G-1U

Assessing Financial Risk Tolerance: Do Demographic, Socioeconomic, And Attitudinal Factors Work?

John E. Grable[1] and Ruth H. Lytton[2]

This paper reports the results of a study that was designed to determine if demographic, socioeconomic, and attitudinal factors can be used to predict financial risk tolerance. Partial support for these factors as predictors was obtained. Using a sample of 1,075 respondents it was determined that above-average levels of financial risk tolerance were associated with increased levels of attained education, an increased knowledge of personal finance, higher levels of income, and being employed in a professional occupation. Gender, economic expectations, age, and marital status explained less variance in risk-tolerance scores.
Key Words: *Risk tolerance, Risk preference, Demographic determinants*

Financial risk tolerance is commonly defined as the maximum amount of volatility one is willing to accept when making a financial decision. Whether in the realms of education, professional practice, or empirical research, risk tolerance is acknowledged as an important factor in savings and investments choices for retirement or other household goals. Choices regarding investment products, asset allocation plans, and portfolio accumulation strategies have been attributed to risk tolerance. Individual risk tolerance may also be taken into account as a part of "risk management" or insurance choices. But aside from these arenas of personal finance, individual risk tolerance is usually given little consideration.

Yet when approached from a broader perspective, risk tolerance may impact a number of financial decisions. For example, there is research (as noted below) to suggest that occupational choice and income can be used to differentiate among levels of risk tolerance. Conversely, how are employment or career choices and the related earnings potential initially effected by an individual's risk tolerance? Similarly, could employee benefit choices or the decision to "opt out" of selected benefits be effected by an individual's tolerance for dealing with future financial uncertainty? Could the acceptance of financial contingencies impact decisions about "acceptable" debt levels, number of creditors, or the choice of a fixed versus an adjustable rate mortgage? Could the personal level of comfort associated with the risk of present or future financial situations impact

decisions on prenuptial agreements, trusts, or other probate or non-probate options for protecting or distributing assets? In fact, it is the very nature of these, and other complex financial decisions that entail both monetary and psychological risks, that raise the much broader question about the relationship between financial risk tolerance and financial decision making. Prerequisite to empirical analysis to answer these questions, however, is a better understanding of the measurement and prediction of the construct, financial risk tolerance.

Although difficult to measure, Trone, Allbright, and Taylor (1996) have suggested that an ability to achieve desired financial objectives is influenced most significantly by a person's emotional ability to accept possible losses stemming from a financial decision. Historically researchers and practitioners have used demographic and socioeconomic factors as predictors of financial risk tolerance. For example, Roszkowski (1998) and others (Grable & Joo, 1997; Grable & Lytton, 1998; Sung & Hanna, 1996b) have documented the persistent use of factors such as gender, age, marital status, income, education, occupation, expectations, and knowledge as determinants of someone's financial risk tolerance. Unfortunately, little empirical evidence exists for the continued use of these factors as effective predictors.

The purpose of this paper is to report the findings of a research project that was designed to (a) determine

[1] Assistant Professor, College of Human Ecology, 303 Justin Hall, Kansas State University, Manhattan, KS 66506-1403, Phone: (785) 532-1482. E-mail: Grableksu@aol.com

[2] Ruth H. Lytton, Ph.D., Associate Professor, Virginia Tech, Department of Near Environments, Blacksburg, VA 24061-0410, Phone: (540) 231-6678, Fax: (540) 231-3250, E-mail: rlytton@vt.edu

whether a set of demographic, socioeconomic, and attitudinal variables could be used to distinguish between levels of financial risk tolerance; (b) determine which variables contributed the most to the separation of sample respondents with above-average risk tolerance from those with below-average risk tolerance; and (c) determine if a linear combination of these variables could be developed to predict a person's risk-tolerance. As suggested by Grable and Joo (1997) and others (Sung & Hanna, 1996b; Wang & Hanna, 1997), by testing and understanding the relationships between and among certain demographic, socioeconomic, and attitudinal factors as determinants of financial risk tolerance, financial well-being of families and individuals can be improved.

Review of Literature
The empirical study of financial risk tolerance in relation to demographic, socioeconomic, and attitudinal factors is limited. Further, according to MacCrimmon and Wehrung (1986), "much of the past research on risk has focused on how people perceive risks as well as rules for choice in risky situations. Little of this work has been concerned with the people who must make risky decisions" (p. 50). Additionally, much of the previous research has tended to use unrealistic settings and events far removed from actual risks faced by family financial managers. Another criticism of previous research (especially experimental studies) is that students, rather than individuals more likely to face actual financial risks, have been used as subjects (Okun, 1976; Okun, Stock, & Ceurvorst, 1980).

Determinants of Financial Risk Tolerance
MacCrimmon and Wehrung (1986) provided the seminal literature and research review concerning risk-tolerance studies from the period 1928 through the early 1980s. They found that empirical findings relating to risk tolerance and gender, age, marital status, occupation, education, income, and attitudinal factors were contradictory over the multi-decade span of review. Contradictory findings were found to be the result of researchers failing to take into account the multidimensionality of risk and the subjectivity of risk tolerances. The remainder of this review of literature examines research associated with the relationships among demographic, socioeconomic, and attitudinal factors, and financial risk tolerance.

Age. In the early 1960s Wallach and Kogan (1961) began studying relationships between risk tolerance and age. They found that older individuals tended to be less risk tolerant than younger persons. This finding is widely

held to be true, both among practitioners and researchers (Bajtelsmit & VanDerhei, 1997; Bakshi & Chen, 1994; Brown, 1990; Dahlback, 1991; Hawley & Fujii, 1993-1994; McInish, 1982; Morin & Suarez, 1983; Palsson, 1996; Sung & Hanna, 1996a). Although there is evidence to suggest otherwise (Grable & Joo, 1997; Grable & Lytton, 1998; Wang & Hanna, 1997), it is reasonable to assume that a negative relationship exists when testing the association between age and risk tolerance.

Gender. Slovic (1966) concluded, after an extensive review of the literature, that a "prevalent belief in our culture is that men should, and do, take greater risks than women" (p. 169). This assumption has been confirmed by others (Blume, 1978; Higbee & Lafferty, 1972). In general, there is consensus among researchers that women tend to be less risk tolerant than men (Bajtelsmit & Bernasek, 1996; Bajtelsmit & VanDerhei, 1997; Coet & McDermott, 1979; Grable & Lytton, 1998; Hawley & Fujii, 1993-1994; Hinz, McCarthy, & Turner, 1997; Rubin & Paul, 1979; Sung & Hanna, 1996b; Xiao & Noring, 1994).

Marital status. According to Baker and Haslem (1974), "the balancing of risk and return represents the classic dilemma faced by investors" (p. 469). It is widely assumed by practitioners that marital status is a factor that significantly influences risk and return preferences and an individual's satisfaction with finances (Lazzarone, 1996). Most financial planners and researchers assume that single rather than married individuals tend to be more risk tolerant (Roszkowski, 1998; Roszkowski, Snelbecker, & Leimberg, 1993; Sung & Hanna, 1996a).

Occupation. According to Roszkowski et al. (1993), other things being equal, different occupations can be used to differentiate between levels of financial risk tolerance. For example, it has long been believed that self-employed individuals, salespersons, and people employed by private firms rather than public employers tend to be more risk tolerant (both generally and in relation to personal finance issues) (Leonard, 1995). There also is a general consensus among researchers and practitioners that individuals employed professionally are more likely to have higher levels of risk tolerance than those employed in non-professional occupations (Grey & Gordon, 1978; Haliassos & Bertaut, 1995; Masters, 1989; Quattlebaum, 1988). The use of this association between occupation and risk tolerance when developing a test hypothesis appears well-founded.

Income. Over the years a positive pattern between income and financial risk tolerance has been observed. For example, Cohn, Lewellen, Lease, and Schlarbaum (1975) concluded that relative financial risk tolerance increases with wealth and income. Similar findings have been reported by Cicchetti and Dubin (1994), Friedman (1974), Schooley and Worden (1996), and Shaw (1996).

Education. A person's level of formal education has been found to influence risk tolerance. Numerous researchers have concluded that greater levels of attained education are associated with increased risk tolerance (e.g., Baker & Haslem, 1974; Grable & Lytton, 1998; Shaw, 1996). Research findings tend to support the hypothesis that a positive relationship exists between educational attainment and financial risk tolerance (Sung & Hanna, 1996a; Zhong & Xiao, 1995).

Other factors. Additional socioeconomic and attitudinal factors have been found to influence financial risk tolerance. For instance, researchers such as Grable and Joo (1997), Grable and Lytton (1997) and Sung and Hanna (1996b) have suggested that a person's knowledge of personal finance and economic expectations may play a role in shaping risk preferences. Specifically, individuals who have more knowledge of risk and risky situations, and those who expect economic events to be positive in the future, tend to have a common psychological profile that allows them to undertake greater financial risks (DeVaney & Su, 1997; Grable & Joo, 1997; Sung & Hanna, 1996b; Weagley & Moore, 1997; Yuh & DeVaney, 1996; Yuh & Olson, 1997).

Research Summary
There is a persistent belief among practitioners and researchers that (a) men are more risk tolerant than women, (b) older individuals are less risk tolerant than younger people, (c) single individuals are more risk tolerant than married individuals, (d) those employed professionally are more risk tolerant than non-professionals and certain occupations are associated with higher or lower levels of risk tolerance, (e) individuals with greater income have greater risk tolerances than lower income earners, (f) greater educational attainment is associated with increased risk tolerance, (g) increased knowledge of personal finance leads to increased risk tolerance, and (h) greater economic expectations are associated with greater levels of risk tolerance. Investigators know that "there are research data in support of these beliefs, but there are also data indicating otherwise" (Botwinick, 1984, p. 166). As Sung and Hanna (1996b) have suggested, more research is needed to test these assumed relationships.

Methodology
Data
Data were obtained from a survey of employees from a southeastern research university in 1997. Employees chosen for inclusion in the sample were randomly selected from a listing of all faculty and staff. A modified Dillman (1978) method was used to direct the management of the survey. Specifically, one-half of all employees ($\underline{N}$ = 2,000) received a risk-tolerance assessment questionnaire. Respondents were asked to complete the 33 question self-directed survey. Twenty of the questions were used to measure each respondent's risk tolerance, while the remaining 13 questions were used to assess respondent demographic, socioeconomic, and attitudinal characteristics. Two weeks after the first questionnaire was mailed, a reminder post card was sent. A duplicate questionnaire was mailed one week later. The recommended Dillman method was modified in that no certified mailings were used as a follow-up to increase participation. The total response rate for the survey was 60%, with 1,192 questionnaires returned. Seven questionnaires were non-deliverable, while 117 were unusable due to missing responses. This resulted in 1,075 respondents for this analysis, or a useable response rate of 54%.

Variables
Dependent variable. Risk tolerance, as determined by each respondent's score on the risk assessment measure, was used as the dependent variable. The 20-item risk-tolerance measure was developed using criteria originally developed by MacCrimmon and Wehrung (1986). (A copy of the risk assessment instrument may be obtained by contacting the first author.) The instrument was multi-dimensional, incorporating questions involving a variety of risky personal finance situations. Question scenarios were brief, and the presence of risk-free alternatives was minimized.

Responses to the risk assessment questions were combined into a risk-tolerance index. Answers were given a weight according to the riskiness of the response. Higher weightings indicated a riskier choice, while lower weightings indicted a less risky choice. The index was developed by summing the weights corresponding to each response. The validity of the measure was tested using procedures outlined by Grable and Joo (1997). Reliability was calculated to be .78 using the Spearman-Brown formula. This level of reliability represents an acceptable level of consistency for an attitudinal measure (Pedhazur & Schmelkin, 1991).

Index scores ranged from a low of 19 to a high of 63, with a mean of 37 and a standard deviation of 6.40. The final dependent variable was measured dichotomously, with those scoring 37 or above on the index coded as 1, and those scoring below 37 coded as 0. Using this method, 52% of respondents were classified as having above-average risk tolerance, and 48% of respondents were classified as having below-average risk tolerance.

Independent variables. The survey included questions about each respondent's gender, age, marital status, occupation, income, education, financial knowledge, and economic expectations. These variables were used as predictor variables in the analysis because they encompass the characteristics that practitioners and researchers have identified as effective in differentiating between levels of financial risk tolerance. Coding for each variable is presented in Table 1.

Statistical Analysis
Individuals are not likely to assign precise values to financial risk tolerance as a continuous variable (Grable & Lytton, 1998). In this study it was assumed that a person's financial risk tolerance can be classified as either above- or below-average (MacCrimmon & Wehrung, 1986; Roszkowski et al., 1993). Based on this assumption, the statistical method, discriminant analysis, was used to classify individuals into risk-tolerance categories using respondents' demographic, socioeconomic, and attitudinal factors.

The technique of discriminant analysis was first developed by Fisher in 1936 (Eisenbeis & Avery, 1972; Huberty, 1975, 1994; Klecka, 1980). The procedure has a solid foundation of previous use in the social sciences. The method can be viewed as a logical extension of multiple analysis of variance (MANOVA) because a hypothesis of equal means is tested using sample estimates of means and common variance (Scott, 1974). In the univariate case, random samples of observations on a single variable are taken, and a test is performed by partitioning the total sample variance into (a) pooled-within-group variance about group means, and (b) the variance of the group means about the grand mean. The explained between-group variance is then compared to the unexplained within-group variance. Based on the results of this test, the hypothesis is either accepted or rejected. "The methodology is a departure from the often-used regression models. It focuses attention on the notion that people may not think in continuous terms as they form their expectations of the future" (Scott, p. 39).

Table 1
Variable Definitions

Variable	Measurement
Gender	1 = male 0 = female
Age	respondent's age (20-75)
Marital Status	1 = married 0 = not married
Occupation	1 = professional (faculty) 0 = non-professional (staff)
Income	1 = less than $20,000 2 = $20,000 - $29,999 3 = $30,000 - $39,999 4 = $40,000 - $49,999 5 = $50,000 - $59,999 6 = $60,000 - $69,999 7 = $70,000 - $79,999 8 = $80,000 - $89,999 9 = $90,000 or more
Education	respondent's education (1 - 17)
Financial Knowledge	respondent's scores to a self-assessed measure of financial knowledge; possible scores ranged from 1 for no knowledge to 4 for substantial knowledge
Economic Expectations	1 = better over the next five years 0 = about the same or worse over the next five years

Findings
Demographic Characteristics of the Sample
More women (55%) than men (45%) responded to the survey. Age of respondents ranged from 20 to 75 years with a mean of 43.50 years. Approximately 23% were 35 years of age or younger. The majority of respondents (71%) were aged 36 to 60 years. Seventy-two percent of respondents were either married or living with a partner. Twenty-eight percent of respondents were single (i.e., either never married, separated, divorced and presently unmarried, or widowed).

The majority of respondents (62%) were employed in staff positions, while 38% were employed in professional faculty positions. Approximately 30% of respondents indicated having individual incomes exceeding $70,000. The majority (48%) had incomes between $30,000 and $69,999, while 22% reported incomes less than $30,000. Nearly 26% of the sample indicated having at least a high school diploma. The remainder of respondents had at least some college

(32%), with 42% having some type of graduate degree.

Fifteen percent of respondents considered themselves very knowledgeable about personal finance topics and investments, which was almost twice the percentage that had no financial knowledge (8%). The vast majority of respondents (77%) indicated having either a somewhat vague or moderate knowledge of personal finance issues. Finally, 78% of sample respondents felt that economic conditions would be about the same or worse over the next five years. Only 22% of respondents felt economic conditions would improve over the next five years.

Discriminant Analysis Test Results
Table 2 provides the means and standard deviations of the two levels of financial risk tolerance (i.e., above- and below-average) on the various independent variables. Data in this table were useful in making initial determinations about which variables distinguished between the two levels of risk tolerance. Note that for dichotomous independent variables (e.g., gender, marital status, occupation, and economic expectations), the mean is the proportion of cases with a value of one. For example, 54% of respondents in the above-average risk-tolerance category were men (i.e., $\underline{X}$ = .5433), while only 36% of respondents in the below-average risk-tolerance category were men (i.e., $\underline{X}$ = .3608). For the interpretation of other continuous variables see Table 1. For example, a mean income of 5.70 indicated a household income between $50,000 and $59,999, while a mean income of 4.20 suggested a household income between $40,000 and $49,999.

Table 2
Group Means and Standard Deviations of Classifying Variables

Variable*	Above-Average Risk Tolerance		Below-Average Risk Tolerance	
	Mean	SD	Mean	SD
Gender	0.54	0.50	0.36	0.48
Age	44.63	10.41	42.35	10.14
Marital Status	0.74	0.45	0.70	0.46
Occupation	0.52	0.50	0.23	0.42
Income	5.74	2.57	4.23	2.27
Education	0.80	0.40	0.45	0.50
Financial Knowledge	2.97	0.75	2.37	0.79
Economic Expectations	0.28	0.45	0.16	0.37
*For dichotomous variables, mean is the proportion of cases with a value of 1.00				

Univariate test statistics, based on the canonical discriminant analysis, are shown in Table 3. These univariate test statistics were generated for the purpose of measuring the significance of the independent variables in differentiating between the two levels of risk tolerance. F-test results indicated that all of the independent variables, except marital status, were significant in differentiating between levels of risk tolerance.

Table 3
Significance Tests of Univariate Equality of Group Means

Variable	Wilk's lambda	F	Sig.
Gender	.9665	37.236	.0000
Age	.9879	13.154	.0003
Marital Status	.9977	2.494	.1146
Occupation	.9126	102.784	.0000
Income	.9112	104.576	.0000
Education	.8656	166.620	.0000
Financial Knowledge	.8681	163.091	.0000
Economic Expectations	.9784	23.688	.0000

In effect, these univariate calculations were similar to t-tests or analysis-of-variance (ANOVA) significance tests for the equality of group means for each variable. For example, the F-value for age in Table 3 is 13.154, which is simply the square of the *t* value from a two-sample t-test. Another statistic displayed in Table 3 is Wilk's lambda. Lambda is the ratio of the within-groups sum of squares to the total sum of squares. A lambda of 1 occurs when the observed group means are equal. Large values of lambda indicate small differences between groups, while small values of lambda indicate large differences (Klecka, 1980). As shown in Table 3, mean responses for education and financial knowledge were the most different for below-average and above-average risk takers.

The next stage of the analysis, the development of structured coefficients, was conducted to determine which of the independent variables explained the most variance in risk tolerances, and to determine which variables contributed the most to the separation of sample respondents with above-average risk tolerance from those with below-average risk tolerance.

Pooled within-group correlations between the predictor

variables and the structured coefficients are provided in Table 4. These coefficients indicate the relative importance of each variable, taking into account interactions between and among the independent variables. The coefficients can be interpreted similarly to beta weights in multiple regression or scores in factor analysis. For example, the variables that shared the most variation with the canonical function were education and financial knowledge, with coefficients of .73 and .72, respectively. The positive signs of the coefficients indicated that increased levels of attained education and increased financial knowledge were positively associated with an above-average level of risk tolerance. Income (.58) and occupation (.58) also were important variables in differentiating between levels of risk tolerance. Similarly, the sign of these coefficients indicated that higher incomes and being employed professionally were associated with an above-average level of risk tolerance.

In summary, the structured coefficients (Table 4) indicated that financial risk tolerance can be explained most effectively by the variables education, financial knowledge, income, and occupation with coefficients of .73, .72, .58, and .58, respectively. Gender, economic expectations, age, and marital status offered less differentiating power between risk tolerance levels. Using all of the independent variables, the value of Wilk's lambda was .7754. Thus, the discriminant function accounted for approximately 22% of the variance in financial risk tolerance scores within the sample.

Table 4
Pooled Within-Group Correlations Between Predictor Variables and the Structured Coefficients

Variable	Risk-Tolerance Coefficient
Education	.73
Financial Knowledge	.72
Income	.58
Occupation	.58
Gender	.35
Economic Expectations	.28
Age	.21
Marital Status	.09

Predicting Financial Risk Tolerance
Using discriminant scores for each respondent (not shown) a prediction into which category (i.e., above- or below-average risk tolerance) a respondent would be classified was made. Table 6 provides the classification results showing that out of 554 actual subjects in the above-average risk-tolerance category, the model was

able to classify 400 or 72.20% correctly; of the 521 subjects actually in the below-average risk-tolerance category, the model was able to classify 356 or 68.30% correctly. Overall, the procedure correctly classified 70.33% of respondents. The classification procedure was statistically significant at the .01 level, indicating that these variables offered a better than by chance prediction.

Table 5
Classification Results

	Actual Group	Predicted Group	
		Above-Average	Below-Average
Above-Average	554	400	154
Below-Average	521	165	356

Conclusions

The use of demographic, socioeconomic, and attitudinal factors as determinants of financial risk tolerance received partial support in this analysis. It was concluded that the classes of risk tolerance (i.e., above- and below-average) differed most widely on a respondent's educational level and personal finance knowledge. These two variables contributed significantly to explaining differences between levels of risk tolerance. Stated another way, financial risk tolerance, as a construct, could best be described by a combination of a respondent's attained educational level and degree of personal financial knowledge. Income and occupation also were useful in explaining differences in risk tolerance. It was concluded that an above-average level of risk tolerance was associated with increased levels of attained education, an increased knowledge of personal finance, higher levels of income, and being employed in a professional occupation. Gender, economic expectations, age, and marital status explained proportionately less variance in risk tolerance. Overall, a respondent's attained educational level was the best discriminating factor between levels of financial risk tolerance.

It also was determined that the discriminant function accounted for approximately 22% of the variance between risk-tolerance groups. Based on an interpretation of the Wilk's lambda statistic, it was concluded that the linear combination of the independent variables was statistically significant, and that the combination of these variables worked to separate the two levels of risk tolerance from each other. The

about which category of risk tolerance someone would be classified into.

Another significant finding from this research involved age as a classifying factor of risk tolerance. It has been widely assumed and reported that older individuals have less time to recover financial losses than do younger persons, which has led to the conclusion that older individuals should have lower risk tolerances than younger persons. The results of this research challenge this conclusion by suggesting that (a) older individuals actually have greater mean risk-tolerance scores than younger persons; (b) any conclusion that increasing age automatically leads to lower financial risk tolerance may be incorrect; and (c) when all interactions between and among a person's unique characteristics are accounted for, age explains a small amount of variance in risk tolerance attitudes.

Implications

Based on the results of this study, the following two factors, presented in heuristic form, are offered as the most effective risk-tolerance differentiating factors:

> (a) An increased level of attained education is associated with above-average risk tolerance, and
>
> (b) A high degree of personal financial knowledge is associated with above-average risk tolerance.

Practitioners and researchers are cautioned to note that the most widely used demographic for use in differentiating between levels of risk tolerance by practitioners, a person's age (Bogle, 1994), was relatively ineffective in differentiating between levels of risk tolerance, and instead of being negatively associated with risk tolerance as is commonly assumed by practitioners, the mean age of respondents in the above-average risk-tolerance category was higher than the mean age of respondents in the below-average risk-tolerance category. This has important implications for practitioners and researchers. For instance, relying on age as a factor when classifying someone into a risk-tolerance category, without taking into account other factors, such as education, personal finance knowledge, and other objective attributes, does not work well as a predictive tool, and if used as a traditional measure assuming a negative relationship between age and risk tolerance, age may be all together misleading (see also Grable & Lytton, 1998 and Wang & Hanna, 1997).

Instead of relying on less statistically robust demographic, socioeconomic, and attitudinal factors such as marital status, gender, economic expectations, and age to differentiate between levels of risk tolerance and to predict risk tolerance, family economics and resource management professionals would be better advised to use variables which optimize the separation of the two levels of risk tolerance (e.g., education, financial knowledge, occupation, and income). For those who want to use only one factor to differentiate between levels of risk tolerance, the education variable is the optimal factor.

Implications from this research for family economists and resource management professionals, when developing educational programming and presenting strategic initiatives to increase family financial stability, are profound. Many of the stereotypical assumptions about what type of person is more or less likely to be risk tolerant, and thus better able to meet certain financial objectives, may be incorrect. When working to improve the financial well-being of individuals and families, it is important to fully assess each person's financial risk tolerance characteristics and profile. Essential to a comprehensive understanding is a valid measurement tool as well as clarification of how risk tolerance contributes to other financial decisions -- either those currently under consideration or those made in the past. As such, this paper serves as a reinforcement of a positive development within the family and consumer sciences profession to take into account both objective and subjective characteristics when attempting to evaluate a person's risk tolerance and to understand financial choice making decisions. Only by using tested heuristics and empirically valid assessments can family economists and resource management professionals accurately measure an individual's ability and motivation to improve their own financial well-being and quality of life.

Finally, researchers and practitioners are encouraged to replicate this study using a different sample frame in order to test the generalizability of these findings to other populations. Researchers and practitioners also are encouraged to examine other demographic, socioeconomic, attitudinal, and personality factors which, within a theoretical context, may explain more variance in financial risk tolerance. Recall that the variables used in this study explained about 22% of the variance in risk-tolerance differences, and as such, these variables provide an incomplete picture of respondents' risk tolerances. As the results of this study indicate, understanding risk tolerance is a complicated process that goes beyond the exclusive use of demographic and socioeconomic factors. More research is needed to determine which additional factors, such as expectations, attitudes, preferences, family background and culture, and other financial well-being factors, can be used to

increase the explained variance in risk-tolerance attitudes. Conversely, learning more about risk tolerance will enable financial professionals to further explore how this dimension of personality impacts complex decisions that shape financial well-being.

References

Bajtelsmit, V. L. & Bernasek, A. (1996). Why do women invest differently than men? *Financial Counseling and Planning, 7*, 1-10.

Bajtelsmit, V. L. & VanDerhei, J. L. (1997). Risk aversion and pension investment choices. In M. S. Gordon, O.S. Mitchell & M. M. Twinney (Eds.), *Positioning pensions for the twenty-first century* (pp. 45-66). Philadelphia: University of Pennsylvania Press.

Baker, H. K. & Haslem, J. A. (1974). The impact of investor socioeconomic characteristics on risk and return preferences. *Journal of Business Research, 2*, 469-476.

Bakshi, G. S. & Chen, Z. (1994). Baby boom, population aging, and capital markets. *Journal of Business, 67*, 165-202.

Blume, M. (1978). *The changing role of the individual investor.* New York: John Wiley & Sons, Inc.

Bogle, J. C. (1994). *Bogle on mutual funds.* Burr Ridge, Illinois: Irwin.

Botwinick, J. (1984). *Aging and behavior.* New York: Springer Publishing Company.

Brown, D. P. (1990). Age clienteles induced by liquidity constraints. *International Economic Review, 31*, 891-912.

Cicchetti, C. J. & Dubin, J. A. (1994). A microeconometric analysis of risk aversion and the decision to self-insure. *Journal of Political Economy, 102*, 169-186.

Coet, L. J. & McDermott, P. J. (1979). Sex, instructional set, and group make-up: Organismic and situational factors influencing risk-taking. *Psychological Reports, 44*, 1283-1294.

Cohn, R. A., Lewellen, W. G., Lease, R. C., & Schlarbaum, G. G. (1975). Individual financial risk aversion and investment portfolio composition. *Journal of Finance, 30*, 605-620.

Dahlback, O. (1991). Saving and risk taking. *Journal of Economic Psychology, 12*, 479-500.

DeVaney, S. A. & Su, Y. (1997). Gender differences in retirement planning knowledge. *Personal Finances and Worker Productivity, 1* (1), 160-171.

Dillman, D. A. (1978). *Mail and telephone surveys.* New York: Wiley.

Eisenbeis, R. A. & Avery, R. B. (1972). *Discriminant analysis and classification procedures: Theory and applications.* Lexington, MA: Lexington Books.

Friedman, B. (1974). Risk aversion and the consumer choice of health insurance option. *The Review of Economics and Statistics, 56*, 209-214.

Grable, J. E. & Joo, S. H. (1997). Determinants of risk preference: Implications for family and consumer science professionals. *Family Economics and Resource Management Biennial, 2*, 19-24.

Grable, J. E. & Lytton, R. H. (1997). Determinants of retirement savings plan participation: A discriminant analysis. *Personal Finances and Worker Productivity, 1* (1), 184-189.

Grable, J. E. & Lytton, R. H. (1998). Investor risk tolerance: Testing the efficacy of demographics as differentiating and classifying factors. *Financial Counseling and Planning, 9* (1), 61-74.

Grey, R. J. & Gordon, G. G. (1978, November). Risk-taking managers: Who get the top jobs? *Management Review, 67*, 8-13.

Haliassos, M. & Bertaut, C. C. (1995). Why do so few hold stocks? *The Economic Journal, 105*, 1110-1129.

Hawley, C. B. & Fujii, E. T. (1993-1994). An empirical analysis of preferences for financial risk: Further evidence on the Friedman-Savage model. *Journal of Post Keynesian Economics, 16*, 197-204.

Higbee, K. L. & Lafferty, T. (1972). Relationships among risk preferences, importance, and control. *The Journal of Psychology, 81*, 249-251.

Hinz, R. P., McCarthy, D. D. & Turner, J. A. (1997). Are women conservative investors? Gender differences in participant-directed pension investments. In M. S. Gordon, O.S. Mitchell, & M. M. Twinney (Eds.), *Positioning pensions for the twenty-first century* (pp. 91-103). Philadelphia: University of Pennsylvania Press.

Huberty, C. J. (1975). Discriminant analysis. *Review of Educational Research, 45*, 543-598.

Huberty, C. J. (1994). *Applied discriminant analysis.* New York: Wiley.

Klecka, W. R. (1980). *Discriminant analysis.* Beverly Hills, CA: Sage.

Lazzarone, B. G. (1996). The economic well-being of rural Nevada elders. *Proceedings of the 1996 Conference of the Western Region Home Management Family Economics Educators*, 67-74.

Leonard, D. (1995, September). Doctor, heal thyself. *Smart Money, 4*, 91-96.

MacCrimmon, K. R. & Wehrung, D. A. (1986). *Taking risks.* New York: The Free Press.

Masters, R. (1989, July). Study examines investors' risk-taking propensities. *The Journal of Financial Planning, 2*, 151-155.

McInish, T. H. (1982). Individual investors and risk-taking. *Journal of Economic Psychology, 2*, 125-136.

Morin, R-A. & Suarez, F. (1983). Risk aversion revisited. *The Journal of Finance, 38*, 1201-1216.

Okun, M. A. (1976). Adult age and cautiousness in decision. *Human Development, 19*, 220-233.

Okun, M. A., Stock, W. A. & Ceurvorst, R. W. (1980). Risk taking through the adult life span. *Experimental Aging Research, 6*, 463-473.

Palsson, A-M. (1996). Does the degree of relative risk aversion vary with household characteristics? *Journal of Economic Psychology, 17*, 771-787.

Pedhazur, E. J. & Schmelkin, L. P. (1991). *Measurement, design, and analysis: An integrated approach.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Quattlebaum, O. M. (1988). Loss aversion: The key to determining individual risk. *The Journal of Financial Planning, 1* (1), 66-68.

Roszkowski, M. J. (1998). Risk tolerance in financial decisions. In D. M. Cordell (ed.), *Readings in Financial Planning* (pp. 281-328). Bryn Mawr, PA: The American College.

Roszkowski, M. J., Snelbecker, G. E. & Leimberg, S. R. (1993). Risk-tolerance and risk aversion. In S. R. Leimberg, M. J. Satinsky, R. T. LeClair & R. J. Doyle, Jr. (eds.), *The tools and techniques of financial planning* (4th ed., pp. 213-225). Cincinnati, OH: National Underwriter.

Rubin, P. H. & Paul, C. W. (1979). An evolutionary model of tastes for risk. *Economic Inquiry, 17,* 585-596.

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

Scott, E. (1974). *A discriminant analysis of financial and economic variables influencing shareholders expectations.* Tallahassee, FL: The Florida State University College of Business.

Shaw, K. L. (1996). An empirical analysis of risk aversion and income growth. *Journal of Labor Economics, 14,* 626-653.

Slovic, P. (1966). Risk-taking in children: Age and sex differences. *Child Development, 37,* 169-176.

Sung, J. & Hanna, S. (1996a). Factors related to household risk-tolerance: An ordered probit analysis. *Consumer Interests Annual, 42,* 227-228.

Sung, J. & Hanna, S. (1996b). Factors related to risk-tolerance. *Financial Counseling and Planning, 7,* 11-20.

Trone, D. B., Allbright, W. R. & Taylor, P. R. (1996). *The management of investment decisions.* Chicago: Irwin.

Wallach, M. A. & Kogan, N. (1961). Aspects of judgment and decision making: Interrelationships and changes with age. *Behavioral Science, 6,* 23-26.

Wang, H. & Hanna, S. (1997). Does risk tolerance decrease with age? *Financial Counseling and Planning, 8* (2), 27-32.

Weagley, R. O. & Moore, D. B. (1997). Employee benefits: Knowledge and satisfaction. *Personal Finances and Worker Productivity, 1* (1), 150-159.

Xiao, J. J. & Noring, F. E. (1994). Perceived saving motives and hierarchical financial needs. *Financial Counseling and Planning, 5,* 25-44.

Yuh, Y. & DeVaney, S. A. (1996). Determinants of couples' defined contribution retirement funds. *Financial Counseling and Planning, 7,* 31-38.

Yuh, Y. & Olson, P. (1997). Factors affecting the retirement fund levels of self-employed households and wage and salary households. *Family Economics and Resource Management Biennial, 2,* 25-31.

Zhong, L. X. & Xiao, J. J. (1995). Determinants of family bond and stock holdings. *Financial Counseling and Planning, 6,* 107-114.