Kathmandu University School of Management Occasional Paper
No. 2

Gender Differences in Risk Aversion

A Study of Nepalese Banking Sector Employees

Binay Kumar Adhikari
Virginia E. O'Leary

July, 2008

ABSTRACT

Women are generally considered more risk averse than men. Using a new graphic-based survey instrument by Hanna and Lindamood (2004), this study examined whether women who are employed in the Nepalese banking sector show more risk aversion than men. Consistent with the existing literature, the findings suggest that women report the intention to take less risk than men. However, risk tolerance is more strongly associated with level of investment knowledge than with sex. No significant interaction effect of sex and marital status for risk tolerance was obtained. Analyses of sex, age, knowledge, risk tolerance and wealth allocation indicated that women demonstrate more risk aversion and invest less of their wealth in risky assets (stocks and direct investments) than men because they consider themselves to be less knowledgeable about investment markets and products. These findings supplement existing literature pointing to the need to educate women investors to increase their confidence in their abilities to succeed in the world of finance.

Risk aversion is a concept in economics, finance, and psychology related to the behavior of consumers and investors faced with uncertainty. Risk aversion refers to the reluctance of a person to accept an outcome with an uncertain payoff rather than another outcome with a more certain, but possibly lower, expected payoff. Thus, many individuals are willing to pay money (or settle for a low return) to avoid playing a risky game, even when the expected value of winning is in their favor.

Considerable empirical evidence suggests that women are more risk averse than men. One study conducted by Weber, Blais and Betz (2002) involved a survey to quantify five distinct risk domains: financial risks, health and safety risks, recreational, ethical and social risks. Their results indicated that women were more risk-averse in all domains except social risk. Hinz, McCarthy and Turner (1997), Sunden and Surette (1998), and Olsen and Cox (2001) found that increased risk aversion affects the investment choices of women. Similarly, Watson and Robinson (2003) reported less variability in profit (risk) for ventures run by women than in those run by men. With respect to superannuation investments specifically, SäveSöderbergh (2003) showed that the proportion of women selecting risky superannuation funds in Sweden was smaller than the proportion of men selecting similarly risky funds. A wealth of psychological literature, summarized in the review by Byrnes, Miller, and Schäfer (1999) of 150 studies examining differences in risk taking between men and women, demonstrated that women, on average, take less risk than men. For example, women tend to use seat belts more often than men and are more likely to be nonsmokers (Hersch 1996).

Previous Tests of Male/Female Risk Aversion in Finance

Several studies have sought to determine whether the difference in risk preferences between men and women found in the psychological literature translates into a difference in investment choices. Two of the first studies to identify women as more risk averse than men when making investment choices were conducted by Cohn et. al. (1975) and Riley and Chow (1992). Later studies by Hinz et al. (1997) and Bajtelsmit and Vanderhei (1997) specifically examined the pension choices of U.S. investors and concluded that, even after the authors had controlled for income and age, women generally chose less risky pension fund options. Similarly, Sunden and Surette (1998) reported that after marital status was added to their list of control variables, women still chose less risky pension funds. Other studies that have found women to be more financially risk averse than men include Olsen and Cox (2001), Jianakoplos and Bernasek (1998), and Bernasek and Shwiff (2001). Likewise, Powell and Ansic (1997) used experimental methods to study financial decision-making and found that women were more risk averse than men, regardless of "familiarity and framing, costs or ambiguity."

Few studies on risk aversion have been conducted in Asian countries. One study by Mittal and Dhade (2007) attempted to determine whether women prefer low risk assets compared to men. An empirical investigation of 167 respondents from Indore, India was conducted. The results indicated that women were less inclined to take risks than men and held less risky portfolios. The impact of the framing effect was found to be more pronounced in the case of females than males.

Other Factors That Might Influence Risk Aversion

Previous research findings not only support the proposition that women are more averse to financial risk than men but also suggest other factors that can influence risk aversion. Using three different datasets, Hartog, Carbonell and Jonker (2000) found substantial empirical support for the claim that risk aversion is higher for both women and civil servants. It is lower for the self-employed and decreases as income, wealth and education increase.

Using the 1983 Survey of Consumer Finances, Hawley and Fujii (1993) employed ordered logit models to investigate the effects of net worth and individual characteristics on risk tolerance. The study included economically active respondents 25-62 years of age. Education, income and debt were positively related to risk tolerance. Married couples and households headed by a single male were more risk tolerant than otherwise similar households headed by a single female. Age was not statistically significant in the analysis. The Hawley and Fujii (1993) results are consistent with results from Warner and Cramer (1995) and Lee and Hanna (1995a). Using 1983 SCF data on risk tolerance, Lee and Hanna (1995a) derived a distribution of dichotomous risk tolerance level by demographic groups. Of 2,691 respondents in the sample, 60% were willing to take financial risks. Predicted risk tolerance was approximately the same for all ages under 55, then decreased with age. Predicted risk tolerance increased with education. Using the 1983 SCF risk tolerance data, Sung and Hanna (1996) employed an ordered probit model of a 3-level dependent variable to analyze the effects of income and demographic variables on risk tolerance. They found that income and education were positively related to risk. Generally, risk tolerance decreased with age after 45. Self-employed persons and farmers were significantly more willing to take financial risks than their counterparts.

Similarly, Jaggia and Thosar (2000) noted an "inverse relationship between age ... and risk taking"; De Bondt (1998) stated that an often cited rule of thumb used in the financial industry is to hold 100% minus the investor's age in equities. Therefore, age is controlled for in most analyses of risk aversion.

However, Jianakoplos and Bernasek (1998) found no relationship between knowledge and risk taking, and Sunden and Surette (1998) found that education had no effect on risk preferences.

A final factor that seems to influence risk aversion, although not necessarily in a predictable manner, is an individual's marital status. Daly and Wilson (2001) suggested that the increased responsibilities accompanying marriage and children will make a man less tolerant of risk. Supportive of this theory is the finding by Sunden and Surette (1998) that marriage makes both men and women more risk averse in their choice of pension plans. Säve-Söderbergh (2003) argued, however, that marriage might encourage a couple to invest in riskier assets because each person now has a second income stream insuring against the loss of his or her own income. Furthermore, Säve-Söderbergh suggested that marriage has the potential to affect the risk preferences of men and women differently. For example, if the joint utility of investment is thought of as a compromise between the risk preferences of the married man and the married woman, the result could be investment outcomes for a couple that reflect greater risk aversion for the man compensated by decreased risk aversion for the woman. Yet another potential outcome of marriage might be that one of the pair takes charge of all investment decisions in the household, and thus the other's investment decisions no longer reflect that individual's risk preferences. Jianakoplos and Bernasek (1998) also found that the presence of children significantly increases the risk tolerance of married couples in their investments but significantly decreases the risk tolerance of single women. Therefore, the literature indicates that marriage may significantly affect the risk preferences of individuals, even if there are potentially offsetting theories explaining the direction of such effects.

In summary, age, income, knowledge, and marital status are the four variables most commonly controlled for in the literature concerned with the relative risk preferences of men and women. Other variables, of course, may also be influencing the results. For example, race has been shown to influence risk perceptions (Flynn et. al. 1994). Finucane et. al. (2000) found white men to be the most risk tolerant. Moreover, Riley and Chow (1992) noted that the geographical location of an investor might influence risk preferences, although they suggest that income is probably driving this result.

Around the globe women are an increasing presence in the financial world. Over time these well educated professional women in Nepal will assume their rightful positions as independent players in the world of work and finance alongside their sisters in the developed world. The fact that such changes have begun is evidenced by the increasing number of women employed in the banking sector. These changes will inevitably continue.

Research suggests that women, because they usually have lower working-life incomes than men (Bajtelsmit & Bernasek 1996 as cited in Watson & McNaughton 2007), are likely to have less wealth than men when they retire. The potential effect of this difference on the retirement benefits of men and women are compounded by the fact that women typically have longer life spans over which their retirement benefits must be allocated and they also tend to retire earlier than men (Blondal and Scarpetta 1998 as cited in Watson and McNaughton 2007). If women are indeed more risk averse in their investment choices, this characteristic will magnify the problems associated with their lower work-life incomes, lower retirement ages, and longer life expectancies. Appropriate policy interventions must be effectively designed. The issue is important to private and social pension policy makers and professionals who provide investment information and services to clients.

If women are, or are believed to be, more risk-averse then men, the implications for the types of jobs they are offered and salary they receive are profound. Women may not be offered jobs which require risky decision making (eg. Investment Manager) or they may be compensated at lower rates than men (Charness & Gneezy, 2004). Bliss and Potter (2001) evaluated the performances of 3200 single mangers mutual funds and found that women manage only 11% of them. Female managers confront "glass ceilings" on corporate promotion ladders more often than men because it is assumed that they cannot make the risky decisions which result in high returns (Johnson & Powell, 1994).

Recently, the World Bank's (2005) released "Engendering Development - Through Gender Equality in Rights, Resources, and Voice", a policy research report focusing on gender issues and their broad economic and social implications in developing and transitional countries. This report examines the conceptual and empirical links among gender, public policy, and development outcomes. Among several findings, it concludes that it is critically important to take gender into account in the field of social protection and the design of public programs. The positive effect of increased household income on the child welfare - their education, health, and nutrition - is stronger if that increase is controlled by - or channeled through - the mother. There may be a case, from a development effectiveness perspective, for targeting larger funds to women or, as is suggested in this report, designing investment products and schemes targeted to the attitudes and values of women, who are likely to be more productive mobilizers of their households' resources than men.

The world wide literature has repeatedly found evidence for the greater financial conservatism of women compared to men (Lewellen, Lease & Schlarbaum, 1977; Bruce & Johnson, 1994; Barber & Odean, 1995; Barskey, Kimball & Shapiro, 1996; Bajtelsmit & VanDerhei, 1997; Hinz et al., 1997,

Jianakoplos & Barnesek, 1998). All other things equal, a conservative investment strategy results in less income on average than a more aggressive strategy. Higher returns generally come at the cost of higher risk. A consequence of the relationship between risks and returns is that women, who choose to bear lower risk, will generally earn lower returns - in the long run. Life expectancy at birth has been increasing for both males and females in Nepal. It has increased from 42 years for males and 40 years for females in 1971[1] to 62 years for both males and females in 2005. Women's life expectancy is projected to exceed that of the men in the near future (World Health Report, 2005 and population projection for Nepal 2001-2021). Women's greater longevity implies that, even with the same investment strategy and pension accumulation, retirement wealth must support a longer period of retirement. Women have lower lifetime earnings, less earnings growth, less wealth, less pension coverage and lower pension participation rates. To date, no empirical study of gender differences in financial risk preference in Nepal has been conducted. In fact research on risk aversion that includes Asian population is very limited (Yao, 2007). This research was undertaken to provide baseline information of value to those working to establish forward looking policies and procedures to accommodate the financial interests and needs of women and men in the world of business and entrepreneurship.

It is hypothesized that after other factors (age, marital status, income, number of children, knowledge of investment) known to influence an individual's risk preferences are controlled, Nepali women will demonstrate, on average, more risk aversion than Nepali men.

METHOD

Hanna, Gutter and Fan (2001) observed that there are at least four methods of measuring risk tolerance: asking about investment choices, asking a combination of investment and subjective questions, assessing actual behavior, and asking questions based on hypothetical scenarios. They noted that inferring risk aversion based on observing actual portfolio allocations has many limitations, including the fact that many households have no portfolio to allocate so that nothing can be inferred about their risk aversion from their allocation.

The methodology for this study employed hypothetical questions because it has been shown to be the firmest link to the theoretical concept of risk aversion. If the respondent chooses to take an uncertain risk that could result in a decrease in income (or a significant gain) instead of one that is certain although

[1]Source: http://www.searo.who.int/EN/Section313/Section1523_6868.htm

less advantageous, Barsky, Juster, Kimball and Shapiro (1997) show that the expected utility of the income resulting from the riskier choice exceeds the expected utility of having the current income stream with certainty.[2]

This study used a modified version of the Hanna et al. (2001) pension choice measure of risk aversion that follows the expected utility model. The modified pension choice questions included graphical illustrations to represent the quantity of the change in the pension to increase the respondents' understanding of the consequences of the hypothetical alternative outcomes and thus more accurately estimate their true risk level.

Instrument

A new, graphic-based survey instrument developed by Hanna and Lindamood (2004) was employed.[3] In addition to the series of pension choice questions, the survey also included the SCF Investment Risk question [4] for comparison purposes.

[2] Let U be the utility function and C be permanent consumption. An expected utility maximizer will choose the 50-50 gamble of doubling lifetime income as opposed to having it fall by factor 1 - λ if:.5 U (2C) + .5 U (λ C) > U(C)

[3] Illustrative of the questions contained in the questionnaire is the following:
Suppose that you are about to retire, and have two choices for a pension. Pension A gives you an income equal to your pre-retirement income. Pension B has a 50% chance your income will be double your pre-retirement income, and a 50% chance that your income will be 20% less than your pre-retirement income. You will have no other source of income during retirement, no chance of employment, and no other family income ever in the future. All incomes are after-tax. Which pension would you choose?
Subsequent questions pose different percentage reductions in income. There were six questions out of which the respondent is required to answer a maximum of four questions. The respondent who accepts the possibility of largest cut in income for a possibility of doubling the income gets the higher possible point (on a scale of 1 to 7) indicating an extremely high subjective risk tolerance (SRT).

[4] The Survey of Consumer Finances (SCF) is used to gather data on assets, liabilities, financial attitudes, and financial behaviors of individuals and families. The SCF questions ask:
Which of the following statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?
1. Take substantial financial risk expecting to earn substantial returns
2. Take above average financial risks expecting to earn above average returns
3. Take average financial risks expecting to earn average returns
4. Not willing to take any financial risks
The SCF risk assessment item has been widely used as a proxy for financial risk tolerance, although no published documentation exists to substantiate the validity of this item. However, based on the use of the item in published research (e.g., Chang, 1994; Grable and Lytton, 1998; Sung and Hanna, 1996; Yuh and DeVaney, 1996 as cited in Grable & Lytton, 1999), one can assume at least a moderate degree of item validity. Also, scores on the item have been very consistent over time, suggesting a high level of reliability.

Participants

Participants in the study were 206 employees of 12 banks and financial institutions in Nepal. Convenience sampling was used to select the respondents. Only employees of the banking sector were chosen in order to control the effects of differences in professions.

RESULTS AND DISCUSSION

Respondents' risk aversion ranks were derived from Hanna and Lindamood's (2004) risk tolerance questions and assigned a numeric rank in ascending order; coded 1 (extremely low), 2 (very low), 3 (moderately low), 4 (moderate), 5 (high), 6 (very high) and 7 (extremely high) risk tolerance. The coded risk tolerance figures were regressed as the dependent variable against several relevant independent variables.

$$SRT = \beta_0 + \beta_1(sex) + \beta_2(age) + \beta_3(marital) + \beta_4(knowledge) + \beta_5(income) + \beta_6(kids)$$

SRT = respondent's Subjective Risk Tolerance rank derived from Hanna and Lindamood's risk tolerance questions; coded from 1 for extremely low to 7 for extremely high risk tolerance

sex = dummy variable; coded 1 for women and 0 for men

age = respondent's age range coded 1, 2, 3, 4, 5 etc. in ascending order.

marital = dummy variable; coded 1 for married and 0 for not married

income = respondent's annual income range; coded 1, 2, 3, 4, 5 etc. in ascending order.

knowledge = respondent's self-reported level of knowledge of investment market and products; coded 1, 2, 3, 4, 5 etc. in ascending order.

kids = number of children (if married)

A regression equation was used employing backward elimination, which involves starting with all candidate variables and testing them one by one for statistical significance, deleting any that are not significant (variables with largest p-values were the first to be eliminated). Once the overall model was

statistically significant ($p < .05$), the remaining individual regressors were analyzed. A two-way ANOVA was conducted to assess the interaction effects of marital status and sex.

The results of the regression with backward elimination are shown in Table 1(a). The overall model became statistically significant at .05 ($F = 3.09$; $p<.05$) when *kids*, *age* and *marital* are eliminated as predictors. This indicates that these variables do have a significant impact on aversion. The regression coefficients of the model with the remaining predictors - *knowledge*, *sex* and *income* - are presented in Table 1(b). The results show that only knowledge had significant impact on SRT ($p < .05$). The impact of sex and income were not statistically significant according to the regression analysis.

Further analyses were employed to determine whether Investment Risk Tolerance (IRT) derived from the SCF questions and the Subjective Risk Tolerance (SRT) vary among sex, knowledge and income. In interpreting these results it is important to note that the higher the score on the SRT the greater the risk tolerance (or less risk aversion). The opposite is true with the IRT scores. The results of the ANOVA in Table 2(a) indicate that both the IRT and the SRT varied significantly between men and women ($p <.05$). As the negative sign of the coefficient of gender from the regression (Table 1b) suggests, men exhibit greater risk tolerance than women. Likewise, the results of Table 2b indicate that both IRT ($p =.01$) and SRT ($p = .01$) varied significantly with the level of knowledge one has or believes he/she has about the investment market and financial products. As the positive sign of the regression coefficients in Table 1 (b) indicates, risk tolerance increases with level of financial knowledge. Neither the IRT nor the SRT varied significantly with the level of income.

Although results of the regression suggest that only knowledge had a significant impact on risk tolerance, the ANOVA applied to individual predictors showed that sex also had an impact on risk aversion. Thus, gender affected risk taking propensity although not in the magnitude hypothesized based on the review of the literature. Directionality of the findings is suggested in the results shown in Table 1(b). Men tend to be more risk tolerant than women (the sex coefficient has a negative sign). Perceived knowledge of the investment market and financial products has been shown to have a significant impact on risk aversion. The positive sign of the regression coefficient suggests that risk tolerance increases with the increase in perceived knowledge of investment related information.

The significant positive relation between age and knowledge is shown in Table 3 ($r = .28$, $p<.05$) indicating that older bank employees are more knowledgeable about financial matters than their younger colleagues. Likewise, there is a positive relationship between knowledge and risk tolerance ($r = .28$, $p <$

.05) which suggests that people with more investment knowledge endorse more risky options. Furthermore, both reported risk tolerance measures, the IRT (r = -.18, p <.05) and the SRT (r = .13, p <.10), for the employees are inversely related to the proportion of wealth kept in risky assets i.e. stocks and direct investment in business. Those who rate themselves as high risk takers invest a larger portion of their wealth in risky assets (stocks and business) than those who rate themselves as more risk averse.

As indicated in Table 5 (a and b), sex by marital status interaction was not significant for either the SRT or the IRT.

Women, who generally consider themselves less knowledgeable about finance than men exhibit greater risk aversion. However, the relationship is stronger between knowledge and risk tolerance than between gender and risk tolerance. It is therefore not surprising that in a review of a wide range of literature Lyons et. al (2008) conclude that the research on risk tolerance indicating women are more risk averse than men is far from clear.

Indeed, the current finding that knowledge plays an important role than sex in risk-taking behavior has supported by a number of studies. For example, Hartog et al. (2000), Hawley and Fujii (1993), Lee and Hanna (1995a), Sung and Hanna (1996) find that education and risk tolerance are positively related. Similarly, Haliassos and Bertaut (1995) have found that people may invest too conservatively due to a lack of financial experience or expertise.

In another study, using data from a national survey of nearly 2000 mutual fund investors, Dwyer, Gilkeson and List (2002) investigated whether investor gender is related to risk taking as revealed in mutual fund investment decisions. Consistent with much of the extant literature, they find that women exhibit less risk-taking than men in their most recent, largest, and riskiest mutual fund investment decisions. However, more importantly, the impact of gender on risk taking is significantly weakened when investor knowledge of financial markets and investments is statistically controlled. This result suggests that the greater level of risk aversion among women frequently documented in the literature is in large part a function of knowledge disparities.

Only recently have women entered the job market in Nepal in large numbers. Therefore, women employees of banks are, on average, much younger than their male counterparts. In the current study women respondents were on an average some 10 years younger than the men. As can be seen in Table 4, the difference between average age of men and women was significant (p =.00). The fact that women are younger and have been in the job market for fewer years affects their perception of themselves as less

knowledgeable about investments rendering them less confident of financial decisions and thus more risk adverse.

Knowledge has been found to be an important determinant of risk tolerance. Therefore, knowledge, acquired through either experience or education, is an important factor that is commonly controlled for in the literature to assess gender effects (Watson & McNaughton, 2007). An individual who has learned that risky investments generally lead to higher returns than conservative investments is more likely to make risky investments. Riley and Chow (1992) found that investors with relatively less education invested conservatively even when income was controlled. Olsen and Cox (2001) found that "experience and level of expertise reduce, but usually do not eliminate risk-taking differences by gender (p. 30)".

In surveys of college students at a large state university, Goldsmith and Goldsmith (1997) and Goldsmith, Goldsmith, and Heaney (1997) found that men reported higher levels of financial knowledge than women. This supports the findings of Dwyer et al. (2002) reported earlier.

Some psychological research on this topic provides a different perspective. Studies using simulations of risky situations like military decision problems (Hudgens & Fatkin, 1985) and gambling (Levin, Synder, & Chapman, 1988) have shown that women are more cautious than men. However, there is some debate about whether gender differences in task familiarity drive these results. Levin et al. (1988) pointed out that differences in observed behavior may be the result of gender-specific exposure and experience.

All in all, the findings of the literature on finance and economics provide evidence that knowledge not gender is the key determinant of risk-taking propensity. A number of recent studies have used the Health and Retirement Study (HRS) data to examine both the sources and consequences of decision-making power (e.g., Elder & Rudolph, 2003; Friedberg & Webb, 2006; Lyons, Neelakantan, Fava, & Scherpf, 2007). Elder and Rudolph (2003) employed the “final say” question in the HRS to identify the sources of decision-making power within households. They found that decisions were more likely to be made by the spouse with greater financial knowledge, more education, and a higher wage, irrespective of gender. Experience and expertise count more than sex.

Only a main effect for sex and marital status was obtained on risk tolerance indicating that women, whether married or single, exhibit less risk-tolerance than men. Traditonally, in Nepalese households, husbands and/or fathers make most of the financial decisions so wives and daughters remain

less knowledgeable about finances, rendering women uncomfortable taking financial risks. Another explanation is that as shown in Table 3, more men than women in our sample are married ($r = -.16$, $p<.05$) so even sex and marital status are not entirely independent.

CONCLUSION

The major finding of the current study, that women exhibit less financial risk tolerance than men is apparently occasioned by a disparity in perceived knowledge about investments. Deaux and Emswiller (1994) and Beyer and Bowden (1997) have noted that women are less confident and more risk averse in domains considered masculine, regardless of their (equal) ability to perform. Men are represented in greater numbers in financial markets than women (Merrill Lynch, 1996). In addition, women are likely to be perceived as more conservative investors and therefore offered less risky investments by brokers (Wang, 1994).

As we have seen earlier, psychological research has shown that men tend to be more overconfident than women in areas like finance. Theory predicts that overconfident people trade excessively. Barber and Odean (2001) tested this prediction using account data from a discount brokerage firm and found that men traded 45% more than women. Trading reduced men's (risky) net returns by 2.65 percentage points a year compared to 1.72 percentage points for women.

There is a need for more specific and targeted financial education to help men and women with their investment decisions. Men may need to be cautioned about the pitfalls of trading excessively, while women may need guidance on how to make investment choices that carry a certain amount of risk to obtain adequate growth.

Future research on risk tolerance that involves observation and analysis of actual behavior can complement the findings of this study well.

REFERENCES

Bajtelsmit, V.L., & Vanderhei, J.L. (1997). Risk aversion and pension investment choices in positioning pensions for the twenty-first century. Edited by M.S. Gordon, O.S. Mitchell, & M. M. Twinney. Philadelphia, PA: University of Pennsylvania Press.

Barber, B. & Odean, T. (1999). Boys will be boys: gender overconfidence and common stock investment University of California at Davis, Davis, CA., Working paper.

Barskey, R., Kimball, M. & Shapiro, M. (1996). Preference parameters and behavorial heterogeneity: An experimental approach in the health and retirement survey. Working Paper Series (5667).

Barsky, R.B., Juster, F.T., Kimball, M.S. & Shapiro, M.D. (1997). Preference parameters and behavioral heterogeneity: An experimental approach in the health and retirement study. *Quarterly Journal of Economics*, 112 (2), 537-579.

Bernasek, A., & Shwiff S. (2001). Gender, risk, and retirement. *Journal of Economic Issues*, 35(2), 345-356.

Beyer, S & Bowden, E. (1997). Gender differences in self-perceptions: convergent evidence from three measures of accuracy and bias. *Personality and Social Psychology Bulletin*, 23, 157-172.

Bruce, A. & Johnson, J. (1994). Male and female betting behavior: new perspectives. *Journal of Gambling Studies*, 10, 183-98.

Byrnes, J.P., Miller, D.C. & Schäfer, W.D. (1999). Gender differences in risk taking: A meta- analysis. *Psychological Bulletin*, 125(3), 367-383.

Charness, G. & Gneezy, U. (2004). Gender difference in financial risk – taking. Retrieved September 10, 2007 from Web site: www.SSRN_ID648735_code96638.pdf.

Cohn, R. A., Lewellen, W.G., Lease, R.C., and Schlarbaum, G.G. (1975). individual investor risk aversion and investment portfolio composition. *Journal of Finance*, 30(2), 605-620.

Daly, M., & Wilson, M. (2001). Risk-taking, intra-sexual competition, and homicide. Nebraska Symposium on Motivation, 47, 1-36.

De Bondt, W.F.M. (1998). A portrait of the individual investor. *European Economic Review*, 42(3-5), 831-844.

Deaux, K., & Emswiller, T. (1974). explanations of successful performance on sex-linked tasks: What is skill for the male is luck for the female. *Journal of Personality and Social Psychology*, XXIX, 80–85.

Dwyer, P.D., Gilkeson, J.H., & List, J.A. (2002). Gender differences in revealed risk taking: Evidence from mutual fund investors. *Economics Letters*, 76(2), 151-158.

Finucane, M.L., Flynn, J., Mertz, C.K., Satterfield, T.A. & Slovic, P. (2000). Gender, race, and perceived risk: the 'White Male' effect. *Health Risk and Society*, 2(2), 159-1 72.

Flynn, J., Slovic, P. & Mertz, C.K. (1994). Gender, race and perception of environmental health risks. *Risk Analysis*, 14(6), 1101-1108.

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

Hanna, S.D. & Lindamood, S. (2004). An improved measure of risk aversion. Association for Financial Counseling and Planning Education.

Hanna, S.D., Gutter, M.S., & Fan, J. X. (2001). A measure of risk tolerance based on economic theory. *Financial Counseling and Planning*, 12 (2), 53-60.

Hartog, J., Carbonell, A.F. & Jonker, N. (2000). On a simple measure of individual risk aversion. Tinbergen Institute Discussion Paper.

Hawley, C.B. & Fujii, E.T. (1993). An empirical analysis of preferences for financial risk: further evidence on the Friedman-Savage model. *Journal of Post Keynesian Economics*, 16(2). 197-204.

Hersch, J. (1996). Smoking, seat belts, and other risky consumer decisions: Differences by gender and race. *Managerial and Decision Economics*, 17(5), 471-481.

Hinz, R.P., McCarthy, D.D. & Turner, J.A. (1997). Are women conservative investors? Gender differences in participant directed pension investments. In positioning pensions for the twenty-

first century. Edited by M.S. Gordon, O.S. Mitchell, and M.M. Twinney. Philadelphia, PA: University of Pennsylvania Press.

Jaggia, S., & Thosar, S. (2000). Risk aversion and the investment horizon: A new perspective on the time diversification debate. *Journal of Psychology and Financial Markets*, 1(3-4), 211-215.

Jianakoplos, N.A., & Bernasek, A. (1998). Are women more risk averse? *Economic Inquiry*, 36(4), 620-630.

Johnson, J. E.V. & Powell, P. L., (1994). Decision making, risk and gender: Are managers different? *British Journal of Management* 5 (2), 123-38.

Lee, H. & Hanna, S. (1995a). Empirical patterns of risk tolerance. Proceedings: Academy of Financial Services.

Levin, I. P., Synder, M. A., & Chapman, D. P. (1988). The interaction of experiential and situational factors and gender in a simulated risky decision-making task. *The Journal of Psychology*, 122(2), 173-181.

Lewellen, W., Lease, R., Schlarbaum, G. (1977). Patterns of investment strategy and behavior among individual investors, *Journal of Business*, 50(3), 296-333.

Lyons, A. C., Neelakantan, U. & Scherpf, E. (2008). Gender and marital differences in wealth and investment decisions: Implications for researchers, financial professionals, and educators. Networks Financial Institute Working Paper No. 2008-WP-02.

Merril Lynch (1996). You and your money. A financial handbook for women investors, New York.

Mittal M. & Dhade A. (2007). Gender difference in investment risk taking: An empirical study. *Icfai Journal of Behavioral Finance,* 4(2), 32-42.

Olsen, R.A., & Cox, C.M. (2001). The influence of gender on the perception and response to investment risk: The case of professional investors. *Journal of Psychology and Financial Markets*, 2(1), 29-36.

Powell, M. & Ansic, D. (1997). Gender differences in risk behaviour in financial decision-making: An experimental analysis. *Journal of Economic Psychology.* 18, 605 – 628.

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

Säve-Söderbergh, J. (2003). Essays on gender differences in economic decision-making. PhD thesis, Stockholm University.

Sunden, A.E., & Surette, B.J. (1998). Gender differences in the allocation of assets in retirement savings plans. *American Economic Review*, 88(2), 207-211.

Sung, J. & Hanna, S. (1996). Factors related to household risk tolerance: An ordered probit analysis. Proceedings of the 42nd Annual Conference of the American Council on Consumer Interests, 221-228.

Wang, P. (1994). Brokers still treat men better than women. *Money*, 23 (6), 108-10.

Warner, N. & Cramer, S. (1995). Saving behavior. *Journal of Consumer Studies and Home Economics*, 19, 57-67.

Watson, J., & McNaughton, M. (2007). Gender differences in risk aversion and expected retirement benefits. *Financial Analysts Journal*. 63(4)

Watson, J., & Robinson, S. (2003). Adjusting for risk in comparing the performances of male- and female-controlled SMEs. *Journal of Business Venturing*, 18(6), 773-788.

Weber, E.U., Blais, A.R. & Betz, N.E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, 15, 263–290

Yao, R. (2007). Financial issues of Asian Americans. In Xiao, J. (Eds.), *Advances in Consumer Finance Research*, (pp. 303-316).

APPENDIX: TABLES

Table 1 (a) ANOVA[g] with Backward Elimination

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	41.0121	6	6.8353	1.5753	0.1609[a]
	Residual	481.6257	111	4.3390		
	Total	522.6377	117			
2	Regression	40.7126	5	8.1425	1.8923	0.1012[b]
	Residual	481.9251	112	4.3029		
	Total	522.6377	117			
3	Regression	40.0794	4	10.0199	2.3463	0.0588[c]
	Residual	482.5583	113	4.2704		
	Total	522.6377	117			
4	Regression	39.3609	3	13.1203	3.0949	0.0298[d]
	Residual	483.2768	114	4.2393		
	Total	522.6377	117			
5	Regression	38.4920	2	19.2460	4.57154	0.0123[e]
	Residual	484.1457	115	4.2100		
	Total	522.6377	117			
6	Regression	31.3623	1	31.3623	7.4052	0.0075[f]
	Residual	491.2754	116	4.2351		
	Total	522.6377	117			

a. Predictors: (Constant), knowledge, income, kids, sex, marital, age
b. Predictors: (Constant), knowledge, income, sex, marital, age
c. Predictors: (Constant), knowledge, income, sex, marital
d. Predictors: (Constant), knowledge, income, sex
e. Predictors: (Constant), knowledge, sex
f. Predictors: (Constant), knowledge
g. Dependent Variable: SRT

Table 1 (b). Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.1444	0.6579		4.7797	0.0000
Sex	-0.4126	0.3201	-0.0981	-1.2889	0.1991
Income	-0.0629	0.0826	-0.0550	-0.7619	0.4471
knowledge	0.4319	0.1320	0.2508	3.2719	0.0013

Predictors: (Constant), knowledge, income, sex
Dependent Variable: SRT

Table 2 (a). IRT SRT by sex (ANOVA)

		Sum of Squares	df	Mean Square	F	Sig.
IRT	Between Groups	2.788	1	2.788	4.555	.034
	Within Groups	112.615	184	.612		
	Total	115.403	185			
SRT	Between Groups	23.550	1	23.550	5.683	.018
	Within Groups	816.393	197	4.144		
	Total	839.942	198			

Table 2 (b). IRT SRT by knowledge (ANOVA)

		Sum of Squares	df	Mean Square	F	Sig.
IRT	Between Groups	9.901	6	1.650	2.849	.011
	Within Groups	100.795	174	.579		
	Total	110.696	180			
SRT	Between Groups	68.754	6	11.459	2.904	.010
	Within Groups	729.996	185	3.946		
	Total	798.750	191			

Table 2 (c). IRT SRT by income (ANOVA)

		Sum of Squares	df	Mean Square	F	Sig.
IRT	Between Groups	3.156	6	.526	.842	.539
	Within Groups	106.866	171	.625		
	Total	110.022	177			
SRT	Between Groups	24.682	6	4.114	.994	.431
	Within Groups	748.876	181	4.137		
	Total	773.559	187			

Table 3. Correlations

		IRT	SRT	sex	age	marital	knowledge	stock
IRT	Pearson Correlation		-.337**	.155*	.031	-0.038	-.280**	-.180*
	Sig. (2-tailed)		.000	.034	.679	0.599	.000	.020
	N		180	186	186	185	181	169
SRT	Pearson Correlation	-.337**		-.167*	.092	-0.038	.284**	.126#
	Sig. (2-tailed)	.000		.018	.197	0.593	.000	.092
	N	180		199	199	198	192	181
sex	Pearson Correlation	.155*	-.167*		-.361**	-0.157*	-.359**	-.159*
	Sig. (2-tailed)	.034	.018		.000	0.024	.000	.030
	N	186	199		206	205	199	188
age	Pearson Correlation	.031	.092	-.361**		0.519**	.277**	.049
	Sig. (2-tailed)	.679	.197	.000		0.000	.000	.508
	N	186	199	206		205	199	188
marital	Pearson Correlation	-0.038	-0.038	-0.157*	0.519**		0.145*	-0.013
	Sig. (2-tailed)	0.599	0.593	0.024	0.000		0.041	0.860
	N	185	198	205	205		198	187
knowledge	Pearson Correlation	-.280**	.284**	-.359**	.277**	0.145*		.272**
	Sig. (2-tailed)	.000	.000	.000	.000	0.041		.000
	N	181	192	199	199	198		182
stock	Pearson Correlation	-.180*	.126#	-.159*	.049	-0.013	.272**	
	Sig. (2-tailed)	.020	.092	.030	.508	0.860	.000	
	N	169	181	188	188	187	182	

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)
Correlation is significant at the 0.10 level (2-tailed)

Table 4. Independent Samples Test for Differences in Age of Men and Women

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
age	Equal variances assumed	27.6362	0.000	5.533	204	0.000
	Equal variances not assumed			6.133	203	0.000

Table 5 (a). Two-way ANOVA for interaction effects of sex and marital status on srt

Dependent Variable: srt

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32.0830	3	10.6943	2.5857	0.0544
Intercept	3582.7731	1	3582.7731	866.2545	0.0000
sex	29.5660	1	29.5660	7.1486	0.0081
marital	5.3144	1	5.3144	1.2849	0.2584
sex * marital	0.2876	1	0.2876	0.0695	0.7923

Table 5 (b). Two-way ANOVA for interaction effects of sex and marital status on irt

Dependent Variable: irt

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.3203	3	1.1068	1.8179	0.1455
Intercept	911.2927	1	911.2927	1496.8609	0.0000
sex	3.1921	1	3.1921	5.2432	0.0232
marital	0.0199	1	0.0199	0.0327	0.8568
sex * marital	0.0231	1	0.0231	0.0379	0.8459