.796
Constant	5.563		3.276**

R²= 0.307; F= 8.550***
* p<.05; ** p<.01, *** p<.001

Household income, holding all other factors constant, is the most important factor when ranked by the amount of explained variance in risk-tolerance scores. This is followed by net worth, financial knowledge, marital status, and education. Self-esteem is the final significant factor in the model. Again, all of these variables, excluding self-esteem, are environmental factors within the study's theoretical framework.

Discussion

The results from this study confirm assertions made by Irwin (1993) regarding the determinants of financial risk tolerance. Specifically, there appears to be a relationship between financial risk tolerance and a person's environmental and biopsychosocial characteristic factors. In this study, the following five environmental factors are significant: net worth, marital status, education, household income, and financial knowledge. Only one biopsychosocial factor – self-esteem – is a significant predictor of financial risk tolerance at the $p < 0.05$ level. Specifically, single respondents, those who have a higher net worth, a high level of education, high household income, and more financial knowledge tend to exhibit a greater level of preference for financial risk. In terms of the biopsychosocial factors, self-esteem is related positively to financial risk tolerance. Overall, the model explains about 31% of the variance in financial risk-tolerance scores.

An interesting trend is apparent in relation to the relative importance of the independent variables as determinants of financial risk tolerance. As indicated above, all but one of the environmental factors in this study is statistically significant in the model. These results suggest that environmental factors may play a more important role in determining an individual's tolerance for financial risk than once thought. These findings also lead to a possible hypothesis related to circular causation. What may be happening is that the mere possession of environmental factors (e.g., high income, net worth, and financial knowledge) allows a person to take greater risks and, in turn, leads to a greater accumulation of additional environmental factors. More research is needed to explore this potential effect.

This research is a partial confirmation of Irwin's (1993) theory of environmental and biopsychosocial factors and risk tolerance. Irwin hypothesizes that predisposing environmental and biopsychosocial factors play important roles in determining a person's risk tolerance. Environmental factors, such as net worth and income and psychosocial factors (e.g., self-esteem) do appear to play an important role in determining an individual's tolerance for financial risk.

Implications and Recommendations

Although there appears to be relationships between risk tolerance and the environmental and biopsychosocial factors, these relationships need to be clarified in future studies. Evidence from this study suggests that environmental factors influence risk tolerance more directly than biopsychosocial factors. This may be the result of circular causation whereby knowledgeable individuals who possess high levels of income and educational attainment exhibit a greater risk tolerance. These environmentally advantaged individuals take greater risks than their less advantaged counterparts, which allows them to profit from opportunities to extend their advantage. The circle continues as enhanced environmental factors then lead to increased levels of risk tolerance. Circular causation may help explain why certain individuals are able to increase their income and net worth over time, when others cannot (Palsson, 1996). For example, having a positive net worth may lead one to be more confident in taking risks, which ultimately leads to an increased net worth through the accumulation of more assets. More research, both quantitative and qualitative, is warranted to examine these potential relationships.

Future research devoted to the fusing of financial risk-tolerance insights into useful tools for practitioners is needed (Webley, 1995). Linking research to practice may require additional refinement of existing measures of predisposing factors and the development of new measures. Measures of sensation seeking, aggressiveness, self-esteem, personality, locus of control, social development, and knowledge should continue to be included in additional studies. Further examination of educational background is warranted. In this study education is a significant variable explaining financial risk tolerance. Future studies should segment education level not only by years but also by education type. For example, one may hypothesize that individuals with a business educational background may be more risk tolerant in financial situations.

Ultimately, two distinct, yet related, research programs are needed. The first program ought to be devoted to the testing of the relationships between and among predisposing factors and a person's tolerance for financial risk. The second program should be focused on creating a standardized measure of financial risk tolerance. This second program is an extension of research conducted in the first program by creating test items that incorporate the multidimensional nature of financial risk tolerance with known predispositions of certain respondents. These two programs of study eventually should lead to a more comprehensive appreciation for and understanding of a person's overall tolerance for financial risk, which, in turn, will

lead to a better understanding of how and why individuals engage in certain risky financial behaviors.

As suggested in the introduction to this paper, over the past decade great strides in knowledge about financial risk-tolerance have been made. These strides led to an increased level of knowledge both within and outside the domain of financial counseling and planning regarding risk tolerance attitudes; however, additional theoretical and empirical work is necessary to better understand the factors associated with risk attitudes and behavior. Such research can help elevate the practice of assessing and predicting risk tolerance attitudes and behaviors from the use of hit-and-miss assessment techniques and qualitative assessments into a world of quantified practice standards. In the end, research and practice efforts should lead to the development of an encompassing theory of financial risk tolerance attitudes, preferences, and actions.

Appendix

A separate study was conducted to determine the validity of the 5-item risk scale. Concurrent validity was tested. This type of validity measures one measure against another measure that has accepted psychometric properties (Litwin, 1995). We hypothesized that the 5-item scale would be significantly positively correlated with a 13-item scale (Grable & Lytton, 1999) and the Survey of Consumer Finances (SCF) risk item. Criterion-related validity also was examined. Criterion-related validity provides an answer to how well an assessment instrument compares to external variables that are considered to be direct measures of a behavior (Isaac & Michael, 1995). The criterion-related validity of the 5-item scale was compared to the percent of cash held by a respondent in his or her portfolio, and to the percent of equity ownership assets held by a respondent in his or her portfolio. We hypothesized that a negative relationship would exist between cash ownership and scores on the 5-item scale (i.e., an inverse relationship between risk attitude and risk-taking behavior). Alternatively, we hypothesized a positive relationship between equity ownership (i.e., a representation of risky behavior) and risk scores.

The test was conducted using a second sample of individuals (N = 371). Data were collected after the university survey was completed. This sample is slightly younger, on average, than the university faculty and staff sample; however, in other ways the two samples are comparable. The validity test sample is split almost equally between men and women, and approximately 52% of respondents indicate being professionally employed. The average household income is \$54,800, and 72% indicated having a bachelor's degree or higher level of education.

The 5-item risk scale was found to be positively correlated with both the 13-item risk scale ($R = 0.5516$, $p < 0.01$) and the SCF item ($R = 0.4726$, $p < 0.01$). While not a perfect substitute for either, the 5-item scale shows a high level of concurrent validity, which provides confidence that the scale does measure multiple dimensions of risk attitude. As was hypothesized, the criterion-related validity relationship between risk-tolerance scores and cash ownership was negative ($R = -0.1406$, $p < 0.05$). The relationship between risk scores and stock ownership was positive ($R = 0.4171$, $p < 0.01$). Results confirm that the 5-item scale provided both a reliable and valid measure of financial risk-tolerance attitudes for use in this study.

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