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An Estimate of the Mediation Effect of Risk Tolerance among Marital Status, Gender, and Investing Behavior

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Abstract

This paper presents a series of path models that were developed to test whether financial risk tolerance mediates the association between the following four variables and investing behavior: (a) male and married, (b) female and married, (c) male and single, or (d) female and single. Data for this study were obtained from a proprietary consumer survey of risk-tolerance attitudes. Four path models were developed to test relationships among the variables in 2008, 2009, 2010, and 2011. These years were chosen to represent the depth and recovery periods in the Great Recession. The total number of respondents was 29,641. Findings showed that financial risk tolerance was positively associated with risky investing behavior (i.e., equity ownership) in each of the four periods. The associations among the gender-marital status variables and investing behavior were mixed; however, findings did indicate that risk tolerance mediates these relationships by sometimes amplifying and occasionally attenuating risky behavior. Based on the findings, implications and limitation are presented.

Keywords

Risk Tolerance, Mediation, Gender, Marital Status, Investing Behavior, Family Resource Management

Introduction

The role played by risk attitudes in shaping risk-taking behavior has been widely studied in the social behavior and health literature. Research has tended to focus on ethical, health, recreational, and social risks (Bonem, Ellsworth, & Gonzalez, 2015; Li, Hamamura, & Adams, 2015). Some have viewed the relationship between risk attitudes and risky behavior from a criminology perspective (Wichary, Pachur, & Li, 2015), sensation seeking viewpoint (Lauriola, Panno, Levin, & Lejuez, 2014; Nordgren, van der Pligt, & van Harreveld, 2007), and natural disaster management standpoint (Brun, 1992; Hanoch & Gummerum, 2011; Teigen, Brun, & Slovic, 1988). Interestingly, the number of studies that have applied risk modeling techniques to decisions involving financial risks have been limited. The majority of these have focused on risky behaviors such as gambling (Kugler, Connolly, & Ordóñez, 2012). Few have examined the effect of risk attitudes on broader financial planning behavior. This study extends this literature by testing financial planning behavior and risk taking attitudes by

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viewing the two concepts from an investing, rather than gambling, context.

Extending risk models to include household financial planning behaviors is needed, if for no other reason, than to bring some uniformity of understanding from the social and behavioral literature to the household finance field. Upon examination, it becomes apparent that risk attitudes play an important role in shaping important financial decisions made at the household level. The prudent management of family financial resources, including decisions related to cash flow management, retirement plan choice, and investment allocations, help shape a household's future wealth (Grable, Klock, & Lytton, 2013). Previous studies have shown that wealth accumulation over time is associated with risk aversion (Mossin, 1968), with higher wealth households being less risk averse. Sahm (2012) found, for example, that heterogeneity in risk preference is strongly associated with heterogeneity in financial portfolios.

Much of the household finance literature that has examined the role of risk attitudes—specifically financial risk tolerance—has tended to focus on interactions between and among demographic and socioeconomic factors, risk attitudes, and risk-taking behavior. Of particular importance has been an emphasis on identifying gender differences as an antecedent of financial decision-making. This interest stems from several societal observations. For example, it is well documented that women tend to live longer than men, at least in most western economies. Also, women's time in the paid workforce tends to be shorter than that for men. In terms of financial variables, women, on average, accumulate less wealth and lower levels of retirement savings and pensions over the life cycle than their counterparts (Lyons, Neelakantan, & Scherpf, 2008). Contributing factors to such financial discrepancies by gender include limited access to high paying jobs, lower levels of financial literacy, and restricted access to retirement plans. When taken together, these “factors put women at higher risk than men of having financial problems” (Fonseca, Mullen, Zamarro, & Zissimopoulos, 2012, p. 90). The situation is even more severe for unmarried women. Fonseca and her associates reported that single unmarried women have less wealth than similar single men and married couples throughout the lifespan, but at retirement the discrepancy is particularly alarming.

While the previously mentioned factors are clearly important, Sunden and Surette (1998) noted that a large part of the difference in lifetime wealth accumulation can also be attributed to the fact that women tend to allocate their investments in a more conservative manner compared to men. While men are generally more willing to invest a larger portion of their investment portfolio in equities, women often feel more comfortable investing in assets that are subject to less volatility. Fonseca *et al.* (2012) argued that low levels of financial literacy help explain this reluctance to invest aggressively. Cupples, Rasure, and Grable (2013) provided some support for this possibility by noting that education—and by extension, financial literacy—plays a strong positive role in shaping risk attitudes.

When taken together, the literature clearly points to both a gender and marital gap in investing behavior. While it is likely that all of the factors mentioned above help explain the investing behavior gender and marital gaps, another possibility also exists. Neelakantan (2010) documented that risk tolerance—generally defined as the maximum level of uncertainty someone is willing to take when making a financial decision in which one or more outcomes is negative (Grable, 2000)—accounts for at least 10% of the gap in lifetime wealth accumulation between women and men. In general, women are thought to be less willing to take financial risks compared to men (Beckmann & Menkhoff, 2008; Eckel & Grossman, 2008). For instance, in terms of retirement planning, even among women and singles who have access to retirement plans, their allocation choices tend to be risk avoiding when participating in retirement plans.

Thus, it is possible to hypothesize that this risk aversion preference is what may be associated with investing behavior gaps and ultimately create future wealth gaps. If this line of thinking is accurate, then it is also possible to suggest that what is perceived as a gender and marital gap in investing behavior may be due less to demographic dissimilarities and more to differences in risk attitudes. That is, the gap may be influenced by a person's risk tolerance. This paper presents a series of path models that were developed to test this possibility. The models classify individuals into one of four categories: (a) male and married, (b) female and married, (c) male and single, or (d) female and single. Based on these categories, tests were conducted to determine what effect

financial risk tolerance has in mediating the investment choices of individuals.

Review of Literature

Controversy, within the literature, exists regarding whether women are more or less risk averse. For instance, Ho, Milevsky, and Robinson (1994) noted that females hold riskier portfolio than males because of their long life expectancy. However, Yao and Hanna (2004) found that females were more risk averse in their investing behavior. In addition, much of the academic literature on financial risk-taking behavior and attitudes suggests that women are less risk tolerant than men, and that singles are more risk averse than married households (see Grable, 2008). In general, men tend to be the sole decision maker in a household when making investment allocation choices (The Investment Company Institute, 2005; 2008). However, even when women are the decision makers, they still tend to be more conservative than men—who are more likely to allocate household wealth into individual stocks and other equities. Data from the Investment Company Institute (2005; 2008) provide a glimpse into the different investment patterns of those who are single and married. Married couples, for example, are five to six times more likely to report owning individual stocks and stock mutual funds compared to those who are divorced, separated, widowed, or single. Even when assets that exhibit less volatility are included in the allocation mix, married couples are more likely to indicate investment ownership. Single individuals are the least likely to own either stocks or bonds.

It is generally asserted that being married heightens the probability of achieving some degree of material affluence (Hirschl, Altobelli, & Rank, 2003). It may be that marriage provides a mechanism to diversify income-earning risks more broadly. Marriage may also provide a mechanism for the division of labor that allows women to take fewer financial risks in the present in exchange for greater financial security later (Waite & Gallagher, 2000). Marriage also allows for use maximization of household resources in a way that reduces the marginal expense allocated per person. These types of factors favor the argument that those who are married are likely to be in a better financial position to engage in financial behaviors that entail risk.

Marital status and gender come together to influence investment choices in an indirect manner. In the United States, a higher percentage of the single population is made up of women (U.S. Census Bureau, 2012). It is less surprising then that when viewed from the aggregate, women tend to exhibit both risk attitudes that are not risk seeking and behaviors that avoid investment and financial risks. Findings reported by Sunden and Surette (1998) highlighted the importance of the gender-marital status relationship. They concluded that gender is not the sole, or even primary, factor determining investment choice behavior. They determined that choice behavior is shaped, in large part, by the combination of gender with marital status. Their estimates showed the following: (a) single women are less likely than single men to invest aggressively; (b) married men, compared to single men, are less likely to own mostly equities; and (c) married women are more likely to choose conservative investments compared to single women. These insights indicate that the effects of gender and marital status are intertwined and somewhat complex. Adding to the complexity is a related finding by Sunden and Surette that risk tolerance plays a role in shaping investment decisions. They noted that exhibiting an average to above-average risk tolerance attitude increases the probability of selecting riskier investments. Based on the results from their study, it is reasonable to conclude that gender and marital status are interconnected in shaping risky investment choice decisions. Further, it is possible to hypothesize that financial risk tolerance may mediate the relationship between investment choices and gender and marital status.

To extend this perspective further, it is important to remember that the financial risk-tolerance literature is relatively united in documenting the negative relationship between willingness to take financial risk and being female. As suggested in the introduction of this paper, it is likely that a portion of investment decisions that appear to be driven by either gender or marital status may be, in actuality, a result of differing levels of risk tolerance. Financial risk tolerance might act as a mediator when single men and women and married men and women make investment choices. If true, then the household finance field's fixation on identifying and addressing the gender and marital gap in investing might be shown to be less effective as compared to helping women (and men) understand their inherent risk profile as a factor shaping decisions.

Another issue involves the objective measure of financial risk taking. Typically, financial ratios have been used as indicators of household financial position. Financial ratios can be used for descriptive and prescriptive purposes (Harness, Chatterjee, & Finke, 2008). For instance, some researchers (e.g., DeVaney, 1993; Godwin, 1996; Greninger, Hampton, Kitt, & Achacoso, 1996; Lytton, Garman, & Porter, 1991; Park & DeVaney, 2007) have used financial ratios to describe how well a household is progressing financially. Ratios for this purpose include assets to liabilities, investment assets to net worth, liquid assets to disposable income, consumption expenditures to disposable income, liquid assets to consumption expenditures, housing expenses to disposable income, and debt repayment to household liabilities. When viewed holistically, the use of financial ratios in research has resulted in inconsistent guidelines but meaningful signals for evaluating the financial position of households. No specific financial ratio stands out as the best or most appropriate guideline for both practitioners and researchers (Grable *et al.*, 2013; Harness *et al.*). For instance, Godwin suggested a 70% guideline for the debt to asset ratio but Park and DeVaney recommended 50%. In the case of the capital accumulation ratio, which is defined as investment assets/net worth, DeVaney suggested a 25% benchmark but Greninger *et al.* recommended 70%. These inconsistent benchmark guidelines tend to be caused by too many external factors influencing the financial position of households.

Although specific benchmarks may vary by researcher, financial ratios continue to be used to provide evidence of a general progression along an outcome continuum. The first study using financial ratios at the household level was conducted in 1985 (e.g., Griffith, 1985; Johnson & Widdows, 1985). Since that time, financial ratios have been used as independent and outcome variables in a diverse number of studies (e.g., Bricker & Thompson, 2016; Dunn & Mirzaie, 2015; Mainal, Kassim, Ho, & Yusof, 2016). The results from these studies suggest that financial ratios can provide a representative overview of a household's financial position even if the guidelines for use vary. Additionally, within the context of risk taking, it is possible to use a financial ratio to objectively identify the level of risk being taken at the household level. For example, the investment assets to fixed-income assets ratio can be used for this purpose. This financial ratio

provides a measurement of relative risk aversion by comparing the ratio of risky assets to safer assets held by a household.

Methodology

Sample

Data for this study were obtained from a proprietary consumer survey of risk-tolerance attitudes. The survey is publically available through an open-access internet site hosted by the Rutgers New Jersey Agricultural Experiment Station (<http://njaes.rutgers.edu:8080/money/riskquiz/>). The website provides a free risk-tolerance analysis to users based on answers to a 13-item risk scale developed by Grable and Lytton (1999). For the purposes of this study, data from more than 25,000 respondents from 2008 through December 2011 were analyzed. Given the nature of the research objective, respondents less than 25 years of age were excluded from this study. Since young adults typically do not have sufficient wealth to invest, they were excluded so that findings would be more generalizable to the general population. In addition, respondents who failed to answer a question about their current investment choices also were excluded from the analyses. The sample was then categorized into the year in which they completed the survey. Four years were chosen to represent elements of the Great Recession: the depth of the recession (2008 and 2009) and the recovery (2010 and 2011). The total number of respondents was 29,641, broken out as 5,660 in 2008, 4,566 in 2009, 6,063 in 2010, and 13,352 in 2011.

In order to enhance the study's generalizability, a sampling weight was applied to the data. This probability weight was used to match the distribution of respondents by age to data reported by the Census Bureau (2011) for 2010. The following probability weights were used: 20.14% 25-34, 20.14% 35-44, 22.07% 45-54, 17.89% 55-64, 10.65% 65-74, and 9.10% over 75 years old. A demographic summary of the sample is shown in Table 1.

Outcome Variable

As a component of the survey, respondents were asked to provide information about their current asset allocation framework by indicating the percent of assets held in four categories: (a) cash, such as savings accounts, CDs, or money market mutual funds; (b)

fixed income investments, such as corporate bonds, government bonds, or bond mutual funds; (c) equities, such as stocks, stock mutual funds, direct business ownership or investment real estate (not including a personal residence); and (d) other, such as gold or collectibles. Respondents who failed to provide complete information (i.e., the total allocation did not equal 100%) were excluded from the analysis. On average, respondents' allocation of assets was as follows: 37% equities (i.e., stocks), 17% bonds, 41% cash, and 5% other assets.

The percentage allocation data were used to calculate an investment asset to fixed-income asset ratio (investment equity ratio) for each respondent. The ratio was calculated by dividing the percentage of investments held in equities over the total sum of cash and bonds (i.e., fixed-income assets). The investment equity ratio was used as a proxy for each respondent's asset allocation preference. High ratios indicated a greater equity exposure, whereas low ratios represented a preference for cash and bonds. The mean, median, and standard deviation for the variable during four years were 2.35, .67, and 7.52, respectively.

Observed Variables

Three observed variables were incorporated into the models: gender, marital status, and financial risk tolerance. Gender was originally coded 1 = female and 0 = male. Marital status was originally assessed as: (a) never married, (b) living with significant other, (c) married, (d) separated/divorced, (e) widowed, and (f) shared living arrangement. For the purposes of this study, marital status was recoded so that 1 = married, otherwise 0. Four variables were created based on combinations of gender and marital status: (a) male and married, (b) female and married, (c) male and single, and (d) female and single. Financial risk tolerance was calculated by summing scores from the 13 items in the Grable and Lytton (1999) risk scale. Grable and Lytton reported that scale scores can range from a low of 13 to a high of 47. In this study, scores did range from 13 to 47, with a mean, median, and standard deviation score of 27.70, 28.00, and 3.97, respectively. The 13 questions are shown in Appendix A.

Data Analysis Method

Given the purpose of this study, the data analysis approach

focused specifically on the effect of risk tolerance as an influential factor on investing behavior. An important element within the empirical model of this study was the mediating role played by financial risk tolerance between the gender-marital status categories and the investment equity ratio. In other words, this study used the key element (i.e., risk tolerance) as a mediating factor between behavioral outcomes. A path model was chosen to test this relationship due to the robustness of the approach (Kline, 2011; Wolfe, 2003). A path model was estimated as a means to determine the direct, indirect, and total effects of the gender-marital status observed variables, and financial risk tolerance, on the investment equity ratio. The remainder of this paper describes the results from the tests and a discussion of the findings.

Results

Table 1 provides a summary of the demographic profile of the sample. Over 60% of the sample, as a whole and by year, was comprised of male respondents. In terms of marital status, over 60% of respondents indicated being married while the remainder were single, divorced/separated, or widowed. The education and income data shown in Table 1 are provided as background about the sample. These data were not used in the path models.

Table 2 shows the descriptive data for risk tolerance and the investment equity ratio by gender-marital status for each year. The notable point from the table is that the change in risk tolerance was smaller than the change of the investment equity ratio. Risk tolerance decreased after the economic recession in 2009 and recovered from 2010. However, the investment equity ratio showed a larger fluctuation before and after the economic recession compared to risk-tolerance scores. As explained in the literature review, male respondents exhibited higher risk-tolerance scores than female respondents. Married male respondents tended to have lower risk tolerance than single males, but married female respondents tended to have higher risk tolerance than single females except in 2009 (i.e., during the economic recession). On the other hand, married respondents, regardless of gender, reported higher holdings of investment assets.

Figures 1 through 4 show the path models that were tested in this study. The power of path modeling techniques is that it is

Table 1. Demographic Profile of the Sample by the Year of Analysis (N = 29,641)

	2008 (n = 5,660)		2009 (n = 4,566)		2010 (n = 6,063)		2011 (n = 13,352)	
	n (%)	μ%	n (%)	μ%	n (%)	μ%	n (%)	μ%
Gender (Male)	3,777 (66.73)	67.62	2,808 (61.50)	63.39	4,009(66.12)	67.42	8,057 (60.34)	63.91
Marital Status (Married)	3,817 (67.44)	69.60	2,679 (58.67)	63.14	3,905 (64.41)	68.53	7,882 (59.03)	68.53
Education								
High sch. or less	49 (0.87)	1.12	107 (2.34)	3.54	94 (1.55)	2.25	132 (0.99)	2.25
High School	340 (6.01)	6.51	295 (6.46)	6.89	349 (5.76)	5.94	580 (4.34)	5.94
Some college	983 (17.37)	17.39	795 (17.41)	16.80	1,025 (16.91)	16.77	2,133 (15.98)	16.77
Associate degree	477 (8.43)	8.36	448 (9.81)	9.45	512 (8.44)	7.83	1,192 (8.93)	7.83
Bachelor degree	2,050 (36.22)	35.62	1,429 (31.30)	29.34	1,981 (32.67)	30.66	5,110 (38.27)	30.66
Graduate degree	1,761 (31.11)	31.01	1,492 (32.68)	33.99	2,102 (34.67)	36.55	4,205 (31.49)	36.55
Income								
Less than \$25,000	278 (4.91)	4.60	429 (9.40)	7.74	519 (8.56)	7.07	978 (7.32)	7.07
\$25,000 – \$49,999	882 (15.58)	15.47	979 (21.44)	20.66	1,032 (17.02)	15.30	2,340 (17.53)	15.30
\$50,000 – \$74,999	1,234 (21.80)	21.58	988 (21.64)	21.46	1,280 (21.11)	20.92	2,953 (22.12)	20.92
75,000 – \$99,999	1,061 (18.75)	18.73	737 (16.64)	16.59	1,059 (17.47)	17.80	2,367 (17.73)	17.80
Over \$100,000	2,205 (38.96)	39.61	1,433 (31.38)	32.55	2,173 (35.84)	38.91	4,714 (35.31)	38.91

Table 2. Risk Tolerance and Equity Ratio by Gender and Marital Status

	Male		Female	
	Single	Married	Single	Married
	M (SD)	M (SD)	M (SD)	M (SD)
2008 (n = 5,660)				
Risk Tolerance	29.41 (3.07)	28.56 (3.87)	26.18 (2.50)	26.57 (3.13)
Equity Ratio	3.21 (10.21)	3.99 (9.53)	2.33 (8.88)	3.45 (13.19)
2009 (n = 4,566)				
Risk Tolerance	28.68 (6.01)	27.54 (5.43)	26.05 (5.19)	25.62 (4.97)
Equity Ratio	.38 (.43)	.53 (.49)	.29 (.38)	.38 (.42)
2010 (n = 6,063)				
Risk Tolerance	29.51 (3.12)	28.79 (3.80)	26.05 (2.48)	26.42 (3.24)
Equity Ratio	1.92 (5.94)	2.83 (6.99)	1.52 (5.88)	2.18 (6.84)
2011 (n = 13,352)				
Risk Tolerance	29.29 (3.08)	28.47 (3.80)	25.77 (2.48)	26.05 (3.09)
Equity Ratio	2.76 (7.79)	3.07 (8.21)	1.62 (6.80)	2.07 (6.99)

possible to estimate not only direct effects, but also the indirect effects, of variables on an outcome measure. In this case, both the direct and indirect effects of the gender-marital status relationships, through financial risk tolerance, were evaluated. The dual headed arrows on the left side of the path models represent correlations between and among the gender-marital status categories. Given the

statistical nature underlying path models, the coefficients shown in the figures represent effects that account for the interdependent associations of the variables in the models.

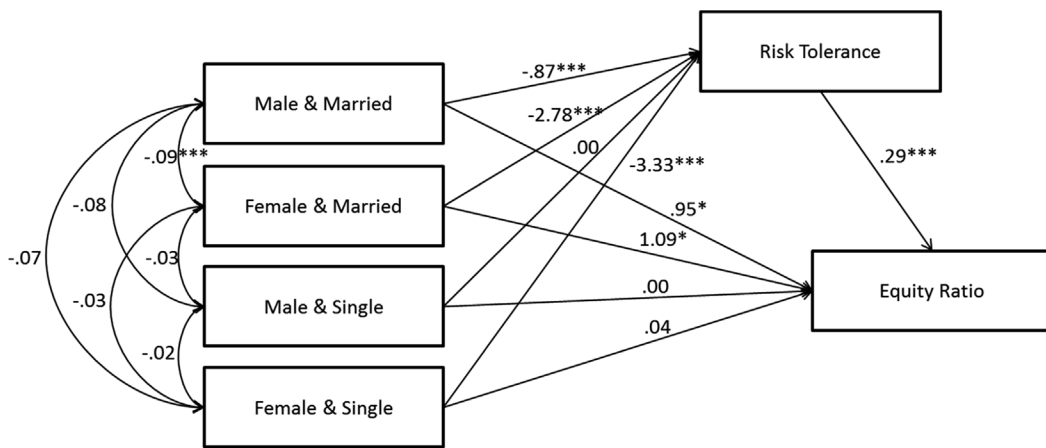
As illustrated, there was a great deal of variation among the models by year. In fact, none of the gender-marital status variables were directly statistically significantly associated with

the investment equity ratio in any of the years. The only significant and consistent direct effect on the investment equity ratio was the association with financial risk tolerance. In each year, the risk tolerance and investment equity ratio relationship was positive.

During the depth of the Great Recession, married males and females were found to be more likely to hold a higher percent of their investments in equities. However, the significance of these associations disappeared during the recovery stage of the recession. No direct effect was noted between the investment equity ratio

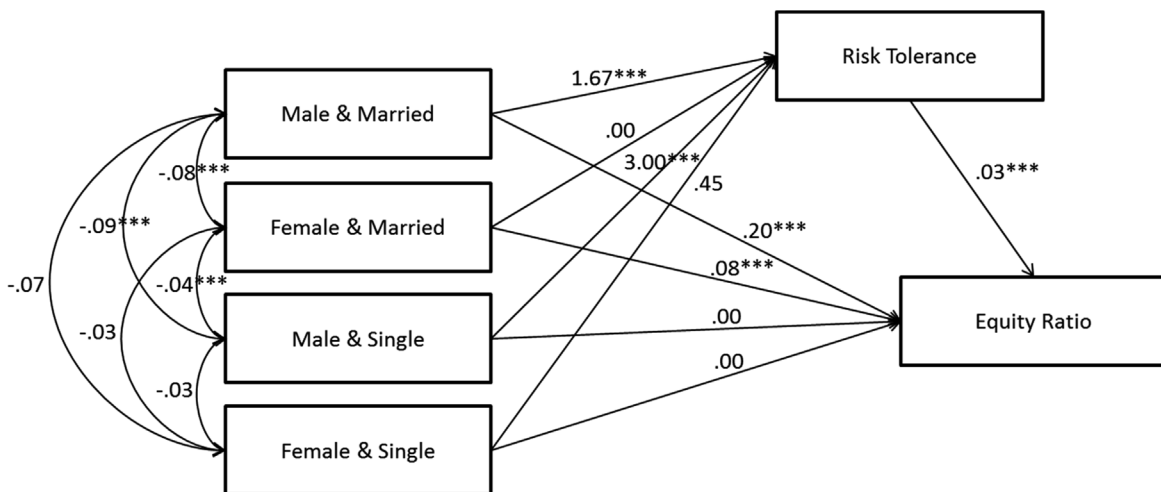
and being a single male or a single female at any point from 2008 through 2011.

The associations between the gender-marital status categories and financial risk tolerance were more nuanced. Consider how the direction of the coefficients changed for married males from 2008 through 2011. While the direct association with financial risk tolerance was statistically significant over the four periods, the direction of the coefficients was negative in 2008 and 2011. This implies that the level of equity holdings was lower in 2009 and



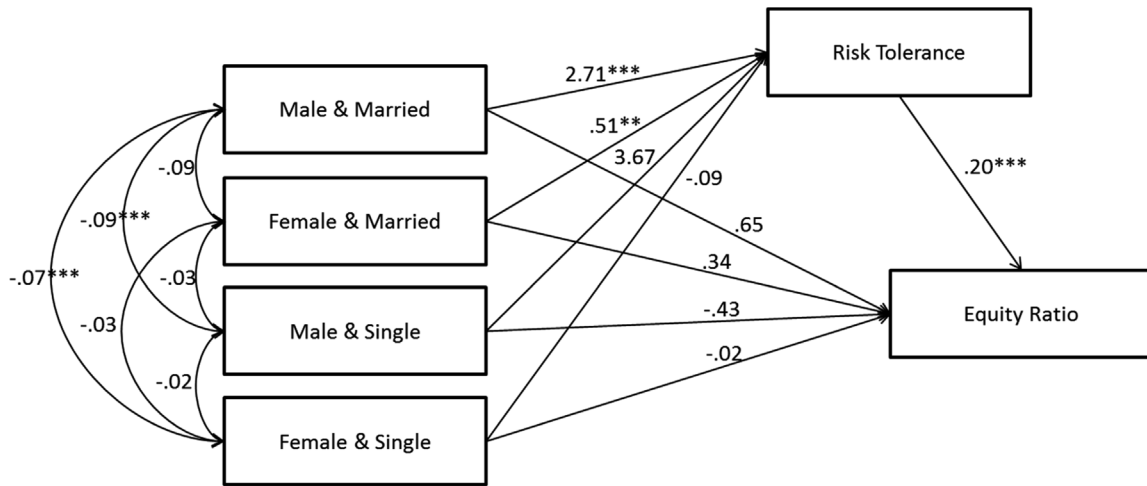
Note. * p<.05; ** p<.01; and *** p<.001, n=5,660

Figure 1. 2008 Path Model Showing Effect of Gender and Marital Status on the Investment Equity Ratio Mediated by Financial Risk Tolerance



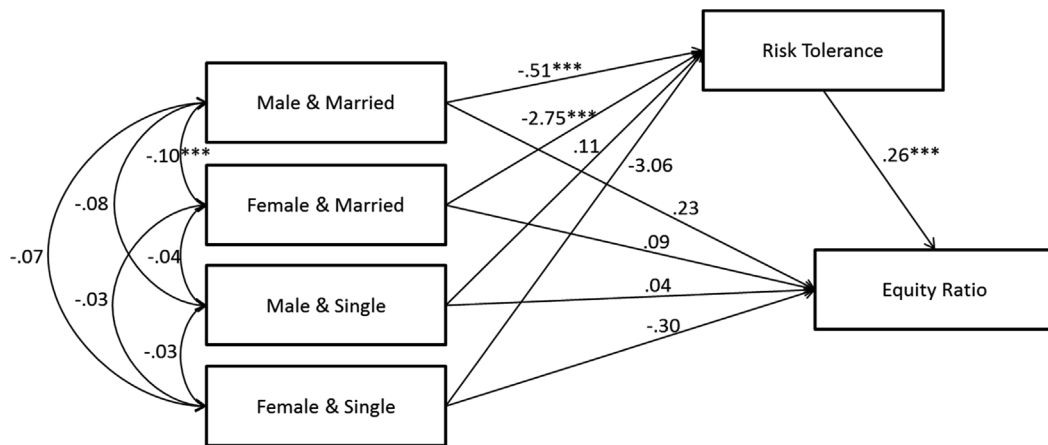
Note. * p<.05; ** p<.01; and *** p<.001, n=4,556

Figure 2. 2009 Path Model Showing Effect of Gender and Marital Status on the Investment Equity Ratio Mediated by Financial Risk Tolerance



Note. * $p < .05$; ** $p < .01$; and *** $p < .001$, $n = 6,603$

Figure 3. 2010 Path Model Showing Effect of Gender and Marital Status on the Investment Equity Ratio Mediated by Financial Risk Tolerance



Note. * $p < .05$; ** $p < .01$; and *** $p < .001$, $n = 13,352$

Figure 4. 2011 Path Model Showing Effect of Gender and Marital Status on the Investment Equity Ratio Mediated by Financial Risk Tolerance

2010. A similar pattern was noted for married females, although the 2009 coefficient was not significant. It turns out that 2008 and 2011 were associated with losses in the US equities markets (-21.92% and -1.02%, respectively), whereas 2009 and 2010 marked gains in US securities (11.23% and 9.25%, respectively). This suggests that married investors were more apt to be swayed by market conditions. Interestingly, the association between being a single male and financial risk tolerance was only significant in 2009. The relationship was positive. Single females were more likely to hold

lower financial risk tolerance attitudes (i.e., be more risk averse) across all of the periods, but especially in 2008 and 2011 when the US equity markets were down. The information presented in Figures 1 through 4 are summarized in Tables 3 and 4.

Table 5 shows the indirect effects of the gender-marital status variables on the investment equity ratio. These indirect coefficients were derived through the mediation effect of financial risk tolerance on the investment equity ratio. Although the direction of the direct effect coefficients did not markedly change, a marked

increase in the statistical significance of the variables was noted. Of particular importance was the effect of marital status on equity holdings. Financial risk tolerance dampened the negative association between being male and married and female and married in 2008 and 2011 while enhancing the direct effects for these groups in 2009 and 2010. Risk tolerance had a significant mediation effect for single males. For those in this category, risk tolerance heightened single men's willingness to hold equities in

three of the four periods. Financial risk tolerance had the opposite effect for single females. While there were no significant direct effects with equity ownership noted for single females, risk tolerance generated significant indirect effects in 2008 and 2011. Single women reported being less risk tolerant; this translated into owning fewer equities as a percent of total investment wealth.

Table 6 provides a summary of the total effects of each variable over the four periods. The total effect was estimated by summing

Table 3. Direct Effects on the Investment Equity Ratio, Annual Models

	2008	2009	2010	2011
	Coefficient	Coefficient	Coefficient	Coefficient
Risk Score	0.28 ***	0.03 ***	0.20 ***	0.26 ***
Married Male	0.95 *	0.19 **	0.65	0.23
Married Female	1.09 *	0.08 *	0.33	0.09
Single Male	0.00	0.00	-0.43	0.04
Single Female	0.04	0.00	-0.02	-0.30

Table 4. Direct Effects on Financial Risk Tolerance, Annual Models

	2008	2009	2010	2011
	Coefficient	Coefficient	Coefficient	Coefficient
Married Male	-0.87 ***	1.66 ***	2.71 ***	-0.51 ***
Married Female	-2.78 ***	0.00	0.51 **	-2.75 ***
Single Male	0.00	3.00 ***	3.68	0.11
Single Female	-3.33***	0.45	-0.09	-3.06***

Table 5. Indirect Effects on the Investment Equity Ratio, Annual Models

	2008	2009	2010	2011
	Coefficient	Coefficient	Coefficient	Coefficient
Married Male	-0.25 ***	0.04 ***	0.54 ***	-0.13 **
Married Female	-0.81 ***	0.00	0.10 *	-0.70 ***
Single Male	0.01 ***	0.08 ***	0.73 ***	0.03
Single Female	-0.96***	0.02	-0.02	-0.78***

Table 6. Total (Direct + Indirect) Effects on the Investment Equity Ratio, Annual Models

	2008	2009	2010	2011
	Coefficient	Coefficient	Coefficient	Coefficient
Risk Score	0.28 ***	0.03 ***	0.20 ***	0.26 ***
Married Male	0.70	0.23 ***	1.19 **	0.10
Married Female	0.28	0.08 ***	0.44	-0.62 *
Single Male	0.01 ***	0.08 ***	0.30 *	0.07
Single Female	-0.91 *	0.02	-0.04	-1.09 ***

the direct and indirect effects for each variable on the investment equity ratio. Results shown in the table support the notion that financial risk is an important, if not the most important, factor in shaping someone's decision to invest in risky assets. Risk tolerance worked as a mediator between the gender-marital status variables on the investment equity ratio. As risk tolerance increased, so did the percentage of assets held in equities. As risk aversion increased, the amount held in equities fell. While risk tolerance did not fully mediate the gender-marital status relationships across all four periods of analysis, the variable did increase the statistical significance of many of the associations.

Discussion

As noted at the outset of this paper, much of the social and behavioral risk research to date has examined risk attitudes and behaviors from an environmental, business, and policy perspective. Few studies have specifically examined the effect of risk attitudes on what has come to be known in the household finance literature as financial planning behavior. The studies that have addressed financial planning topics have most often evaluated financial risk tolerance using responses to gambling task questions. This paper extends this literature by testing financial planning behavior and risk taking attitudes by viewing the two concepts from an investing, rather than gambling, context. Additionally, the study used a psychometrically designed risk-tolerance assessment that was created to measure a person's willingness to engage in financial decisions that entail the possibility of gains and losses rather than gambling questions.

The paper advances the literature in another significant way. Specifically, the research reported here helps clarify the importance of gender and marital status in shaping both risk attitudes and risky financial behavior. The literature is replete with documentation that women are more risk averse than men. Additionally, the literature suggests that marital status differences are involved in shaping risky financial decision making. By combining gender and marital status categories, this study has shown that while the gender-marital status relationship with investing decisions is important, the association is outweighed dramatically by the risk attitude held by the decision maker.

In general terms, risk tolerance tends to be positively associated with investing behavior. However, as shown in previous studies, gender and marital status have different influences on investing behavior. The investing behavior of males seems to be amplified by risk tolerance as compared to females, whose investing behavior appears to be attenuated by lower risk tolerance. For marital status, being unmarried shows a non-significant, direct association with investing behavior; however, the relationship is more nuanced than what it appears. The specific association between marital status and investing behavior is significantly amplified by risk tolerance. Stated another way, financial risk tolerance mediates the marital status investment equity ratio relationship.

The mediation effect of financial risk tolerance on the gender-marital status and investment equity ratio association has both research and policy implications. It is important to note that, to some degree, both gender and marital status exhibited some level of relationship with risky financial behavior, although the associations were not particularly consistent across time. The association between financial risk tolerance and the investment equity ratio, on the other hand, was both positive and significant across the four periods of analysis. Those who were more willing to take financial risks were more likely to report holding a greater percent of their wealth in equities. As a mediator between the gender-marital status variables, financial risk tolerance amplified risk taking in some years and attenuated risk taking in other years. Consider 2008 and 2011. These years marked losses in the US equities markets. During these periods, the risk tolerance of married males and females declined, which reduced the direct effect coefficients; however, in 2009 and 2010, when the markets recorded gains, the risk tolerance of married males and females increased, which had a positive effect on the investment equity ratio coefficients. Additionally, results add to the literature by showing that single males are more likely to report a greater willingness to take financial risks than single females. This tendency resulted in single males being more likely than single females to hold more equities.

These findings can be used by those who provide financial education. For example, rather than assume that females universally will be less willing to take financial risks, it seems more appropriate to focus on providing females with information and guidance on taking appropriate risks to meet current and future

goals. Consider again the findings that showed how having a higher tolerance for risk shifted the investment equity ratio higher in 2010 for married women, whereas exhibiting a lower risk tolerance shifted the investment equity ratio lower in 2009 and 2011. Instead of lamenting the lack of investing on the part of women that often results in lower lifetime wealth accumulation, it may be better to promote education interventions that lessen fear associated with financial decision making. If new approaches to empowering females can be identified that result in an enhanced willingness to take risk, then much of the gender and marital status gaps in wealth that have been identified may be reduced. Of course, this only a conjecture, but it is worth additional study.

While the findings from this study are noteworthy, it is important to place the results in context of certain limitations. First, the results were based on responses from a non-randomly developed sample. The survey in which answers were derived was open to anyone with internet access. This may have skewed responses to those who were, at the time of survey completion, more technically savvy. Second, the path models were, by design, limited to four variables. Had other variables been included the results may have changed. It is important, therefore, that future studies be conducted to validate the findings reported here by including other relevant demographic and socioeconomic predictor variables, including income and education. Nonetheless, results from this research project provide a starting point in further discussions regarding the role gender, marital status, and financial risk tolerance play in shaping financial behaviors. The paper does advance the literature by showing how financial risk tolerance acts as a mediator between gender-marital status variables and investing behavior.

Appendix A. 13-Item Risk Tolerance Scale

1. In general, how would your best friend describe you as a risk taker?
 - a. A real gambler
 - b. Willing to take risks after completing adequate research
 - c. Cautious
 - d. A real risk avoider
2. You are on a TV game show and can choose one of the following, which would you take?
 - a. \$1,000 in cash
 - b. A 50% chance at winning \$5,000
 - c. A 25% change at winning \$10,000
 - d. A 5% chance at winning \$100,000
3. You have just finished saving for a “once-in-a-lifetime” vacation. Three weeks before you plan to leave, you lose your job. You would:
 - a. Cancel the vacation
 - b. Take a much more modest vacation
 - c. Go as scheduled, reasoning that you need the time to prepare for a job search
 - d. Extend your vacation, because this might be your last chance to go first-class
4. 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
5. 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
6. When you think of the word “risk,” which of the following words comes to mind first?
 - a. Loss
 - b. Uncertainty
 - c. Opportunity
 - d. Thrill
7. Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value; bond prices may fall, however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?
 - a. Hold the bonds
 - b. Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets

- c. Sell the bonds and put the total proceeds into hard assets
 d. Sell the bonds, put all the money into hard assets, and borrow additional money to buy more
8. Given the best and worst case returns of the four investment choices below, which would you prefer?
- a. \$200 gain best case; \$0 gain/loss worst case
 b. \$800 gain best case; \$200 loss worst case
 c. \$2,600 gain best case; \$800 loss worst case
 d. \$4,800 gain best case; \$2,400 loss worst case
9. In addition to whatever you own, you have been given \$1,000. You are now asked to choose between:
- a. A sure gain of \$500
 b. A 50% chance to lose \$1,000 and a 50% chance to lose nothing
10. In addition to whatever you own, you have been given \$2,000. You are now asked to choose between:
- a. A sure loss of \$500
 b. A 50% chance to lose \$1,000 and a 50% chance to lose nothing
11. Suppose a relative left you an inheritance of \$100,000, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select?
- a. A savings account or money market mutual fund
 b. A mutual fund that owns stocks and bonds
 c. A portfolio of 15 common stocks
 d. Commodities like gold, silver, and oil
12. If you had to invest \$20,000, which of following investment choices would you find most appealing?
- a. 60% in low-risk investment, 30% in medium-risk investment, 10% high-risk investment
 b. 30% in low-risk investment, 40% in medium-risk investment, 30% high-risk investment
 c. 10% in low-risk investment, 40% in medium-risk investment, 50% high-risk investment
13. Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. IF you had the money, how

much would you invest?

- a. Nothing
 b. One month's salary
 c. Three month's salary
 d. Six month's salary

Scoring

1. a = 4; b = 3; c = 2; d = 1
 2. a = 1; b = 2; c = 3; d = 4
 3. a = 1; b = 2; c = 3; d = 4
 4. a = 1; b = 2; c = 3
 5. a = 1; b = 2; c = 3
 6. a = 1; b = 2; c = 3; d = 4
 7. a = 1; b = 2; c = 3; d = 4
 8. a = 1; b = 2; c = 3; d = 4
 9. a = 1; b = 3^a
 10. a = 1; b = 3
 11. a = 1; b = 2; c = 3; d = 4
 12. a = 1; b = 2; c = 3
 13. a = 1; b = 2; c = 3; d = 4

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

^aAnswers to questions 9 and 10 can be averaged to obtain a combined score.

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