FINANCIAL RISK TOLERANCE AND SELECTED DEMOGRAPHIC FACTORS: A COMPARATIVE STUDY IN 3 COUNTRIES

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ABSTRACT

This study indicates that financial risk tolerance increases with education and income. However, risk tolerance decreases with age, female, and marriage. Australia has the highest risk tolerance score, followed by the United States, and finally the United Kingdom in a country comparative analysis. This finding appears to contradict the work of Hofstede (2009) which indicates that Australia and the United Kingdom have the highest and lowest uncertainty avoidance scores, respectively, of the three countries. A more detailed analysis of selected questionnaire questions shows that the U.S. respondents are most willing to tolerate more risks if they have achieved a basic level of protection. The U.S. respondents also tend to show the highest amount of confidence in making financial decisions and the most willing to adapt when things go wrong. This study generates some interesting implications that warrant further investigation and also provide suggestions for further research opportunities.

Key Words: Financial risk tolerance, demographic factors, comparative study, U.S.A, U.K., Australia

JEL codes: G11, A14, D81

I. INTRODUCTION

The purpose of this paper is to explore the link between selected demographic factors and financial risk tolerance in three countries – Australia (Aus), the United States (U.S.), and the United Kingdom (U.K.). The research question that this paper attempts to answer is whether the demographic factors of age, gender, income, and marital status have any impact on the level of risk tolerance in each country. This will be a question of interest for investment advisors and personal financial planning professionals. Risk tolerance is an important financial concept because of its numerous implications. For example, a significant discrepancy between the client's risk tolerance

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and the risk level of the client's portfolio may affect the investor's willingness to stick to an investment plan, especially in times of weakening markets. Knowing what impact certain demographic factors have on risk tolerance can add to a better understanding in terms of offering better-suited products and services to clients in each country. The paper also explores whether nationality is a mitigating factor on demographic impact on risk tolerance.

II. LITERATURE REVIEW

An individual's financial risk tolerance can be influenced by one's personality and genetics. For example, individuals with high sensation-seeking and greater extroversion scores tolerate more financial risk (Carducci and Wong 1998). The same study also finds that individuals with Type A personality are generally more risk tolerant. A person's financial risk tolerance can also be influenced by demographic factors.

According to several research works, males have a higher level of risk tolerance than females (Bajtelsmit, Bernasek, and Jianakoplos 1999; Grable 2000). However, others (Grable and Joo 1999; Hanna, Gutter, and Fan 1998) fail to detect any evidence that gender has an impact on risk tolerance. A study on gender stereotyping suggests that investment advisors have a tendency to underestimate and overestimate the risk tolerance of female and male clients, respectively (Roszkowski and Grable 2005). Female advisors have a higher tendency to stereotype than their male counterparts (Siegrist, Cvetkovich, and Gutscher 2002).

Some studies have found that age has a negative relationship with risk tolerance (Palsson1996; Hallahan, Faff, and McKenzie 2003) but the relationship may not be linear (Bajtelsmit and VanDerhei 1997). However, works done by Hariharan, Chapman, and Domian (2000), and Gollier and Zeckhauser (2002) reveal that age is not a determining factor. Grable (2000) finds that education level increases one's risk tolerance level but Shaw (1996) fails to detect that. It is thought that income and wealth levels have a positive relation to risk tolerance (Bernheim, Skinner, and Weinberg 2001). Like gender, the study by Roszkowski and Grable (2005) also finds that advisors stereotype by income or wealth. They underestimate the risk tolerance of low-income clients and overestimate the tolerance of high-income clients.

Singles are more risk-tolerant than married people, according to a study by Roszkowski, Snelbecker, and Leimberg (1993). Some studies (Haliassos and Bertaut 1995; Deaves et. al 2007) fail to find any relationship between marital status and risk tolerance. However, a study by Grable and Lytton (2003) finds that married people show higher risk tolerance. Riley and Russon (1995) finds that people's risk tolerance decreases with more dependents but Ardehali, Paradi, and Asmild (2005) finds that the number of dependents is not a factor in explaining risk tolerance. Faff, Hallahan, and McKenzie (2009) states that there is a relationship between the number of dependents and risk tolerance but the relationship is non-linear.

It appears that the debate on finding a relationship between demographic factors and financial risk tolerance is not settled. Past studies have shown conflicting results. Furthermore, no study has explored the link between demographic variables and financial risk tolerance in a comparative basis across nationalities. This study seeks to fill that void.

III. METHODOLOGY

This paper uses risk tolerance data from FinaMetrica, an Australian firm that sells risk tolerance assessment services. The firm uses a computer-based attitude test comprising of 25 risk tolerance assessment questions, followed by 8 demographic questions. The validity and consistency of the 25 assessment questions exceed international psychometric standards. Most people who took the test from FinaMetrica were personal financial planning clients. The assessment tool generates a financial risk tolerance score anywhere from 1 (low) to 100 (high).

Regression and ANOVA are used to perform analyses on the data. For regression, the data is coded as shown in the table 1 below. The regression analysis is performed to find out which demographic variables contribute to the prediction of risk tolerance and the extent of the contribution. The risk tolerance score is the dependent variable and gender, age, education, and marital status are independent variables. The regression-testing hypothesis is that Bgender, Bage, Beducation, and Bmaritalstatus are not significantly different from zeros in each country.

Table 1 -- Variable Coding for Regression Analysis

Age	Gender	Income	Education	Marital Status
*Data as is -- no coding for regression	Male – 0	$1 to $49K – 0	No HS – 0	Married – 0
	Female – 1	50K to 199K – 1	HS – 1	Single – 1
		200K & higher -- 2	Trade -- 2	
			Univ -- 3	

* *Categorized for ANOVA analysis as follows: 14 to 30 yrs – 1; 31 to 55 yrs – 2; over 5yrs -- 3*

IV. RESULTS

A. Demographic Impact on Risk Tolerance

The regression results in Table 2 below show that all the B coefficients are significant for the three countries. Thus, the null hypothesis is rejected for each of the independent variables. Except for the marital status factor, Table 2 also shows that step-wise introduction of each of the independent variables into the regression model causes an increase in R square. Table 3 exhibits the results of the ANOVA analysis which

compares the risk tolerance scores between the groups of each demographic variable, and between the actual and perceived risk groups.

Table 2 - Regression Coefficients

Model		Unstd B	UnStd Error	Std Beta	T	Sig.	R Sq Change	Regres R Sq	F Value	DW
AUS	**(Constant)**	65.34	0.30		220.45	0.00				
	Age	-0.25	0.00	-0.27	-57.49	0.00	0.09			
	Gender	-4.97	0.12	-0.20	-41.69	0.00	0.06			
	Income	3.12	0.10	0.16	31.42	0.00	0.03			
	Education	1.11	0.06	0.09	17.97	0.00	0.01			
	Marital	0.37	0.14	0.01	2.64	0.01	0.00			
	Regression					0.00	0.19	0.193	1,875	1.89
US	**(Constant)**	62.68	0.34		186.71	0.00				
	Gender	-5.69	0.12	-0.24	-46.81	0.00	0.079			
	Age	-0.23	0.00	-0.27	-53.76	0.00	0.076			
	Income	2.41	0.09	0.14	25.60	0.00	0.02			
	Education	1.45	0.08	0.09	18.26	0.00	0.01			
	Marital	0.46	0.14	0.02	3.19	0.00	0.00			
	Regression						0.264	0.186	1,539	1.92
UK	**(Constant)**	62.47	0.43		143.97	0.00				
	Income	3.17	0.14	0.17	22.78	0.00	0.10			
	Age	-0.24	0.01	-0.26	-38.01	0.00	0.06			
	Gender	-6.30	0.18	-0.25	-35.67	0.00	0.06			
	Education	0.54	0.07	0.05	7.39	0.00	0.002			
	Marital	0.62	0.21	0.02	3.02	0.00	0.00			
	Regression					0.00	0.222	0.215	1,002	1.90

(1) Constant

Table 2 shows that the regression constant terms for Australia, the U.S., and the U.K. are 65.34, 62.68, and 62.47, respectively. Thus, a 40-year-old, married male, with no high school diploma and earning less than $50,000, would have a risk tolerance score of 55.3 points in Australia, 53.5 points in the U.S., and 52.9 points in the U.K. The constant coefficients intuitively suggest that Australia has the highest tolerance level, followed by the U.S., and then the U.K. The results seem to contradict Geert Hofstede's work (2009) on the cultural dimension of uncertainty avoidance.

Uncertainty avoidance deals with a society's tolerance for uncertainty and what extent a society feels comfortable in an unstructured environment. Out of 100, the Uncertainty Avoidance Index for Australia, the U.S. and the U.K. are 51, 46, and 35. It is possible that Australia, with the highest uncertainty avoidance index value, has over time tried to minimize uncertainty by instituting strict laws and rules to regulate and

control the uncertainty level. As such, Australians might have a higher tolerance for risk that is controlled by a more regulatory environment. Tables 2 and 3 also show that, overall, the three demographic variables that have the highest impact on risk tolerance are age, gender, and income.

(2) Age

Table 2 shows that as a person ages, the tolerance for risk decreases in all three countries. An explanation for the negative relationship between age and risk tolerance may be biologically based. Harlow and Brown (1990) attributes risk tolerance changes to changes in enzymes due to aging. Furthermore, the pain of regret is higher as one ages because the chances of recouping losses are lower in terms of time. The rate of decrease in risk tolerance per year is quite similar in the three countries although it is a bit greater in Australia than in the U.S. and U.K. (Aus: -0.25, US: -0.23, UK: -0.24). The results in Table 3 support this observation. The average difference between the three age groups in Australia is 4.5 points whereas it is 3.6 points in the U.S. and 4.1 points in the U.K.

Table 3 -- Risk Tolerance Scores Across Demographic Variable Groups

	Score		**Gender**		**Age Groups**			**Education**				**Marital**		**Income Groups**		
AUS	**Actual (1)**	**PS (2)**	**Mal (1)**	**Fem (2)**	**Yg (1)**	**Mid (2)**	**Old (3)**	**<HS (1)**	**HS (2)**	**Trad (3)**	**Univ (4)**	**Mar (1)**	**Sing (2)**	**Low (1)**	**Mid (2)**	**High (3)**
Risk Score	55.3	49.7	58.2	52.3	60.2	58.1	51.2	50.4	52.5	55.2	58.2	55.5	56.2	51.2	57.6	61.2
Group Differenc	(Grps:1,2) -5.6		(1,2) -5.9		(1,2) -2.1	(2,3) -6.9	(1,3) -9.0	(1,2) 2.1	(2,3) 2.7	(3,4) 3.0	(1,4) 7.8	(1,2) 0.7		(1,2) 6.4	(2,3) 3.6	(1,3) 10.0
***Avg Diff**	-5.6		-5.9		-4.5			2.6				0.7		5.0		
US	**Actual (1)**	**PS (2)**	**Mal (1)**	**Fem (2)**	**Yg (1)**	**Mid (2)**	**Old (3)**	**<HS (1)**	**HS (2)**	**Trad (3)**	**Univ (4)**	**Mar (1)**	**Sing (2)**	**Low (1)**	**Mid (2)**	**High (3)**
Risk Score	53.3	48.3	56.6	50.1	57.6	56.0	50.5	***48.4***	***49.8***	***51.4***	55.1	53.8	52.7	50.3	54.4	57.9
Group Differenc	(Grps:1,2) -5.0		(1,2) -6.5		(1,2) -1.6	(2,3) -5.5	(1,3) -7.1	(1,2) 1.4	(2,3) 1.6	(3,4) 3.7	(1,4) 6.7	(1,2) -1.1		(1,2) 4.1	(2,3) 3.5	(1,3) 7.6
Avg Diff	-5.0		-6.5		-3.6			2.2				1.1		3.8		
UK	**Actual (1)**	**PS (2)**	**Mal (1)**	**Fem (2)**	**Yg (1)**	**Mid (2)**	**Old (3)**	**<HS (1)**	**HS (2)**	**Trad (3)**	**Univ (4)**	**Mar (1)**	**Sing (2)**	**Low (1)**	**Mid (2)**	**High (3)**
Risk Score	50.8	45.7	54.6	46.6	55.7	54.6	47.6	48.1	50.3	51.2	53.3	51.7	51.2	45.7	52.3	57.7
Group Differenc	(Grps:1,2) -5.1		(1,2) -8.0		(1,2) -1.1	(2,3) -7.0	(1,3) -8.1	(1,2) 2.2	(2,3) 0.9	(3,4) 2.1	(1,4) 5.2	(1,2) -0.5		(1,2) 6.6	(2,3) 5.4	(1,3) 12.0
Avg Diff	-5.1		-8.0		-4.1			1.7				0.5		6.0		

**Average difference between adjacent groups only. Bold and italic figures signify no significance at the 5% level*

(3) Gender

The regression coefficients for gender in Table 2 shows that females tend to have lower risk tolerance than males. A possible reason for the difference is cultural (Slovic 1966). When young, girls are usually associated with activities that are relatively less aggressive. On the other hand, boys are associated with activities that involve more risks, such as climbing trees, football, and board skating. They are trained culturally to take more risk and thus may be more risk tolerant. Another possible reason may be biological in nature (Sapienza, Zingales, and Maestripieri 2009) in terms of the different levels of testosterone.

Although Australia has the highest risk tolerance scores for both male (58.2) and female (52.3) groups, the difference in risk tolerance between females and males is more pronounced for the U.K. respondents (-6.3) than for the U.S. (-5.69) and Australia (-4.97). Table 3 shows that the average difference between males and females is 8 points for the U.K. respondents and 6.5 and 5.9 points, respectively, for the U.S. and Australian respondents. These results appear to support Geert Hofstede's Masculinity Index values for the three countries. The Masculinity Index refers to the degree of gender differentiation of roles in a society. A society with a higher index value implies a higher degree of differentiation and it usually shows a larger gap between men's and women's values. The U.K. has an index value of 66, followed by 62 in the U.S. and 61 in Australia.

(4) Income

The results also show that risk tolerance increases as income rises higher to the next level. A person at a higher income level has more disposal income and so is in a better position to tolerate more risk. It is surprising that income is not a more important contributor to risk tolerance than gender and age. Table 2 indicates that risk tolerance increases by 3.12 points as the income increases to the next bracket for Australians. Risk tolerance increases the highest for the U.K. (3.17) and the lowest for the U.S. (2.41). It is difficult to explain why an average person with more disposal income in the U.K. is willing to tolerate more risk than a person in the U.S.

If there is a logical explanation, it is more likely based on social and economic rationales. Maybe, society in the U.K. is less accepting of economic inequality and more class conscious. Consequently, people in the U.K. may be willing to tolerate more risk to make it to the next status or catch up with the "Joneses" faster as their incomes increase. The increase in risk tolerance may also be tax driven. The U.K has only 3 tax brackets for individuals (20%, 40%, and 50%) and they are relatively higher compared to those in the U.S. (10%, 15%, 25%, 28%, 33%, and 35%) and Australia (0%, 15%, 30%, 37%, and 45%). As such, a jump in the tax bracket in the U.K. would be more obvious and more painfully felt for a taxpayer in the U.K. than in the other two countries. As one's income propels a person to reach the next tax bracket, especially from the 20% to 40% bracket, it seems intuitive that the person would be willing to tolerate more risk to try to generate a higher return to help pay for the higher tax on investment income.

Table 3 shows the mean difference between the various income groups is significant for each country. It also indicates that the average size of risk tolerance increase declines as income increases. For example, for the U.K group, the average increase in risk tolerance is 6.6 points from the low to middle income group and 5.4 points from the middle to high income group.

(5) Education

Table 2 shows risk tolerance increases as a higher level of education is attained. A person who is more willing to invest time and money in more education is probably a more competitive person, thus willing to tolerate more risk. Furthermore, a more educated person has more options available to him or her to deal with losses in terms of recovery. There might be more resources that they can tap to minimize the consequences of losses.

Another possibility has to do with more understanding of risk. It probably depends on the type of education that is received. A person receiving a financial education, especially in investment, would become more risk tolerant than one who is receiving non-investment types of education (Grable 2000). The U.S. education has the greatest impact on risk tolerance increase (Aus: 1.11; US 1.45; UK 0.54) while the U.K.

The level of individualism may also explain the difference in risk tolerance. A highly individualistic individual may be a highly competitive person, using education, among other means, to improve his or her competitive advantage over others. Thus a person with a higher level of education, reflecting the higher level of individualism and competitiveness, would not hesitate to take more or tolerate more risk. The Individualism Index (Hofstede 2009) for the U.S. is 91, which is a bit higher than the index values for Australia (90) and the U.K. (89).

Although education's contribution to R Square is statistically significant for each country, the contribution is small. For example, Table 2 shows that an upgrade in education from one level to another would only contribute a 1.45 point increase in financial risk tolerance in the U.S. Table 3 shows that risk tolerance increases at an increasing rate with each higher level of education in Australia and the U.S. but the trend is opposite in the U.K.

(6) Marital Status

As for marital status, it seems that singles are slightly more tolerant than married people. For married people, a loss would affect not only the investor but the family (Roszkowski 1998). It means more family-related expenses and a decreased ability to handle investment losses, thus leading to decreased risk tolerance. It is also plausible that a married couple has a relatively larger investment size and has more to lose, affecting their risk tolerance. Risk tolerance decreases with marriage with a B coefficient of 0.37 in Australia, 0.46 in the U.S. and 0.62 in the U.K. The greatest decrease in risk tolerance occurs in the U.K. than the other two countries. The cultural dimension of masculinity (described earlier) may explain the difference in risk tolerance. In a relatively more masculine society like the U.K., where the gender

differentiation of roles is greater, a marriage would serve to decrease the "competitiveness" of the male partner, thus decreasing risk tolerance more after marriage. Of all the demographic variables studied, marital status has the lowest impact on risk tolerance. Table 2 also shows that marital status does not contribute to any change to R square in the regressions for all three countries.

However, the ANOVA result in Table 3 seems to differ with Table 2's regression result. Table 3 shows that the U.S. and U.K. married respondents have a higher risk tolerance than their single counterparts (US: 53.8 married vs 52.7 single; UK: 51.7 married vs 51.2 single). However, the Australian ANOVA result supports the regression result in Table 2. The result difference could be due to the difference in assumptions underlying the test hypotheses associated with the two techniques. The ANOVA technique tests the effect of marital status on the risk tolerance score after controlling for the effects of the other independent variables, but not controlling for the interaction between marital status and the other independent variables. The regression technique tests the effect after controlling for both the other variables and the interaction effect, thus providing a more rigorous result (Olsen 1996).

(7) Actual Versus Perceived Scores

Although not a technically demographic factor, Table 3 shows that people have a tendency to have a lower perceived risk tolerance than what their actual risk tolerance scores indicate. On average, the perceived score is anywhere from 5.0 to 5.6 points lower than the actual score. It is interesting to note that the size of the average difference is quite similar in all three countries. Investment advisors who depend on clients to provide their perceived risk tolerance may have to adjust for the bias to arrive at their actual risk tolerance level.

B. Scores on Selected Risk Tolerance Questions

Table 4 shows results of responses to selected risk-tolerance questions in the questionnaire. The results of the seven questions provide some insights into the differences of risk tolerance in Australia, the U.S., and the U.K.

In line with the observations of Table 2 results, more Australian than the U.S and U.K. respondents are more concerned about possible gains than losses (**Q6**: Aus 55%, US 48%, UK 47%) and are more willing to buy stock after declining (**Q13**: Aus 42%, US 40%, UK 36%). More Australians than other nationalities also prefer less job security with the potential of big pay raises (**Q5**: Aus 41%, US 37%, UK 37%).

Table 4 – Country Risk Tolerance Score in Selected Questions

Q2-How easily do you adapt when things go wrong financially?

	Aus	US	UK
Uneasily	44.4%	41.3%	47.0%
Somewhat Easily	42.6%	45.5%	39.6%

Q5-If you had to choose between more job security with a small pay rise and less job security with a big pay rise, which would you pick?

	Aus	US	UK
Job security	44%	47%	46%
Not sure	15%	16%	17%
Less job security	41%	37%	37%

Q6-When faced with a major financial decision, are you more concerned about the possible losses or the possible gains?

	Aus	US	UK
Possible losses	45%	52%	53%
Possible gains	55%	48%	47%

Q8-Imagine you were in a job where you could choose whether to be paid salary, commission or a mix of both. Which would you pick?

	Aus	US	UK
Salary	57%%	54%	63%
Equal mix	35%	34%	30%
Commission	8%	12%	7%

Q12-How much confidence do you have in your ability to make good financial decisions?

	Aus	US	UK
Little/Reasonable	76%	73%	82%
Great deal/Complete	24%	27%	18%

Q13-Buy a stock after declining

	Aus	US	UK
No	31%	29%	36%
Not sure	27%	31%	28%
Probably/Definitely	42%	40%	36%

Q24-Insurance can cover wide variety of life's major risks - theft, fire, accident, illness, death etc. How much cover do you have?

	Aus	US	UK
Little/Some	48%	47%	53%
Considerable	52%	53%	47%

Compared with the Australians, more U.S. respondents are concerned with job security but prefer to be paid with commission if job security is not an issue (**Q8**: Aus 8%, US 12%, UK 7%). It seems that once the U.S. respondents achieve a certain basic level of protection, they are more willing than the other nationality groups to tolerate more risk. Support for this observation comes from the responses to Question 24, which indicate that 53% of the U.S. respondents would purchase considerable or complete amount of insurance to cover major risks. The Australians follow with 52%. Surprisingly, only 47% of the U.K. respondents indicate the need for considerable coverage, in view of the fact that they generally score the lowest in risk tolerance assessment.

Lastly, more of the U.S. than the other 2 nationality groups show high level of confidence in their abilities to make good financial decisions (**Q12**: Aus 24%, US 27%, UK 18%). However, if things do not work out, the results in Question 2 show that the majority of the U.S. respondents (51%) indicate easy adaptability versus 48% for Australian respondents and 45% for the U.K. respondents.

In summary, it seems like the U.S. respondents want to achieve a certain basic level of protection before willing to take or tolerate more risks. Australians have the greatest amount of risk tolerance. Of the three, the U.K. respondents tend to be conservative and have the least amount of risk tolerance but interestingly show lower tendency than the U.S. respondents in taking steps to acquire a basic level of protection.

V. CONCLUSION

The study indicates that financial risk tolerance increases with education and income. However, risk tolerance decreases with age and gender (female). Although risk tolerance also decreases with marital status (married), the impact is small. In this study, as in previous multiple regression studies, the R square value change is not that high. It is 0.193 for Australia, 0.186 for the U.S., and 0.215 for the U.K. in this study. The implication is that a person's demographic standing is not a big impact factor on the person's level of risk tolerance. Some sort of psychological or personality evaluation of a person's attitude toward risk may also be needed (Ardehali, Paradi, & Asmild 2005).

Australian respondents generally exhibit highest level of risk tolerance while the U.K. respondents exhibit the lowest level of the three countries. A more detailed analysis of selected questionnaire questions show that the U.S. respondents are most willing to tolerate more risks if they have achieved a basic level of protection. When the country comparison is done in each variable category, Australian respondents exhibit the highest level of risk tolerance in all demographic categories with the U.K. respondents generally exhibiting the lowest level. An analysis of selected questionnaire questions also show that the U.S. respondents tend to show the highest amount of confidence in making financial decisions and the most willing to adapt when things go wrong.

The volatility of risk tolerance is greatest for Australian respondents in the age and education variables. For the U.S. respondents, risk tolerance varies the most among groups in only the marital variable while the U.K. respondents exhibit the most volatility in the gender and income variables.

There are some limitations in this study and they provide implications and opportunities for future research. First, the study is done using samples from developed nations. Future research should include samples from developing nations and also from countries with widely different cultures and values. Culture and traditional values may have a mediating effect on financial risk tolerance. Future research should also determine whether attainment of investment knowledge helps in increasing risk tolerance. It is possible that a better understanding of investment risk would raise tolerance for financial risk. Finding out whether there is a link between

individualism, competitiveness, and education, and how such a link (if it exists) might affect risk tolerance can open up a new line of interesting research opportunities. Furthermore, there needs to be some studies to determine the comprehensive impact of personality on risk tolerance and whether personality has a greater impact on risk tolerance than that of demography. Lastly, the relationship between changes in tax status and risk tolerance behavior should be explored.

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