

**FINANCIAL RISK TOLERANCE:
A STATE OR A TRAIT?**

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Abstract

This paper examines the robustness of financial risk tolerance as a psychological trait. One hundred and twenty-nine finance students each managed a portfolio on an on-line trading simulation for eight weeks. Financial risk tolerance was measured three times - pre, post and follow-up - and was found to be stable. The increase in financial experience and knowledge, as well as the occurrence of a major stock market crash during the trading period did not appear to affect the stability of risk tolerance. Generally males were found to be more risk tolerant than females, this was also reflected in their trading strategies. However, this had no impact on their ability to obtain desired outcomes. It was concluded that financial risk tolerance is better considered as a trait and not a state.

Keywords:

Financial risk tolerance; stability; trait; demographics; gender differences; stock market simulation; ProQuest Financial Risk Tolerance Questionnaire.

People react differently to risk, some are more inclined to reject it, while others accept it. Financial risk tolerance is a measure of a person's willingness to accept the risk of an unfavourable result for the chance of achieving a favourable result.

Financial risk tolerance has attracted the attention of researchers in various disciplines including behavioural economists (e.g. Roszkowski and Snelbecker 1990); consumer research (e.g. Grable and Joo 1999); cognitive psychologists (e.g. Holtgrave and Weber 1993; Kahneman and Tversky 1984; Liverant and Scodel 1960); social psychologists (e.g. Carducci and Wong 1998; Wong and Carducci 1991; Zuckerman 1983); as well as financial analysts and financial planners (e.g. Riley and Chow 1992, Quattlebaum 1988). However, the study and assessment of financial risk tolerance is fragmented, with each discipline using different methodologies and with different focuses (Grable and Joo, 2000). While some researchers look at factors such as demographics, socio-economic status, personality, attitudes about money and even birth order to predict individual financial risk tolerance (e.g. Carducci and Wong 1998; Roszkowski 1996; Sulloway 1997; Carducci and Wong 1991; Grable and Joo 1999; Grable and Joo 2000); others look at how framing, contextual factors and situational factors influence financial risk tolerance (e.g. Roszkowski and Snelbecker 1990; Levin, Johnson, Deldin, Carstens and Davis 1986).

The assessment of risk tolerance has also proven to be difficult due to the subjective nature of risk taking, and has been open to the interpretations of researchers within their fields of work. Behavioural economists typically measure risk tolerance by the

choices the individual make in financial situations, for example, Roszkowski and Snelbecker (1990) looked at how framing affects 'risk tolerance' as measured by the choice of either certain gain or probable gain. Other researchers have measured financial risk tolerance by designing questionnaires containing behavioural statements and personality-style questions (e.g. Wong and Carducci 1991; Grable and Joo, 1999).

Grable and Joo (1999, 2000) noted that the fragmented approach to the measurement, assessment, and testing of financial risk tolerance has often led to inconsistent and controversial findings. Ganzach (2000) also pointed out some of the shortcomings of previous risk research such as the degree of which these studies reflected real-life financial situations and the validity of the measures.

The current study attempts to establish whether risk tolerance as measured using a previously-reported reliable self-report instrument is stable over several testing occasions.

Gender Differences and Financial Risk Tolerance

A number of studies have looked at gender differences in business decision-making and risk. However, there is no consensus on the size of gender differences or the fact that there are any differences at all. The general psychology literature dated before 1980 contains many primary and meta-analytical studies of gender differences in social, sexual and motor behaviour, attitudes, cognitive ability, decision making, and personality traits (see Eagly, 1995 for an extensive review). The literature suggests that women are more cautious, less confident, less aggressive, easier to persuade, and have inferior leadership and problem solving abilities when making decisions concerning risk compared to men. Johnson and Powell (1994) argue that these

research findings were instrumental in establishing a dominant view that substantial gender trait differences exist in nature, and in the outcomes of management decision involving risk. However, a re-examination of these studies and the more recent evidence on gender differences suggest that there are no significant differences in management decision making values or styles (Chaganti, 1986; Powell, 1990), and that there are more similarities than differences in personality of male and female entrepreneurs (Birley, 1989; Sexton and Bowman-Upton, 1990). Males and females are found to be equally capable of performing in terms of achieving desired outcomes from decision making under risk (Hudgens and Fatkin, 1985; Hollander, 1992).

However, the one gender difference that is persistently found in both the general and business specific literature is a lower preference for risk amongst females. Examples of such findings in business specific literature include Grable (2000); Masters (1989); Sung and Hanna (1996); Bajtelsmit and Bernasek (1996). Further, Johnson and Powell (1994) examined betting behaviour in the general population and an investment decision amongst a sample of management students. They found a lower preference for risk amongst women, but only in the general population.

Powell and Ansic (1997) examined whether the gender differences in risk propensity and strategy in financial decision-making are due to context factors such as familiarity and framing, costs or ambiguity rather than a general trait. They derived their pool of subjects from a business school to ensure that any gender differences found were not associated with non-specialist populations. They concluded that females are less risk seeking irrespective of contextual factors, and that females adopt different strategies in financial decision environments compared to males, but that these strategies have no significant impact on their ability to perform.

Age, Financial Situation, Marital Status, Level of Education and Financial Risk

Tolerance

Risk studies on age differences indicate that older people are more risk adverse and are less likely to engage in risky behaviours or make risky decisions (Brown 1990; Bakshi and Chen 1994; Grable 2000). Practitioners and researchers have long believed that age was negatively related to risk tolerance (e.g. Palsson 1996; Brown 1990; Morin and Suarez 1983; Wallach and Kogan 1961), however recent studies suggest that this assumption is not necessarily true (e.g. Grable and Joo 2000, 1999, 1997; Grable and Lytton 1998; Wang and Hanna 1997). Grable and Joo (1999) conducted a regression analysis of a number of demographic and socio-economic factors to test the strengths of these factors in predicting financial risk tolerance. Age was not a significant predictor of financial risk tolerance when all other factors were held constant. They found that education, financial knowledge, income, home ownership, the number of dependants, financial solvency and ethical background were significant predictor variables of financial risk tolerance. The most significant effects were education level, financial knowledge and income, all of which have positive relationships with financial risk tolerance.

It was also interesting to note that Grable and Joo (1999) found gender and marital status are not significant in predicting financial risk tolerance. This is inconsistent with studies that associate high risk tolerance with males (Grable 2000; Masters 1989; Sung and Hanna 1996); and being single (Baker and Haslem 1974). Nevertheless, the results suggest that the importance of demographic and socio-economic characteristics previously thought as important predictors of financial risk tolerance may diminish when all other factors are accounted for. Grable and Joo (1999, 2000) asserted that in

order to differentiate among levels of risk tolerance more effectively, a rigorous and systematic investigation of demographic, socio-economic, attitudinal and psychological factors should take place.

There are also other researchers that have associated income and assets as predictors of financial risk tolerance (Cicchetti and Dubin 1994; Lee and Hanna 1991; Riley and Chow 1992; Schooley and Worden 1996; Shaw 1996; Sung and Hanna 1996). It was found those individuals with higher incomes and net assets tend to have greater financial risk tolerances. The strength of these factors and how they influence financial risk tolerance has yet to be investigated.

Financial Risk Tolerance as a Stable Trait

Research that looks at the relationship between personality and financial risk taking is providing increasing evidence that financial risk tolerance resembles a psychological trait, as are intelligence, personality, aptitude, attitudes and values (Carducci and Wong 1998; Wong and Carducci 1991; Zuckerman 1983). A trait can be defined as any distinguishable, relatively enduring way in which one person varies from another. Carducci and Wong (1998) investigated the extent of which personality factors could determine financial risk taking in everyday money matters. It was found that Type A individuals took greater financial risks than Type B individuals, providing evidence that personality factors influence financial risk tolerance.

However, it is still debatable on whether such robust psychological trait exists, for instance, Mischel (1968) is well known for his critique of the trait theory in which he argued that the individual's behaviour is highly variable and relatively situation-specific. He and his colleagues concluded that individuals have stable behavioural

tendencies that are contextualised in terms of particular types of psychological situations (Shoda, Mischel and Wright, 1994).

Grable and Joo (1999) found that financial knowledge is a strong determinant of one's financial risk tolerance. They hypothesised that financial risk tolerance may not be a fixed psychological trait, but somewhat elastic, and that financial education could change one's attitudes and risk tolerance. However, the study was cross-sectional, an alternative explanation to their observations could be that those who are more financially risk tolerant are generally attracted to financial matters, their interests in this area would have resulted in their high scores on the financial knowledge tests. In order to investigate the robustness of financial risk tolerance and the effects of financial knowledge, a study with repeated measures would be more appropriate.

Finally, Powell and Ansic (1997) found distinguishable gender differences in financial risk tolerance and suggested that risk propensity may be viewed as a general trait, rather than dependent on contextual factors. However, they also noted the need to assess the robustness of the risk preference as a general trait.

The topic of financial risk tolerance in the psychological field is rather young, there has been no major research conducted on the stability of financial risk tolerance. This is possibly due to the lack of standardisation in measuring financial risk tolerance as pointed out by Grable and Joo (1998). Thus, the central theme of the current study is to look at the robustness of financial risk tolerance across time, and how life experiences and financial knowledge may affect people's willingness to take risks. In other words, whether financial risk tolerance is a stable trait or a state that is context dependent. In achieving this, a real-life event where financial decisions are made, and which people's risk propensity can be observed, was incorporated into the study. This

takes form of a portfolio management competition which simulates an on-line trading environment in real-time with the US stock market.

Butler and Hey (1987) pointed out that experimental studies which use gambling examples, are appropriate in terms of gains and losses for financial decision-making, but lack salience if they do not involve real winnings. As such, monetary rewards were offered for the top three competitors at the end of the competition.

It was recognised that gambling involves an element of utility derived from leisure, as distinct from the utility associated with winning money, which may not be reflected in financial decisions (Johnson and Bruce, 1992). To minimise any uncharacterised decisions involving high stakes, participants are instructed to manage their portfolio as a pension fund, and that their weekly portfolio returns must match the Dow Jones Index within a 5% margin every week. These conditions are justified as realistic to the market constraint fund managers are confronted with in their line of work.

A number of hypotheses were formulated:

Hypothesis 1: Financial risk tolerance is a stable trait, it remains robust over time.

Hypothesis 2: Females are generally less tolerant in taking financial risks compared to males.

Hypothesis 3: Males and females are equally capable of performing in terms of achieving desired outcomes in financial situations involving risks. As such, there are no gender differences between the quality of decision-making in financial situations as measured by consistency of returns and overall portfolio returns.

Hypothesis 4: Demographic factors such as age, current financial situation, marital status, and level of education could be used to predict financial risk tolerance.

Method

Design.

To investigate hypothesis 1, the study used a single factor repeated measures design. Financial risk tolerance, as the dependent variable, was measured at pre-competition, post-competition and a follow-up 8 weeks after the competition. The variability between the three measurement occasions provided information on changes of the dependent variable over time within the same subjects.

To investigate hypotheses 2 and 3, a between-subjects design was used to look at gender differences. Pre-competition financial risk tolerance and performances during the competition were treated as the dependent variables.

There were three distinctive measures of performance during the competition:

- 1) Overall portfolio returns - this gives the percentage of gain (or loss) made on the initial portfolio after 8 weeks of trading.
- 2) Volatility of returns – this is represented by the variance of weekly returns for each portfolio.
- 3) Competition ranking (with risk-adjusted) - in order to simulate the real online trading environment, penalty were imposed on those who had selected particularly risky portfolios and consequently lost capital. A formula was devised to evaluate performance by looking at the portfolio returns adjusted for the risk

profile¹. Thus, in order to win the competition, it was not sufficient to make the largest gains, one must also be aware of the risks involved with each stocks they traded. Any under-performance during the competition would have adverse effects on the performance ranking, even if the total portfolio returns were high.

Finally, for hypothesis 4, demographics were used as possible predictors of financial risk tolerance at pre-competition. Independent variables included year of birth, income groups, net assets, education level obtained and marital status.

Participants.

One hundred and twenty-nine participants from the University of New South Wales partook in this study. The average age of the participants was 24.22 years, (Range = 17-35 y.o). There were 41 females and 88 males.

Two courses from the Master of Commerce (Funds Management) program at the University of New South Wales incorporated the trading competition as part of their assessments. Eighty students in these courses participated in the exercise.

Forty-nine additional participants were recruited through advertisements within the Faculty of Commerce and Accounting. These participants comprised of university students who are studying commerce in undergraduate levels (n = 12) and

¹ At the end of each trading week, the portfolio returns were compared with the performance of the Dow Jones Index (DJI). If the portfolio returns matched (or over-performed) the DJI by a +/-5% margin, it would receive 1 score; if it under-performed the DJI by more than 5%, it scored 0 for the week. The scores were aggregated and were used to calculate the competition ranking using the following formula: Risk-adjusted Performance = (8 weeks/aggregated score)² * portfolio returns (%)

The resulting risk-adjust performance determined the competition ranking for each participant.

postgraduate levels (n = 37). To encourage participation, cash prizes of \$600, \$300 and \$100 were offered for the top three contestants in the competition respectively.

All participants were drawn from the population of undergraduate and post-graduate students from the commerce faculty. This provided a sample of subjects who are familiar with stock market trading, financial decisions and experienced with computers and the Internet.

Materials/Apparatus.

Both the questionnaire and the portfolio management competition were web-based. All participants provided their own access to computers and the Internet. The computer based decision environment was felt to be appropriate as many financial decisions are based on information derived from computer screens and this approach realistically represents a financial decision environment, whilst the web-based simulation ensured that all individuals received the same information at the same time. Financial risk tolerance was measured on three occasions using a questionnaire that was also available on-line.

- The ProQuest Financial Risk Tolerance Questionnaire. The ProQuest Financial Risk Tolerance Questionnaire has been developed for the purpose of profiling people in terms of their risk tolerance (ProQuest, 1999). The questionnaire has 25 financial risk-related questions and 9 demographic questions and has been specifically developed for use in Australia. The questionnaire is in a multiple-choice format, and takes approximately 15 minutes to complete (See Appendix A). An Australian norm was established in 1998 with a sample size of 3000. The scale has a reported reliability (Cronbach) of 0.87.

The raw data from the questionnaire were standardised onto the ProQuest Risk Tolerance scale, which is normally distributed and has a mean of 50, standard deviation of 10 and a range of 0 to 100. The normal distribution allows for the scale to be divided into seven segments or risk groups, differentiating between people with different levels of financial risk tolerance. The middle risk group consists of scores from 45- 54, while risk groups either side are a standard deviation higher or lower, and end segments covering the balance of the high and low ends of the distributions.

- Online Stock Market Trading Simulation². A Portfolio Management Competition was set up in which participants could trade stocks and build up a portfolio in an online stock market trading simulation. All participants began with an initial portfolio of US\$500,000. They had the opportunity to follow the stock markets, place stock orders and manage the portfolios on a virtual stock exchange. Participants had access to all of the stocks listed on the New York Stock Exchange, the NASDAQ and the American Stock Exchange.

The competition was realistic in that the movements in stock prices and their market availability simulated the stock markets in real-time. Information on each of the stocks was accessible from the host site, and participants were able to monitor the performance of their portfolios throughout the competition.

Procedure.

Participants were first asked to complete the online Financial Risk Tolerance Questionnaire prior to the competition. The performance of all participants was

² A private competition was customised for this study. This was hosted by The Virtual Stock Exchange, located at www.virtualstockexchange.com

tracked throughout the competition. The competition lasted for 8 weeks, after which the participants completed the Risk Tolerance Questionnaire for the second time. The questionnaire was administered for a third time 8 weeks after the competition had ended.

Results

The internal consistency of the Financial Risk Tolerance Questionnaire was measured using Cronbach's alpha. The 25-item questionnaire obtained an alpha of 0.87 ($N = 195$, $SE = 0.07$) indicating that the items were measuring one underlying factor. This value is identical with the reported reliability in the technical manual.

1. Financial Risk Tolerance as a Stable Trait

The questionnaire was administered three times – pre-competition, post-competition and a follow-up 8 weeks after the competition. The means, standard deviations and range of scores obtained on each occasion are set out in Table 1. There were a number of participants who did not complete the questionnaires on all three occasions and this missing data is reflected in the degrees of freedom for the following analyses.

Table 1. Mean and Standard Deviations of scores on the Financial Risk Tolerance

Questionnaire

	N	Mean	Std. Dev.	Range of Scores
Pre-Competition	121	61.33	10.17	40 – 86
Post-Competition	55	63.75	9.11	47 – 83
Follow-up (8 weeks)	18	60.44	10.83	42 - 89

Note. The questionnaire was first administered prior to the competition (Pre); and again after 8 weeks of competition (Post); finally a follow-up was conducted 8 weeks after the competition has ended (Follow-up).

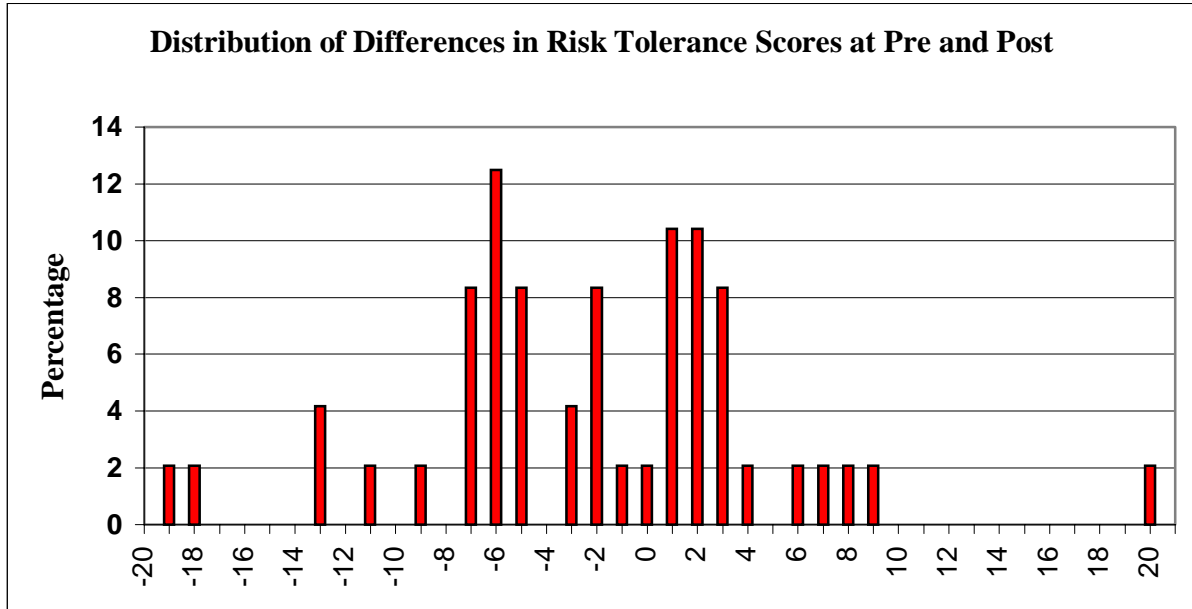
An analysis of variance (ANOVA) for repeated measures was first applied to the risk tolerance scores obtained on the three occasions. The overall statistical test revealed no significant effect within individuals across repeats ($F(1, 7) = 0.29, n.s.$)

Due to the small number of participants who had completed the questionnaire on all three repeats ($N = 8$), multiple t-tests were used to further investigate the possible differences between the repeats. However, the limitations of using multiple t tests when comparing three or more dependent means were noted, and interpretations should take into account of the increased probability of a type I error.

Three pairs of one-sample t-tests were conducted to test for differences between financial risk tolerance scores on the three occasions, that is, 1) pre-competition and post-competition; 2) pre-competition and follow-up; and 3) post-competition and follow-up. The correlations between the three pairs were found to be significant and reasonably large ($r_{\text{pre,post}} = 0.75$, $p < 0.0001$ ($N = 48$); $r_{\text{pre, follow-up}} = 0.65$, $p < 0.005$ ($N = 17$); $r_{\text{post, follow-up}} = 0.82$, $p < 0.01$ ($N = 9$) respectively). The pre-competition risk tolerance scores were significantly lower than the post-competition risk tolerance scores, ($M_{\text{diff.}} = -2.10$, $t(47) = -2.10$, $p < 0.05$), however, there were no differences between pre-competition and follow-up ($M_{\text{diff.}} = 2.35$, $t(16) = 1.00$, n.s.); and post-competition and follow-up ($M_{\text{diff.}} = -0.44$, $t(8) = -0.19$, n.s.)

Further examination of the differences between the risk tolerance scores at pre-competition and post-competition indicated a range of -19 to 20 , and a median of -2 . Figure 1 illustrates the distribution of differences in risk tolerance scores at pre-competition and post-competition. The results showed a tendency for an increase in risk tolerance scores after eight weeks of trading in the competition. However, the differences for the majority (58.3%) of the participants remained within 1 standard deviation on the Financial Risk Tolerance Scale ($SD = 10$), in other words, they remained within the same risk group.

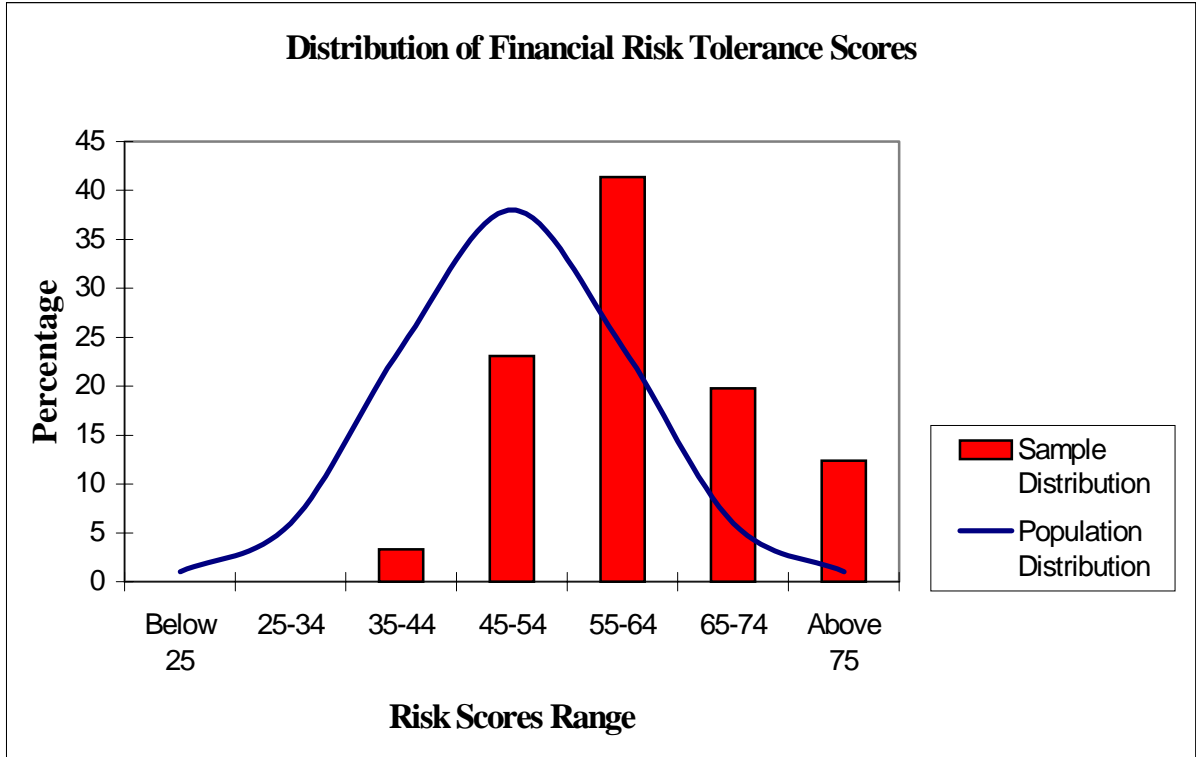
Figure 1. Distribution of Differences in Financial Risk Tolerance between Pre-competition and Post-competition



Note. The difference was calculated by subtracting the financial risk tolerance scores obtained at post-competition from the financial risk tolerance scores obtained at pre-competition for each individual. Thus a negative difference indicates an increase in risk tolerance scores from pre-competition to post-competition. (N = 48, Mean = - 2.10, SD = 6.94)

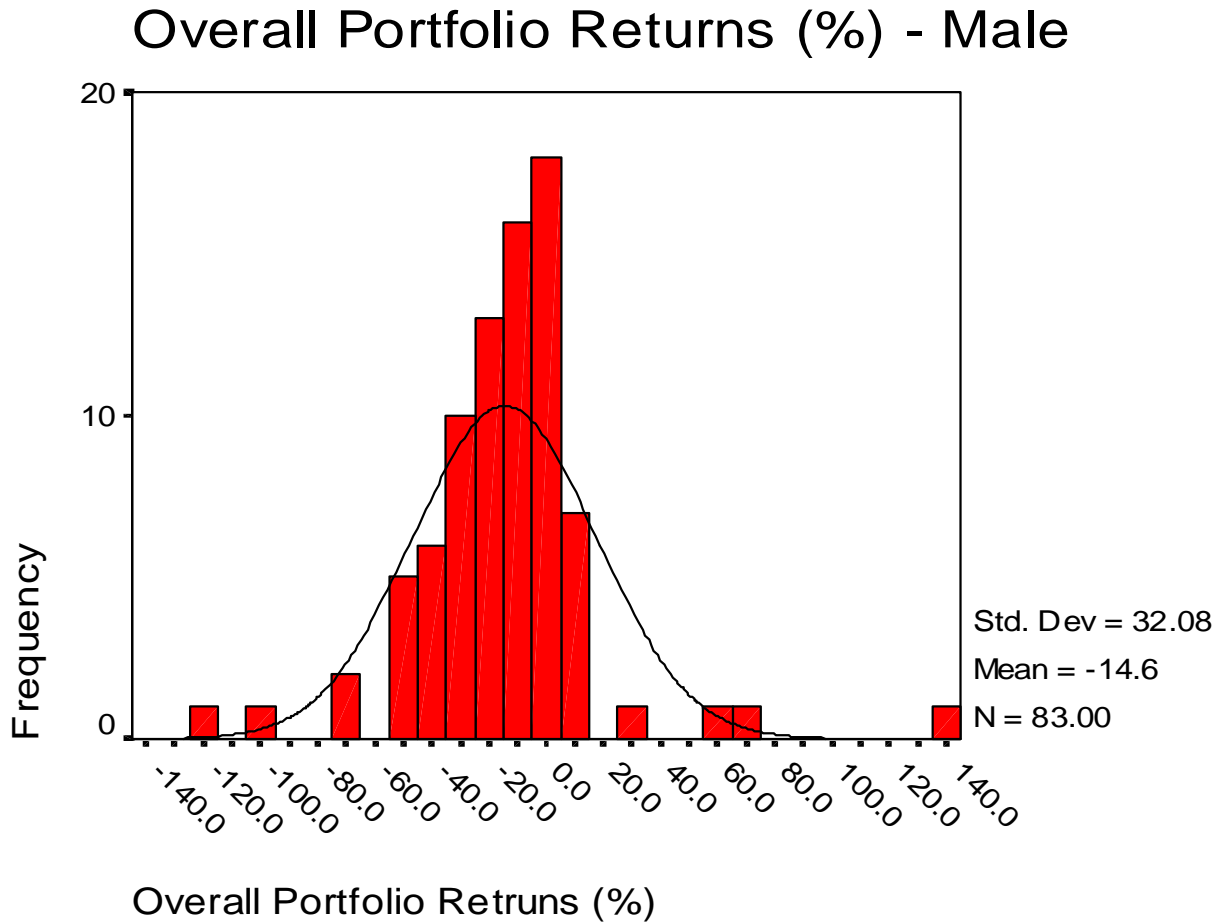
The current sample consists of postgraduate students and undergraduate students undertaking courses in commerce and finance. It was noted that financial risk tolerance scores obtained from this sample at pre-competition ranged from 40 to 86 ($\underline{M} = 61.33$; $SD = 10.17$). The distribution of scores tend towards the higher end of the scale with 73.6% of respondents obtaining scores above the average range of 45-54. Figure 2 compares the distribution of the current sample with the general population.

Figure 2. Distribution of Financial Risk Tolerance Scores Range in the Current Sample



Note. Financial risk tolerance scores at pre-competition are displayed ($N = 121$, Mean = 61.33, SD = 10.17). The sample consists of university students who are studying commerce and finance either at postgraduate or undergraduate levels. The normal distribution of financial risk tolerance score for the general population is also shown.

Figure 3. Overall Portfolio Returns of Males



Note. The overall portfolio returns are represented as the percentage of gain/loss made after 8 weeks of trading from the initial portfolio. A negative return indicates a reduction in the overall portfolio value.

2. Gender Differences and Financial Risk Tolerance

An ANOVA was conducted on the financial risk tolerance scores obtained from the pre-competition questionnaire to test for gender differences.

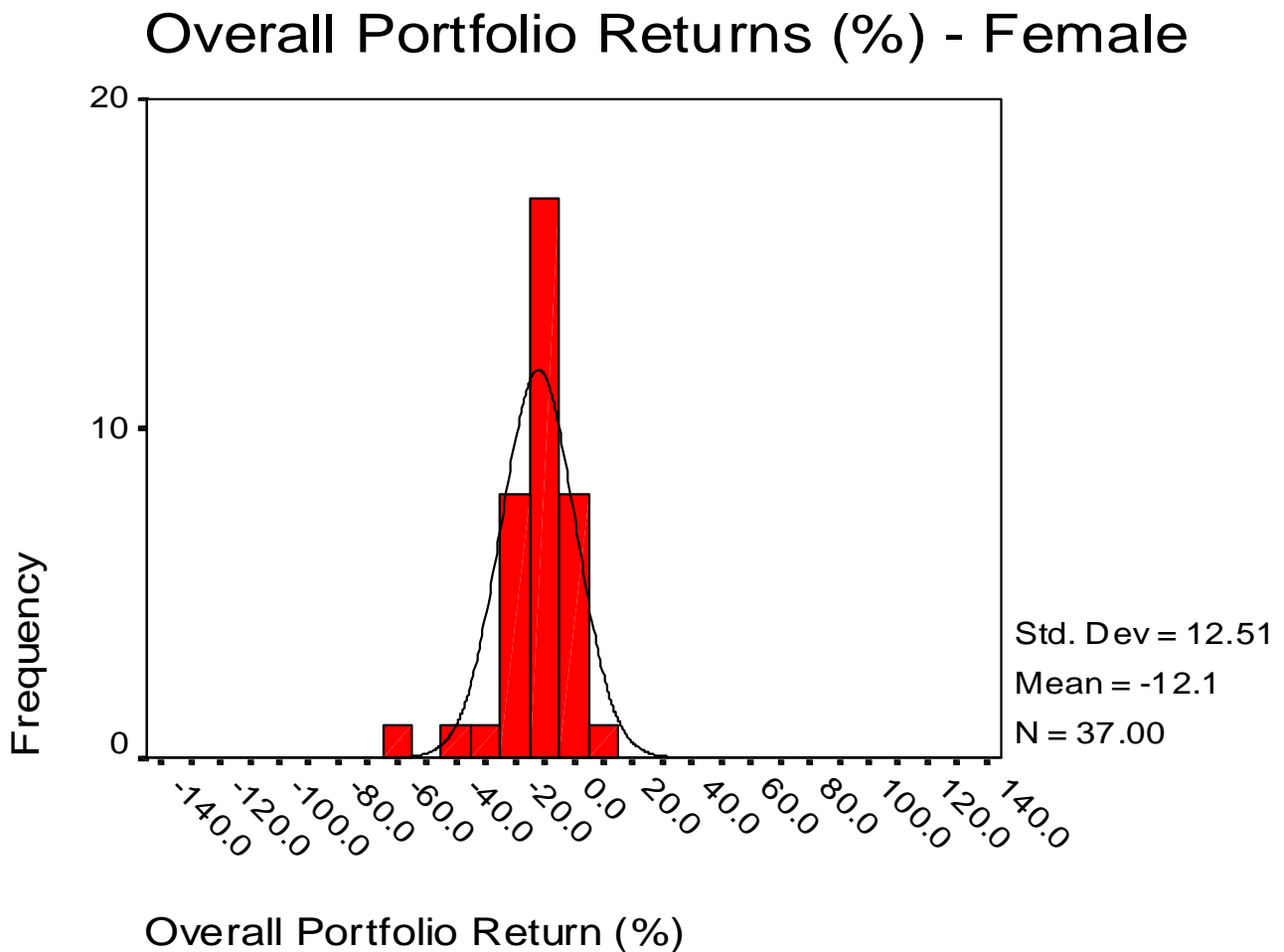
Males returned an average risk tolerance score of 63.16 (SD = 9.88) and females returned an average score of 57.00 (SD = 9.63). It was revealed that males have significantly higher financial risk tolerance scores than females ($F(1,119) = 9.99, p < 0.005$.) However, the mean risk scores for both males and females fell into the same risk group of 54-65.

No effects of gender were found on the stability of risk tolerance scores. ($F_{\text{pre,post}}(1,46) = 1.77, \text{n.s.}; F_{\text{pre, follow-up}}(1,15) = 3.28, \text{n.s.}; F_{\text{post, follow-up}}(1,7) = 0.85, \text{n.s.}$)

3. Gender Differences and Performance

On average, males ($n = 83$) produced an overall portfolio return of -14.59% (SD = 32.08% , Range = -121.50% to 140.80%); while females ($n = 38$) produced an average return of -12.11% (SD = 12.51% , Range = -55.60% to 6.60%), the differences were insignificant using an ANOVA ($F(1,118) = 0.21, \text{n.s.}$). Figure 3 and 4 illustrate the distribution of the overall portfolio returns of males and females. The large range of returns by males was mainly due to the marginal performances on either ends, the distribution of portfolio returns amongst males and females were similar.

Figure 4. Overall Portfolio Returns of Females



Note. The overall portfolio returns are represented as the percentage of gain/loss made after 8 weeks of trading from the initial portfolio. A negative return indicates a reduction in the overall portfolio value.

Males on average had a more volatile portfolio than females ($F(1,117) = 8.431$, $p < 0.005$). Incidentally, it was found that females ($M = 6.71$, $SD = 1.23$) matched their portfolio returns to the Dow Jones Index more frequently than males ($M = 5.76$, $SD = 1.55$). An ANOVA revealed a significant effect ($F(1,119) = 11.10$, $p < 0.001$).

Finally, there were no effects of gender on the competition rankings ($F(1, 119) = 1.05$, n.s.)

4. Age, Income, Assets and Financial Risk Tolerance

Analyses on risk tolerance scores (at pre-competition) and demographics of the participants were conducted. No relationships were found between age and financial risk tolerance scores ($r = 0.12$, n.s.; $N = 120$.) The small age range of 17 to 35 years may limit the interpretations of this result.

Those in higher income groups and those with higher total assets had a tendency to return higher risk tolerance scores overall, these were found to be significant by ANOVA ($F(1, 121) = 2.92$, $p < 0.05$; $F(1, 121) = 2.28$, $p < 0.05$ respectively.)

Analyses were not conducted for marital status and level of education due to the lack of range in the current student sample, as almost all participants were single and have completed a university degree.

A multiple regression analysis using a stepwise procedure found that sex and income are significant predictors of financial risk tolerance at the 0.05 level, when other factors are held constant. Age and assets were excluded. The model explains 14.7% of the variance in financial risk tolerance ($F(2, 105) = 9.05$ $p < 0.001$.)

Discussion

The ProQuest Financial Risk Tolerance Questionnaire has an inter-item consistency that is well-above accepted levels outlined by Pedhazur and Schmelkin (1991), it can be treated as a valid and reliable measure of financial risk tolerance.

The financial risk tolerance scores obtained from the current sample ranged from average to well-above average, indicating that they are more willing to accept the risk of an unfavourable result for the chance of achieving a favourable result in financial situations when compared to the general population. This is consistent with the profile of the participants who are currently studying finance and commerce at university level, and aspire to work in the finance sector. One would expect these students to be more acceptable to financial risk-taking than the general population.

Financial Risk Tolerance as a Stable Trait

The financial risk tolerance questionnaire was administered three times with 8 weeks intervals. No differences in risk tolerance scores across the three measures were found, suggesting that financial risk tolerance is relatively stable and robust across time and events.

There were some indications of increases in risk tolerance scores after eight weeks of competition. One possibility of the observed movements in risk tolerance scores at pre-competition and post-competition is due to an increase in confidence of handling financial risks after eight weeks of trading experience. Grable and Joo (1999) hypothesised that financial knowledge may increase financial risk tolerance. However, the increases of risk scores from pre-competition to post-competition were found to be movements within a single risk group for the majority of the people in the sample. Secondly, no function of knowledge was observed on financial risk tolerance across the three measures, particularly, no differences were observed between pre-competition and the follow-up, conducted 16 weeks after the first measure. These findings give support to the hypothesis that financial risk tolerance is stable across time and remains relatively robust.

The competition in this study simulated the US stock market using the actual stock prices and availability in real-time. The timing of this study coincided with a stock market crash³, which occurred four weeks into the competition, affecting many of the portfolio values. This event was unique in that most of the stocks affected were NASDAQ stocks characterised by its high profitability and high volatility, while non-NASDAQ stocks retained its relative value as indicated by the stability of the Dow Jones Index. While it was not possible to differentiate those people who had build their portfolios with the volatile stocks of NASDAQ, the weekly returns during the crash indicated that a significant number of people had invested in NASDAQ stocks. If financial risk tolerance is dependent on states and contexts, then one would expect people become less risk tolerant after such an event. This was not found to be the case, further supporting the hypothesis that financial risk tolerance is a stable trait.

Gender Differences in Financial Risk Tolerance

Studies on gender differences have been the centre of controversy for decades (Eagley, 1995). These are coupled with inconsistent results, which may be attributed to the methodological differences in approaches and the lack of equal representations from the gender samples (Powell and Ansic, 1997). The current study compared the financial risk tolerance and performance of both males and females that have similar educational background and knowledge in the financial arena.

The evidence supports the view that gender differences in financial risk tolerance exist, however these differences have no effect on the capability of both gender in terms of achieving desired outcomes from financial decisions-making. While males

³ On 4th April, 2000, dubbed as ‘Terrible Tuesday’, the NASDAQ fell by 13.6%, followed by a record drop of 25.3% for the week of 10th – 14th April. The NASDAQ hit its lowest point on the 17th April at 3227.04 and remained low for the last few weeks of the competition.

were found to be more risk tolerant than females, there were no reported gender differences in the average overall portfolio returns.

Concerns may arise from the large range of overall portfolio returns observed amongst the males compared to the females. Figures 2 and 3 showed that the patterns of returns for both genders. There were a number of males who had performed either very well or very poorly and has flattened the distribution curve, however the distributions were similar for both genders and resembled the normal distribution. While it may be true to say that outstanding performances were observed in the male sample, on average the performance of both gender were equivalent. This phenomenon may be a direct result of the higher risk propensity of males and their willingness to take risks compared to the females, thus resulting in the range of performance amongst the male sample. However it should be noted that females are somewhat under-represented by numbers in the sample, which may limit the interpretations of the observed range in performance. Furthermore, the unexpected event of the NASDAQ Crash may have distorted the results, the marginal performances could be attributed to chances rather than the quality of the decisions made by the participant.

There are some indications of gender differences in the strategies used during the competition. Males were found to maintain a more volatile portfolio than females, indicating that males were more inclined to invest in risky stocks, thus willing to accept the greater possibility of resulting in an unfavourable outcome for the greater potential benefits of gaining high returns. Incidentally, males were less consistent in their returns compared to the females during the competition, and a larger range of performance resulted. Females, on the other hand, were likely to build a more stable

portfolio to minimise loss, resulting in more consistent returns. However, it can be concluded that despite the differences in tolerance levels and the differences in the strategies used, the overall performance of both males and females were equivalent. These findings are consistent with the literature (Hudgens and Fatkins 1985; Powell and Ansic, 1997).

Demographics as Predictors of Financial Risk Tolerance

Grable and Joo (1999, 2000) has recommended the use of multiple regression models to determine the strength of demographic and socio-economical factors as predictors of financial risk tolerance, while holding other factors constant. The analysis found sex and income as significant predictors of financial risk tolerance, while age and net assets were excluded from the model.

Findings relating to income being a good predictor of financial risk tolerance supports previous research findings (Cicchetti 1994; Lee and Hanna 1991; Riley and Chow 1992; Sung and Hanna 1996; and Grable and Joo 1999). Age, one of the most widely used predictor of financial risk tolerance among practitioners (Roszkowski, 1996) however, was not an effective predictor in this study. Recent studies that looked at age in the presence of other demographic and socio-economical factors have also found age as insignificant in predicting financial risk tolerance (Grable and Joo 1999, 2000; Cutler 1995).

It was noted that the resulting regression model accounted for only a small amount of the variance in financial risk tolerance, indicating that there is more than 85% of variance that has not been account for. While it was the intention of the study to examine the strength of demographic and socio-economical factors in predicting

financial risk tolerance, conclusions on the findings were limited by the lack of range in the student sample.

Nevertheless, the low accountability of the demographic and socio-economical factors as predictors of financial risk tolerance is consistent with the literature. Grable and Joo (1999) noted this phenomenon and hypothesised that if psychological constructs were combined with traditional predictor factors into a prediction model, the effect of demographic (including gender) and socio-economical factors may diminish. This was supported by a later study by the same authors who found locus of control and financial knowledge to be better predictors of financial risk tolerance than demographic and socio-economic factors (Grable and Joo, 2000). This advocates the position that financial risk tolerance is a psychological trait, and is stable and robust. From the findings of this study, there appears to be a general psychological profile of persons willing to take financial risks as compared to persons less willing to take financial risks. It follows that financial risk tolerance should not be a function of factors such as age, income, marital status and education. Rather, personality constructs and attributes may be better predictors of financial risk tolerance. Carducci and Wong (1991, 1998) who looked at financial risk taking and personality found an association of Type A behaviour patterns with financial risk tolerance, further supporting the position that financial risk tolerance is better treated as a trait than a state.

Conclusion

In conclusion, financial risk tolerance was found to remain stable across time and event. The experience of managing a portfolio, the financial knowledge gained and the event of a major stock market crash during the competition did not appear to affect the

stability of risk tolerance. Financial risk tolerance resembles a psychological trait that is distinguishable and relatively robust, and varies from one person to another. It was found that generally males are more risk tolerant, and therefore are more willing to accept financial risks for the chance of achieving a favourable outcome. Males were observed to be more likely to invest in risky stocks in order to increase their portfolios, while females were more likely to adopt a more risk adverse strategy. However, this general trait has no impact on the capability of both gender to perform in financial situations. Despite the different strategies used, the overall performance of the two populations closely resembled one another. Finally, there are indications that those demographic factors that are traditionally used to predict financial risk tolerance may not be effective predictors as once assumed. Financial risk tolerance may be more closely associated with psychological traits and constructs.

Implications for Future Research.

Two implications emanate from the findings of this study. Firstly, a longitudinal study that looks at individuals' financial risk tolerance as they progress through life may shed light to the nature of the relationship between financial risk tolerance and income. If financial risk tolerance is a psychological trait and closely relates to personality constructs such as competitiveness, hard driving and other Type A behaviours (see Carducci and Wong, 1998), then the observed relationships with socio-economical factors such as income and assets may be attributed to the individual's tendency to pursue higher income jobs and desire for material success. This may explain the positive relationship that is often found between the two, yet the lack of variance they account for one another. As such, the direction of association between financial risk tolerance and socio-economical factors may be the opposite of what most practitioners

believe. Financial risk tolerance may be a better predictor of income than income is a predictor of financial risk tolerance.

Secondly, any studies that attempt to explain gender differences will always remain controversial. Johnson and Powell (1994) warned of the underlying intention of many gender studies in reinforcing the old-fashioned, stereotypical views that women are inferior when making decision. In this study, it was found that generally males are more financial risk tolerant, however the average risk tolerance scores for both males and females fell into the same risk group. Further, the overall performance and spread of performance between males and females were found to resembled closely to one another. One should consider whether there are any practical implications for gender distinctions in risk tolerance research at all?

It would perhaps be more constructive for future researchers to look at financial risk tolerance as a general trait, and focus studies on examining the implications of varying levels of financial risk tolerance on behaviours and performance.

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APPENDIX A

PROQUEST FINANCIAL RISK TOLERANCE

QUESTIONNAIRE