Subjective financial risk tolerance among students at selected South African universities: a comparative analysis of different fields of studies

By

Pfano Michael Ramudzuli

(Student no: 23034017)

Dissertation submitted in fulfilment of the partial requirements for the degree Master of Commerce in Risk Management at the Vaal Triangle campus of the North-West University

Supervisor: Dr PF Muzindutsi

November 2016

It all starts here ™

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

DECLARATION

I Pfano Michael Ramudzuli declare that

Subjective financial risk tolerance among students at selected South African universities: a comparative analysis of different fields of studies

is my own work and that all the resources used have been duly indicated and acknowledged by means of complete references. I also declare that this work has not been submitted for any other qualification at any other institution.

Date: ……..

Signature: ……..

Pfano Michael Ramudzuli

ACKNOWLEDGEMENTS

The greatest words of thanks go to the Almighty God for allowing me the opportunity to get this far, giving me strength to keep on when I felt like giving up and also giving me the wisdom to complete this project.

I would further like to extend my genuine gratitude to my supervisor, Dr PF Muzindutsi for taking his time to work with me and make this project a success. This would not have been a possible without your guidance and encouragement.

I would like to send a special thank you to all the students from the different universities who took their valuable time to participate in this research by providing their invaluable opinions.

I would also like to thank my parents, family and friends for motivating me and supporting me throughout this project.

Last but not least, special thanks to Lufuno Tshivhase for her support throughout the project. Your emotional support and understanding in difficult times did not go unnoticed.

ABSTRACT

Central to the construction of investment portfolios and appropriate asset allocation is the level of financial risk tolerance (FRT) for each individual investor. In order to enhance the portfolio allocation process, individuals have to understand their financial ability and psychological willingness to tolerate financial risks. To carry this task out, the FRT level of individuals has to be quantified. The theoretical explanations behind FRT tend to stimulate contestations and discussions about what FRT is, how it can be measured and about the factors that can influence an individual's tolerance level. The former has been adequately dealt with as researchers concurred that FRT can be explained as the willingness and ability to risk current financial resources in anticipation of higher future returns. FRT can be measured using either objective measures or subjective measures, however, evidence as to which of the two methods is superior is somewhat mixed given the strengths and weaknesses of each of the measures. Factors that influence FRT levels provide for a very important discussion that has seen a lot of demographic variables including age, gender, income, education, race and expenditure emerge. Interestingly, the debate as to how these demographic factors shape FRT levels is widespread and sometimes inconclusive, indicating the need for further analyses in this field, specifically in a South African context.

The study reported in this document was designed to quantify the effect of age, gender, level of education (LOE), qualification and field of study (FOS) on FRT levels. The key empirical objective of this study was thus to determine the extent to which these demographic factors can be used to explain variations in FRT levels. Data was collected from selected South African universities using a questionnaire developed from reviewing a combination of previous questionnaires in this field, particularly the Grable and Lytton (1999a) questionnaire together with the Hanna and Lindamood (2004) questionnaire. A binary logistic regression model (BLRM) was adopted as the main econometric model used to analyse the effect demographic factors have on FRT levels. Ultimately, participants were classified as either risk tolerant (RT) or risk averse (RA) based on an empirical model of risk tolerance scoring adopted from the Grable and Lytton (1999a) study. Other tests such as the Mann-Whitney U test, median analysis, the Kruskal-Wallis test and correlations tests were conducted to establish and explain relationships between variables. Using correlation analysis, it was concurred that the sample was free from

any inter-correlations among the independent variables. The Mann-Whitney U test concurred that there were significant differences in the FRT levels of males and females. On the other hand, the Kruskal-Wallis test concluded that FRT levels can be statistically significantly explained by LOE and FOS, while age and qualification could not statistically significantly explain FRT differences.

Results from the BLRM showed that various demographic factors do in fact influence FRT levels. Specifically, gender, LOE and FOS were found to be statistically significant factors affecting an individual's level of FRT. With regards to gender, it was concluded that females tolerate less financial risks compared to males. The results for LOE meant that higher levels of education increased FRT levels whilst the results for FOS meant that being in a finance related FOS increases FRT. Specifically, being in Humanities, Law, Education, Engineering & Information Technology (IT) decreased the likelihood of being FRT . On contrary, age and the qualification of participants were found to be statistically insignificant with regards to their influence on FRT. The findings of this study have provided new evidence from a larger and well representative South African sample which could be used to improve the understanding of FRT and its demographic determinants. It is important to also note that demographic factors are only a starting point with regards to assessing investor FRT. The understanding of FRT provides a complex process going beyond the exclusive use of demographic variables; hence more research is warranted to determine additional variables that can be used to improve the explained variance in FRT differences.

Key words: Financial risk tolerance, demographic factors/variables, financial risk, objective financial risk tolerance, subjective financial risk tolerance, South African universities.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

ARA	:	Absolute Risk Aversion
BLRM	:	Binary Logistic Regression Model
CDQ	:	Choice Dilemma Questionnaires
ECMR	:	Expected Capital Market Returns
ER	:	Entrepreneurial Risk
FOS	:	Field of Study
FR	:	Financial Risk
FRT	:	Financial Risk Tolerance
IT	:	Information Technology
IR	:	Income Risk
IVR	:	Investment Risk
LOE	:	Level of Education
NYSE	:	New York Stock Exchange
OFRT	:	Objective Financial Risk Tolerance
OLS	:	Ordinary Least Squares
PR	:	Personal Risk
RA	:	Risk Averse
RRA	:	Relative Risk Aversion
RT	:	Risk Tolerant

RTS	:	Risk Tolerance Score
SCF	:	Surveys of Consumer Finances
SFRT	:	Subjective Financial Risk Tolerance
SR	:	Speculative Risk
UKZN	:	University of KwaZulu-Natal
U.S.A	:	United State of America

CHAPTER ONE: INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTION

Individuals today face an increasingly important decision of determining how to efficiently and effectively allocate their money and limited financial resources into different asset classes helping them build the best investment portfolios. The significance of these decisions is frequently underestimated considering the huge impact they have on the financial well-being of individuals and their retirement plans. In determining portfolio allocations, individuals need to have full understandings of what their FRT levels are (Bodie *et al.,* 2007:28). FRT is largely defined as the degree to which individuals are willing and able to endure the likelihood of an uncertain financial outcome in anticipation of higher financial returns (Harlow & Brown, 1990:51). These tolerance levels can be quantified using subjective measures thus measuring subjective financial risk tolerance (SFRT) levels or using objective measures in which case we measure objective financial risk tolerance (OFRT) levels. SFRT is referred to as an individual's own-perceived FRT largely affected by attitudes and opinions towards financial risk (FR) (Chang *et al.,* 2004:54). OFRT is on the other hand is an individual's tangible FRT level seen through revealed behaviour and actual past asset allocations (Chang *et al.,* 2004:54). Grable (1997:92) has proven beyond doubt that an individual's SFRT and OFRT are closely correlated although not on a one to one basis. In broad sense, this process of determining ones tolerance levels may be affected by numerous factors including demographic factors such as age, gender, LOE and type of education received. Callan and Johnson (2002:38) also identified willingness, ability and the need to take FR as other important factors affecting FRT levels.

The origin of what is today known as FRT goes back to when the Hindu-Arabic numbering system that reached the West about eight hundred years ago (Bernstein, 1996:3). However, serious efforts in the study of FRT began during the 14th to the 17th century when people broke loose from the limitations of the past and subjected long held beliefs to open challenge (Bernstein, 1996:3). The importance of understanding FRT became apparent in the 1700s with the introduction of the probabilities theory mainly used by gamblers and governments to determine life expectancies (Bernstein, 1996:4). Between 1958 and 1962, Wallach and Kogan (1959:556) and Wallach and Kogan (1961:24) made a huge advancement in the study of FRT by

developing what is today largely known as the choice dilemma questionnaires (CDQ) used to measure FRT in everyday life situations using scenarios. CDQ have since been largely accepted in the study of FRT although recent researchers prefer to use more direct and multidimensional measures to quantify FRT. In the era post 2010, research in FRT has lost its momentum due to an increasing complexity of the financial industry and the emergence of technology where people can instantly determine their tolerance levels on the click of a button.

Numerous international researchers such as (Bernstein, 1996; Chang *et al.*, 2004; Eckel & Gilliam *et al.*, 2010; Grossman, 2008; Hallahan *et al.*, 2004; Koh & Fong, 2011; Pieson, 2012) and very few South African researchers (Gumede, 2009; Metherell, 2011; Strydom & Metherell, 2012; Strydom *et al.*, 2009; Ramudzuli & Muzindutsi, 2015) have made successful attempts to measure FRT levels of individuals. Literatures reviewed on these studies partly indicate inconsistent findings mainly due to the nature of the samples used. This just makes research in FRT an interesting one offering an ideal opportunity for further research since there is no clear cut solution into what determines tolerance levels. In its simplest form, the study of FRT involves tracking behaviour and/or actual past asset allocations to determine whether an individual should be classified as either RT or RA (not risk tolerant). This allows the individuals to have an idea of the suitable assets they need to invest in, while in turn making it easier for investment companies and managers to market relevant products to the correct target markets. RA individuals would largely be attracted to investments with less FR, usually cash, bonds and any other instruments in the money market. RT individuals would however be more attracted to riskier investments usually in the stock markets and in foreign markets. As such, this study attempts to use different demographic factors, particularly: age, gender and education to determine their influence when classifying individuals as either RT or RA.

1.2 PROBLEM STATEMENT

Riley and Russon (1995:65) pointed out that appropriate asset allocation is highly dependent on expected capital market returns (ECMR) and the desire and ability of individuals to tolerate FR. Although a significant amount of work has been done regarding these two topics, the research in FRT has been limited in enhancing the understanding of different factors that influence an individual's FRT level especially in a South African context. Because demographic factors are a

major aspect in the FRT study, it may also be inappropriate to generalise international and local studies conducted in different locations under different demographic and geographic factors, hence a more specific analysis is required in order to make correct conclusion about a given set of the population. With personal savings and investment behaviours becoming an increasingly important issue facing households, the desire for financial managers to understand the drivers of FRT levels of these households has become an important aspect. It is also apparent from previous studies and discussions that determining an individual's level of FRT is a very important issue in both the academic industry and the investment finance industry. The study of FRT has also gained attention in efforts to understand the process through which individuals make daily finance related decisions and select optimal investment portfolios.

The need for additional empirical testing of the relationships between demographic factors and FRT is supported by the following factors. Investment managers and portfolio managers who still continue to use these demographic factors to differentiate among and classify individuals into RA and RT categories and the assumption that these managers will continue to use these in the future. Additional research is also necessary to try and positively influence investment portfolio performances through the application of these demographics as differentiating factors. Lastly, academic findings in relation to FRT and demographic factors have been inconclusive and often conflicting, thus requiring more and better structured researches. To date, five studies (Gumede, 2009; Metherell, 2011; Strydom & Metherell, 2012; Strydom *et al.*, 2009; Ramudzuli & Muzindutsi, 2015) have investigated the effect of demographic factors, notably age, gender, level of income, race and LOE on FRT in a South African context. However, only Ramudzuli and Muzindutsi (2015) investigated the effect of FOS (type of education) on FRT. To add to this, some of these studies, (Gumede, 2009; Strydom *et al.*, 2009; Ramudzuli & Muzindutsi, 2015) focused on a homogeneous sample of students at a single university with similar demographic factors. The survey instrument (questionnaire) used by (Gumede, 2009; Strydom & Metherell, 2012; Strydom *et al.*, 2009) was also limited in that it required a certain level of financial knowledge for one to answer the questions, which posed difficulties for participants that did not have such levels of financial knowledge. Gumede (2009) and Strydom *et al.*, (2009) went on to measure FRT in terms of income risk (IR) whereas Grable and Lytton (1999a:168) suggested that this concept could cover a wide range of risk categories such as investment risk (IVR), speculative risk (SR), entrepreneurial risk (ER) and guaranteed and probable gambles. Hence,

there is a need for a study which includes all these categories in its risk measurement. University students (mainly comprising of the youth) are the future, hence, a better understanding of their savings, investing and spending decisions can be an important tool in these current economic conditions. It is also important for one to have a better understanding of his/her FRT level in order to make informed financial decisions. This study will therefore investigate SFRT levels and the effect of demographic factors on these tolerance levels at selected South African universities, with the aim of bridging these aforementioned gaps.

1.3 OBJECTIVES OF THE STUDY

The following have been identified as the objectives of this study:

1.3.1 Primary objectives

The primary objective of this study was to conduct an analysis of the extent to which demographic factors, specifically education affect FRT levels among South African university students. To achieve this, the following objectives were formulated for the study:

1.3.2 Theoretical objectives

- To discuss the various definitions of FRT and its main focus;
- To discuss the history of FRT;
- To discuss the various risk tolerance categories used in the classification of individuals based on their FRT levels;
- To review the theoretical concepts relating to the measurement of FRT (OFRT and SFRT);
- To review theoretical studies on the linkage between SFRT and demographic variables and the implications of determining an individual's tolerance level.

1.3.3 Empirical objectives

With the aim of achieving the above mentioned primary objective, the following empirical objectives were formulated for the study:

- To quantify the extent to which an individual's FOS influences their SFRT levels;

- To determine the extent to which LOE (measured by an individual's academic year) affects SFRT;
- To quantify whether the qualification (Diploma, certificate, degree, etc.) one is studying towards has any influence on individual SFRT;
- To determine if gender affects SFRT levels of individuals;
- To determine the interaction between the age of individuals and their SFRT levels;
- To compare the findings of this study to those of previous South African studies.

1.4 JUSTIFICATION OF THE STUDY

It is very usual that investment portfolio managers use various demographic factors to categorise individuals into FRT categories in order establish investment management standards, and to control the purchase and sales of investments while also managing the overall client resources (Roszkowski *et al.,* 1993). Palsson (1996) indicated that the use of demographic factors in the FRT study has the potential to influence investment performance and household welfare, but this has not always been the case. This is particularly because people do not go and implement these findings. With research concerning the differentiating efficacy of demographic factors not particularly conclusive, there is a general consensus in both the academic and financial industry that additional research is needed with regards to the importance of certain demographics in classifying individuals into a risk tolerance category (Gibson *et al.,* 2013:45; Heenkenda, 2015:18; Larkin *et al.,* 2013:87; Ramudzuli and Muzindutsi, 2015:182).

Changes in portfolio structures and compositions have also been justified by changes in income, age, gender, and other demographic factors. It is very frustrating to receive a call or marketing email selling a product you do not need or one that does not fit your needs, hence knowing ones FRT level brings a number of advantages including knowing exactly the type of financial products that may be attractive to that specific individual. This means that financial companies will better understand the types of financial products they need to market/sell to a specific group of individuals without spending much effort and money. It was thus important to conduct a study on the factors affecting FRT levels and specifically how these factors shape tolerance levels for individuals.

1.5 METHODOLOGICAL APPROACH

This study comprised a literature review and an empirical study. A combination of methods using both explanatory and descriptive quantitative research methods was employed with questionnaires used for the empirical portion of the study. Secondary sources were also consulted to add to both the qualitative and the quantitative portions of the study.

1.5.1 Literature review

The information used in this study was largely obtained from journal articles. However a range of relevant internet sources, textbooks, academic theses and dissertations were also consulted to obtain necessary information. The literature review focused on the following:

- Explaining what risk and FR refers to and ultimately what FRT is;
- Discussing the deep history of FRT;
- Discussing the various risks (IR, IVR, and SR) that one needs to consider when quantifying FRT levels;
- Explaining the behavioural aspects of FRT while also discussing its important components;
- Reviewing the different FRT categories;
- Differentiate between SFRT and OFRT; and
- Reviewing the existing empirical research on the relationship between an individual's demographic factors and their level of FRT.

1.5.2 Empirical study

The empirical section of this study comprised of the below discussed methodological dimensions:

1.5.2.1 Target population and sample

The targeted population for this study included all the students (males and females) registered at the selected South African universities for any of the selected qualifications and for the academic year 2016. As for the sample, a total of 500 participants were sought as the sample of this study. In the end, a total of 470 usable questionnaires were received.

1.5.2.2 Sampling method

In reality, it is not feasible in terms of energy, time, labour, equipment, or money to quantify every element of the population being studied (Latham, 2007:1). As such, an appropriate sampling strategy was adopted to obtain a representative and statistically valid sample from the population. A probability sampling method was used in the form of stratified random sampling. In this regard, the population was divided into different groups based on the different FOS before applying a random sampling technique to each of the identified groups. The selection of the location was largely affected by convenience to collect data as the researcher could accesses the location with ease.

1.5.3 Data collection method and measuring instrument

With the help of data collectors, a questionnaire developed from a revised combination of the Grable and Lytton (1999a:172) questionnaire together with the Hanna and Lindamood (2004:37) questionnaire was administered to the targeted population. This revised questionnaire allowed for a more comprehensive data collection instrument suitable for the population being studied. The developed questionnaire eliminated a major problem of understand-ability for individuals with limited financial knowledge. The questionnaire used was also simplified in terms of both the language used and the length of the questions to ensure accuracy and rationality of collected data. The questionnaire consisted of two major sections (see Appendix A) with the first section capturing the demographic composition of participants. The second section captured the level of FRT of participants and was divided into subsections measuring personal risk (PR) taking, IVR taking, IR taking and SR taking. Responses were analysed using a risk tolerance scoring system first used by (Grable & Lytton, 1999a: 172). This system allocates a numeric number to each option in the questionnaire depending on its riskiness. Riskier options are assigned higher values while less risky options receive a smaller value (Grable & Lytton, 1999a: 172). When classifying participants as either RA or RT, each individual's risk tolerance score (RTS) was compared to the observed average RTS. Those with a RTS greater than the observed average score were classified as RT while those with a score below the observed average score were classified as RA.

1.5.4 Statistical analysis

In addition to descriptive analysis, this study employed a BLRM which had a dependent variable of a dichotomous nature and a number of independent variables each with its own hypothesis. A method of risk tolerance scoring adopted from the Grable and Lytton (1999a) study was applied in classifying participants as either RT or RA.

1.5.4.1 Dependent variable

When using a BLRM, proper definition of the dependent variable is important. The dependent variable of this study was of a dichotomous nature with two possibilities. The possibility of being RT coded as 1 and the possibility of being RA coded as 0. FRT status being the dependent variable was reliant on a number of independent variables.

1.5.4.2 Independent variables

All the independent variables used in this study are categorical. Table 1.1 represents a summary of the independent variables including their various categories. There were five independent variables, namely age, gender, LOE and qualification FOS.

1.5.4.3 The binary logistic model

By definition, a BLRM is a predictive analysis in which the dependent variable is categorical. A BLRM is used to explain relationships between the dependent variable and a number of independent variables (Grable, 1997:12). There is theoretical support for the use of a BLRM by various researchers on this topic (Anbar & Eker, 2010; Hanna & Lindamood, 2004; Strydom & Metherell, 2012; Strydom *et al.*, 2009; Sung & Hanna, 1996). As such, a BLRM was used in this study, and is detailed in Chapter 4.

Table 1.1: A summary of independent variables and their categories

Variables	Categories
Age	18 or younger
	19-21
	22-24
	25 or older
Gender	Female
	Male
LOE	First year
	Second year
	Third year
	Postgraduate
Qualification	Certificate
	Diploma
	Degree
	B-Tech
	Honours
	Masters
FOS	Economics
	Business Management
	Engineering & IT
	Humanities[1]
	Accounting Sciences
	Education
	Law

Source: Own construct

1.6 ETHICAL CONSIDERATION

With questionnaires being a big part of this study, a number of ethical considerations had to be complied to. In essence, this study adhered to all ethical standards relating to academic research. The identities of the participants have been protected as this was also assured in the questionnaires. Participation was voluntary and participants where made aware that they could withdraw at any point during the process. The information collected was only used for the

1 This refers to an academic discipline concerned with human culture such as psychology, theology, religion and musicology.

purpose of this study while being handled confidentially. Anonymity was guaranteed and maintained with regards to the identities of the participants and the information they provided. Permission in the form of ethical clearances was obtained from the universities concerned in order to collect the data.

1.7 CHAPTER CLASSIFICATION

This study comprises of the following chapters:

Chapter 1 - Introduction and background of the study: This chapter introduces the study, giving a background of the study, the scope of the study, the research problem, the study objectives, the justification of the study and the methodology adopted.

Chapter 2 - Literature review: This chapter discussed FRT, its history and the basic important concepts in FRT such as tolerance categories, components and behavioural aspects. The second section of this chapter discussed the empirical portion of FRT looking at the effects of various demographic factors. This incorporated results and findings reported by previous local and international researchers.

Chapter 3 - Research design and methodology: This chapter comprised a detailed outline of how this study was conducted. It included the sample (in terms of how, where and from whom data was collected), method of analysis, instruments deployed and how these instruments were used to analyse the collected data. This chapter also included a discussion of the BLRM used and statistical models used to analyse the data.

Chapter 4 - Results and findings: This chapter discussed the results and findings of the study. This is where the differences between FRT levels as differentiated by each independent variable were discussed.

Chapter 5 - Summary, conclusions and recommendations: This chapter summarised the study highlighting the important findings, providing concluding remarks and also presenting the necessary recommendations. Problems encountered and the limitations of the study together with suggestions for future research were also discussed in this chapter.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

Derived from the Italian word 'risicare', which means to dare, risk is more of a choice than a fate (Bernstein, 1996:2). Risk is about the actions that people dare to take which are largely dependent on how free people are to make such choices. Koh and Fong (2011:22) cited up to four different types of risks in ethical, social, physical and lastly FR with the latter being the focus for this study. People are therefore expected to behave consistently within, but not between these various types of risks (Koh & Fong, 2011:22). Tolerance for both financial and non-financial risks refers to the extent to which people are psychologically receptive to various uncertain decisions affecting either their social, ethical, physical or be it financial wellbeing (Koh & Fong, 2011:23). Generally, risk tolerance is the summation of all the fear/greed trade-offs available (Finametrica, 2015:1). This include trade-offs between making the most of opportunities and securing financial well-being, the trade-offs between regret avoidance over losses incurred from taking too much risk and abnormal gains missed through not taking enough risk (Finametrica, 2015:1). Therefore, risk tolerance is best defined as the extent to which a person chooses to risk experiencing a less favourable outcome in the pursuit of a more favourable outcome (Hallahan *et al.,* 2004:58). It is essential to recognise that risk tolerance represents a trade-off on the continuum from minimising unfavourable outcomes to maximising favourable outcomes and not just an upper limit on unfavourable outcomes (Finametrica, 2015:1).

This chapter covers the theoretical objectives of the study by providing a conceptual review of FRT, its components, determents, how it can be measured and the linkage to various demographic factors. It starts with a discussion around risk tolerance and the various FRs (IR, SR and IVR) which people are exposed to and towards which tolerance can be measured. This helps to create a basis for understanding what risk tolerance is and acknowledging that it can apply to various types of risks be it financial or non-financial risks. This discussion is then followed by a sub-section focussed on broadly defining FRT by bringing in various definitions from a number of researchers such as Bernstein (1996); Grable (2000) and Hallahan *et al.* (2004). A historical review of FRT then follows looking at how this study has evolved over the

years. The various components and behavioural aspects of FRT are then discussed focusing on the ability to assume risk, willingness to take risk, the need to take risk, knowledge, regret, comfort and investment choice.

Faff *et al.* (2008:8) emphasised that FRT is inversely related to the concept of risk aversion; as such a discussion linking these two concepts also formed part of this chapter. As an important factor in the study of FRT, a section is devoted to discussing how portfolio formation may be affected by FRT before discussing the various FRT categories. These categories are used to group individuals according to their levels of FRT and include but no limited to conservative, moderately conservative, moderate, moderately aggressive and aggressive (Tools for Money, 2004:1). As already noted, a distinction is made between OFRT and SFRT. The contrast between these two concepts is explored although this study only makes use of subjective measures as detailed in the methodology. Furthermore, a broader discussion on how various demographic factors may influence an individual's FRT level then follows. This also includes empirical review on findings by previous international and local researchers on the effect of these various demographic factors on FRT levels. Although there are a number of these demographic factors to which researchers have made reference, this study is only limited to age, gender, LOE, FOS and type of qualification. Lastly, this chapter also explored the implications of a recorded FRT score for individuals, financial planners and portfolio managers before providing concluding remarks on arguments presented in the chapter.

2.2 CONCEPTUALISATION OF FINANCIAL RISK TOLERANCE

2.2.1 Defining risk tolerance

As already defined, risk refers to a situation which may involve exposure to something that is undesirable (Bernstein, 1996:2). This may include exposure to physical danger, mental danger or financial danger (Koh & Fong, 2011:22). As such, risk is thus the chance that actions taken may result in undesired results mainly as a result of uncertainty (Gough, 1988:6). Whether financial or non-financial, risk can be divided into pure risk and SR. Pure risk refers to the likelihood of loss provided an event occurs; for example, the risk of a flood causing damage to a home (Pieson, 2012:1). SR however refers to the possibility of loss, gain or staying the same (notice that there are three possibilities) (Pieson, 2012:1). An example of SR is gambling where one can

win or lose money or come out even. Because of this uncertainty, people are expected to retain a certain capacity to be able to tolerate such undesirable outcomes; this is called risk tolerance (Gough, 1988:42). Risk tolerance can therefore be summarised as an individual's ability to withstand irregularities and uncertainties both in their daily social life and in their finances (Pieson, 2012:1). It is thus a measure of how much people are willing to stretch their possibilities of getting physically injured (physical risk), getting on the wrong side of the law (ethical risk) or losing their money (FR) when pursuing their goals and objectives (Pieson, 2012:1). This concept of risk tolerance is largely documented in FR where individuals are examined to determine the extent to which they are comfortable with risking their money through a number of financial decisions including investing and gambling. For non-financial risks, risk tolerance has not been documented to a large extent; however psychologists are usually interested in how and why people make certain decisions affecting their physical and social wellbeing. The crucial objective of risk tolerance is to protect one's goals, dreams, treasures and personal well-being from those 'what ifs' that might become 'what now' (Pieson, 2012:1). Risk tolerance is not a static process and as such will always change over time. This is because the risks that people face and the strategies that they use to protect themselves changes as personal, mental and financial circumstances changes (Pieson, 2012:1).

As human beings, it is in our instincts to come up with solutions when faced with uncertainties in order to preserve our goals and objectives; this speaks to our risk tolerance strategies (Grable & Joo, 2004:73). As indicated by Pieson (2012:1), there are five distinctive methods and strategies usually assumed when one is dealing with risks. From risk avoidance to risk transfer, these methods also indicate the type of a risk taker one is as discussed below. Firstly, the first instinctive response to risk may be to avoid it (Kahneman & Tversky, 1979:266). Risk avoiders will naturally avoid those high risk activities that, should they happen, they would be disastrous to personal or financial plans (Pieson, 2012:1). Examples of these activities would be speeding, dangerous sports and smoking. Secondly, other people may prefer to retain the risk provided that such risks do not impose substantial financial and non-financial threats (Pieson, 2012:1). Risk retainers will personally assume the risk through self-insuring. Examples of risk retainers include people who may feel that they do not need protection from risk as they do not have debt obligations or because they believe they have sufficient cash flows and assets to take care of any potential risks (Grable & Joo, 2004:75). Thirdly, most people believe in risk reduction which is a

strategy applied by preventing and controlling both losses and damages (Pieson, 2012:1). According to Pieson (2012:1) risk reducers tend to ensure that they have sufficient preventive measures to prevent risk and if this fails they always have control measures such as insurance to take care of the risks. Examples of risk reduction include the use of fire and burglar alarms, air bags, and FR hedging strategies. Risk reduction can also include minimising risk by taking out an insurance policy for protection in the case of a predetermined event occurring (Kahneman & Tversky, 1979:271). The fourth strategy for dealing with uncertainty is risk sharing (Pieson, 2012:1). According to Pieson (2012:1) risk sharers usually determine a manageable amount of risk they can assume before transferring the remaining risk to one or more organisations. For example, a person who chooses a high deductible health plan that would require him to pay the first 10 percent of a major health bill, but would then pick up 100 percent of the cost thereafter. Lastly, people may prefer to completely transfer risks to a third party thus leaving them absolutely not liable to any uncertainties (Pieson, 2012:1). Risk transferors will usually transfer all the risk to a third party such that in the case of an event occurring, their assets and possessions are not affected at all. However this strategy may be more expensive than the other strategies due to high protection premiums (Grable & Joo, 2004:77). Examples of risk transfer include taking out comprehensive life covers and insurances.

2.2.2 Types of financial risks

In personal finances, people are expected to manage their financial resources with regards to saving, budgeting and spending these resources while also taking into account the various FRs they may be exposed to. As already mentioned, various risks need to be considered when dealing with personal finance and the measurement of risk tolerance. These include IR, SR and IVR. This section looks at defining these different personal FRs that are combined to form the overall FR. Reference is made to their basic definitions, how they are measured and how participants can essentially be classified as either RT or RA under each of these risks.

2.2.2.1 Income risk

By definition, Guiso *et al.* (1996:158) referred to IR as the possibility that financial inflows from a salary or from a financial investment product may decrease or cease due to job loss, changes in rates or employment changes. This may result in individuals unable to finance their budgets,

debts or fulfil their savings desires (Marx, 2010:7). Ideally, this is the major risk type in FRT as it has the ability to influence other risks as detailed below. Income can accurately be measured through wages and salaries received on a regular basis, hence, tolerance for IR is measured by determining the extent to which individuals are comfortable taking part in activities or making decisions which may pose a threat to these income streams (Guiso *et al.*, 1996:158). Such decisions may include leaving a job or moving to a different job, borrowing money from friends or lending money to friends. With economic advancement, investment streams have also become a source of regular inflows of income and may also be used to quantify tolerance for IR. These are affected by changes in interest rates and general economic conditions (Guiso *et al.*, 1996:158). Essentially, those that are reluctant to make decisions and take part in activities which may pose a threat to their incomes are usually less RT compared to those that are less sceptical to changes in income.

Another dimension of IR can be looked at through the effect of expected income on FRT levels. Expected income simply refers to un-earned income that people are anticipating to receive or earn in the near future (O'Neil, 1995). Grable (1997:15) indicated that expected income may usually have the same impact on FRT levels as actual income. This is because people, who are anticipating earning a certain amount of income in the near future, are able to make risky decisions knowing that they will be able to compensate any losses with the income they are anticipating earning. For example, many people feel comfortable taking out loans knowing that they will receive a certain income in the future in order to pay back the loan. This is a risky decision because with loans linked to interest rates, the amount borrowed can fluctuate over time. People who are not anticipating earning any income in the near future will similarly also not be able to take as much FR as those with higher expected incomes.

2.2.2.2 Speculative risk

As stated by Marx (2010:4), the concept of speculation involves the tendency of people committing their money in anticipation of making extraordinary profits based on presumptions that they make about the possible loss and return on a specific transaction. A popular concept highly exposed to SR is gambling which involves "betting on an uncertain outcome and taking a risk for the sake of enjoyment of the risk itself and accepting any return, even a low return or a

loss" (Guiso *et al.*, 1996:158). Grable and Lytton (1999a:173) indicated that items used to quantify SR usually assume that individuals with a higher tendency of making speculations have relatively higher risk tolerance levels compared to others. SR is also a category of risk that is assumed voluntarily and will either result in a profit, a loss or an even outcome (Reilly & Brown, 2012:440). All SRs are undertaken as a result of a conscious choice, consequently, many financial investment activities present examples in which SR has been undertaken (Reilly & Brown, 2012:440). This is because such financial investment ventures ultimately result in an unknown amount of success or failure (Reilly & Brown, 2012:440). SR can be contrasted with pure risk, which is a category of risk in which a loss is the only possible outcome while there are three possible outcomes in SR (Reilly & Brown, 2012:441). For example, when individuals purchase shares, they thus speculate that the initial principal investment will grow, decrease or stay the same (Guiso *et al.*, 1996:158).

2.2.2.3 Investment risk

Reilly and Brown (2012:444) defined an investment as the current commitment of money made for a specified period of time with the aim of deriving future monetary returns that will be able to compensate the individual investor for inflation expectations over the investment period, compensate the time period over which funds are committed and the uncertainty of future payments. Accordingly, IVR is thus the possibility that there will be uncertainty in investment returns resulting in reduced returns that are unable to compensate the investor for inflation expectations, time period over which funds are committed and the uncertainty of future payments (Reilly & Brown, 2012:444). Knowledge and temperament are known to be major determinates of an individual's ability to successfully deal with IVR (Grable & Lytton, 1999a:173). Hence, an individual is considered to be more RT than others when he/she is looking to invest funds in equities, hard assets, real estate or any other risky assets as compared to less volatile investments such as bonds (Grable & Lytton, 1999a:174).

In quantifying IVR, Grable and Lytton (1999a:179) used questions that required participants to indicate their level of comfort in terms of how much risk they can assume. This included questions in which participants were required to indicate how they would allocate their funds among high risk, medium risk and low risk assets. Furthermore, investment experience of

participants was also determined in terms of how likely are they to invest in high risk assets such as shares and mutual funds (Grable & Lytton, 1999a:179). Further questions asked how individual participants would react and alter their investments given different market conditions (Grable & Lytton, 1999a:180). In quantifying IVR this study looked at different dimensions such as personal comfort when making investment decisions, allocation of funds among investment products with different levels of risk and maximum loss that participants would accept in their investments.

2.2.3 Financial risk tolerance defined

One of the first appropriate definitions of FRT favoured by researchers in the consumer and financial studies was proposed by Kogan and Wallach (1964:22) where FRT was defined as 'the willingness of an individual to engage in a behaviour where there is a desirable goal however, the attainment of the goal is uncertain and accompanied by the possibility of loss'. Okun (1976:222) also described a key feature of FRT as a person's perception of change and danger accompanied by the necessity to evaluate the relative value of a given alternative and the likelihood of achieving it successfully. FRT is broadly referred to as the amount of variability in investments and investment returns that an investor is willing, comfortable and able to withstand (Grable & Lytton, 1999a:164). As FRT is an essential component in investing, individuals ought to have a realistic understanding of their ability to endure large swings in the value of their investments (Bernstein, 1996:17). Another definition of FRT referred to FRT as the extent to which an individual is willing to accept more risk in exchange for the possibility of a higher return (Hanna *et al.,* 2001:54). According to Roszkowski *et al.* (2005:69), it is also important to note that FRT combines both an individual's attitude and their financial capacity to take on risk as it is a measure of a person's willingness and ability to take on FRs. FRT is also defined as the maximum amount of volatility one is willing to accept when making a financial decision (Bellante & Green, 2004:270). Bernstein (1996:15) and Hallahan *et al.* (2004:57) referred to FRT as an indication of a person's attitude towards accepting risk which is their psychological ability to deal with uncertain outcomes. FRT has also been referred to as attitudes that people hold towards uncertainty (Faff *et al.,* 2008:1), the optimal amount of uncertainty that people are willing and able to accept when making financial decisions (Grable, 2000:625), the magnitude to which an investor is willing to assume more risk in anticipation of probable higher future

financial returns (Hanna & Lindamood, 2004:27), the tolerable level of variation relative to the achievement of objectives (Larkin *et al.*, 2013:78), the degree of inconsistency in investment returns that individuals are willing and able to withstand (Gibson *et al.*, 2013:24), the level of comfort drawn from financial decision making processes that include risking current money in anticipation of future growth (Grossman & Eckel, 2009:2) and a psychological component of decision making under financial uncertainty, where individuals evaluate the desirability of possible outcomes and the likelihood of those outcomes occurring (Chaulk *et al.*, 2003:259).

From the above FRT definitions, there seems not to be a specific general definition for FRT. As seen above, it has been referred to as attitudes towards loss, attitudes towards return, attitudes towards risky investment choices, tolerance of a given risk level, willingness and ability to assume risk, financial capacity to risk losing money and the psychological capacity to risk losing money. Moreover, FRT is individual, and what is deemed risky by one individual may be viewed as having relatively little risk by another individual (Chang *et al.*, 2004:62). However, all these different definitions have one thing in common as they all acknowledge that FRT has to do with how far an individual is comfortable to stretch his/her chances of loss and return when making financial decisions (Anbar & Eker, 2010:505). For the purpose of this study, FRT is defined as the amount of uncertainty in financial investments and savings that an individual personally feels comfortable to accept when risking his or her money through the purchase of investment products, the purchase of assets such as a house or car, gambling, borrowing money and lending out money to friends and family. Anbar and Eker (2010:505) stressed out that FRT is not static and tends to change over time as people and economic conditions change. With a rich history, these changes on what is deemed risky and what is deemed not risky by different people under different conditions are explored below looking at how the study of FRT has evolved over the years.

2.2.4 The history of financial risk tolerance

The study of FRT is not new as it has been of interest to financial planners, financial institutions, investors and academic researchers for hundreds of years (Grable, 1997:19). Bernstein (1996:3) indicated that the present conception of risk tolerance is highly rooted in the Hindu-Arabic numbering system that reached the West seven to eight hundred years ago. It was during the

Renaissance[2] when serious thoughtful efforts were taken towards the study of FRT after people broke loose from the constraints of the past and subjected long held beliefs to open challenge (Bernstein, 1996:3). However, the very first traceable attempt to measure FRT came about in 1654 when Blaise Pascal[3] was challenged using a series of questions developed by Paccioli (1494) to solve the puzzle: *'how does one divide the stakes of an unfinished game of chance between two players when one of them is ahead'* (Grable 1997:20). Working together with Pierre de Fermat[4], Pascal solved this problem while in turn discovering the basic concept and laws of probability (Devlin, 2008:55)

Up until the 1700, the concept of probabilities was used as the primary domain of gamblers and by 1725 this theory was being used for several other things such as placing marine insurances and determining life expectancies (Grable 1997:20). The concept of standard deviation followed shortly through the work of de Moivre (1730) who also discovered the bell curve. Even more important to the study of FRT was the conceptualisation of marginal utility and loss aversion by Daniel Bernoulli in 1738 (Bernstein, 1996:5). According to Grable (1997:20) one of Bernoulli's findings where that the satisfaction resulting from a small increase in wealth was inversely proportionate to the quantity of goods already possessed. This meant that as individuals increased their wealth, they required greater guaranteed returns in order to risk more wealth, and in general, people tended to prefer less risk to more risk. The statement that 'people prefer less risk compared to more risk' stood as the dominant hypothesis of rational behaviour for about 250 years while also laying the foundation for modern principles of investment management (Bernstein, 1996:5).

Research in the FRT study did not resurface as a subject of importance until the 1900 as economists and researchers accepted the logic of risk taking proposed by Bernoulli (Keynes (1937:23). Friedman and Savage (1948:281) noted that, during this time, very minimal additional research was being conducted in the FRT field as economists and researchers were predominantly preoccupied by social and political problems. In the late 1940s however, Friedman and Savage (1948:283) turned their attention to exploring the original risk taking propensity by proving that people may not necessarily have a constant risk tolerance throughout

[2] A period in Europe, from the 14th to the 17th century considered the bridge between the middle ages and modern history.
[3] A French mathematician, physicist, inventor, writer and Christian philosopher
[4] A French lawyer and mathematician involved in the developments that led to infinitesimal calculus.

the entire domain of wealth as they proposed a utility function which had both risk-avoiding and risk taking segments. As the earliest work on risk tolerance was focussed in the area of consumer behaviour (MacCrimmon & Wehrung, 1984), researchers in the fields of business (Fitzpatrick, 1983), finance (Cohn *et al.*, 1975; Markowitz, 1959; Siegel & Hoban, 1982), natural hazards (Kunreuther, 1979), and natural situations (Newman, 1972; Slovic, *et al.*, 1978) also began to pay more attention to measuring risky situations and surveying perceived individual risks.

Throughout the late 1950s and early 1960s, a major progression in the study of choice in risky situations was advanced by Wallach and Kogan (1959) who developed the widely used CDQ to measure risk tolerance in everyday life situations (Wallach & Kogan, 1959:560). The original questionnaire required that participants advise other individuals regarding 12 choices with two outcomes: a sure gain or a sure loss (Wallach & Kogan, 1961:24). An example of these questions included the following: *"Mr A, an electrical engineer has the choice of sticking with his present job at a modest, though adequate salary or moving on to another job offering more money but no long term security. Please advise Mr A by deciding what probability of success would be sufficient to warrant choosing the risky alternative"* (Wallach & Kogan, 1959:558). These types of choice dilemmas were commonly used to measure risk-taking propensities until the mid-1970s. Behavioural economists and psychologists supported the use of CDQ, while economists still advocated for the use of utility functions (Grable, 1997:21). After the mid-1970s, both approaches came under increased criticism for lack of validity and reliability due to the one dimensional nature of these types of risk assessments (Grable, 1997:21). Slovic *et al.* (1978:281) also revealed that the lack of consistency between and among distinctive CDQ administered by different researchers was posing problems and inaccuracy when quantifying FRT. Studies such as those by Bell (1982); Kahneman and Tversky (1979); Loomes and Sugden (1982); Payne *et al.* (1984); Shefrin and Statman (1985); Tversky and Kahneman (1981) shed doubt on economists' claims that risk-taking propensities and preferences could be represented and understood within a utility function environment.

In their research, Kahneman and Tversky (1979:266) concluded that people are consistently more willing to take risks when certain losses are anticipated than when gains are anticipated. Since the mid-1970s, additional research by Statman (1995) and Tversky and Kahneman (1981) substantiated the hypothesis that individuals, in general, exhibit risk-taking preferences for losses

and risk avoidance preferences for gains. In the late 1970s, Kahneman and Tversky (1979:267) found the use of CDQ and utility functions inadequate as procedures to measure investor FRT; hence, these methods became under attach and were considered inappropriate. It has thus been recommended that, instead of relying on choice dilemmas and utility functions, investment managers and researchers should attempt to measure individual risk tolerance in a direct and multidimensional manner (MacCrimmon & Wehrung, 1986:55).

In recent years, researchers and financial managers have not lost interest in the study of FRT. Recent studies such as those by Anbar and Eker (2010); Charyton *et al.* (2013); Jahedi and Mendez (2013); Metherell (2011); Ramudzuli and Muzindutsi (2015); Strydom *et al.* (2009) have attempted to link an individual's FRT with various demographic factors. This approach has been used since the 1990s with researchers such as Grable (1997); Hanna and Chen (1997); Hawley and Fujii (1994) using both objective and subjective measures of risk to associate FRT with a number of demographic factors. Largely, age, gender, income/wealth, education and religion/cultural background have all been identified as prime determinants of FRT. These demographic factors are believed to be important when determining an individual's tolerance for risk and are discussed in the sections to follow (Hallahan *et al.*, 2004:58).

2.2.5 Important components and behavioural aspects in financial risk tolerance

Traditionally, financial advisers and planners would only rely on willingness to take risk when selecting investment portfolios for their clients (Callan & Johnson, 2002:36). However in light of various market developments and regulations, it is now important to also consider other aspects such as the need to take risk and the ability to take risk (Callan & Johnson, 2002:36). As such, FRT is thus highly affected and to some extent dependent on these important factors (willingness, need and ability) (Roszkowski *et al.*, 2004:131). These three components of FRT comprise an individual's true risk profile in terms of the psychological willingness, financial ability and the personal/financial need to take FR (Loomes & Sugden, 1982:805). Ultimately, a client might insist on an investment strategy that matches their risk attitude and the adviser may need to accept this, however the client/adviser's decision will at least need to be in the context of a thorough review of the investor's risk capacity, attitude and need (Callan & Johnson, 2002:37).

2.2.5.1 Willingness to take risk

Willingness refers to the psychology, rather than to the financial conditions of the investor (Callan & Johnson, 2002:38). Some individuals find the prospect of investment volatility and the chance of losses distressing; while others are more relaxed and sometimes excited about such issues (Loomes & Sugden, 1982:810). Financial advisers should thus try to fully understand the psychological willingness to take risk for each investor. This component of risk may be affected by a number of factors including an individual's demographic factors as discussed in sections to follow or past investment experience. For example, females may be psychologically unwilling to take on FR sometimes due to environmental issues such as upbringing and lack of confidence, while males are usually psychologically more willing to take above average FRs (Roszkowski *et al.*, 2004:133). Willingness to assume risk is thus about the emotional and mental readiness of an individual to handle FR. It is important to also note that willingness to take risk is a non-quantitative concept which is about a gut feeling of comfort (Loomes & Sugden, 1982:811). According to Frakt (2009:1), the sleep test is used as one the common measures for willingness to take FRs. The sleep test indicates that if one cannot sleep at night due a risk taking decision they have taken or in consideration, then willingness to take risk may have been exceeded. Similarly, if the decisions that an individual has taken do not cause any unrest, it is more likely that these decisions are within that individual's willingness to take risks (Frakt, 2009:1).

2.2.5.2 Ability to take risk

The ability to take FRs relates to financial circumstances and investment goals of the investor (Callan & Johnson, 2002:39). Generally, investors with higher levels of wealth relative to liabilities and longer investment horizons have the ability to take above average FRs (Callan & Johnson, 2002:40). Ability thus relates more to the financial capacity to tolerate large swings and movements in investments and investment returns (Roszkowski *et al.*, 2004:135). An individual's psychological willingness to take risk can sometimes clash with their financial ability to do so (Roszkowski *et al.*, 2004:135). For example, individuals may be psychologically excited by the prospect of risk and are thus high RT, but he/she may not have the financial ability to accommodate such desired levels of risks. When such a conflict exists, financial advisers need to take time to counsel the individual and explain the consequences of the mismatch. The ability

to take risk may be constrained by a number of aspects that involves an individual's potential need for liquidity together with the desired time horizon for his/her investments. Unlike willingness, the ability to take risks is usually quantifiable through the financial capacity of the individual to partake in various risky activities and investments (Frakt, 2007:1).

2.2.5.3 Need to take risk

The need to take risk is the third component of a true client risk profile. Willingness and ability need to be evaluated in the context of an individual's need to take risk to achieve a goal (Callan & Johnson, 2002:41). The need to take FR relates to the specific goal driving the investor to assume risk such as meeting a defined objective, avoiding falling short of a goal or having wealth eroded by inflation (Frakt, 2009:1). This component thus includes both personal and financial objectives that may propel investors to take either more FRs or relatively lessor FRs (Callan & Johnson, 2002:42). Investors may have the willingness and ability to take on more FR however they should also have a reasonable need to take on the amount of risk they are looking at (Roszkowski *et al.*, 2004:136). Studying FRT using a subjective questionnaire makes it simpler to explore these factors by asking questions relating to each of the factors. As such, the researcher can be able to attribute an investor's FRT level to either ability or lack of ability, willingness or unwillingness and having a need or not having a need to take risk.

2.2.5.4 Behavioural aspects in financial risk tolerance

Bailey and Kinerson (2005:23) mentioned that the difficulties of measuring FR attitudes also require that the researcher address a number of interrelated factors. Just like the various components of FRT discussed above, there are a number of behavioural factors which may affect an individual's FRT level (Bailey & Kinerson, 2005:23). These include knowledge, regret, investment choice and comfort. The below brief discussion on these factors links with a later discussion on how various demographic factors may affect an individual's level of FRT. **Knowledge:** Individuals with more financial and investment knowledge are generally more willing to accept FR (Bailey & Kinerson, 2005:25). According to Callan and Johnson (2002:34), knowledgeable individuals often know that they will need to take at least some risk to generate higher returns and that those short-term fluctuations in the value of investments need not matter for investors with longer-term horizons. **Regret:** this negative emotion arises from making the

wrong decision (Roszkowski *et al.,* 2004:136). Individuals who are particularly prone to regret tend to try and make decisions that are less likely to cause regrets. For example, they might engage in regret avoidance by investing in relatively lower risk assets (Bailey & Kinerson, 2005:26). **Comfort with risk:** Some individuals have psychological traits that allow them to accept taking risk. These individuals typically see risk as involving a thrill or opportunity rather than as a danger or a loss (Callan & Johnson, 2002:34). Questions addressing risk comfort levels often involve individuals choosing among alternative courses of action relating to saving decisions, or simply stating their comfort level to an amount of risk (Bailey & Kinerson, 2005:26). **Investment choice:** preferences for different kinds of investments can also help to gauge risk attitudes (Callan & Johnson, 2002:38). For example, the safety of a bank account versus the risk/return potential of the stock market (Bailey & Kinerson, 2005:27).

2.2.6 Financial risk tolerance and risk aversion

The notion of FRT is inversely related to the concept of risk aversion which refers to the unwillingness of an investor to accept a bargain which has an uncertain outcome rather than one with high levels of certainty, but lower expected returns (Faff *et al.*, 2008:2). In both finance and economic studies, risk aversion is referred to as the behaviour that consumers and investors reveal when exposed to uncertainty, and in attempt to reduce that uncertainty (Bommier & Rochet, 2006:708). For example, a RA investor might choose to put his or her money into a bank account with a low but guaranteed interest rate, rather than into a stock account that may have high expected returns, but also involves high chances of loss (Bommier & Rochet, 2006:708). Therefore, individuals who are more RA will have lower tolerance for FR and those who are less RA will have higher FRT levels (Faff *et al.*, 2008:1). When comparing risk aversion and FRT, it is argued that FRT is however a more specific measure of the degree of uncertainty with respect to negative financial returns that an investor is willing to accept whereas risk aversion is a broad-based level where investors are constantly concerned about the risk assumed rather than the potential returns associated with the risk (Faff *et al.*, 2008:2).

Palsson (1996:773) indicated that risk aversion is a measure of the inability or unwillingness to accept risk, whilst Menezes and Hanson (1970:482) referred to a RA individual as someone who, for any random risk, prefers the sure amount equal to the expected value of the risk rather than

the risk itself. This was also confirmed by Protopopescu (2007:2) who added that risk aversion is comparable to the concavity of the utility function[5]. Risk aversion was further referred to as the subjective tendency of investors to avoid unnecessary risk (Bellante & Green, 2004:271). Hanna and Lindamood (2004:31) maintained that risk aversion is subjective since different investors always have different definitions of what is necessary and what is unnecessary. While investors seeking significant returns are likely to see more risk as necessary, those who only want smaller returns will find such risks unnecessary (Bellante & Green, 2004:271). While concluding their study, Bellante and Green (2004:281) indicated that most if not all rational economic players are adequately RA such that, given two investments with the same return and different levels of risk, they would choose the less risky investment. The bottom line is that RA individuals avoid risks and as such they always stay away from high-risk investments. Therefore, investments which provide a sure return such as government bonds, debentures and index funds will be preferred to any other investments by RA individuals (Faff *et al.,* 2008:22).

According to Arrow (1971:23) and Pratt (1964:125) there are two components of risk aversion in relative risk aversion (RRA) and absolute risk aversion (ARA). More precisely, ARA is defined as 'the change in a nominal amount that is allocated to a risky asset as wealth increases' (Arrow, 1971:23) and is represented by the Equation 2.1. According to Arrow (1971:23) and Pratt (1964:132), the ARA function is used to measure the risk aversion of an individual who is assumed to maximise the expected value of U".

$$\mathbf{ARA = -U"(W)/U'(W)} \qquad \mathbf{(2.1)}$$

Where: ARA is absolute risk aversion, U" is the Concave utility function differentiated twice; U' is the Concave utility function differentiated once; and, W is the Wealth of an individual (Arrow, 1971:22; Pratt, 1964:130).

RRA conversely relates to the change in an individual's portfolio allocation given changes in their wealth base (Arrow, 1971:2; Pratt, 1964:122). RRA is on the other hand represented by the below mathematical formula.

$$\mathbf{RRA = -W\,[U"(W)/U'(W)]} \qquad \mathbf{(2.2)}$$

[5] A measure of preferences over a set of goods and services upon which investors base their decisions

Where RRA is relative risk aversion, U", U' and W have the same definitions as in Equation 2.1. Both these concepts of ARA and RRA are important when trying to understand the behaviour of the investor as well as many other theoretical issues in finance and economics (Levy, 1994:289). It is clear that risk aversion and FRT are strongly interlinked with support for the inverse relationship between the two concepts (Hanna & Lindamood, 2004:29). FRT however is the main focus of this study and will be predominantly explored further. FRT can also be measured using either objective or subjective measures with the contrast between the two measures explored below.

2.2.7 Objective and subjective measures of financial risk tolerance

As has already been mentioned, FRT can either be measured using subjective measures or objective measures. Whilst SFRT generally assess an individual's self-perceived risk tolerance level (Chang *et al.,* 2004:54), OFRT looks at an individual's revealed behaviour through actual past asset allocations (MacCrimmon & Wehrung, 1985:2). Rooted on the economic concept of risk aversion, SFRT is centred on the psychological component of decision making under financial uncertainties such as judgments, attitudes, perceptions, personal feelings, tastes and opinions of individual investors (Chaulk *et al.,* 2003:259). This measure of FRT is highly influenced by self-selection bias and do not typically consider other factors that would prevent ownership such as financial constraints, discrimination or lack of exposure to information about financial markets (Chang *et al.,* 2004:55). OFRT on the other hand is based on the idea of the objective financial situation of the household and is more concerned about revealed/actual allocations rather than attitudes and opinions formed (Hanna and Chen, 1997:17).

Supporting the use of SFRT measures, Anbar and Eker (2010:505) claimed that an investor's SFRT level will change over time and is therefore, not static, especially as demographic and economic factors are altered. Due to this, it is necessary for investment managers and financial advisors to continuously update their clients' risk profiles. However, Riley and Chow (1992:32) provided support for the use of objective measures due to that actual asset allocations are often different from what investors indicate as their subjective allocations. Riley and Chow (1992:32) further commented that this led to the objective approach being far superior than the subjective approach which typically request investors to respond to hypothetical scenarios. It can also be

contended that the objective approach of measuring FRT prevents the problem of framing[6] when it comes to asking hypothetical questions (Anbar & Eker, 2010:505). Halek and Eisenhauer (2001:3), who objectively measured FRT in their study, noted that the framing of questions either in terms of gains or losses can distort individual responses.

Questionnaires and surveys are popular instruments through which FRT can be subjectively measured (Hanna & Lindamood, 2004:30). The use of the questionnaire method is however highly recommended as the most preferred way of assessing an individual's FRT level (Grable & Lytton, 1999a:165). This is mainly because it allows for a large number of participants to be covered eliminating response bias. Secondly, the questionnaire instrument can include items that cover a wide range of financial and investment decisions or scenarios that are important in determining the risk level of an individual which may not be achieved using objective measures (Grable & Lytton, 1999a:166). Moreover questionnaires allow for a comparison to be made on fairer terms between all participants regardless of differences in income, gender, age or religion (Hanna & Lindamood, 2004:32). Although both objective and subjective measures have their advantages, there are certain drawbacks in using these methods as well. In comparing the drawbacks of using objective rather than subjective measures, in their study, Chaulk *et al.* (2003:259) elucidated that objective measures would result in some participants being excluded from the analysis especially younger people and families in their formation years, who are less likely to have accumulated significant levels of wealth/income or hold any risky assets in their portfolios. Contrastingly, most individuals would have formed attitudes towards FR regardless of their financial situations or age (Chaulk *et al.,* 2003:259). Hanna and Chen (1997:20) and Hanna *et al.* (2001:55) concluded that economic models, used in OFRT may not be entirely accurate as well, due to the fact that a large number of households have very low levels of liquid assets and in turn cannot hold much risky assets. On criticising OFRT measures, Yang (2004:21) specified that using asset allocations to objectively measure risk tolerance can be inaccurate as they may not necessarily be a true reflection of an individual's risk appetite. This is because people may be forced into certain investments they would not usually pursue. A good example of this would be the case of a company requiring employees to invest some of their pension in the company's shares. Grable and Lytton (1999a:165) further stated that OFRT measures tended to be

[6] The construction, phrasing and presentation of questions in a questionnaire.

descriptive rather than predictive; hence these measures cannot explain actual investor behaviour. On the other hand, the use of SFRT measures is not without its own weaknesses. Barsky *et al.* (1997:538) acknowledged that participants may not be entirely accurate when answering subjective questions in a questionnaire or any other form data collection, thus adding to validity problems when subjectively measuring FRT. SFRT measures may also suffer from many systematic biases related to halo-effects, order and scale (Podsako *et al.,* 2003:881), macroeconomic fluctuations (Ujhelyi, 2009:375) and psychological factors (Bertrand & Mullainathan, 2001:7). Furthermore, subjective measures have also been cited as difficult to aggregate and interpret because they are often expressed in ordinal scales (Rose-Ackerman, 1999:15).

Although SFRT and OFRT levels ought to be the same for each individual, it is possible for the OFRT of households to be different from their SFRT (Chang *et al.,* 2004:64). This is mainly because OFRT is usually measured by the amount of risky financial assets relative to either total assets or net worth and other households may not have any risky assets in their portfolios (Chaulk *et al.,* 2003:259). On the other hand, SFRT is concerned with attitudes that people form towards risk and these can be formed irrespective of an individual's financial stance (Chaulk *et al.,* 2003:259). Furthermore, households may invest only a small amount in risky financial assets and still believe that they are highly tolerant of risk or vice versa (Sahm, 2007:15). The different definitions of FRT may also account for the differences in subjective and objective tolerance levels when studying the same sample. Hence, it is not clear that OFRT is the same as SFRT. For example, a study by Chang *et al.* (2004:62) concluded that age was a significant determinant of FRT when it was measured objectively, however, when it was subjectively measured, age was not a significant determinant of FRT.

The discussion above indicates how the concept of risk tolerance has evolved and developed over time. A number of strengths and weaknesses in the measures of this concept have also been indicated. As such, based on a number of variables such the composition of the sample, available time (note that using subjective measures may be time consuming than when using objective measures), financial cost, availability of data and feasibility, one needs to select the appropriate method to measure FRT. With this study based on university students, it is seen fit and feasible to use subjective measures of FR and hence a questionnaire was administered to the sample as

detailed in the methodology. The use of either subjective or objective measures of FRT only does half the job in quantifying these tolerance levels. These measures will help gather the data needed to perform analysis and once the analyses have been performed one will have to classify investors and determine portfolio implications of the recorded tolerance scores. The process of classification usually involves grouping investors into a set of pre-defined risk tolerance categories again based on their FRT levels. The discussion on these classifications is outlined below together with the portfolio formation implications of a recorded FRT score.

2.2.8 Financial risk tolerance, portfolio formation and risk tolerance categories

When defining FRT, it is important to note that the level of FR one is willing and able to withstand is an important determinant of how they would construct their investment portfolios (Corter & Chen, 2006:369). As such, investors with high tolerance for risk are likely to invest in risky options such as shares in start-up companies as they are willing to accept the possibility that the value of their portfolio may decline (Corter & Chen, 2006:370). However, investors with low FRT levels tend to invest predominantly in stable shares and highly-graded bonds (Corter & Chen, 2006:370). The various investment vehicles for investors with different risk tolerance levels are summarised in Figure 2.1. Low RT investors will predominantly invest in cash, money market securities and the various types of bonds (C2VTrader, 2015:1). High RT investors will predominately invest in more sophisticated and risky investment products such as future contracts, land development, shares and start-up businesses (C2VTrader, 2015:1). With the aim of achieving average exposure, investors looking for relatively average risk will primarily invest in a mixture of both high risk and low risk products including bonds and other high risk company shares (C2VTrader, 2015:1). As shown in Figure 2.1, the amount of risk one is willing to assume is also a determinate of returns he/she is likely to receive from the investment (C2VTrader, 2015:1). This means that those who take relatively low risk are likely to yield lesser returns compared to those who take relatively more risks (C2VTrader, 2015:1). This is a good elastration of the positive relationship between risk and return while also indicating the type of assets one is likely to include in their portfolio given their FRT level. As already been mentioned, a combination of risky products is likely to yield higher returns compared to a combination of low risk products.

Figure 2.1: Low vs. high risk portfolio construction

Source: Own construct based on C2VTrader (2015)

FRT is a life factor that has a significant influence on portfolio construction, the mix of asset classes an investor is willing to hold and how aggressive or conservative investors should be in their investment decisions (Olivares *et al.,* 2008:10). This makes it important to discuss the several risk tolerance categories defined in the finance industry. These categories are used by both researchers and financial managers to group investors based on their FRT levels (Tools for Money, 2004:1). These pre-defined categories make it simpler for portfolio managers to develop portfolio models that can automatically construct portfolios for investors depending on their tolerance categories. Investment managers have made reference to as much as 10 different categories (Tools for Money, 2004:1); however this study only focused on five FRT categories. This discussion included a summary of how investors feel about FR, how much downside market fluctuations can be tolerated and how much they expect to profit when markets are going up under each of the different categories.

2.2.8.1 Conservative investor

By definition, a conservative investor is one who is naturally not willing to assume any evident downside market variations hence; these investors are willing to sacrifice most significant potential benefits in attempt to achieve this goal (Tools for Money, 2004:1). Therefore, conservative investors are those investors who never want to receive their monthly statements

and see less money than they had before, besides if it was due to their own withdrawals. As a result, conservative investors hold portfolios that provide them with inflation adjusted income streams mainly used to finance daily living expenses (Tools for Money, 2004:1). In terms of age and career stage, conservative investors are in most cases older, towards retirement or retired with the majority of funds retained in short term high quality bonds and fixed income streams while high risk asset classes are avoided altogether (Lytton & Grable, 1997:7). Conservative investors do not tolerate any level of FR in their investments. Their level of FRT ranges between no tolerances for any risk and very low risk tolerance levels (Larkin *et al.*, 2013:81). They are sometimes referred to as RA investors in that they avoid exposure to FR as much as they can. As stated by Larkin *et al.* (2013:82), investors in this category have a zero appetite for risk if any. Most conservative investors are either currently depending on their investments to give them a retirement pay check, or are expecting this to happen soon. Some are on tight budgets, barely making a living; hence they fear losing the little they have as they may not have the financial capacity to recoup these losses (Tools for Money, 2004:1). On the other hand, some investors tend to be conservative simply because they do not see a need to assume any risk as they do not require their portfolios to provide income for more than several years, due of low life expectancy, so growth is just not the objective (Grable, 1997:81).

Evident in Figure 2.1, conservative investors will predominantly retain their money in short-term assets, cash, high-quality bonds and fixed income streams. Satisfying needs becomes a challenge for conservative investors when inflation is on the rise because the market value of fixed income securities is negatively correlated to inflation and market rates (Hinz *et al.*, 1997:91). According to Afza and Nazir (2007:12), other noticeable demographic factors seen in this category include most female investors, older investors towards retirement, those with little investment experience and those with very low levels of education and income. With very little risk taken, these investors also don't expect to make substantial returns when the markets move in their favour (Olivares *et al.*, 2008:11). In summary, these low risk investors prefer knowing that their capital is safe and they are not comfortable investing in shares as they would rather keep their money in a bank account (Tools for Money, 2004:1). Conservative investors are likely to suffer from severe regret if their decisions turn out badly; they also need to understand that their caution can mean that their investments may not keep pace with inflation or that they may fall short of their investment goals and objectives (Campbell *et al.*, 2003:59).

2.2.8.2 Moderately Conservative investors

A Moderately conservative investor is typically a conservative investor who is however willing to tolerate a little more FR than the usual conservative investor, but is still adverse to large short-term downside fluctuations while looking for a little more return than the conservative investor (Tools for Money, 2004:1). The typical investor in this category is either retired and getting their pay check from portfolio income, soon to be retired, or has been hurt by poor investment management in the past (Tools for Money, 2004:1). Moderately conservative investors require protection from large downside market fluctuations and are willing to not fully-participate when markets are moving upwards however, informed investors realise that if their life expectancy is more than a decade, then having exposure to investments that increase in value is needed to provide adequate income in the later years (Campbell *et al.,* 2003:59). According to Afza and Nazir (2007:13), moderately conservative investors are able to achieve their goals by having a significant exposure to fixed income securities, real estate, several different types of stocks and tangible commodities that track inflation. Core equity asset classes are used, but very risky asset classes are still held to a minimum.

As such, moderately conservative portfolios typically produce returns a little more than inflation and taxes with annual income yields in the ranges of three percent to five percent and little capital gains distributions (Tools for Money, 2004:1). When major markets are doing relatively well, these investors are able to achieve double-digit returns, however, in down financial markets, annual returns can go to as low as negative figures. In rising financial markets they can achieve up to nine percent in annual returns (Weinraub & Visscher, 1998:13). This category is not very different from the conservative investor category and will still mainly consist of older investors, low income earners, females, less educated individuals and those with non-finance related qualifications but with good experience in investments (Afza & Nazir, 2007:12). In summary, moderately conservative investors would prefer not to take risk with their investments, but they can be persuaded to do so to a limited extent. They would rather prefer to keep their money in the bank, but they may realise that other investments might be better over the longer term (Campbell *et al.,* 2003:60). Just like conservative investors, moderately conservative investors may also suffer regret when decisions turn out badly (Campbell *et al.*, 2003:60).

2.2.8.3 Moderate investors

The majority of financial investors fall in this middle-of-the-road category mainly due to the desire to invest short term for daily expenses and long term for retirement purposes (Tools for Money, 2004:1). For these investors, the need for portfolio generated income is usually several years away however, moderate investors still require good returns, and know that they have to take some risks to get those returns (Olivares *et al.*, 2008:11). Moderately managed portfolios yield returns similar to a basket of similarly weighted market indices; however, they usually go up/down less than the market as a whole. To achieve maximum diversification, Campbell *et al.* (2003:61) indicated that moderately managed portfolios will on average consist of a balanced mix of most all-major viable asset classes including conservatively-managed bonds as well as high-risk shares. While using both risky and safe assets pragmatically, moderate investors end up using the most number of asset classes compared to any other investors (Tools for Money, 2004:1).

Weinraub and Visscher (1998:14) went on to indicate that moderate investors, as compared to conservative investors have the ability to achieve returns which are more than inflation and taxes with as much as a twelve percent returns when markets are moving up and as low as negative nine percent returns when markets are moving down. According to Afza and Nazir (2007:13) the demographic composition in this category would include middle age investors who just got married and are looking to save for long term goals such as children tuition and retirement. Males would also usually dominate this category; however females with sufficient funds and education are also bound to fall in this category. In summary, moderate investors understand that they have to take IVR to meet their long term goals and are thus willing to take risks with at least part of their available assets (Tools for Money, 2004:1). Conservative investors may have some experience of investment, including investing in products containing higher risk assets such as equities and bonds, hence they quickly and easily make up their minds on financial matters however, they are still prone to regret when their decisions turn out badly (Tools for Money, 2004:1).

2.2.8.4 Moderately Aggressive

Moderately aggressive investors seek to outperform a basket of similarly weighted indices when the markets are up, and do mind being down more when markets are down (Tools for Money, 2004:1). As moderately aggressive investors take relatively more downside risks than the markets, they also expect to be compensated accordingly when markets are moving upwards. Investors in this category will typically avoid fixed income positions while fully utilising risky asset classes (Tools for Money, 2004:1). If any, bonds and other risk free assets are aggressively managed and will be kept to ensure that the portfolio is fully diversified. Most moderately aggressive investors aim to accumulate significant amounts of wealth in the future while also willing to wait a significant amount of time for their rewards (Olivares *et al.,* 2008:11). Since investors in this category put more emphasis on making money rather than preventing the loos of money, they can get returns as low as negative fifteen percent when markets are down and as much as sixteen percent when markets are moving upwards (Tools for Money, 2004:1). As such, this category would be dominated by males, high income earners, individuals with financial postgraduate qualifications and those with sufficient knowledge about the markets (Afza & Nazir, 2007:13). In summary, moderately aggressive investors are willing to take on IVR and understand the nature of the long-term risk/return trade off. These investors are typically experienced in a wide range of investment products with the ability to make up their minds quickly and easily (Campbell *et al.,* 2003:61). Although moderately aggressive investors may suffer from regret should their decisions turn out badly, they are able to accept and deal with occasional poor portfolio performances (Campbell *et al.,* 2003:61).

2.2.8.5 Aggressive investors

Aggressive investors are those investors who are looking to substantially outperform the markets however, they are aware that they need to be exposed to much more risks than the markets (Tools for Money, 2004:1). Aggressive investors hold mostly growth, small-cap, sector mutual funds and shares with bonds and other fixed income assets avoided all together. Aggressive investors are typically younger and intend to contribute relatively large amounts into their portfolios periodically over time trough contributions coming from earned income (Tools for Money, 2004:1). Most aggressive investors either want to accumulate substantial wealth in the

future, are in a hurry, have enough income from other sources to fund their living expenses, or have plenty of time to work and recoup any potential losses (Campbell *et al.*, 2003:61). Some may just not have experienced significant losses in the markets, so their bravery usually ends up being their own downfall. On average, in down financial markets, returns can go down by as much as negative twenty percent while positive returns of as much as thirty percent are possible when markets are moving upwards (Olivares *et al.,* 2008:11). In this category, one will usually find younger male individuals with high levels of income, well-educated and most probably in the risk/finance field or with a job relating to investments or finance (Afza & Nazir, 2007:14). In summary, these high risk investors want the highest possible return on their capital and are willing to take considerable amounts of risk to achieve this goal. Aggressive investors typically have substantial amounts of investment experience and will typically have been managing their own investments with concrete investment views and the ability to make up their minds on financial matters easily and quickly (Campbell *et al.,* 2003:61). These investors may not suffer from regret as they have both the financial and psychological capacity to deal with occasional poor outcomes without much difficulty (Campbell *et al.,* 2003:61).

2.3 THE RELATIONSHIP BETWEEN FINANCIAL RISK TOLERANCE AND DEMOGRAPHIC VARIABLES

As already noted in preceding sections, important to the study of FRT is to understand how various demographic variables can affect an individual's FRT level. South African studies such as those by Gumede (2009); Metherell (2011); Ramudzuli and Muzindutsi (2015); Strydom and Metherell (2012); Strydom *et al.* (2009); have all studied FRT while also determining the effect of various demographic factors on tolerance levels. To mention a few, international studies such as those by Al-Ajmi (2008); Anbar and Eker (2010); Antonites and Wordsworth (2009); Chang *et al.* (2004); Friend and Blume (1975); Hanna and Lindamood (2004); Morin and Suarez (1983); Sulaiman (2012) have also studied FRT while examining how various demographic factors may influence an individual's tolerance level. From past research, age, gender, income, education, population group and cultural background have all emerged as significant demographic variables affecting FRT. Understanding these determinants is also critical in attempts to understand an individual's investment decision making processes (Sulaiman, 2012:111). Although these factors have been comprehensively investigated in the past, reviewed

literatures still show conflicting results with some studies finding positive relationships between a variable and the level of risk tolerance, whilst others find a negative or no relationship for the same variable. This next section examined these different demographic variables including empirical evidence from both South African and international studies.

2.3.1 Financial risk tolerance and age

Logically, it is expected that as people grow older they will tend tolerant lessor FRs as they are faced with shorter investment horizons in which they can realise returns on their investments (Al-Ajmi, 2008:18). It is also true that older individuals may not have sufficient investment horizons to cover and make up for losses they may incur in their investments. Chaulk *et al.* (2003:260) referred to this logic as reasonable since younger investors are able to decrease their consumption patterns or replace leisure time with more work in order to compensate for any portfolio losses. Through its ability to measure the period to which an individual's financial assets are needed in order to meet financial objectives and the ability to measure the possible investment time horizon and the likelihood of recovering possible losses, age has proven to be a significant factor affecting FRT (Lyons *et al.*, 2008:73). Although the basic logic seems to be reasonable, there is research evidence for and against this logical stance as discussed below. Chang *et al.* (2004:55) cited this relationship between age and FRT as a special one since they believe that tolerance for risk will first increase as age increases until age reaches a certain point where risk tolerance will start to decrease. Specifically, this variance in the relationship of age and FRT occurs in the investment accumulation face and may also be a factor of other demographic factors such as income which can be highly correlated to age (Chang *et al.*, 2004:55).

In an international study by Sung and Hanna (1996:12) using the Federal Reserve Board's Surveys of Consumer Finances (SCF), the authors employed SFRT measures to a sample of employed participants aged 16-70. It was found that only four percent of the sample was willing to take a considerable amount of FR while as much as forty percent was not willing to take any noticeable FRs (Sung & Hanna, 1996:13). Amongst other conclusions, Sung and Hanna (1996:13) also concluded that age had neither a significant effect on FRT nor a significant correlation with FRT. In their study, Hallahan *et al.* (2004) investigated the effect of

demographic factors including age on personal FRT. Using data extracted from the database of an Australian company (Pro Quest) these authors had a sample consisting of a maximum of 20 415 observations with fourteen percent below the age of 30, seventy-two percent between the age of 30 and 60 while fifteen percent above the age of 60 (Hallahan *et al.,* 2004:60). Employing a hierarchical regression, the relationship between FRT and age was tested both in a linear and nonlinear stance (Hallahan *et al.,* 2004:64). The results indicated that the linear relationship between age and FRT was not significant while the nonlinear relationship between age and FRT was significant. Both relationships were however negative although the linear relationship was not significant (Hallahan *et al.,* 2004:65). When Wallach and Kogan (1961:25) investigated the relationship between FRT and age, they found that older individuals tended to be less FR tolerant than younger individuals. Other international studies that found a negative significant relationship between age and FRT include those by Ahmad *et al.* (2011); Bajtelsmit and Bernasek (1996); Palsson (1996); Riley and Chow (1992).

Chang *et al.* (2004) also investigated the relationship between age and SFRT. With data on the United State of America (U.S.A) families drawn from the 2001 SCF, information was collected from 4 442 households. According to Chang *et al.* (2004:56), one of the hypotheses was that 'the relationship between age and FRT is positive'. The study by Chang *et al.* (2004:57) employed a Chi-square analysis and an Ordinary Least Squares (OLS) analysis to explore this relationship between age and FRT. The results from this study was interesting as there was a hump-shaped relationship where younger and older individuals tended to be less RT than individuals between the ages of 35 to 49 and 50 to 64 respectively (Chang *et al.,* 2004:55). As such Chang *et al.* (2004:65) concluded that age had no significant influence on SFRT. In his study, Sulaiman (2012:110) used data obtained in the year 2010 from a survey of employees from two different Indian universities (The University of Kerala and Mahatma Ghandi University). While randomly selecting a sample of 300 participants from a list of all faculties and staff members, Sulaiman (2012:111) attempted to analyse the effect of a number of demographic factors including age on the FRT of the sample. With the sample age ranging from 25-75 years, the study was able to reveal a relatively low positive correlation between FRT and age (Sulaiman, 2012:113). When testing the significance of this relation, the null hypothesis was rejected and Sulaiman (2012:113) concluded that there was a significant positive relationship between FRT and age. As such, FRT levels would be expected to increase as the age of the individuals increase.

After a comprehensive analysis of the relationship between FRT and a number of demographic factors, Al-Ajmi (2008:21) indicated that there was no clear direction in terms of the effect age had on FRT, even though between age groups the results were significantly different. More specifically, it was found that participants between the age of 20 and 29 years had a mean RTS of 1.75 which was greater than the 1.68 mean RTS of participants between the ages of 30 and 39 years and the 1.72 mean RTS of participants over the age of 50 years (Al-Ajmi, 2008:20). However, the category comprising of participants aged between 40 and 49 years had the highest mean FRT of 1.82 (Al-Ajmi, 2008:20). Al-Ajmi (2008:21) attributed the differences in the results mainly to changes in the financial goals and commitments of the different age groups where those who are single and in their early working life show more FRT, whilst after getting married and having children they become slightly more RA. As their children grow older and become less reliant and more financially independent, FRT levels increases, whilst when individuals approach retirement age, or do in fact retire, they appear to be less RT (Al-Ajmi, 2008:21).

In the context of South African studies, age has also been examined as a possible determinant of FRT. Using a shopping mall survey, Strydom and Metherell (2012:9) used a total of 320 responses collected from their sample to determine among others the effect of age on FRT levels. With the use of a BLRM to analyse the data, Strydom and Metherell (2012:13) found that age was statistically significant at the 10 percent level of significance; suggesting a negative relationship with FRT where older individuals are expected to be dominantly RA and younger individuals to be dominantly RT. The study by Strydom and Metherell (2012) reported a mean age 41.03 years, minimum age of 17 years and a maximum age of 85 years. With a β value of -0.015 and an odds ratio of 0.985, Strydom and Metherell (2012:13) rejected the null hypothesis that 'age has no effect on FRT levels'. A study by Ramudzuli and Muzindutsi (2015:182) also employed a BLRM to analyse a sample of 330 participants from a South African University. The results from this study indicated that age had no significant effect on FRT. This finding by Ramudzuli and Muzindutsi (2015:182) was largely attributed to the age distribution of the sample. There was lack of variation in age differences of the sample which consisted of only university students who were almost in the same age category (Ramudzuli & Muzindutsi, 2015:183).

From as far back as the work of Pratt (1964) and Arrow (1971) in the development of utility functions, RRA has always been considered to increase with respect to age and there is support for this notion from a range of researchers such as Morin and Suarez, (1983); Palsson, (1996) and those noted above. On the other hand, substantial evidence has also been given in support of the opposite were FRT either increases as age increases and where age is not a significant determinant of FRT (Grable & Lytton, 1999b; Grable & Joo, 1997; Grable & Joo, 2004). Chang *et al.* (2004:65) also went as far as indicating that the relationship between age and FRT is hump-shaped were FRT would decrease as age increases for a certain age group and then increase as age increases for another age group. Other pieces of research by Faff *et al.* (2008); Gilliam *et al.* (2010); Riley and Chow (1992); Weagley and Gannon (1991) also indicate a curvilinear relationship such that FRT increases with age up to a certain point where it then starts to decrease as age increases. These differences in findings can be attributed to a number of factors including the type of sample one is studying, age differentials in the sample and the instrument used. The lack of consensus in the relationship between age and FRT shows that more research on this variable is necessary.

2.3.2 Financial risk tolerance and gender

Just like age, the gender of investors has also been cited as one other important factor affecting an individual's level of FRT (Gibson *et al.*, 2013:24; Grossman & Eckel, 2009:1; Grable, 2000:626; Weber, 2013:1). This physical composition and sexuality of individuals has been studied by a number of international and local researchers such as Gumede (2009); Metherell (2011); Powell and Ansic (1997); Ramudzuli and Muzindutsi (2015); Strydom and Metherell (2012); Strydom *et al.* (2009); Sulaiman (2012); Yao *et al.* (2005); Yao *et al.* (2011) with the aim of determining its effect on FRT levels. For many years, men have been logically deemed more RT than women (Powell & Ansic, 1997:607). This stereotype view of males being less RA compared to females is also evident in other risks such as physical risk tolerances and social risk tolerances (Grable, 1997:14). The gender differentials in FRT have always been attributed to a number of factors including that men tend to possess more confidence in their decisions compared to women (Bernasek & Shwiff, 2001:345). High personal investment in human capital by men, cultural beliefs, exposure, women oppression, education and financial knowledge have also been cited as major factors contributing to gender differences in the study of SFRT (Barber

& Odean, 2001:269). Furthermore, Bajtelsmit and Bernasek (1996:6) attributed gender based SFRT differences to the fact that financial advisors usually assume that females are not tolerant of FRs therefore they tend to provide them with conservative investment options, advice and products.

Most studies have concluded that women are less RT than men to degrees varying with situational context (Ahmad *et al.*, 2011; Bajtelsmit & Bernasek, 1996; Grable, 2000; Grable & Lytton, 1999b; Grossman & Eckel, 2009; Palsson, 1996). These differences are explained by the inherent biological characteristics of the genders. Because women are responsible for child bearing and mothering, they naturally have higher levels of enzyme monoamine oxidase to reduce sensation, thereby making them more averse to uncertain situations (Cooper *et al.*, 2014:272). It is also debated that these differences maybe aggravated by other variables such as age or income. For example, younger men are more RT than younger women, but older men are less RT than older women (Chaulk *et al.*, 2003; Grable & Lytton, 1999b). It is also well-known that women earn less than men with the differences attributed to career work and experience, education, familial priorities, undervaluation of women's skills and even discrimination (Boheim *et al.*, 2007). Nonetheless, the gender difference in FRT has serious repercussions as women generally accumulate less wealth and pensions than men (Neelakantan, 2010; Watson & McNaughton, 2007). Unlike age, researchers have rarely found evidence against the general norm of men being more RT, however gender has been found to be a non-significant factor in the FRT study (Blum, 1976; McInish, 1982; Schooley & Worden, 1996).

Sulaiman (2012:111) used data obtained from a survey of employees from both the University of Kerala and the Mahatma Gandhi University to study the relationship between FRT levels and a number of demographic factors including gender. With a sample of 300 participants, Sulaiman (2012:111) used the 'FinaMetrica[7]' personal profiling questionnaire consisting of 24 questions to collect the data used in the study. With the null hypothesis: 'gender and the FRT of individual investors are independent of each other', Sulaiman (2012:113) conducted a number of analyses which resulted in the null hypothesis being accepted. As such, it was conclusive that the gender of investors and their FRT were completely independent of each other (Sulaiman, 2012:113).

The FinaMetrica system is a commercially provided Computer-based risk tolerance measurement tool used by leading academic educators and researchers.

After a comprehensive review of questionnaires obtained from over 30 banks, Cooper *et al.* (2014:275) designed a new questionnaire to collect data from participants in order to conduct a study on FRT and its determinants. Data was collected from 187 individuals with 58 percent of the respondents being male and the remaining 42 percent female (Cooper *et al.,* 2014:275). The results of the study indicated that the majority of individuals identified as 'riskiest' were male and in actual fact, females' scores were consistently lower than those of men suggesting that they perceive FR differently than men (Cooper *et al.,* 2014:278). The T-test results also showed that the differences between FRT levels of male and female participants was significant and men tended to tolerate more FR than women (Cooper *et al.,* 2014:278). Ryack (2011:185) collected data from a sample of incoming college first years together with their parents attending the orientation sessions at a public university. A paper survey was administered and data was received from 177 mothers, 118 fathers and 378 incoming first years with 43 percent being male and 57 percent female (Ryack, 2011:182). Consistent with prior research, gender was found to be significantly correlated with FRT at the one percent level of significance, with males showing higher FRT scores than females (Rayck, 2011:187). Gilliam *et al.* (2010:33) employed a subjective measure of FRT on a convenience sample of faculty members drown from a South-western public university. Among other control variables, Gilliam *et al.* (2010:36) concluded that being male was positively associated with greater portfolio allocations into riskier products such as stocks and futures.

In the 1990s, a number of researchers were involved in the study of FRT with conclusions focused on men being more willing to assume higher FRs compared to women (Hawley & Fujii, 1994; Sung & Hanna, 1996; Xiao & Noring, 1994). Hawley and Fujii (1994); Sung and Hanna (1996); Xiao and Noring (1994) each used a version of the SCF to obtain data for regression analyses such as the OLS and a BLRM where willingness to take FR was the dependent variable, and gender (among a number of other variables) was defined as an independent variable. These researchers concluded that men were more willing than women to take FRs (Hawley & Fujii, 1994:203; Sung & Hanna, 1996:17; Xiao & Noring, 1994:42). Similarly, Bajtelsmit and Bernasek (1996:9) also concluded that women were more willing to invest their pensions in more conservative portfolios than men and in general, women were found to be less RT when compared to men. Furthermore, in a study by Grable and Lytton (1999b:9), gender differences in financial attitudes were analysed using data collected from a random sample of 592 tax payers in

the mid-Atlantic state. From the analysis, Grable and Lytton (1999b:9) concluded that females expressed lessor confidence in their financial attitudes and lower risk taking propensities in relation to financial management strategies when compared to males. Contrastingly, Blum (1976) conducted a study using a sample of 91 female and 90 male business people, professionals, skilled and semi-skilled workers, housewives and clerical workers from an area in New York City. Asking the participants a number of hypothetical questions, Blum (1976:89) with the help of fourteen judges ranked the answers in terms of their riskiness. Based on the rankings, Blum (1976:90) reached a conclusion that the differences in risk tolerances of males and females were not statistically significant. Similarly, after conducting a random sample survey on 300 investors, McInish (1982:135) also indicated that gender differences in FRT were not statistically significant. Using data from the 1983 and 1989 SCF respectively, Haliassos and Bertaut (1995:1128) and Schooley and Worden (1996:98) concluded that gender had no statistical influence on the type of investment products included in portfolios by both male investors and female investors. As such, gender did not display any significant influence on FRT levels. Furthermore, with the use of a logistic regression Palsson (1996) attempted to determine if the FRT of individuals varied with demographic factors including gender. Using Swedish cross-sectional data which was based on tax returns from 7000 households, Palsson (1996:776) concluded that the FRT of households did not statistically change according to their gender. Other studies with similar conclusions include those by Fitzsimmons and Wakita (1993:178) and Hanna *et al.* (2001:54) who indicated that there were no any evident significant correlations between gender and FRT.

In a South African based study, Strydom and Metherell (2012) extended on the already established FRT study by investigating the effect of a number of demographic factors including gender, on an individual's level of FRT. Strydom and Metherell (2012:12) employed a BLRM to analyse the effect of gender (amongst other demographic variables) on FRT based on a stratified random sample of 320 participants surveyed in Pietermaritzburg, KwaZulu-Natal. Off the 320 participants, 172 were male and 148 female (Strydom & Metherell, 2012:11). Gender was found to be statistically significant at the 10 percent level of significance. This meant that gender did play an important role in determining an individual's FRT level and males were more RT than females in the sample (Strydom & Metherell, 2012:13). As such, the results were in line with most international studies suggesting that men will tolerate more FR than females.

Another South African study by Strydom *et al.* (2009) explored FRT levels of students at the University of KwaZulu-Natal (UKZN). These authors apportioned the distribution of male and female participants with regards to their FRT levels and found that most of the male participants sit in the high risk tolerance categories (Moderately aggressive, aggressive and extremely aggressive). Although women dominate the moderate risk tolerance category, most of them still fell in the conservative RT category (Strydom *et al.,* 2009:15). Consistent with international research, Strydom *et al.* (2009:19) concluded that gender was a significant factor affecting an individual's level of FRT and that men tend to tolerate more FRs compared to women. Ramudzuli and Muzindutsi (2015) used a subjective questionnaire to collect data from 330 participants at a South African university. With 170 male and 160 female participants, a BLRM was used to analyse the data. Ramudzuli and Muzindutsi (2015:183) concluded that gender had no significant effect on the level of FRT. These findings were largely attributed to the gender distribution in the sample. With the Commerce faculty (defined as a RT faculty) dominated by females and the Humanities faculty (defined as a RA faculty) dominated by males, FRT levels ended up equalising between males and females resulting in statistically insignificant findings. Similarly, Gumede (2009:33) also found that there were no significant differences in FRT between males and females.

Historically, women have been regarded as being more RA than men (Powell and Ansic, 1997: 607); however, the extent to which these gender differences represent evidence of general traits rather than contextual responses to social and environmental factors is still unresolved. Although most research suggests that the general norm of men assuming more risk than women is true, times are changing whiles opportunities among males and females are also equalising. As such, females have also gained an edge with the ability to assume more risk than they are usually deemed to assume. It is therefore still an interesting and evolving phenomenon as to what contributes to men assuming more FR than women if they do at all. It is therefore important to caution financial advisors not to discriminate against females and assuming they are automatically less RT than males just because of their gender. Individual risk analysis should always be conducted in order to appropriately determine an investor's risk appetite and therefore, match the required investment portfolio to the correct FRT level. Based on this, it is important to conduct analyses and determine whether gender is a significant factor affecting FRT levels and to also determine if men do tolerate more risks than women.

2.3.3 Financial risk tolerance and income

An investor's level of income is a very important factor in the study of FRT as it determines the financial ability to withstand large swings in investments (Canner *et al.,* 1994:183). Investors with relatively higher levels of income are usually assumed to be more RT than investors with lessor incomes (Cohn *et al.,* 1975:610). Whether it is expected income or income earned though wages, salaries, and profits or accumulated over a period of time (wealth), income plays an important role in shaping how people consider FRs in their saving, spending and investment decisions. In explaining this relationship of income and FRT, Finke and Huston (2003:235); Grable (2000:626); Hallahan *et al.* (2004:58) stressed out that high income earners have more money to tolerate and endure more risks than low income earners. It is further believed that income provides various investors with the ability and affordability to invest in more sophisticated products such as futures thus increasing their FRT levels as opposed to low income earners who may only be exposed to less sophisticated products and thus less risky financial products (Finke and Huston, 2003:236). Perceived and expected income also plays an important role in determining an individual's level of FRT as people are likely to assume more risk when expecting some sort of income in the future compared to when expecting lessor income or no income at all in the future (Hallahan *et al.,* 2004:58). Over the years, international researchers such as Cicchetti and Dubin (1994); Cohn *et al.* (1975); Cooper *et al.* (2014); Dohmen *et al.* (2011); Friedman (1974); Grable and Lytton (1999b); Hallahan *et al.* (2004); Riley and Chow (1992); Sulaiman (2012); Yao *et al.* (2011) have found a positive pattern between the income of investors and their FRT levels. South African researchers such as Strydom and Metherell (2012) have also found a positive relation between an individual's income and their level of FRT. Finding no relation and/or a negative relationship between income and FRT has proven hard to come by, however Gumede (2009) and Strydom *et al.* (2009) have reached such conclusions.

Over and above, unlike other demographic factors, income is a more realistic factor in the FRT study. The amounts of money people receive, spend, expect to receive or expect to spend will definitely shape risk tolerance attitudes, however, the issue is not clear cut (Cooper *et al.,* 2014:275). On the one hand, wealthy investors have the ability to easily afford losses that may arise from risky investments while their accumulated wealth may even be a reflection of their preferred level of risk (Hallahan *et al.,* 2004:58). Alternatively, wealthy investors may also tend

to be more conservative with their hard earned money while poorer investors may view risky investments as a way of making money and thus become more willing to assume the risks associated with such outcomes (Hallahan *et al.*, 2004:58). Similarly, Bowman (1982) argued that troubled firms prefer and seek risk than untroubled firms in order to generate more returns and turn around their situations. As such, it is important to determine the extent to which the sample in this study may or may not be affected by income when determining their risk tolerance patterns.

Using both data obtained from a random sample of 1 015 participants and a comprehensive research review, Blum (1976:88) conducted a detailed analysis of different risk-taking behaviours and was able to concluded that individuals with annual incomes of 50 000 dollars or more were willing to tolerate more FRs than individuals with lessor incomes. As already been mentioned, this pattern has since been observed more frequently over the years making increased levels of income more commonly accepted as a driver of FRT levels. Using a 100 item questionnaire, Cohn *et al.* (1975:613) gathered data from 972 randomly selected participants. With a combination of a BLRM, Chi-Square analysis and a multiple discriminant analysis, Cohn *et al.* (1975:615) found that the relative investor risk tolerance increased as income and wealth increased. Friedman (1974:211) used econometric modelling techniques to analyse aggregate U.S.A employer provided insurance premiums and coverage ratio data to report similar findings. As such, he concluded that people who received higher salaries displayed a relatively higher degree of FRT compared to those with lessor salaries (Friedman 1974:213). Schooley and Worden (1996:96) also arrived at the same conclusion based on a multivariate regression analysis of multiple imputed data from the 1989 SCF. Shaw (1996:633) also used a BLRM technique to analyse data from the 1983 SCF before concluding that income/wage growth was positively correlated with FRT.

More recently, Christiansen *et al.* (2009:8) utilised a bivariate probit model in estimating the extent to which demographic variables affected FRT. It was concluded by Christiansen *et al.* (2009:22) that individuals who had greater income/wealth were more likely to invest in the risky investment options compared to those with lessor income/wealth levels. Ryack (2011:185) also collected data from a sample of college freshmen and their parents to determine the effect of demographic factors (including income) on the level of FRT. Using the Grable and Lytton

(1999a) thirteen-item questionnnaire, data was analysed to determine the effect various demographics had on FRT. For college freshmen, income was found to be significantly correlated to FRT at the one percent level of significance (Ryack, 2011:187). Contrastingly, when analysing data collected from parents, it was found that income had a weak positive correlation with FRT. To assess the dependence of FRT levels on demographic factors of investors, Sulaiman (2012) conducted a study were one of the tested hypothesis was "High income earners are more FR tolerant than lower income earners'. Collecting data from a survey of employees at two Indian universities, Sulaiman (2012:111) gathered responses from a total of 300 participants. The results of the study supported the null hypothesis (Sulaiman, 2012:111), and there was a significant positive correlation between FRT and annual incomes of individual investors with a Karl Pearson's Coefficient of Correlation: $r = 0.9924$ (Sulaiman, 2012:113). In testing the significance of the Pearson's correlation coefficient between the two variables, the p-value was less than 0.05 suggesting that the null hypothesis can be rejected. As such, it was concluded that there is significant positive correlations between the income of participants and their FRT levels (Sulaiman, 2012:113).

Although income has been proven to positively influence FRT levels, this effect has not always been conclusive. Samuelson (1969:241) used a Bernoulli type utility model when analysing the existence of relationships between FRT and affluence, and FRT and income. After a number of comprehensive analyses, Samuelson (1969:244) arrived at the conclusion that higher salaries were not predictive of greater FR taking or tolerances. He also added that it was inconclusive whether more wealth was associated with higher FRT levels (Samuelson, 1969:244). Based on a sample of 17 056 observations, Blume and Friend (1975:600) also concluded that risk tolerance remained relatively constant as wealth and income increased. Furthermore, Schoemaker (1980:25), used experimental methods, and he was also unable to find any relationship between income and FRT. Palsson (1996:780) used regression analysis to calculate the degree of risk aversion among households in order to investigate the extent to which risk varied with household characteristics. Based on an analysis of Swedish tax data, Palsson (1996:775) concluded that FRT did not systematically vary with changes in income.

Just like international studies, South African based studies have also investigated the effect of income on an individual's level of FRT. Strydom *et al.* (2009:6) administered a revised version

of the Hanna and Lindamood (2004) questionnaire to a sample of 84 participants at UKZN in Pietermaritzburg. Strydom *et al.* (2009:10) further used the Chi-Square Test, Spearman's rho, Kruskal-Wallis test, Kendall's tau statistic and the Mann-Whitney U test to analyse data and test its hypotheses. One of the hypotheses tested was that 'Risk tolerance is correlated to income' (Strydom *et al.,* 2009:6). After the above mentioned analyses, both the Spearman's rho and the Kendall's tau tests indicated that there was no statistically significant correlation between an individual's income and their level of FRT (Strydom *et al.,* 2009:18). This non-significant correlation was attributed to a number of factors including that only 48 percent of the 84 participants responded to the income questions and that the study required participants to estimate their household incomes (parents joint income) rather than their own personal income (Strydom *et al.,* 2009:19). As such, income estimates were more likely to be incorrect thus leading to the recorded results. In another study, Strydom and Metherell (2012:8) used a BLRM to analyse data from 320 participants collected through a shopping mall survey. For the BLRM, an individual's level of FRT was used as the dependent variable with income amongst others being the independent variables (Strydom & Metherell, 2012:8). With a mean RTS of 26.18, a minimum RTS of 14 and a maximum RTS of 45, 51.9 percent of the participants were below the recorded mean RTS (Strydom & Metherell, 2012:12). The results suggested that income was a highly significant factor affecting an individual's level of FRT (Strydom & Metherell, 2012:14). With a p-value of 0.0063 and a positive coefficient, it was also concluded that individuals will tend to tolerate more FRs as they move into higher income brackets (Strydom & Metherell, 2012:14). Similarly, Gumede (2009:38) also concluded that income had a positive effect on the level of FRT however this relationship was not statistically significant.

Although highly documented as a significant factor affecting the level of FRT of individuals, contrasting conclusions also exist. The results of above mentioned studies suggest that caution be taken when developing hypotheses concerning income as a differentiating and classifying factor in determining levels of investor FRT. However, based on the empirical evidence offered, a hypothesis suggesting that income is positively associated with investor FRT seems appropriate. Due to the sample used in study consisting of students who do not have income and also likely to fall within the same income category, income has been omitted as a differentiating factor. This also makes sense since Gumede (2009) and Strydom *et al.* (2009) who used student's samples found insignificant results, citing lack of variation in the income differences of students.

2.3.4 Financial risk tolerance and education

Traditionally, the education of the investor is believed to positively influence FRT levels (Baker & Haslem, 1974:470). Researchers such as Chaulk *et al.* (2003); Gilliam *et al.* (2010); Hammond *et al.* (1967); Larkin *et al.* (2013); MacCrimmon and Wehrung (1986:26) supported this notion as they believed that formal attained academic training presents an opportunity for individuals to assess risk and benefits more accurately compared to individuals with less education. Education can be measured in terms of level, type of qualification and field of qualification. Each of these is discussed below to determine how they can potentially influence FRT levels. It is important to note that type of qualification and LOE are very closely linked and thus discussed as one variable. Type of qualification refers to the qualification one is studying towards, be it a certificate, diploma, degree or doctorate and equally implicates LOE. It has also been noted that there is very limited information and evidence on how field of qualification may influence FRT levels.

The LOE of an investor refers the formal highest grade of schooling or year of college/university completed and is believed to positively influence an individual's level of FRT (Baker & Haslem, 1974:470). Baker and Haslem (1974:472) argued that those with less formal academic training find price stability more appealing and important; hence they are more likely to assume less FRs than those with higher levels of education. Similarly, the higher the qualification one holds, the more likely they are to tolerate more FRs than those with lower qualifications (Riley & Chow, 1992:33). A number of researchers including, Barsky *et al.* (1997); Chaulk *et al.* (2003); Gilliam *et al.* (2010); Hammond *et al.* (1967); Larkin *et al.* (2013); Shaw (1996) have proven that FRT will increase as the level education of the investor increases and very few researchers have provided conflicting evidence. However, Potter (1971) argued that those with little or no education are more desirous of quick returns from risky trading activities and as such tend to assume more FRs than those with higher levels of education. Other contrasting findings where documented by Yao *et al.* (2005) who inferred that LOE had no significant effect on the level of FRT assumed by individuals. Blume (1978); Hallahan *et al.* (2004); McInish (1982) also recorded negative and insignificant relationships between LOE and FRT. The highly documented positive relationship between FRT and LOE has also been cited to be influenced by other factors such as income and wealth which are positively correlated to both FRT and LOE. Gumede

(2009:6) cited that an individual's LOE has a direct contribution to their earnings power; typically individuals with higher LOE's have more opportunities for higher employment status and ultimately higher income potential. As such, Grable and Joo (2004:74); Riley and Chow (1992:34); Sung and Hanna (1996:14) all cited that the positive relationship between LOE and FRT may be highly influenced by its correlation to income of which income has been extensively proven to increase FRT levels.

Using a general regression model, Hammond *et al.* (1967:401) conducted a study where they investigated life insurance expenditure patterns by different households. Amongst other variables, the LOE of household heads was found to be significantly related to higher premium expenditures and therefore, households with higher levels of education tolerated relatively more risks than those with lower levels of education (Hammond *et al.*, 1967:402). Using data from the 1983 SCF to estimate a wage growth equation, Shaw (1996:640) indicated that individuals with higher levels of education are more likely to be risk takers, and that risk taking explained a portion of the returns to education. Haliassos and Bertaut (1995:1125) also found that those who had not attended college were significantly less likely to hold stocks (form of risky assets) compared to those with at least a college degree. After conducting a Tobit analysis using data from the 1989 SCF, Zhong and Xiao (1995:112) reported that increased ownership of stocks increased with LOE.

In their study, Grable and Joo (2004:74) aimed to improve how people understood the determinants of FRT by testing the effects of socioeconomic, demographic and psychosocial factors on FRT levels. A sample of 460 responses was drawn from college staff at two different universities before using FRT as the dependent variable when analysing the data (Grable & Joo, 2004:75). Along with other independent variables, education was measured as a dummy variable were a value of one was assigned for participants who were college graduates and a value of zero was assigned to participants with less than a college qualification (Grable & Joo, 2004:77). Using the OLS multiple regression method, Grable and Joo (2004:78) found a positive significant relationship between FRT and the LOE of investors. In another study, Bellante and Green (2004) also investigated the effect of LOE on subjective FRT. In their study Bellante and Green (2004:277) concluded that individuals with a college degree displayed higher tolerance for FRs than those with only a high school qualification. In turn, those who did not graduate from

high school also showed lower FRT levels when compared to those with just a high school qualification (Bellante & Green, 2004:277). The Bellante and Green (2004) and the Grable and Joo (2004) studies provided further evidence and support for the notion that highly educated individuals tolerate more FRs than those who are less educated.

In their study, Chang *et al.* (2004:56) used data from the 2001 SCF designed to provide detailed information on the U.S.A families' balance sheets, their pensions, their use of financial services, their labour force participation and their demographic factors. With both objective and subjective FRT being the dependent variables, SFRT was based on questions asking about the amount of risk people were willing to assume when making investment and saving decisions (Chang *et al.*, 2004:57). The independent variables included race, age, education, marital status, net worth and employment status (Chang *et al.*, 2004:57). Using Chi-square analysis to explore the relationship between SFRT and demographic factors, Chang *et al.* (2004:62) concluded that as the LOE education of households increased, their FRT level also increased. Furthermore, using the OLS regression to examine the influence independent variables had on the SFRT, Chang *et al.* (2004:62) concluded that education significantly predicted SFRT levels. In particular, those with only a high school education or less were the most likely to tolerate no risks at all compared to those with more than a high school qualification (Chang *et al.*, 2004:62).

Using a convenience sample of staff from the Southwestern public University, Gilliam *et al.* (2010:33) collected data using a web-based survey tool to determine the effect of various demographic factors on SFRT. With educational attainment divided into high school or lower, college degree (reference group), associate degree and postgraduate degree, the Chi-square results for LOE were significant (Gilliam *et al.*, 2010:35). Compared to the reference group, those who had relatively less educational attainment displayed lower tolerance levels for FRs whilst those who had postgraduate degrees displayed significantly higher FRT levels (Gilliam *et al.*, 2010:35). Sulaiman (2012:111) collected data from a survey of employees at two Indian universities while selecting a total of 300 participants for the study. Amongst other hypotheses, Sulaiman (2012:111) attempted to test if 'greater levels of attained educational qualifications were associated with increased FRT levels'. Upon conducting a number of analyses using statistical tools such as Correlation analysis and Chi-square test, Sulaiman (2012:113) found that the calculated value of x^2 (16.93) was more than the tabulated value (9.49) and as such the LOE

of individuals was associated to FRT levels. In actual fact, higher levels of formal education were said to increase an individual's ability to evaluate and understand risk hence translating to higher tolerance levels (Sulaiman, 2012:114).

Solely dependent on a quantitative method of analysis, Heenkenda (2015:7) collected data from 1100 households to test a number of hypotheses including the effect of LOE on FRT in three residential sectors (rural, urban and estate). Using both descriptive statistics and an ANOVA test to compare FRT levels of the different settlement types, Heenkenda (2015:9) reached interesting conclusions. The results indicated that LOE had no significant effect on the level of FRT for participants in the urban sector (Gilliam *et al.,* 2010:32). For those in the rural sector, education was found to be statistically significant at the 10 percent level of significance indicating that educated people will tend to tolerate more FRs compared to people in other categories of education status (Gilliam *et al.,* 2010:32). When considering the education factor in the estate sector, the estimated coefficient of education was positive and significant at the one percent level of significance (Gilliam *et al.,* 2010:32). This again meant that educated people in the estate sector tolerated more FRs compared to people in other categories of education status in the estate sector (Gilliam *et al.,* 2010:32).

As already mentioned, very little international evidence exists where less educated individuals are more tolerant of FRs than educated individuals. However, in his study, Potter (1971) admitted that those with little education were desirous of quick profits from risky trading thus making them more tolerant of FRs than those with relatively more education. Masters (1989:154) also concluded that general education level was not always a factor influencing investment decisions, however in general, investors with higher education levels tended to invest in high risk investments. Using results from a large random national survey of New York Stock Exchange (NYSE) investors, Blume (1978:124), found that educated investors were slightly less willing than others to take substantial FRs, but at the same time, they reported a less than average propensity for reducing FRs to the barest minimum, preferring some intermediate trade-off between risk and expected return.

The effect of education on FRT has also been investigated by a few South African researchers including Gumede (2009); Ramudzuli and Muzindutsi (2015); Strydom *et al.* (2009); Strydom

and Metherell (2012). In a study by Strydom *et al.* (2009:16), the sample was made up of exclusively final year Accounting and Finance students (Strydom *et al.,* 2009:16). As such all participants had exactly the same LOE and therefore differences in FRT could not be explained by difference in the LOE. Gumede (2009) who used a University student's questionnaire to collect data at UKZN found no significant relationship between FRT level and the education of participants (Gumede, 2009:27). This was mainly attributed to that the sample which consisted of university students and did not provide enough differences in the LOE of participants (Gumede, 2009:28). Using a random stratified sampling technique, Strydom and Metherell (2012:9) employed a shopping mall survey to collect data from 320 participants to be used in their FRT study. According to Strydom and Metherell (2012:15), the regression results indicated that LOE had no significant effect on FRT levels. To be more precise, education had three categories in Matric or less, three year undergraduate degree or less and postgraduate degree (Strydom and Metherell, 2012:15). With p-values of 0.317, 0.262 and 0.731 for the above mentioned education categories respectively, the results indicated that LOE had no significant effect on SFRT (Strydom and Metherell, 2012:15).This result was deemed surprising given extensive international evidence that LOE and FRT are significantly positively related (Strydom & Metherell, 2012:15). However, when analysed separately, the results indicated that the first category (Matric or less) and third category (Postgraduate degree) were significant at the ten percent level (Strydom and Metherell, 2012:16). This meant that a participant with a postgraduate degree qualification was more RT than a participant with a matric or less.

With data collected from 330 participants, Ramudzuli and Muzindutsi (2015:184) found that the LOE had a positive coefficient, suggesting that the probability of being RT would increase with LOE. However, a low z-statistic of 0.61859 (with a p-value = 0.5362), implied that LOE was not a significant predictor of FRT (Ramudzuli and Muzindutsi, 2015:184). Although extensive literature suggests that a positive relationship between the level of attained education and FRT is reasonable, there is however the possibility that education is merely a proxy for income and that effects may be income linked rather than educational. Hence, as with the implications derived from research concerning other demographics, this relationship is not definite and additional research is warranted.

2.3.5 Financial risk tolerance and population group/race

It is believed that an individual's race, ethnicity or population group is potentially an important determinant of SFRT levels (Yao *et al.,* 2005:58). However, the evidence as to which race group is the most RT is conflicting. Zhong and Xiao (1995:109) indicated that differences in preferences, tastes and cultural values tend to have significant influence on the level of FRT of different population groups. It is usually generalised that due to availability of resources, knowledge and historical trends, Whites as compared to other population groups tend to tolerate more FRs measured both objectively and subjectively (Grable, 2000:627). This means that Whites tend to hold portfolios and assets that are riskier while when asked hypothetical financial risk questions, they also indicate that they are willing to assume more risks compared to non-White individuals (Grable, 2000:627).

In evaluating the allocations made to investment portfolios by different households, Plath and Stevenson (2000:348); Sung and Hanna (1996:13) together with Zhong and Xiao (1995:110), indicated that, keeping other things unchanged, White households tend to exhibit higher allocations to risky assets compared to non-White households. Other researchers who were also convinced that Whites displayed higher levels of SFRT than other population groups include Bajtelsmit *et al.* (1999:4); Bellante and Green (2004:279); Yao *et al.* (2005:55). On the other hand, Barsky *et al.* (1997:550); Halek and Eisenhauer (2001:13); Schooley and Worden (1996:93) documented results which indicated that Blacks and Hispanics tended to tolerate more FRs than any other population groups including Whites. Riley and Chow (1992:34) acknowledged that there were small differences in the levels of FRT among four categories (White, Black, Asian and Native American). Accordingly, Riley and Chow (1992:34) discovered that on average, Whites, Blacks, Asians and Native Americans indicated that they would hold 4.6 percent, 2.3 percent, 4.5 percent and 2.4 percent respectively as their proportion of risky assets.

Among other hypotheses, Strydom *et al.* (2009:6) used a sample of 84 participants to test if there were any differences in risk tolerances across race. With the sample consisting of twenty-eight Blacks, thirty Indians, twenty-three Whites and five Coloureds, Strydom *et al.* (2009:17) concluded that there was a significant difference in risk tolerance levels of the different racial groups. Using cross tabulation, Strydom *et al.* (2009:16) found evidence that black participants

were evenly spread either side of the median. White participants however predominantly fell below the median while more than fifty percent of Indian participants fell above the median. As such, these results suggested that Whites were significantly less RT than both Indians and Blacks (Strydom *et al.*, 2009:17). On the other hand, Gumede (2009:34) found that Whites were more RT than Blacks, Indians and Coloureds. When testing the relationship between race and FRT, Strydom and Metherell (2012:9) found that Coloureds, Blacks, Indians and Whites produced Wald statistics of 0.050, 2.740, 1.200 and 0.362 respectively. This meant that all the racial groups were insignificant. However Strydom and Metherell (2012:9) used the racial group Whites as a reference group and was able to conclude that Indians were significant at the ten percent level of significance with a negative coefficient indicating lower risk tolerance by Indians compared to Whites. Due to the sensitivity of this demographic factor, it has been omitted from analyses made in this study. It was also noted that the area from which data was collected is predominantly a Black area and therefore there were no any significant variations in terms of racial groups of participants in the sample thus backing up the decision to drop this demographic factor.

2.3.6 Summary of financial risk tolerance and demographic factors

There is still a persistent belief among investment managers and researchers that men tolerate more risks than women, that younger individuals are more RT than older individuals, low income earning individuals are less RT than high income earners, non-Whites tend to be less RT than Whites, greater LOE is associated with increased risk tolerance and that financial literacy increases capacity to tolerate more FRs. Table 2.1 provides a summary of the assumed relationships between FRT and demographic factors. As shown above, there is evidence supporting these relationships and also against these relationships and therefore this research also tries to determine the extent to which the demographic factors of the studied population affect FRT levels.

Table 2.1: Summary of demographic factors and levels of financial risk tolerance

Characteristics	Low Risk Tolerance	High Risk Tolerance
Gender	Female	Male
Age	Older	Younger
Income	Low	High
LOE	Less	High
FOS	Non-financial	Financial
Race	Non-white	Whites

Source: Own construct

It is important to also note that the above mentioned demographic factors have not undergone enough rigorous testing. In actual fact, there is a general consensus among researchers such as Blum (1976); Okun (1976) that studies conducted prior to the mid-1970s tend to have methodological problems which make the validity and reliability of past findings and conclusions doubtful. Specific problems included samples drawn from extremes of the population, lack of multidimensional risk-tolerance measures, scarcity of data on the scales and indices used and researchers failing to distinguish between and among demographic variables. As suggested, many of the characteristics used to classify individuals into investor risk tolerance categories may be little more than myths.

2.4 IMPLICATIONS AND IMPACTS OF FINANCIAL RISK TOLERANCE

An investor's level of FRT is a very important and crucial component of individual choices relating to human capital investment, wealth accumulation, portfolio allocation, retirement and policy decisions as well as insurance related decisions (Clemen, 2004:4). In a comprehensive study by Bajtelsmit and Bernasek (1996), the two authors found evidence that gender differences in investing, saving and risk taking tend to increase/decrease the confidence of individuals' investment choices for retirement funds. This makes it such that certain gender groups, usually females may be at risk of not having adequate retirement income should they be extremely RA. Although it is not very evident as to which extent academic research in finance is used by financial planners offering various portfolio advice in both short term and long term investors, it

has been found that academic research in this field has had a remarkable impact on a number of aspects of the financial services industry, from securities pricing to mutual fund management and corporate risk management (Roszkowski *et al.,* 2005:69).

It is also crucial to comprehend that an individual's FRT level may affect their own lifestyles and financial behaviour including those of others around (Grable, 1997:21). Amongst other things, understanding how people think and feel with regards to FR may be helpful to financial advisors and planners when performing their primary duties and delivering best value and satisfaction to their clients (Roszkowski *et al.*, 2005:70). Jianakoplos and Bernasek (2006:985) also acknowledged that individuals who are more RT tend to be financially satisfied than those who are less RT. Furthermore, when not satisfied with their finances, individuals may end up leading stressful and frustrating lives; hence the ability to be satisfied with your finances can contribute to a reduction in such feelings (Jianakoplos & Bernasek, 2006:985). It is thus important to keep expanding upon this concept of risk and continuing to understand how risk can affect all aspects of one's life. Most importantly, FRT has to be measured to enable financial institutions to develop markets and sell the appropriate financial products to a suitable group of individuals based on their FRT levels (Coetzee & de Beer, 2014:23). Furthermore, FRT has to be measured purely because it is an important aspect of utility for any investment decision and maximising the expected utility is considered to be the ultimate goal in any financial activity. FRT is one factor which has the ability to determine the appropriate composition of assets in a portfolio which is optimal in terms of risk and return relative to the needs of the individual investor. FRT is also important in household portfolio decisions and the growth of household wealth because investors who tolerate higher risks tend to obtain higher returns over the long run. Households with very low risk tolerance levels are unlikely to invest in stocks and thus may have greater difficulty in achieving an adequate retirement and reaching other personal financial goals.

2.5 SUMMARY AND CONCLUDING REMARKS

FRT is a multidimensional concept with the ability to arouse debates, contestations and discussions regarding its relevance to the financial industry, the academic industry and the society at large. Various descriptions have been used to elaborate on what FRT is. More than often, FRT has been referred to as an individual's willingness and ability to assume FR, an

individual's attitude towards risk, opinions towards risk and the capacity to tolerate uncertainties embedded in investment and other personal finance decisions. Over and above, researches did acknowledge that FRT has to do with the level of comfort when making risky financial decisions. Above all, FRT is individual and dynamic in that what is deemed risky by one individual may be viewed as containing no risk by another individual. FRT is also not static as it changes over time as demographic factors of individuals change. FRT can thus be defined as the degree of uncertainty in personal financial investments and savings that an individual personally feels comfortable to accept when risking his or her money. In other words, FRT is about an individual's capacity to tolerate FR that can be defined by his/her attitudes, opinions, willingness, needs, ability, knowledge and comfort to assume such risks. Earlier discoveries in the study of FRT included the concept of probabilities which was used in the early years to determine marine insurance premiums, life expectancies and also used for gambling.

There are seven components and behavioural aspects that drive an individual's level of FRT. These are summarised as the willingness to take risk, the ability to take risk, the need to take risk, knowledge, regret, investment choice and comfort. Of all these seven factors, only the ability to take risk speaks to the financial aspect of an investor's FRT. While willingness, knowledge, regret and comfort are all psychological components, the need to take risk and investment choice are the only two factors caught in between being financial and being psychological. This proves that as much as FRT sounds like a financial problem, it is as much a psychological concept. Besides these components, FRT has two dimensions (SFRT and OFRT) which speak to the way it can be measured. Through SFRT, an individuals' FRT status is measured by assessing their self-perceived risk tolerance level. OFRT on the other hand looks at an individual's revealed behaviour through actual past asset allocations. Whether using OFRT or SFRT, financial advisors and academics are ultimately looking into FRT levels in order to classify individuals into various risk tolerance categories. These categories are used to classify investors as either RT or RA. RT investors will primarily dominate the aggressive and moderately aggressive FRT categories while RA investors dominate the conservative and moderately conservative categories. The moderate FRT category is dominated by the middle of the class investors who strike a balance between being RT and being RA.

An important part of this chapter was discussing the effect of demographics factors on FRT levels. This was very important as it is ultimately what this study attempts to do, determining the effect of various demographic factors on FRT levels. Demographic factors reviewed include age, gender, income, education and population group. Table 2.1 provides a summary of the perceived relationships between these demographic factors and FRT. However, through the discussion, it was proven that there is evidence for and against these relationships. Lastly, the implications of a recorded FRT level were discussed making reference to what this means for financial advisors and for portfolio formation. One important aspect drawn from this discussion was that FRT has to be measured purely because it is an important aspect of utility for any investment decision and maximising the expected utility is the ultimate goal of any individual.

The measurement of FRT contributes to human development and financial development by addressing various issues such as the need to invest, comfort and regret avoidance and the returns that people can get from optimising their portfolios according to their tolerance levels. Overall, this chapter provided a conceptual overview of FRT and the various demographic factors affecting FRT including the empirical studies that tested the discussed concepts and theories. In more detail, this chapter also briefly reviewed the history of investor FRT while also detailing previous research which was designed to measure relationships between and among FRT and gender, age, income, education and race. This review suggested that while these demographics are widely considered to be effective in differentiating FRT levels, there is reason to doubt the efficacy of these demographics as discriminating factors hence additional multivariate analysis is warranted. The remainder of this study details the methodology, results, findings, conclusions and recommendations involved in examining the hypotheses detailed in Chapter 3.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLGY

3.1 INTRODUCTION

In the previous chapter, preceding literature on SFRT and the influence of demographic factors were reviewed including a review of empirical studies on the various demographic factors. Chapter two also cited the importance of assessing an investor's level of FRT for a better understanding of their personal finance matters and informed investment decisions. The reviewed literature provided evidence that although FRT has been largely documented; inconsistencies in results still exist due to a number of factors including variations in samples. As such, it is important to conduct a study that will assist people (especially the youth) in enhancing their personal finance related matters while also simplifying the jobs of financial managers and advisors. This Section provides a systematic and theoretical analysis of the methods applied in the study, providing insight in terms the sample, sampling technique, data collection method and the survey technique and instrument.

3.2 POPULATION AND SAMPLING

3.3.1 Population

A population is defined by Latham (2007:2) as the collective total number of people or cases forming the subject of a study, from which the sample is drawn and on whom the conclusions of the study are based. The population tends to be large, making it almost impossible for one to study the entire population, hence samples are generated (Latham, 2007:3). Alreck and Settle (1995:54) further indicated that the very first step in designing a sample is to define the population. For the purpose of this study, the population is defined as all the students (males and females) registered at the selected South African universities for any of the selected qualifications and for the academic year 2016. As already mentioned, a sample is a subset of the entire population on which statistical tests are conducted before drawing conclusions about the entire population (Latham, 2007:3). A sample is selected from the entire population and should be even and un-bias for appropriate conclusions to be drawn about the population (Walliman, 2005:276). Since research by means of a survey is heavily dependent on the sampling process and the asking of questions using questionnaires, interviews or observations, the issue of

representativity of the sample relative to the population is a very important factor (Walliman, 2005:275). A total of 500 participants were sought as the sample of this study, however 420 responses were received. The representativity and randomness of the sample is also largely determined by validity of the methods used to randomise the selection (probability methods or non-probability methods) discussed in the section below.

3.3.2 Sampling technique

In reality, it is not feasible in terms of energy, time, labour, equipment, or money to quantify every element of the population being studied (Latham, 2007:1). As such an appropriate sampling strategy has to be adopted to obtain a representative and statistically valid sample from the population. As stated by Walliman (2005:275), using subjective questionnaires in a research requires a clear description of the sampling technique and sampling process in terms of how the sample was constructed, methods of sampling and representativity of the sample to avoid problems such as uneven samples and sample bias. Sampling methods are classified as either probability or nonprobability (Leedy, 1989:153). In probability sampling, each member of the population has a known non-zero probability of being selected into the sample. Probability methods include random sampling, systematic sampling, and stratified sampling (Leedy, 1989:153). In nonprobability sampling, members are selected from the population in a non-random manner and these include convenience sampling, judgment sampling, quota sampling, and snowball sampling (Leedy, 1989:153). This study used probability sampling. The major advantage of probability sampling is that the sampling error of the study can be calculated however, in nonprobability sampling, the degree to which the sample differs from the population remains unknown (Leedy, 1989:153).

Specifically, this study employed a stratified random sampling technique which is a probability sampling method (Grable, 1997:75). With stratified sampling, the researcher divides the population into separate groups before a probability sample is drawn from each of the groups (Neyman, 1934:559). In this regard, the population was divided into different groups based on the different FOS's before applying random sampling to each of the identified groups. Stratified sampling has several advantages including the ability to reduce the sample size required to achieve a given accuracy and the ability increase accuracy with the same sample size (Metherell,

2011:87). Other advantages of stratified sampling are its ability to be used with random or systematic sampling, its ability to generate results which are more representative of the whole population and the fact that it is very flexible and applicable to many geographical enquiries and correlations and that comparison can be made on a fairer basis between sub-sets (Neyman, 1934:560). Stratified sampling is not without its disadvantages which include the difficulty to stratify questionnaire data collection, the fact that the proportions of the sub-sets have to be known and accurate if it is to work properly and that the construction of different groups may not be an easy task as common demographic variables have to be identified (Hanna & Chen, 1997:19; Metherell, 2011:87; Neyman, 1934:560).

3.3 SURVEY TECHNIQUE

As already been discussed, FRT can either be measured subjectively or objectively with the key determinant of these two measures being the framework each uses to measure tolerance for risk. Objectives measures favour the assessment of actual behaviour and asset allocations while subjective measures focus on opinions and attitudes formed towards risk (Hanna & Chen, 1997:17). While economists favour the assessment of FRT using actual behaviour, psychologists have opted for the assessment of FRT by analysing individual attitudes (MacCrimmon & Wehrung, 1985:2). The objective approach to FRT has been slammed for various reasons including problems that may exist with regards to age and asset allocation as older individuals are more likely to have more investments than younger individuals who may not have any investments at all (Subedar *et al.,* 2006:6). This creates a problem of age discrimination when objectively measuring FRT. Actual allocations may also not be a true reflection of an individual's tolerance as advice from investment and portfolio managers may shape these allocations. Lastly, it is not always simple to obtain the required objective data when conducting finance related researches as individuals may be reluctant to share such confidential information.

The subjective approach to FRT (as used in this study) has the ability to combine certain aspects of both objective and subjective measures and hence it is the most widely used method (Subedar *et al.*, 2006:6). The use of subjective measures is advantageous as it allows for a number of questions to be asked in order to acquire required data. Participants also have the ability to participate anonymously thus increasing the possibility of accurate data. Subjective measures of

FRT are not without their shortcomings. Jahedi and Mendez (2013:2) indicated that subjective measures tend to suffer from a number of systematic biases related to psychological factors and macroeconomic fluctuations. Subjective measures may also be difficult to aggregate and interpret as they are usually expressed in ordinal scales. With one using subjective measures to assess FRT, it is then important that the most appropriate form of subjective measurement is selected. This means choosing between a various methods including interviews, surveys and questionnaires. The next section thus discusses the survey instrument used.

3.4 SURVEY INSTRUMENT

As mentioned previously, complementing the use of SFRT measurement are questionnaires, surveys and interviews. In their study, Lyons *et al.* (2008:69) stated that using interviews is not always suitable as it often introduces interviewer bias problems into the study, as such; interview responses are not always accurate. Questionnaires and surveys on the other hand may be more appropriate and have been used extensively in the study of FRT. Popularly; researchers such as Bellante and Green (2004); Chang *et al.* (2004); Gilliam *et al.* (2010); Strydom and Metherell (2012); Strydom *et al.* (2009); Sulaiman (2015) have adopted either the Hanna and Lindamood (2004:37) questionnaire or the Grable and Lytton (1999a:172) questionnaire. The Hanna and Lindamood (2004:37) questionnaire involves the modelling of hypothetical pension/income based scenarios and requires the participants to make decisions based on a fifty percent chance that, as the sole income earner in a family, their income would be doubled or a fifty percent chance that there would be a certain percentage loss (Hanna & Lindamood, 2004:29). This questionnaire was evidently utilised in a South African study by Strydom *et al.* (2009). The Hanna and Lindamood (2004) questionnaire is not without its limitations as a certain level of financial knowledge is needed to answer some if not all the questions and it does not account for the different dimensions of FRT but only IR. The Grable and Lytton (1999a:172) questionnaire on the other hand uses a 13 questions index to test tolerance levels. Each option in this multiple choice poised questionnaire is assigned a relative value based on its riskiness with a high score indicating high risk (Grable & Lytton, 1999a:177). This questionnaire is praised for its ability to somehow combine different dimensions of FRT measurement (Grable & Lytton, 1999a:177). Apart from being user-friendly the Grable and Lytton (1999a) questionnaire was also carefully tested for both reliability and validity making it more trustworthy to use as a data collection tool.

In general, questionnaires are usually praised for being practical, being able to collect as much data as possible from a larger group of people at a low cost and in a short period of time (Subedar *et al.,* 2006:7). Another advantage of questionnaires is that they can limit response bias as they allow a large number of participants to take part in the process (Grable & Lytton, 1999a:166). Questionnaires are however disadvantageous in that some participants may fail to understand the questions and they may lack validity as one cannot be able to tell the level of honesty in responses. For this study, the Hanna and Lindamood (2004:37) questionnaire together with the Grable and Lytton (1999a:172) questionnaire where reviewed to develop a more comprehensive instrument suitable for the population being studied. The developed questionnaire eliminated a major problem of understand-ability for individuals with limited financial knowledge. The developed questionnaire was also simplified in terms of both language and length of questions to ensure accuracy and validity of collected data. As seen in Appendix A, the questionnaire consisted of two major sections with the first section capturing the demographic composition of participants including questions on FOS, gender, age, LOE, type of qualification and levels of income. The second section aimed at capturing the level of FRT of participants and was divided into subsections measuring PR taking, IVR taking, IR taking and SR taking. In total, the administered questionnaire was three pages long with a total of 38 questions (see Appendix A). Most of these questions were asked in the form of multiple choices where a question was asked and a number of options presented for the participants to choose the most relevant option to them. Some of these were posed in ordinal form were a statement was made and participants were required to indicted the degree to which they agree or disagree to the statement. It is believed that the questionnaire used in this study accounts for the aforementioned issues as it measures FRT with respect to four different dimensions (IR, SR, IVR and PR) and not all the questions are difficult to answer.

3.5 METHOD OF ANALYSIS

Apart from the descriptive analysis, this study employed a BLRM model which has a dependent variable of a dichotomous nature and a number of independent variables each with its own hypothesis. For each individual participant, a RTS was calculated and compared to the average score in order to classify participants as either RA or RT. Grable and Lytton (1999a) indicated

and proved beyond doubt that it is safe to assume that those with a RTS below the average score are RA while those with a RTS above the average score are RT.

3.5.1 Risk tolerance scores

A RTS refers to an absolute value generated from conducting a questionnaire where each option in a question is assigned a relative value based on its riskiness (Gilliam *et al.,* 2010:31). A higher RTS usually indicate higher tolerance for risk while a lower score indicate lower tolerance for risk (Faff *et al.,* 2008:4). In a study by Faff *et al.* (2008:4), a questionnaire with 25 questions was administered to participants and generated RTSs of between one to one hundred with a lower score indicating RA individuals and a higher score indicating RT investors. The study had a mean score of sixty-five with thirty-eight and eighty-nine being the minimum and maximum scores respectively (Faff *et al.,* 2008:15). In their study, Gibson *et al.* (2013:28) observed a mean RTS of 56.18. Similarly, Strydom and Metherell (2012:12) observed an average RTS of 26.18 with a standard deviation of 5.804, while the maximum and minimum scores were 45 and 14 respectively. This shows that this method of analysis has been trusted by both local and international researchers in the FRT study. In attempts to classifying individuals under different risk tolerance categories, Anbar and Eker (2010:508); Grable and Lytton (1999b:4) indicated that individuals with a FRT score below the observed average score are classified as RA, while those with a score above the observed mean score are categorised as RT individuals. It is however noticeable that both the Anbar and Eker (2010:508); Grable and Lytton (1999b:4) studies used the 13 items Grable and Lytton (1999a) questionnaire which only has 13 questions, each with a maximum of four options and a minimum of two options. Although a different questionnaire with more questions and different options in each question has been used, this method will still be adopted.

3.5.2 Descriptive statistics of risk tolerance

Another factor supporting the use of a BLRM is the dependent variable, and as such, it is important that it is thoroughly defined in the study. The dependent variable of this study is of a dichotomous nature with two possibilities. The possibility of being RT coded as 1 and the possibility of being RA coded as 0. The dependent variable is thus a categorical variable which indicates the presence or the absence of an attribute (Gujarati, 1988:432). Since the questionnaire

used allows for numeric scores to be assigned to each of the options and a RTS determined for each participant, it was thus simple to determine the minimum, maximum and average RTSs of the sample.

Table 3.1: Risk tolerance score sample statistics

N Valid	470
Missing	0
Mean	43.0511
Std. deviation	6.62984
Max	64
Min	28

Source: Own construct

There were 470 RTSs obtained, the minimum score was 28, the maximum was 64 and the average score was 43.05 with a standard deviation of 6.63. In similar fashion to Anbar and Eker (2010:508); Grable and Lytton (1999b:4), participants who scored below 43.05 were categorised as RA and those that scored above 43.05 were categorised as RT. In total, of the 470 participants, 52 percent were RA and the remaining 48 percent were RT as per the risk tolerance scoring method adopted. This meant that a total of 243 participants had a RTS below 43.05 while as much as 227 participants had a RTS greater than 43.05. Quite obvious was the need of BLRM to estimate this categorical dependent variable. As mentioned before, there are a number of demographic factors which are believed to influence an individual's level of FRT and these ought to be examined. These demographic factors are thus the independent variables observed in this study and are discussed below.

Table 3.2: Risk tolerance categorisation sample statistics

	Frequency	**Percent**
Below Average Risk Tolerant	243	52%
Above Average Risk Tolerant	227	48%
Total	470	100%

Source: Own construct

3.5.3 Description of the determinants of risk tolerance

An independent variable is one that can stand on its own without being affected by other variables. Independent variables can either take a numeric or a categorical form and are used to determine factors that make the dependent variable change. According to Gujarati (1988:431) the inclusion of independent variables makes the BLRM an extremely flexible method of analyses capable of handling various problems that may arise in empirical studies. Shown in Table 3.3, all the independent variables used in this study are categorical. Table 3.3 also shows the frequencies of each of the categories for the various independent variables. The first observed independent variable is age. Age is traditionally thought of as a numeric variable. However, this independent variable has been made categorical with four categories mainly due to the lack of variation in the ages of the participants. The least frequent category appearing 100 times was the category representing people who are 25 years and older. The 19 years to 21 years category was the most frequent one with 133 appearances. Furthermore, there were 131 participants between the ages of 22 years and 24 years while there were only 106 participants aged 18 years and younger. The second independent variable observed was gender. Of the 470 participants 50.85 percent (239) were female while 49.15 percent (231) were male. This summed up the gender variable which only has two categories displaying evenly distributed data among the two categories. Next was academic year used to measure the LOE of participants. This independent variable consisted of four categories. The first category represented first year students and there were 120 of them. The second category represented second year students with 76 of them and the third category represented third year students with 156 of them.

Table 3.3: Summary of independent variables

Variables	Categories	Frequency	Percent in variable
Age	18 or younger	106	22.55%
	19-21	133	28.30%
	22-24	131	27.87%
	25 or older	100	21.28%
Gender	Female	239	50.85%
	Male	231	49.15%
LOE	First year	120	25.53%
	Second year	76	16.17%
	Third year	156	33.19%
	Postgraduate	118	25.11%
Qualification	Certificate	61	12.98%
	Diploma	41	8.72%
	Degree	59	12.55%
	B-Tech	78	16.60%
	Honours	163	34.68%
	Masters	68	14.47%
FOS	Economics	59	12.55%
	Business Management	64	13.62%
	Engineering & IT	38	8.09%
	Humanities	95	20.21%
	Accounting Sciences	75	15.96%
	Education	74	15.74%
	Law	65	13.83%

Source: Own construct

The fourth and final category represented postgraduate students who made up 25.11 percent of this independent variable. Another independent variable observed was qualification. This

represented the qualification towards which the participants are studying. Data collected included qualifications such as a Certificate, Diploma, Degree, B-Tech, Honours and Masters. 34.68 percent of the participants were studying towards an Honours while 12.98 percent where studying towards a Certificate. As much as 14.47 percent of the participants were studying towards a Masters while only 8.72 percent were studying towards a Diploma. To sum up things, there were 12.55 percent of the participants studying towards a Degree. The last observed independent variable was the FOS of the participants. This was used to determine if participants are in a finance related field or not. A total of seven categories were recorded for this variable. 59 participants were in the Economics field, 64 in Business Management, 38 in Engineering and IT, 95 in Humanities, 75 in Accounting Sciences, 74 in education and 65 in Law.

3.5.4 Binary logistic regression model

It is evident from previous research that there is theoretical support for the use of a BLRM model (Gumede, 2009; Hanna & Lindamood, 2004; Larkin *et al.*, 2013; Lyons *et al.*, 2008; Ramudzuli & Muzindutsi, 2015; Riley & Chow, 1992; Strydom *et al.*, 2009; Sung & Hanna, 1996). To mention a few, the study by Sung and Hanna (1996) conducted a BLRM analyses with a dependent variable that had two values; RT or RA. The independent variables used by Sung and Hanna (1996:13) are also very similar to those used in this study in that they were categorical demographic factors (Sung and Hanna, 1996:14). Hanna and Lindamood (2004:36) also created a dichotomous dependent variable in their study which consisted of the categories RT and RA. In their analysis, they also used a BLRM citing that it is an appropriate multivariate analysis to use when the dependent variable is of a dichotomous nature. In another study, Anbar and Eker (2010:509) also went on to use a BLRM to determine the effect of demographic variables on FRT status.

By definition, a BLRM is a statistical method of analysis used to analyse dataset in which there are two or more independent variables whiles the dependent variable is of a dichotomous nature, meaning that it can take only two outcomes (Sung & Hanna, 1996:13). Like any other regression analysis, a BLRM is a predictive analysis used to describe data while also explaining the relationship between the dependent and the independent variables. According Grable and Lytton (1999b:6), there are a few important assumptions one needs to make when using a BLRM.

Firstly, the assumption that the outcome must be discrete. This refers to the assumption that the dependent variable must be of a dichotomous nature representing the presents of something against the absence of something. Secondly, Grable and Lytton (1999b:6) indicated that a BLRM needs one to assume that the data does not have any outliers. This is usually dealt with by converting continuous independent variables into categorical variables. Lastly, there should not be any inter-correlations between the independent variables (Grable & Lytton, 1999b:6). All these assumptions have been tested in this study and complied to. According to Koop (2008:279) a BLRM can be expressed by a linear variable Y^* as shown in Equation 3.1:

$$\boldsymbol{Y_i^* = \sum \beta X_i + u_i} \quad \textbf{(3.1)}$$

Where Y_i^* is a representation of the dependent variable, β on the other hand represent coefficients ($\beta_1, \beta_2, \beta_3, \ldots \beta_n$), X_i represents a set of independent demographic variables that determine an individual's FRT status and lastly u_i represents the random error term. Since Y_i^* is a latent variable and thus unobservable, we thus observe an event represented by a dummy variable Y defined as follows:

Y= 1 if Y^* > 0 and Y = 0 otherwise. **(3.2)**

Therefore, from Equation 3.1 and equation 3.2, the probability of being financial risk tolerant can be represented as follows:

Prob ($Y_i = 1$) = $F(\beta X_i)$

Prob ($Y_i = 0$) = $1 - F(\beta X_i)$ **(3.3)**

Ultimately, the binary logistic model with the assumption of normal distribution is as follows:

$$\boldsymbol{FRT_i = \beta_0 + \beta_1 FoS_i + \beta_2 LoE_i + \beta_3 G_i + \beta_4 Q_i + \beta_5 AG_i + e_i} \quad \textbf{(3.4)}$$

Where FRT_i is the FRT status of the participants with two possibilities of either being RA or RT, with the possibility of being RA coded as 0 and the possibility of being RT coded as 1. FoS_i is the FOS of the participants. This is used to measure exposure to financial education through the course one is studying. LoE_i is the LOE of participants used to measure the level of formal accumulated learning by participants. G_i is the gender of the participants. Q_i on the other hand is

the qualification towards which participants are studying while AG_i represents the age of the participants. Lastly, e_i is the error term.

As shown in sections above, the variables in Equation 3.4 have been explained before; however it is important to note that when estimating a BLRM with categorical independent variables one of the categories can be treated as the base or reference category in order for comparisons to be made with this category (Gujarati, 1988:437). However, the decision as to which category within a variable is treated as the reference category is a matter of choice. For consistency reasons wherever a reference category is chosen, the first category was chosen as the reference category. Following to the estimation of Equation 3.4 using the BLRM one is able to conduct a number of statistical tests to determine the appropriateness of the model and whether there were any significant relationships between the independent variables and the dependent variable. As such the main hypotheses tested as part of the study are detailed below.

3.5.5 Study hypotheses

Hypothesis 1: The effect of field of study on financial risk tolerance

As shown in Chapter 2, there is not much research on how financial education or lack of therefore affects FRT. However, the little research available shows that exposures to financial education and financial literacy are important contributors to higher FRT levels. This study thus investigates the effect of financial education on FRT levels. This is done by investigating the effect various field of studies that are either financial or non-financial may have on FRT levels. Financial education is a categorical variable with a total of seven categories measured by considering the different courses each of the participants is studying towards. The null hypothesis that financial education has no effect on FRT levels was tested and is shown below.

H_0: $\beta_1 = 0$

H_1: $\beta_1 \neq 0$

Hypothesis 2: The effect of level of education on financial risk tolerance

Majority of studies have indicated that LOE is positively related to an investor's level of FRT. Barsky *et al.* (1997); Chaulk *et al.* (2003); Gilliam *et al.* (2010); Hammond *et al.* (1967); Larkin *et al.* (2013); Shaw (1996) all concluded that FRT levels will rise for people with superior levels of education. This is largely related to the fact that improved education is likely to lead to higher earnings potentials and a better understanding of one's finance. On the other side, there is a possibility that superior levels of education may provide participants with a better understanding of personal finance matters thus propelling them to make less risky and uninformed decisions. In order to determine if those with lower levels of education are RA and if those with higher levels of education are RT, the second relationship was hypothesised as below:

H_0: $\beta_2 = 0$

H_1: $\beta_2 \neq 0$

In this case, the acceptance of the above null hypothesis would suggest that there are no differences in FRT levels between participants with lower levels of education and those with higher levels of education.

Hypothesis 3: The effect of gender on financial risk tolerance

Overwhelmingly, reviewed literature on the relationship between gender and FRT concluded that females preferred less FRs compared to males (Ahmad *et al.*, 2011; Bajtelsmit & Bernasek, 1996; Eckel & Grossman, 2008; Grable, 2000; Grable & Lytton, 1999b; Palsson, 1996; Roszkowski *et al.,* 2005). However, conflicting conclusions have been recorded by Blum (1976); Haliassos and Bertaut (1995:1128); Schooley and Worden (1996:98). This remains an interesting aspect as women are becoming equally economic vibrant and with opportunities equalising among males and females. In order to determine whether males are more RT than their female counterparts, the relationship between FRT and gender was hypothesized where the rejection of the null hypotheses would mean that there are differences in FRT levels.

H_0: $\beta_3 = 0$

H_1: $\beta_3 \neq 0$

Hypothesis 4: The effect of qualification financial risk tolerance

Similar to LOE, the qualification towards which someone is studying to obtain may have big implications on their levels of FRT. This is because for instance, a Certificate may be obtained over a period of a year while a Masters may take up to 5 years. The number of years in the process of obtaining the qualification has big implications on ones understating of general concepts including financial concepts and is likely to shape FRT levels. Although there is not enough previous evidence as to how an individual's type of qualification may affect their FRT, the hypothesis below has been tested.

H_0: $\beta_4 = 0$

H_1: $\beta_4 \neq 0$

The acceptance of this hypothesis would be a suggestion that the type of qualification towards which a participant is studying does not have any influence on their FRT levels.

Hypothesis 5: The effect of age on financial risk tolerance

It is highly evident from previous literatures such as those by Morin and Suarez (1983:1210); Schooley and Worden (1996:92) and many others that FRT decreases as people grow older. The opposite has also been found to be true as Sulaiman (2012:113) articulated that a positive relationship between age and FRT is also possible usually. People are only more likely to receive higher incomes as they grow older and become more experienced in their careers, as such tolerance for risk is likely to increase with age. This provides for an interesting discussion on whether age is a factor affecting FRT, hence the null hypothesis that age has no effect on FRT is tested as shown below:

H_0: $\beta_5 = 0$

H_1: $\beta_5 \neq 0$

3.5.6 Statistical analysis

As already been discussed, this study employed a BLRM as its central method of analysis, however, other tests were also conducted to fulfil various research objectives and also for additional investigative purposes in terms of analysing the data. Non-parametric tests in the form of the Kruskal-Wallis test, the Mann-Whitney U test and Median analyses were conducted on the data. Correlation tests were also conducted to check the data for possible problems such as inter-correlation in the independent variables.

3.5.6.1 Non-parametric Tests

Pallant (2007:210); Robbins (2010:3) and Roscoe (1969:7) indicated that non-parametric tests are statistical tests that do not make any parametric assumptions such as the assumption that data comes from a distribution described by normal distribution with mean μ and variance x. However this does not mean that non-parametric tests are free of assumptions but rather very few assumptions compared to parametric tests. Non-parametric tests are more suitable when examining ordinal and nominal data that does not rely on numbers but rather a ranking and an order of sets (Robbins, 2010:3). Due to fewer assumptions, non-parametric tests are usually preferred over parametric tests (Pallant, 2007:211). However this does not mean that they are more powerful, Robbins (2010:4) stressed the fact that lack of assumptions can mean that non-parametric tests are weaker than other tests. Non-parametric tests are also disadvantageous as they may require that the hypothesis be modified. Norušis (2006:384) also noted that non-parametric tests generally do not discover the true differences and the hypotheses tested are sometimes different as one tests hypothesis about the medians. Similar to Anbar and Eker (2010:509); Strydom and Metherell (2014); Strydom *et al.* (2009:10), non-parametric tests in the form of the Mann-Whitney U test, Kruskal-Wallis test and median analyses have been used in this study. The Mann-Whitney U test is used to compare the medians of two or more groups in an ordinal data variable in order to determine if there is any statistical difference (Robbins, 2010:15). This test is more effective and suitable when testing categories with only two possibilities such as gender. As such, the Mann-Whitney U test was used in the analysis of gender. The Kruskal-Wallis test on the other hand is also a rank based test used to determine if there are any statistical differences between two or groups of an independent variables on an

ordinal dependent variable. This is similar to the Mann-Whitney U test, it just differs on that it can be used for variables with more than two categories, and hence this test will be used for all the other variables besides gender. Lastly, analyses of the medians were also used to analyse the independent variable.

3.5.6.2 Multicollinearity for the Binary Logistic Model

Pallant (2007:167) stressed that when using a BLRM for hypotheses testing in the data, it is very important to check for multicollinearity that may be caused by high levels of inter-correlation between the many independent variables. As such, the model used in this study is very susceptible to high levels of inter-correlation between the independent variables. Correlation analysis in the form of the Spearman correlation test has been performed to identify any high inter-correlations between the variables.

3.6 SAMPLE DESCRIPTIVE STATISTICS

To distinguish the sample and its composition, this section covers all the descriptive statistics and frequencies about the participants in the sample. This helps to further the description of the sample by looking at what it is made out of. The description provided predominantly used the aid of tables constructed from survey data with the use of frequencies and percentages to elaborate on sample composition. This included facts such as the number of participants in each of the categories for each independent variable.

3.6.1 Age of participants

Table 3.4: Distribution of participants by age

Categories	Frequency	Percent
18 years or younger	106	22.6%
19-21 years	133	28.3%
22-24 years	131	27.9%
25 years or older	100	21.3%
Total	470	100.0%

Source: Own construct

Instead of being kept as a continuous variable, age was changed into a categorical variable with a total of four categories. This was more favourable than it being non-categorical in order to eliminate outliers in the data. The first category was that of participants aged 18 years or younger. This category appeared 106 times accounting for 22.6 percent of the total participants. With the most frequency, the second category was that of participants aged 19 to 21. There were a total of 133 participants in this age group making up 28.3 percent of the total participants. Following the 19-21 years category was the 22-24 years category with the second most frequency. A total of 131 participants were in this category which also meant that the 22-24 years category made up as much as 27.9 percent of the total 470 participants. Lastly, the least frequent age category was the one representing participants aged 25 years and older. This category appeared 100 times, which also meant that it accounted for 21.3 percent of the total 470 responses.

3.6.2 Gender distribution

Table 3.5: Distribution of participants by gender

Categories	Frequency	Percent
Female	239	50.8%
Male	231	49.2%
Total	470	100.0%

Source: Own construct

By default, the gender of participants is a categorical variable with only two possibilities, either male or female. From the 470 responses received, a total of 239 responses were from female participants while as much as 231 responses were from male participants. This meant that there was an even distribution of responses between the two gender groups as females accounted for 50.8 percent and males 49.2 percent of the entire 470 responses.

3.6.3 Participant's Level of education

As discussed in previous section, LOE was measured by taking into account the academic year of study of each of the participants. With a total of 470 participants, there were a total of four different categories for the variable LOE. The most frequent category, an education level of third

year, had a total of 156 observations (33.2%). The second most frequent category was LOE first year. This made up 25.5 percent of the total responses with 120 observations. Making up 25.1 percent of the total responses with 118 observations, LOE 'postgraduate' was the third most frequent category. The least frequent category of LOE was second year. This category had 76 observations making up 16.2 percent of the total 470 responses.

Table 3.6: Distribution of participants by level of education

Categories	Frequency	Percent
First year	120	25.5%
Second year	76	16.2%
Third year	156	33.2%
Postgraduate	118	25.1%
Total	470	100.0%

Source: Own construct

3.6.4 Participants' qualification

Table 3.7: Distribution of participants by qualification

Categories	Frequency	Percent
Certificate	61	13.0%
Diploma	41	8.7%
Degree	59	12.5%
B-Tech	78	16.6%
Honours	163	34.7%
Masters	68	14.5%
Total	470	100.0%

Source: Own construct

As indicated before, all the independent variables are categorical, and so was the qualification of the participants. This variable with six categories represents the qualification towards which participants are studying and included categories such as a Certificate, Diploma, Degree, B-tech, Honours and Masters. Starting with the most frequent category, 'Honours', there were 163

observations for this category which is a total of 34.7 percent of the 470 responses. Participants studying towards a Certificate made up 13.0 percent with 61 observations while those studying towards a Diploma made up 8.7 percent with 41 observations. The B-Tech category was the second most frequent category appearing 78 times, which meant that it made up to 16.6 percent of the 470 responses. Those studying towards a Degree and a Masters made up 12.5 percent and 14.5 percent with 59 and 68 observations respectively.

3.6.5 Participants' field of study

Table 3.8: Distribution of participants by field of study

Categories	Frequency	Percent
Economics	59	12.55%
Business Management	64	13.62%
Engineering & IT	38	8.09%
Humanities	95	20.21%
Accounting Sciences	75	15.96%
Education	74	15.74%
Law	65	13.83%
Total	470	100.0%

Source: Own construct

For the variable 'FOS' there were eighteen original categories collapsed into the seven categories shown in Table 3.5 for analysis purposes, due to the small number of participants in some of the categories. The first category represented participants in the Economics FOS and had 59 observations (12.55%). The second category represented participants in the Business Management field with 64 observations (13.62%). This was followed by a category representing those in the Engineering and IT field appearing 38 times thus making up 8.09%. For the category Humanities, there were 95 observations (20.21%) which also meant that this was the most frequent category. Accounting Sciences was the next category with 75 observations (15.96%). For the category Education, there 74 observations (15.74%) and there were 65 participants (20.6%) who fell into the Law category.

3.7 SUMMARY AND CONCLUDING REMARKS

This study was designed to test whether various demographic variables specifically education could be used to differentiate among levels of FRT. A questionnaire developed from revising the Grable and Lytton (1999a) and the Hanna and Lindamood (2004) questionnaires was used to ascertain participants' tolerances for different degrees of IR, IVR and SR. A sample of 470 participants was drawn from a population of students from selected South African universities. This sample was arrived at using a stratified random sampling technique which is a probability sampling method. To test the five hypotheses discussed, a BLRM was created and analysed using SPSS. Other analyses performed include the Mann Witney U test, Median analyses, the Kruskal-Wallis test and correlation analyses. To sum it up, this chapter provided both the theoretical and empirical compositions of how the study was carried out. This includes the selection of the sample, sampling techniques, survey techniques and the survey instrument. The method of analysis discussed how risk tolerance scoring is used to quantify FRT levels while also discussing both the dependent variable and the independent variables. The BLRM used to test the study's hypotheses was also discussed with Equation 3.4 being the final BLRM. The next chapter discusses the findings and results of the study.

CHAPTER FOUR: RESULTS AND FINDINGS

4.1 INTRODUCTION

The previous three chapters have provided the background of the study, the literature and empirical review of the study together with the methodology of the study respectively. The first two chapters provided the basis of what the study is all about including its objectives and what other researchers have done in this topic. The third chapter provided further clarification on how the analyses of the study are to be conducted including a brief description of the sample composition. This chapter presents the results and findings of the study obtained from the various tests conducted as discussed in Chapter 3. The first part of this chapter details the results from the non-parametric tests carried out in. This will be followed by analysis of participants' FRT status for each of the independent variable. After these two discussions, results from the BLRM are detailed and discussed determining what they mean to the hypotheses of the study.

4.2 NON-PARAMETRIC TEST RESULTS

4.2.1 Mann-Whitney Test and Median Analysis for Gender

As indicated in the previous chapter, the Mann-Whitney U test was used to analyse and compare the medians of male and female participants. The Mann-Whitney U test conducted for gender concluded that there was a significant difference (p = 0.000) in the FRT of males and females with a high Mann-Whitney U test statistic of 19873. Table 4.1 shows that the male category has the highest mean rank (294.94) compared to (178.05) for females and is therefore showing higher FRT concentrations. The median scores also suggest that male participants were more RT compared to female participants.

Table 4.1: Median analysis for gender

Gender		N	Mean Rank	Sum of Ranks
FRT	**Male**	231	294.94	68132.00
	Female	239	178.05	42553.00
	Total	470		

Source: Own construct

Table 4.2: Mann-Witney U test for gender

	FRT
Mann-Whitney U	13873.000
Wilcoxon W	42553.000
Z	-10.777
Asymp. Sig. (2-tailed)	.000

Source: Own construct

4.2.2 Kruskal-Wallis Test and Median Analyses for Remaining Explanatory Variables

Indicated in Chapter 3, the Kruskal-Wallis Test was used to analyse and compare medians tougher with statistical differences between independent variables with more than two categories. This turned out to be all the independent variables besides gender and is shown in Table 4.3. The Kruskal-Wallis test for age indicated that there was no statistical significant difference (p = 0.141) in FRT levels between the different age groups. The 22-24 years category (N = 131) did however record the highest median of 247.57. For LOE it was conclusive that with x^2 = 57.157, p = 0.000, there was a significant difference in FRT levels across the different categories. The category likely to be the most RT was 'Third year' with N = 156 and Median = 284.69. This was followed by the postgraduate category with N = 118 and Median = 245.7. The category representing first years was the most likely to be RA with N = 120 and Median = 188.58. The category representing second year students had a Median of 193.12 with N = 120. The results for FOS concluded that there was a significant difference in FRT across the various FOS categories. This difference with a *p*-value of 0.000 was significant at the one percent level of significance. The Median analysis further indicated that those in finance related studies (Economics, Accounting Sciences and Business Management) are likely to tolerate more FR than those in non-finance related studies (Engineering & IT, Humanities, Education and Law). In order from the highest to the lowest, Accounting Sciences had a Median of 310.00 followed by Business Management (305.59) then Economics (301.24), followed by Law (205.15) then Engineering & IT (196.21), then Humanities (186.32) and then Education (156.93). The results also showed that there was statistical significance (p=0.031) in FRT levels across the different qualifications. Those studying towards a Certificate were more likely to be RT (median=272.25) followed by the Diploma category (median=259.56) then the Masters category (median=239.50), followed by

the Honours group (median = 231.57). The category least likely to be RT was that of participants studying towards a Degree (median 213.61).

Table 4.3: Kruskal-Wallis Test results and Median analyses

Variables	N	Mean Rank	Chi square (x^2)	df	sig. (p)
Age					
18 years or younger	106	219.55	5.453	3	.141
19-21 years	133	245.68			
22-24 years	131	247.57			
25 years or older	100	223.05			
LOE					
First year	120	188.58	57.157	3	.000
Second year	76	193.12			
Third year	156	284.69			
Postgraduate	118	245.47			
FOS					
Economics	59	301.24	129.583	6	.000
Business Management	64	305.59			
Engineering & IT	38	196.21			
Humanities	95	186.32			
Accounting Sciences	75	310.00			
Education	74	156.93			
Law	65	205.15			
Qualification					
Certificate	61	272.25	12.265	5	.031
Diploma	41	259.56			
Degree	59	213.61			
B-Tech	78	215.40			
Honours	163	231.57			
Masters	68	239.50			

Source: Own construct

As discussed before, non-parametric tests in the form of the Kruskal-Wallis test is characterised by various limitations including that it is not possible to control for the effect of other variables in the results. It is also important to note that the Kruskal-Wallis Test is unable to indicate

exactly categories in an independent variable are statistically significantly different from each other. This makes it important to conduct other analysis such as correlation analysis and the BLRM. The results for these two tests are outlined below.

4.3 CORRELATION TEST RESULTS

Correlation test measures the direction and strength of association that may exist between variables. Results from the correlation test are represented in Table 4.4. Ideally, the independent variables should be free of any correlations among each other. Pallant (2007:132) indicated that a correlation coefficient between two independent variables is a concern if it is above 0.5.

Table 4.4: Correlation results

Spearman's rho		Age	Gender	LOE	FOS	Qualification
Age	Correlation Coefficient	1.000	-.074	.170**	.088	.333**
	Sig. (2-tailed)		.108	.000	.057	.000
Gender	Correlation Coefficient		1.000	-.308**	.339**	.057
	Sig. (2-tailed)			.000	.000	.215
LOE	Correlation Coefficient			1.000	-.104*	.257**
	Sig. (2-tailed)				.024	.000
FOS	Correlation Coefficient				1.000	.075
	Sig. (2-tailed)					.104
Qualification	Correlation Coefficient					1.000
	Sig. (2-tailed)					

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

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

Source: Own construct

From Table 4.4, it is evident that as per the Pallant (2007:132) 0.5 correlation coefficient rule, none of the independent variables are extremely highly correlated to each other. The highest

correlation however occurs between age and FOS with r = 0.339. This is however still below the 0.5 mark suggested by Pallant (2007:132) and is thus not a concern.

4.4 BINARY LOGISTIC MODEL RESULTS

The results of the BLRM used are summarised in Table 4.6. These results satisfied the goodness of fit statistics providing support for the BLRM used. Table 4.5 tabulates the Hosmer and Lemeshow test results with a chi-square value of 8.443 and degrees of freedom 8. Table 4.5 also shows that the Hosmer and Lemeshow test had a significance level of 0.391 which is larger than the required value of 0.05. This then proves and provides further support for the BLRM used. The results in Table 4.6 were used to test the various hypotheses introduced in Chapter 3 and to also explain the relationships between FRT and demographic factors while also showing the contribution of each independent variable to the model together with its statistical significance.

Table 4.5: Hosmer and Lemeshow test results

Chi-square	Df	Sig.
8.443	8	.391

Source: Own construct

4.4.1 The effect of demographic factors on financial risk tolerance

With the aid of Table 4.6 and Table 4.7, this section outlined the effect that the various independent variables have on SFRT. This was done by examining if p-values of different demographic variables are significant or not, with the significant ones indicating a probable impact on SFRT. This section also provided results for each of the study hypotheses introduced in Chapter 3. Elaborative figures were also used to show how being RT and being RA was distributed among the different demographic factors.

Table 4.6: Binary logistic regression model results 1

Variables	Coefficient	Odds Ratio	Std. Error	Z-statistic	Sig.
Age	-0.0160	0.9841	0.106	-0.15	0.882
Gender	-1.8075	0.1640	0.038	-7.86	0.000
LOE	0.2958	1.3442	0.139	2.85	0.004
FOS	-0.1743	0.8400	0.050	-2.9	0.004
Qualification	-0.1122	0.8938	0.065	-1.55	0.121
Constant	1.2759	3.5820	1.647	2.77	0.006

Source: Own construct

4.4.1.1 Age and financial risk tolerance

According to the general norm, the probability of being RT decreases as individuals grow older. This was attributed to the possibility that older individuals may be reluctant to assume risk as they do not have longer time horizons making it difficult to recoup any possible losses. The null hypothesis that age has no effect on FRT was tested using the Wald statistic and is shown as follows:

H_0: $\beta_5 = 0$

H_1: $\beta_5 \neq 0$

The model produced a coefficient of -0.0160, odds ratio of 0.9841 and a *p*-value of 0.882 as seen in Table 4.6. The *p*-value results suggest that the variable age was not a significant factor affecting FRT; hence the null hypothesis cannot be rejected. Although age was not significant, an odds ratio less than one indicated that younger individuals are less likely to be RT than older individuals. Given that a sample consisting of students was used it was likely that age differentials between participants would not be large enough to provide appropriate variations. The results that age is not a significant factor affecting FRT have been documented before although not to a large extent. Anbar and Eker (2010:505) and Hanna *et al.* (2001:59) both concluded that there was no significant relationship between FRT and the age of participants in their studies.

The study by Hallahan *et al.* (2004) investigated the effect of both linear and non-linear relationships between age and FRT levels. The linear relationship was found insignificant although the non-linear relationship was significant (Hallahan *et al.*, 2004:64). Al-Ajmi (2008:21) also investigated the effect of age on FRT, in his concluding remarks, it was inferred that there was no clear direction as to how the age of the participants may affect FRT levels. On the other hand, contrasting evidence do exist as Grable and Lytton (1999b:7); Hanna and Chen (1997:24); Sulaiman (2012:113) all found significant relationships between age and FRT were. With regards to South African studies, Gumede (2009) opted not to investigate the effect of age on FRT. Strydom and Metherell (2012) found statistically significant results at the ten percent level of significance whereby FRT decreased as age increased. Strydom *et al.* (2009) concluded that there were very little variations in ages of participants due to the nature of the sample which contributed to the insignificant findings. Lastly, Ramudzuli and Muzindutsi (2015) inferred that age was also not a significant variable affecting FRT.

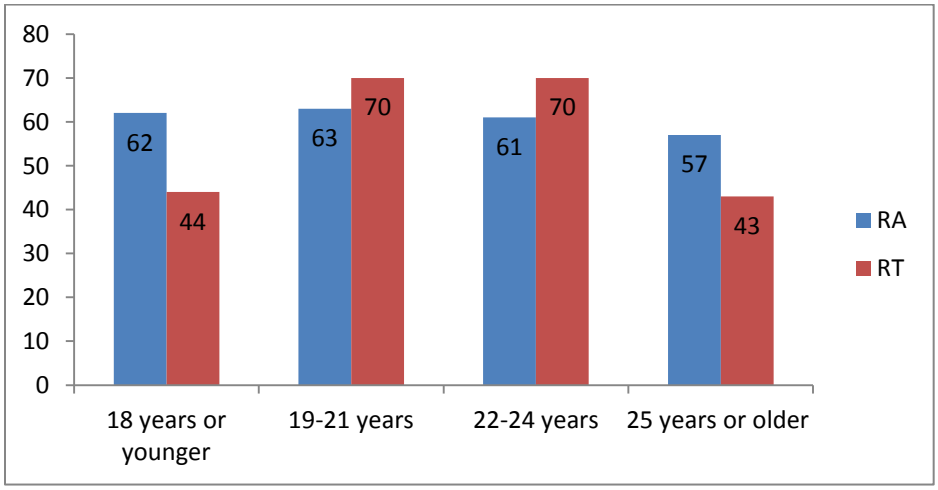

Figure 4.1: Risk tolerance by age

Source: Own construct

From Figure 4.1 it can be seen that there is no real direction in terms of a trend when it comes to risk tolerance for each of the age categories which explains the insignificant results. Majority of participants in the youngest category (18 years or younger) are RA while the majority of participants in the oldest category (25 years or older) are also RA. The two middle categories (19-21 years and 22-24 years) have slightly more RT participants than RA participants.

Table 4.7: Binary logistic regression model results 2

Variable	Categories	B	S.E.	Wald	Sig.	Odds ratio
Age	18 years or younger			5.178	.159	
	19-21 years	.605	.462	1.715	.190	1.831
	22-24 years	.482	.462	1.089	.297	1.619
	25 years or older	-.106	.459	.053	.818	0.899
Gender	Female	-1.165	.281	17.148	.000	0.191
LOE	First year			5.202	.158	
	Second year	.244	.429	.323	.570	1.275
	Third year	.598	.355	2.830	.093	1.817
	Postgraduate	.852	.414	4.231	.040	2.344
FOS	Economics			44.928	.000	
	Business Management	-.045	.545	.007	.934	0.955
	Engineering & IT	-1.236	.553	4.996	.025	0.290
	Humanities	-2.093	.501	17.442	.000	0.123
	Accounting Sciences	.211	.488	.186	.666	1.234
	Education	-1.896	.521	13.235	.000	0.150
	Law	-1.635	.500	10.709	.001	0.194
Qualification	Certificate			12.741	.026	
	Diploma	.038	.546	.005	.945	1.038
	Degree	-1.076	.521	4.271	.039	0.341
	B-Tech	-.762	.502	2.306	.129	0.466
	Honours	-.774	.502	2.379	.123	0.460
	Masters	.229	.477	.230	.632	1.257
	Constant	1.279	.585	4.782	.029	3.592

Source: Own construct

To be more specific this study produced a Wald statistic of 5.178, 1.715, 1.089 and 0.053 for each of the age categories (18 years or younger. 19-21 years, 22-24 years and 25 years or older) as per Table 4.7. It can be seen that that these values are very low especially for the 25 years or older category. With *p*-values of 0.159, 03.190, 0.297 and 0.818 respectively, none of the age

categories were significant. Therefore it was very conclusive that age has no significant effect on SFRT.

4.4.1.2 Gender and financial risk tolerance

As detailed in Chapter 2, the gender of participants is an important factor affecting FRT. Previous research has concluded that gender has a statistical significant influence of FRT; specifically men tolerate more FR than women. The null hypothesis that there are differences in FRT levels of males and females was tested. The model produced a Wald statistic of 17.148 for female participants which was significant at the one percent level of significance (p = 0.00). The fact that gender was significant with a high Wald statistic infers that gender does have an effect on SFRT. This also means that the null hypothesis can be rejected. The odds ratio for gender was 0.1640 which is less than one. This meant that being female decreased the probability of being RT.

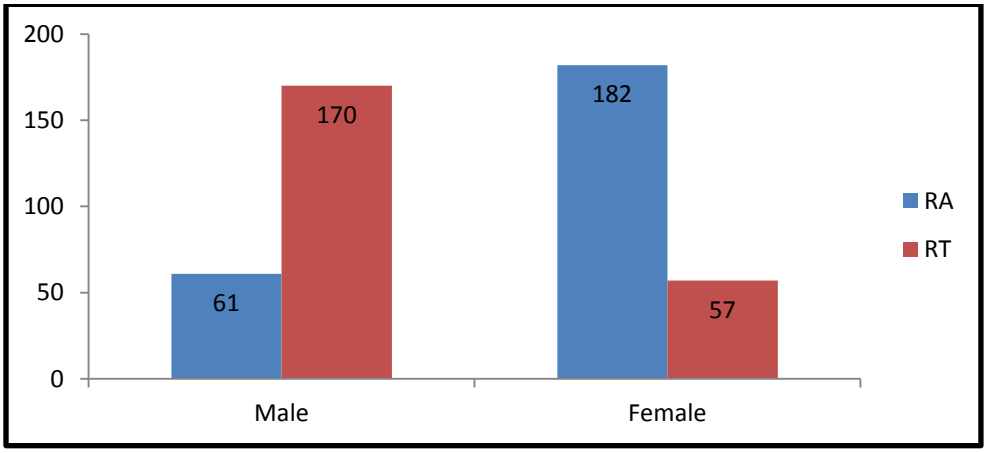

Figure 4.2: Risk tolerance by gender

Source: Own construct

In Figure 4.2 it can be observed that there was a clear direction with regards to FRT by gender. Most of the males (170) preferred taking higher risks compared to 61 who preferred to take lessor risks. With regards to females, most of the female participants (182) were RA while only 57 were RT. This shows that females prefer less FR compared to their male counterparts who seemingly prefer more FR.

This finding that females are less RT than males is not surprising as there is extensive evidence that this relation does exist. Al-Ajmi (2008:22); Hallahan *et al.* (2004:67); Hanna and Lindamood (2004:34); Hartog *et al.* (2000:11); Palsson (1996:775) all concluded that men took more FR than females. Other studies with similar findings include those by Chamess and Gneezy (2007:13); Coleman (2003:106); Faff *et al.* (2008:16); Olivares *et al.* (2008:10) as the researchers attributed this finding to lack of equal opportunities between males and females and also that naturally, females do not partake in risky activities be it physical activities or financial activities. With regards to South African studies, Gumede (2009:33); Ramudzuli and Muzindutsi (2015:183) concluded that gender had no significant influence on FRT, whilst, consistent with this study, Strydom *et al.* (2009:15) found that men were predominantly attracted by higher levels of FR compared to women. Strydom and Metherell (2012:13) also concluded that men tolerate more risks than women given a β value of negative 0.436163 with a *p*-value = 0.0694.

4.4.1.3 Qualification and financial risk tolerance

The qualification of participants is believed to influence their FRT levels similar to the LOE. When analysing a total of 470 responses, the model results as per Table 4.6 produced a β value of -0.1122, with an odds ratio of 0.8938 and a *p*-value of 0.121. The *p*-value meant that qualification was not statistically significant and hence could not explain variations in FRT levels. However, with an odds ratio less than one, this meant that those studying towards certificates were less RT compared to any other superior qualification. These findings are somewhat surprising as the qualification of participants is expected to increase FRT levels. The lack of previous evidence however may be a sign that this variable has no influence on FRT. Based on these results, one cannot reject the null hypothesis that qualification has no effect on FRT.

According to Figure 4.3 the certificate and diploma categories were dominated by RT individuals. The degree, b-tech and honours categories were dominated by RA individuals, while the Masters category had an equal distribution between RT individuals and RA individuals. The widespread of Reponses across the six types of qualifications may have caused the above results as there are very few participants in each of the categories.

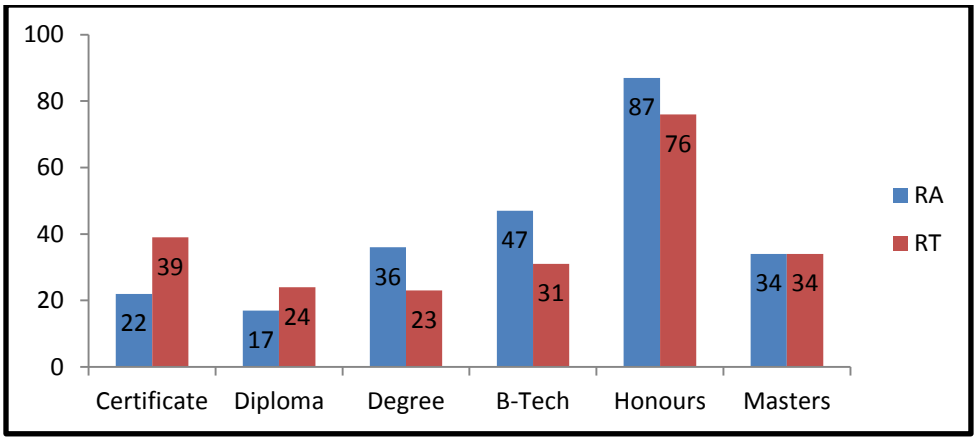

Figure 4.3: Risk tolerance by qualification

Source: Own construct

For the BLRM results, certificate was used as the reference category. Wald statistics of 12.741, 0.005, 4.271, 2.306, 2.379 and 0.230 were produced together with *p*-values of 0.026, 0.945, 0.039, 0.129 and 0.632 for certificate, diploma, degree, b-tech, honours and masters respectively. This meant that the certificate category was significant at the five percent level of significance together with the degree category also significant at the five percent level of significance. Diploma, B-tech, Honours and Masters categories were not significant as their *p*-values exceeded 0.1. With an odds ratio of 0.341 for the degree category, having a degree compared to having a certificate positively influenced FRT. Although not significant, the odds ratios for b-tech (0.466) and honours (0.460) were below one indicating that studying towards these qualifications as compared to studying towards a certificate positively influenced FRT levels. For the masters' category, an odd ratio of 1.257 was observed which is greater than one, implying that those studying towards a certificate were more likely to be RT than those studying towards masters. Results in this study are similar to some of the international studies such as those by Blume (1978) and Masters (1989).

4.4.1.4 Level of education and financial risk tolerance

The below hypothesis was tested in order to determine whether there was any significant relationship between LOE and FRT:

H_0: $\beta_2 = 0$

$H_1: \beta_2 \neq 0$

The results tabulated in Table 4.6 indicated that the variable LOE had a coefficient of 0.2958, odds ratio of 1.3442 and a *p*-value of 0.004. The *p*-value meant that LOE was significant at the one percent level of significance and as such, LOE could explain variations in FRT levels. This implied that the null hypothesis that LOE has no influence FRT could be rejected. An odds ratio greater than one also meant that, first years were more likely to be RT compared to any other LOE categories. This finding with regards to LOE is in line with previous research by Bellante and Green (2004:278); Chang *et al.* (2004:62); Donkers *et al.* (2001:185); Grable and Joo (2004:78). Similarly, Kimball *et al* (2007:20); Riley and Chow (1992:34); Schooley and Worden (1996:92); Sung and Hanna (1996:18) also concluded that the LOE of participants has a positive effect on FRT. In the context of South African studies, Strydom *et al.* (2009) opted not to investing the effect of LOE on FRT whilst Gumede (2009:27) concluded that there was no statistically significant relationship between LOE and FRT. On the other hand, Ramudzuli and Muzindutsi (2015) used a comparative analysis method between two groups (Commerce and Humanities) before concluding LOE was significant for the commerce group and not for the Humanities group. Similar to the latter finding by Ramudzuli and Muzindutsi (2015), Strydom and Metherell (2012) inferred that LOE had no statistical significant effect on FRT levels.

4.4.1.5 Field of study and financial risk tolerance

The FOS of participants is believed to influence FRT levels; hence the null hypothesis that FOS does not influence FRT was put into a test:

$H_0: \beta_1 = 0$
$H_1: \beta_1 \neq 0$

The BLRM produced in Table 4.6 produced a *p*-value of 0.004 and an odds ratio of 0.8400 for the variable FOS. It was thus conclusive that FOS does influence FRT levels to the extent that those in finance related studies tolerate more risks than those in non-finance related studies. To be more specific, Table 4.9 tabulated Wald statistics of 44.928, 0.007, 4.996, 17.442, 0.186, 13.235 and 10.709 with *p*-values 0.000, 0.934, 0.025, 0.000, 0.666, 0.000 and 0.001 for each of the FOS categories respectively (Economics, Business Management, Engineering & IT,

Humanities, Accounting Sciences, Education and Law). Of the seven categories, only two (Business Management and Accounting Sciences) were not significant. Economics, Humanity, Education and Law were significant at the one percent level of significance. Engineering & IT was significant at the five percent level of significance. This provided support to reject the null hypotheses as FOS has a statistical significant influence on FRT levels. With economics being the reference category, odds ratios of 0.955, 0.290, 0.123, 1.234, 0.150 and 0.194 were produced for Business Management, Engineering & IT, Humanities, Accounting Sciences, Education and Law respectively. Besides Accounting Sciences, all the other categories had an odds ratio less than one. This implied that being in those categories decreased the probability of being RT as compared to being in the reference category (Economics). For Accounting Sciences an odds ratio greater than one meant that being in this category increased the probability of being RT. In line with international studies, Barsky *et al.* (1997:570) and Chang *et al.* (2004:60) found similar results with the current study as lack of literature continues to be a problem with regards to this variable.

4.5 SUMMARY AND CONCLUDING REMARKS

The aim of this chapter was to tabulate and represent the results and findings of the study. The discussion was to include results with regards to the effect that demographic factors may have on FRT levels. Upon looking at the results, age and the qualification of participants were not significant in predicting FRT levels. Specifically, all the age categories (18 years or younger, 19-21 years, 22-24 years and 25 years or older) were not significant. With regards to the qualification of participants, degree and certificate were significant as they could partially explain variations FRT levels. Diploma, B-tech, Honours and Masters were all not significant. The third variable investigated was gender of which the results indicate a significant relationship with FRT. For LOE which was also significant, only half of the categories explained variations in FRT levels. Specifically, being in third year and being a postgraduate student positively influenced FRT levels of the participants. Another observed variable was FOS which was also significant at the one percent level of significance. Being in Economics, Engineering & IT, Humanities, Education and Law affected FRT levels. Being in Business Management and Accounting Sciences however did not influence FRT levels.

The results drawn from the various tests conducted provide a couple of interesting arguments for discussion; nonetheless, it is acknowledged that using students in a sample can be limiting. These results have very important implications as they not only provide further evidence that demographic variables play important roles in shaping FRT levels, but also dispute the importance of other variables that have been deemed important before. In some cases variables had a significant effect as shown above, whereas the evidence for other variables was not always as conclusive. Overwhelmingly, one is unable to rule out the conception that SFRT is influenced by these demographic factors. It however noted that research is necessary particularly with regards to the impact of a participant's qualification, age and LOE.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The desire for financial freedom, changes in personal needs, social status and financial needs have propelled our society to revisit their portfolio allocation strategies. This forces them to understand the trade-off between risk and return where the amount of financial return from an investment is directly proportional to the riskiness of that investment. Academics and financial planners have an immense task of assisting the community to understand this risk and return trade off through the assessment FRT. To carry this task out, academics indulge in researches to determine FRT levels of individuals based on a combination of personal preferences, financial capacity and psychological willingness. The understanding of FRT and the determination of asset allocations based on FRT levels helps reduce regret and stress as people will usually operate with their means and their tolerable levels. FRT is both psychological and financial; hence individuals need to assess it in both dimensions. This study used various statistical models to analyse the effects of demographic factors on SFRT among students at selected South African universities. The findings of this study as indicated under each discussion in Chapter 4 were at most in line with general norms and various popular studies; however other findings opposed general norms. To be more specific, the empirical objectives of the study attempted to:

- Quantify the influence of demographic factors (FOS, LOE, qualification, gender and age) on SFRT; and
- Compare the findings of this study to those of previous South African studies

The aim of this chapter is to summarise the findings of the study and also provide study concluding remarks. This is achieved by first summarising the reviewed theoretical approaches together with the empirical findings of the study. Conclusions and all the necessary recommendations are then provided. Lastly, an outline of the study limitations together with suggestions for future research areas is then provided.

5.2 SUMMARY OF THE STUDY

5.2.1 Theoretical background

The theoretical background of this study was a two dimensional review which included the conceptual review of FRT theories together with the review of both South African and international studies that have tested these theories. In the conceptual review, reference was made to what FRT refers to, its history, components and behavioural aspects, how it can be measured and the various tolerance categories. The empirical portion on the other hand focused on the findings of various different studies under this topic.

5.2.1.1 Theoretical concepts of financial risk tolerance

FRT is said to be a measure of an individual's willingness and ability to tolerate FR. FRT is multidimensional as it speaks about both the financial ability and the psychological willingness affecting risk tolerance. The psychological portion is hugely influenced by individual's opinions and attitudes towards risk, while the financial portion is highly influenced by an individual's finances. Different researchers have referred to FRT in different ways, mentioning that it has to do with attitudes towards loss, attitudes towards return, attitudes towards risky investment choices, tolerance of a given risk level, willingness and ability to assume risk, financial capacity to risk losing money and the psychological capacity to risk losing money. Moreover, it is important to understand that FRT is dynamic and continuously changing as various demographic factors change. The concept of FRT has various components and behavioural aspects which are both financial and psychological affecting an individual's FRT level. Financial components include ability to take risk (Which depends on the finances of an individual), the need to take risk (which may refer to the financial need propelling individuals to take risk) and investment choice (which speak to the types of financial products one may be comfortable with). Psychological components of FRT include an individual's willingness to take risk, the degree of regret that might be suffered should actual returns not match desired returns and lastly an individual's comfort with the amount of risk being taken.

The concept of FRT has been contrasted with the concept of risk aversion. Risk aversion is thus the inverse of FRT where by individuals are unwilling to accept the likelihood of an uncertain

outcome. There are two components of risk aversion in ARA and RRA which serve as ways of determining the amount and proportion of one's wealth that is placed into risky assets provided that the portfolio decision is limited to choosing a combination of risk free assets and one risky asset. While ARA refers to additional amounts allocated to risky assets when there is a change in income, RRA refers to the change in portfolio allocation as wealth base increases. Measurers explaining how FRT can be quantified tend to induce contestations and discussions regarding which is the better option. In this study reference has been made to two different measures of FRT in subjective measures and objective measures. SFRT quantifies FRT through perceived allocations while OFRT uses actual allocations from the past. OFRT is often different from SFRT as illustrated by the advantages and disadvantages of the two measures. Disadvantages of OFRT include the fact that past allocations are not always a true reflection of future allocations as these may be enforced by financial managers. Also, it may be impossible to find actual un-estimated data as this data is usually confidential and that only those with past assets allocations can be quantified. OFRT is also said to be an un-prophetic measure rather than being a predictive measure. Advantages of OFRT include that it involves actuals rather than estimates and it eliminates the problem of framing when it comes to hypothetical questions. SFRT on the other hand is commended for its ability to include everyone, even those without any past allocations; more data can be collected using SFRT by just asking the relevant questions. On the other hand, SFRT introduces the problem of framing when asking hypothetical questions which can distort results and lead to different findings for OFRT and SFRT.

Despite some differing views, there is consensus regarding the different FRT categories. These categories are used to classify individuals based on their tolerance level. From conservative to aggressive, the amount of risk being assumed changes as one moves through each category. The conservative category is the least RT category followed by the moderately conservative category. The middle of the class category is the moderate risk tolerance category which finds itself housing participants who try and strike a balance between taking risk and not taking risk. This is followed by the moderately aggressive category which is however housing less RT investors compared to the aggressive risk tolerance category.

5.2.1.2 Empirical studies on financial risk tolerance

Having suggested that demographic variables have an effect on FRT levels, it was important to assess whether the empirical findings from previous studies support this claim or not and if so to what extent. Overall, there are a number of demographic factors said to influence FRT, however, this study only focused on age, gender, education and population group. An individual's demographic category for each of these variables is thus expected to shape FRT in a certain direction. Traditionally younger people are expected to tolerate more risk that older people, males are also expected to tolerate more risks that females while those with higher incomes are also said to tolerate more risks than those with lower incomes. With regards to population group, Whites are said to tolerate more risks than any other people from a different population group. With regards to education, there is LOE and type of education influencing FRT. Higher LOE are said to traditional induce the desire to tolerate more risks while lower LOE the desire to tolerate less FR. Type of education on the other hand has to deal with either financial education or non-financial education with those in finance fields tolerating more risk than those in non-finance fields.

From the reviewed studies, it was very interesting to find that there is empirical support for and against the above mentioned FRT stances. Some studies found these relationships true and significant; others found the relationships false while others found the relationships insignificant. Another important aspect drawn from the empirical studies was the use of different methodological approaches and regression analyses. Most of the studies preferred to use a BLRM together with various analysis such as correlation and median analysis. If not using a BLRM, very few studies utilised a linear regression technique. In addition to the methodological approach, important from the empirical portion of reviewed studies was the method used to measure FRT. SFRT was predominantly adopted by the reviewed studies with questionnaires being the main source of collecting data. Few studies did however make use of OFRT methods. A review of empirical studies on the link between FRT and demographic factors showed that various demographic factors do actually have a significant effect on FRT levels. This suggested that through demographic factors, one can estimate risk tolerance levels and ultimately the correct portfolio for individuals. The education of investors was identified as the one variable in need of further analysis especially in a South African context.

5.2.2 Empirical findings of the study

The empirical analysis of this study was conducted on data collected from selected South African universities using a manual questionnaire. To start things off, descriptive analyses of the sample were discussed using various classifying variables. This was followed by non-parametric tests on the data to provide further analysis. Correlation tests were also conducted to determine the extent to which the data might have been exposed to the problem of multicollinearity. It can be concurred that the data was free from such problems, although income and gender were highly correlated. The next analysis was aimed at achieving a number of the empirical objectives of the study and was the estimation of the BLRM with FRT as the dependent variable. Tables and figures were also been used to represent data and provide analysis. Three (LOE, FOS and gender) of the five demographic variables had statistically significant influences on the level of SFRT. This meant that only age and qualification were statistically insignificant with regards to their influence on SFRT.

5.2.2.1 Findings on the financial risk tolerance and its determinants

In the review of the literature it was indicated that FRT is highly influenced by demographic factors. To assess which demographic factors affect FRT and to what extent, statistical tests and econometric models such as the BLRM were used. This analysis was based on data collected between June 2016 and September 2016. The findings of this study as indicated under each discussion were at times found to be in line with general norms and various popular studies; however other findings opposed general norms. The finding for age was not in line with the general norm as age was not a significant factor affecting FRT. With regards to gender the results shows a statistical significant influence on FRT were by females tolerate less risks than males. This is in line with the general norm as females are said to be RA compared to males. Only two of the six qualification categories were significant. This was the Certificate category and the Degree category. This meant that the results were inconclusive regarding the effect of qualification FRT levels. With regards to LOE, the results gave significant *p*-values for the third year category and the postgraduate category. This meant that LOE did have an influence on FRT levels. Lastly, the variable FOS with seven variables was also tested to check if it has a statistical significant effect on FRT levels. Upon getting the results, five of the seven variables were

significant; precisely four variables (Economics, Humanities, Law and Education) were significant at the one percent level of significance with the other variables (Engineering and IT) significant at the five percent level of significance. This meant that FOS had a significant statistical influence on SFRT.

5.3 REALISATION OF THE OBJECTIVES

Before concluding the study, it is important to ensure that from the primary objective to the theoretical objectives and then the empirical objectives, all the study objectives have been realised. This section attempted to show how each of the study objectives were realised and any challenges that may have been encountered in the realisation of objectives.

5.3.1 Primary objective

The primary objective of this study was to conduct an analysis of the effect of various demographic factors on SFRT levels, specifically, education, gender and age. Education was identified as the major demographic factor divided into three sections, LOE, FOS and qualification. An analysis of the effect of each of these demographic factors was conducted primarily using a BLRM together with the aid of other statistical tests such as the Mann-Whitney U test, Median analysis and the Kruskal-Wallis test. It was found that gender, LOE and FOE were the only three demographic factors with a statistically significant effect on SFRT. Age and qualification were found to not affect SFRT as they were not significant. As such the primary objective of the study was realised.

5.3.2 Theoretical objectives

Primary to the theoretical objectives of this study was the conceptualisation of FRT through explaining what it is, where it originates from and any other behavioural components of FRT. Specifically, the primary objectives of this study were to provide a definition of FRT and its main focus, briefly discuss the history of FRT, explain the various FRT categories, discuss how FRT can be measured and review theoretical studies on FRT and demographic factors. These objectives were all achieved as articulated below. In Section 2.2.3, FRT was defined as an individual's psychological willingness and financial ability to tolerate above average FR. The concept of FRT was contrasted with the concept of risk aversion which is a behaviour were

people are not willing to take any FR, as such they prefer risk free options as compared to options containing any sort of risk. The history of FRT was discussed in Section 2.2.4. It was shown that the concept of what is today FRT originates from the Hindu-Arabic numbering system from eight hundred years ago. FRT went through various developmental stages through the years from the use of probability theories to the use of CDQ. Currently FRT can be measured using questionnaires with the Grable and Lytton (1999a) and the Hanna and Lindamood (2004) questionnaires being the most popularly adopted questionnaires.

It was discussed that reference can be made to various FRT categories which differ as the risk an individual is willing and able to take changes. The FRT categories discussed range from low risk to medium risk and high RT. The low risk categories discussed are conservative and moderately conservative. Although moderately conservative investors tolerate relatively more risks than conservative investors, these are still considered very low RT inventors. They like to keep their money where it is exposed to very little FR and as such returns are very minimal. The medium RT category is the moderate category. As discussed, investors in this category attempt to strike a balance between risk free assets and risky assets. Lastly, the high FRT category includes moderately aggressive and aggressive investors. These investors are willing to tolerate above average risks to achieve higher financial returns. As such the third theoretical objective of the study was achieved.

The fourth theoretical objective of this study was to discuss the contrast between the two FRT measures, SFRT and OFRT. In discussing these it was noted that SFRT deals with opinions and attitudes as it measures FRT through perceived risk taking. OFRT on the other hand focus on quantifying FRT through actual allocations made in the past. Various advantages and disadvantages of each of these factors were discussed and it was concluded that the best method depends on the sample being used and the objectives of the study at hand. The fifth theoretical objective was to review previous theoretical studies on FRT. A number of international and local studies were review looking at the methods of analyses they used and the results they reported on the effect of demographic factors on FRT. From the discussion above, it can be seen that the fifth theoretical objective of the study were realised.

5.3.3 Empirical objectives

The empirical objectives of the study were to be realised through the Results and findings section as the effect of each demographic factor on FRT was tested. Specifying, the empirical objectives of this study were to determine the actual effect of age, gender, LOE, FOS and qualification on FRT levels. Using a BLRM, it was found that LOE, FOS and gender influenced FRT levels while age and qualification did not have any statistically significant influence on FRT levels. The last empirical objective of this study was to compare previous South African results for each of the demographic factors to the results this study reported. With regards to age, Gumede (2009) opted not to include this variable in the analysis, Ramudzuli and Muzindutsi (2015) found similar results were age did not influence FRT. On the contrary, Strydom and Metherell (2012) found that age does influence FRT and younger people tolerate more risks than older people. With regards to gender, similar results were reported by Strydom and Metherell (2012) and Strydom *et al.* (2009) as males tolerated more risks than females. Gumede (2009) and Ramudzuli and Muzindutsi (2015) concluded that gender had no significant effect on FRT. For LOE, Gumede (2009) found that education had no influence on FRT levels. Similarly; Strydom and Metherell (2012) concluded that education did not affect FRT level. Strydom *et al*. (2009) also inferred that education did not explain FRT differences. For FOS, similar to this study, Ramudzuli and Muzindutsi (2015) concluded that FRT levels increased for those in finance fields compared to those in non-finance fields, specifically Humanities. All other South African studies did not quantify this relationship. It therefore conclusive that all the study objectives were realised.

5.4 CONCLUSIONS

The purpose of this study was to provide important insight regarding the determinants of FRT levels in order to identify vital aspects to consider when constructing investment portfolios. Important to the study of FRT is to ensure that FRT has been adequately measured using either objective measures or subjective measures. This study opted for the latter as discussed in the methodology mainly because it is an inclusive method regardless of the type of sample or population. It is apparent from reviewed studies that the application of FRT measures is widespread however the difficulty in giving the most appropriate assessment is compounded by

the lack of consensus regarding which is the most appropriate measure to use when determining FRT levels.

The evidence regarding the effect demographic factors have on FRT appears to be mixed. Many international studies have investigated such relationships and have either found support for the previous literature or reasons to refute it. The literature reviewed from a South African context was limited to three UKZN based studies by Gumede (2009) Strydom and Metherell (2012); Strydom *et al* (2009) who found interesting results despite some of their studies' weaknesses. One of the aims of this study was to improve on these existing South African studies by obtaining a more representative sample while also using robust statistical analyses technique. As such the use of a BLRM formed part of the main analysis; however, non-parametric techniques were also used to draw direct comparisons between independent variables. The study sample was drawn from a sample of students at selected South African universities. Quantifying FRT levels does not only benefit the financial managers, but also the individual's themselves in order to understand their portfolio construction processes. A well-structured FRT study tends to increase individuals' awareness with regards to their financial assets and investments. The job of financial companies is also simplified when it comes to the marketing of relevant products to the market. Financial managers are also able to keep their clients happy by keeping risk within their financial and psychological means; hence the studying FRT should be a continuous process.

Overall, this study did provide evidence that as per international literature, there exist an important relationship between demographic factors (gender, FOS and LOE) and individual FRT. The implications of this for various practitioners are that the assessment of FRT is vital when constructing portfolios and the importance of knowing the client when advising has to be taken into account. Hence, it is strongly advisable for practitioners to ensure that they adhere to these and other similar guidelines in order to avoid any portfolio allocation errors. In a South African perspective these findings are also important as they provide new evidence for fellow researchers. The limitations as discussed next provided ideal opportunities for future research in this topic.

5.5 LIMITATIONS AND AREAS FOR FUTURE RESEARCH

Beyond the conclusions drawn from this study, various opportunities have presented themselves for those interested in continuing with a similar topic. A sample which is representative in all its aspects especially age is warranted as an area of improvement. This is because age has been a problem for many of the South African studies (Ramudzuli & Muzindutsi, 2015; Strydom *et al.*, 2009). The use of student samples has also proven to be a disadvantage in the study of FRT; hence samples not made up of students could provide interesting results. It has also been noted that South African studies have since provided analysis for three or more variables at a time, which may be limiting in terms of the analyses that one can provide. Hence, future research can focus on one specific demographic factor which will improve the analyses provided together with the discussions. A questionnaire applicable to South African participants can also be developed to ensure that relevant and appropriate information is collected from the sample. Going forward, researchers can also look into expanding on the number of risk tolerance categories reported instead of just having RA and RT. This would ensure that participants are correctly classified in the different FRT categories. One can thus include conservative, moderately conservative, moderate, moderately aggressive and aggressive when classifying participants in the results.

BIBLIOGRAPHY

Arrow, K.J. 1971. Essays in the Theory of Risk Bearing. Chicago: Markham Publishing Company.

Afza, T. & Nazir, M. 2007. Is it better to be aggressive or conservative in managing working capital. *Journal of Quality and Technology Management,* 3(2):11-21.

Al-Ajmi, J.Y. 2008. Risk tolerance of individual investors in an emerging market. *International Research Journal of Finance and Economics,* 17(1):15-26.

Alreck, P. & Settle, R. 1995. *The survey research handbook*. 2nd ed. New York: McGraw-Hill.

Anbar, A. & Eker, M. 2010. An empirical investigation for determining of the relationship between personal financial risk tolerance and demographic characteristics. *Ege Academic Review,* 10(2):503-523.

Antonites, A.J. & Wordsworth, R. 2009. Risk tolerance: A perspective on entrepreneurship education. *Southern African Business Review,* 13(1):69-85.

Arrow, K.J. 1971. Essays in the Theory of Risk Bearing. Chicago: Markham Publishing Company.

Bailey, J. & Kinerson, C. 2005. Regret avoidance and risk tolerance. *Financial Counselling and Planning,* 16(1):23-28.

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

Baker, H.K. & Haslem, J.A. 1974. The impact of investor socioeconomic characteristics on risk and return preferences. *Journal of Business Research,* 2(1):469-476.

Barber, B.M. & Odean, T. 2001. Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics,* 1(1):261-292.

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. *The Quarterly Journal of Economics,* 112(2):537-579.

Bell, D.E. 1982. Regret in decision making under uncertainty. *Operations Research,* 30(1):961-981.

Bellante, D. & Green, C.A. 2004. Relative risk aversion among the elderly. *Review of Financial Economics,* 13(1):269-281.

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

Bernstein, P.L. 1996. Against the Gods: The Remarkable Story of Risk. New York: John Wiley & Sons.

Bertrand, M. & Mullainathan, S. Do people mean what they say? Implications fo subjective survey data. *MIT Economics Working Paper,* 1(4):1-14.

Blum, S.H. 1976. Investment preferences and the desire for security: A comparison of men and women. *The Journal of Psychology,* 94(1):87-91.

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

Blume, M.E. & Friend, I. 1975. The asset structure of individual portfolios and some implications for utility functions. *The Journal of Finance,* 30(1):585-603.

Bodie, Z., Kane, A. & Marcus, A.J. 2007. Essentials of investments. Chicago: McGraw-Hill.

Bommier, A. & Rochet, J.C. 2006. Risk aversion and planning horizons. *Journal of the European Economic Association,* 4(4):708-734.

Bowman, E.H. 1982. Risk seeking by troubled firms. *Sloan management review,* 23(4):33.

C2VTrader. 2005. Swing Trade Stocks and EFTs. http://www.c2vtrader.com Date of access: 30 Jul. 2016.

Callan, V. & Johnson, M. 2002. Some guidelines for financial planners on measuring and advising clients about their levels of risk tolerance. *Journal of Personal Finance,* 1(1):31-44.

Campbell, J.Y. Chan, Y.L. & Viceira, L.M. 2003. A multivariate model of strategic asset allocation. *Journal of Financial Economics,* 67(1):41-80.

Canner, N., Mankiw, N.G. & Weil, D.N. 1994. An asset allocation puzzele. *American Economic Review,* 87(1):181-191.

Chang, C., DeVaney, S.A. & Chiremba, S.T. 2004. Determinants of subjective and objective risk tolerance. *Journal of Personal Finance,* 3(3):53-67.

Charness, G. & Gneezy, U. 2007. Strong evidence for gender differences in investments. *Departmental Working Papers, University of Carlifornia, Santa Barbara,* 1(1):1-20.

Charyton, C., Snelbecker, G.E., Rahman, M.A. & Elliott, J.O. 2013. College students' creative attributes as a predictor of cognitive risk tolerance. *American Psychological Association,* 7(4):350-357.

Chaulk, B., Hohnson, P.J. & Bulcroft, R. 2003. Effects of marriage and children on financial risk tolerance: A synthesis of family development and prospect theory. *Journal of Family and Economic Issues,* 24(3):257-279.

Christiansen, C. Joensen, J.S. & Rangvid, J. 2009. Fiction or fact: Systematic gender differences in financial investments? Paper presented at the EFA 2007 Ljubljana Meetings, Ljubljana, 22 April. http://www.bankofspain.org/webbde/Secciones/SobreBanco/Conferencias/Ponencias/Household/paper/Fich/12-Rangvid_GenderParticipation-April09.pdf Date of access: 09 Mar. 2015.

Cicchetti, C.J. & Dubin, J.A. 1994. A microeconometric analysis of risk aversion andthe decision to self-insure. *Journal of Political Economy,* 102(1):169-186.

Clemen, B. 2004. Assessing risk tolerance. *Decision Analysis Newsletter,* 23(1):4-5.

Coetzee, J. & de Beer, J. 2014. Financial literacy amongst students in South Africa. *Department of Economics, University of the Free State Paper prepared for ESSA Conference, Bloemfontein*, 22-27.

Cohn, R.A., Lewellen, W.G., Lease, R.C. & Schlarbaum, G.G. 1975. Individual investor risk aversion and investment portfolio composition. *Journal of Finance*, 30(1):605-620.

Coleman, S. 2003. Women and risk: An analysis of attitudes and investment behaviour. *Academy of Accounting and Financial studies Journal,* 7(2):99-114.

Cooper, W., Kingyens, A. & Paradi, J. 2013. Two-stage financial risk tolerance assessment using data development analysis. *European Journal of Operational Research,* 233(1):273-280.

Corter, J.E. & Chen, Y. 2006. Do investment risk tolerance attitudes predict portfolio risk? *Journal of Business and Psychology,* 20(3):369-381.

de Moivre, A. 1730. Miscellanea analytica de seriebus et quadraturis. London: Tonson and Watss.

Devlin, K. 2008. The unfinished game: Pascal, Fermat and the seventeenth-century letter that made the world modern. New York: Basic Books.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. & Wagner, G. 2011. Individual risk attitudes: Measurements, determinants, and behavioural consequences. *Journal of the European Economic Association,* 9(3):522-550.

Donkers, B., Melenberg, B. & Van Soest, A. 2001. Estimating risk attitudes using lotteries: A large sample approach. *The Journal of Risk and Uncertainty*, 22(2):165-195.

Eckel, C.C. & Grossman, P.J. 2008. Forecasting risk attitudes: An experimental study using actual and forecast gamble choices. *Journal of Economic Behavior & Organization*, 68(1):1-17.

Faff, G., Mulino, D. & Chai, D. 2008. On the linkage between financial risk tolerance and risk aversion. *The Journaal of Financial Research,* 31(1):1-23.

Finametrica. 2015. What Is Risk Tolerance? https://www.myrisktolerance.com/risktolerance Date of access: 22 Feb. 2016.

Finke, M. & Huston, S. 2003. The brighter side of financial risk: Financial risk tolerance and wealth. *Journal of Family and Economic Issues,* 24(3):233-256.

Fitzpatrick, M. 1983. The definition and assessment of political risk in international business: A review of the literature. *Academy of Management Review,* 8(1):249-254.

Fitzsimmons, V.S. & Wakita, S. 1993. Expectation of future financial condition: Aremen and women different? *Financial Counseling and Planning,* 4(1):165-180.

Frakt, A. 2009. High-risk pools and health reform. http://theincidentaleconomist.com/wordpress/high-risk-pools-and-health-reform/ Date of access: 15 Apr. 2016.

Friedman, B. 1974. Risk aversion and the consumer choice of health insurance option. *The Review of Economics and Statistics,* 56(1):209-214.

Friedman, M. & Savage, L.J. 1948. The utility analysis of choices involving risk. *The Journal of Political Economy,* 56(1):29-304.

Friend, I. & Blume, M.E. 1975. The demand for risky assets. *American Economic Review,* 65(1):900-922.

Gibson, R., Michayluk, D. & Van de Venter, G. 2013. Financial risk tolerance: An analysis of unexplored factors. *Financial Services Review,* 22(1):23-50.

Gilliam, J., Chatterjee, S. & Grable, J. 2010. Measuring the perception of financial risk tolerance: A tale of two measures. *Journal of Financial Counseling and Planning,* 21(2):30-43.

Gough, J. 1988. Risk And Uncertainty. Canterbury: Centre for Resource Management, Lincoln College and University of Canterbury.

Grable, J.E & Joo, S.H. 2004. Environmental and biopsychosocial factors associated with financial risk tolerance. *Financial Counseling and Planning Education,* 15(1):73-80.

Grable, J.E. & Joo, S.H. 1997. Determinants of risk preference: Implications for family and consumer science professionals. *Family Economics and Resource Management Biennial,* 2(1):19-24.

Grable, J.E. & Lytton, R.H. 1999a. Financial risk tolerance revisited: The development of a risk assessment instrument. *Financial Services Review,* 8(1):163-181.

Grable, J.E. & Lytton, R.H. 1999b. Assessing financial risk tolerance: Do demographic, socioeconomic, and attitudinal factors work? *Family Relations and Human Development/Family Economics and Resource Management Biennial,* 1(1):1-9.

Grable, J.E. 1997. Investor risk tolerance: Testing the efficacy of demographics as differentiating and classifying factors. Virginia: Virginia Polytechnic Institute and State University. (Dissertation - PhD).

Grable, J.E. 2000. Financial risk tolerance and additional factors that affect risk taking in everyday money matters. *Journal of Business and Psychology,* 14(4):625-630.

Grossman, P. & Eckel, C.C. 2009. Loving the longshot: Risk taking with skewed gambles. *Economics Seminar Series,* 1(1):1-32.

Guiso, L., Jppelli, T. & Terizzese, D. 1996. Income risk, borrowing constraints and portfolio choice. *The American Economic Review,* 1(1):158-172.

Gujarati, D. 1988. *Basic econometrics*. 2nd ed. New York: McGraw-Hill.

Gumede, V. 2009. Demographic determinants of financial risk tolerance: A South African perspective. Pietermaritzburg: University of KwaZulu-Natal. (Thesis - Hons).

Halek, M. & Eisenhauer, J.G. 2001. Demography of risk aversion. *The Journal of Risk and Insurance,* 68(1):1-24.

Haliassos, M. & Bertaut, C.C. 1995. Why do so few hold stocks? *The Economic Journal,* 105(1):1110-1129.

Hallahan, A., Faff, R.W. & Mckenzie, D. 2004. An empirical investigation of personal financial risk tolerance. *Financial Services Review,* 12(1):57-78.

Hammond, J.D. Houston, D.B. & Melander, E.R. 1967. Determinants of household life insurance premium expenditures: An empirical investigation. *The Journal of Risk and Insurance,* 34(1):397-408.

Hanna, S.D. & Chen, P. 1997. Subjective and objective risk tolerance: Implications for optimal portfolios. *Financial Counseling and Planning Education,* 8(2):17-26.

Hanna, S.D. & Lindamood, S. 2004. An improved measure of risk aversion. *Association for Financial Counseling and Planning Education,* 15(2):27-45.

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

Harlow, V. & Brown, K. 1990. Understanding and assessing financial risk tolerance: A biological perspective. *Financial Analysts Journal,* 46(6):50-62.

Hartog, J., Ferrer-i-Carbonell, A. & Jonker, N. 2000. On a simple measure of individual risk aversion . *Tinbergen institute discussion paper,* 1(1):1-24.

Hawley, C.B. & Fujii, E.T. 1994. An empirical analysis of preferences for financial risk: Further evidence on the Friedman-Savage model. *Journal of Post Keynesian Economics,* 16(1):197-204.

Heenkenda, S. 2015. Determination of financial risk tolerance among different household sectors in Sri Lanka. *Discussion Paper No.196, Nagoya University,* 1-20.

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

Jahedi, S. & Mendez, F. 2013. On the advantages and disadvantages of subjective measures. *Department of Economics - University of Arkansas,* 2013(1):1-36.

Jianakoplos, N.A. & Bernasek, A. 2006. Financial risk taking by age and birth cohort. *Southern Economic Journal,* 72(4):981-1001.

Kahneman, D. & Tversky, A. 1979. Prospect theory: An analysis of decision under risk. *Econometrica,* 47(2):263-291.

Keynes, J.M. 1937. The general theory of employment, interest and money. New York: Harcourt, Brace.

Kimball, M., Sahm, C. & Shapiro, M. 2007. Imputing risk tolerance from survey responses. *NBER Working Paper Series,* 1(13337):1-33.

Kogan, N. & Wallach, M.A. 1964. Risk taking: A study in cognition and personality. New York: Holt, Rinehart, & Winston.

Koh, B. & Fong, W.M. 2011. Personal Fiancial Planning. Jurong: Pearson Education.

Koop, G. 2008. Introduction of econometrics. West Sussex: John Wiley and Sons.

Kunreuther, H. 1979. The changing societal consequences of risks from natural hazards. *The Annals of the American Academy of Political and Social Science,* 443(1):104-116.

Larkin, C., Lucey, B.M. & Mulhol, M. 2013. Risk tolerance and demographic characteristics: Preliminary Irish evidence. *Financial Services Review,* 22(1):77-91.

Latham, B. 2007. Sampling: What is it? http://webpages.acs.ttu.edu/rlatham/Coursework/5377(Quant))/Sampling_Methodology_Paper.pdf Date of access: 26 Jun. 2016.

Leedy, P. 1989. *Practical research: Planning and design*. 4th ed. New York: Macmillan Publishing Company.

Levy, H. 1994. Absolute and relative risk aversion: An experimental study. *Journal of Rsik and Uncertainty,* 8(1):289-307.

Loomes, G. & Sugden, R. 1982. Regret theory: An alternative theory of decision under uncertainty. *The Economic Journal,* 92(1):805-824.

Lyons, A., Neelakantan, U. & Scherpf, E. 2008. Gender and marital differences in wealth and investment decisions. *Journal of Personal Finance,* 6(4):57-76.

Lytton, R.H. & Grable, J.E. 1997. A gender comparison of financial attitudes. Proceedings of the Annual Conference of the Eastern Regional Family Economics-Home Management Association, 1-7.

MacCrimmon, K.R. & Wehrung, D.A. 1984. The risk in-basket. *Journal of Business,* 57(1):367-387.

MacCrimmon, K.R. & Wehrung, D.A. 1985. A portfolio of risk measures. *Theory and Decision,* 19(1):1-29.

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

Markowitz, H.M. 1959. Portfolio selection. New York: Wiley.

Marx, J., *ed.* 2010. Investment management. 3rd ed. Pretoria: Van Schaik.

Masters, R. 1989. Study examines investors' risk-taking propensities. *The Journal of Financial Planning,* 2(1):151-155.

McInish, T.H. 1982. Individual investors and risk-taking. *Journal of Economic Psychology,* 2(1):125-136.

Menezes, C.F. & Hanson, D.L. 1970. On the theory of risk aversion. *International Economic Review,* 11(3):481-487.

Metherell, C. 2011. The impact of demographic factors on subjective financial risk tolerance: A South African study. Pietermaritzburg: UKZN. (Thesis - Mcom).

Morin, R.A. & Suarez, F. 1983. Risk aversion revisited. *The Journal of Finance*, 38(1)1:1201-1216.

Neelakantan, U. 2010. Gender differences in wealth at retirement. , 100(2). *American Economic Review,* 100(2):362-367.

Newman, O. 1972. Gambling: Hazard and reward. Atlantic Highlands, NJ: Athlone Press/Humanities Press.

Neyman, J. 1934. On the two different aspects of the represenatative method: the method of stratified sampling and the method of purposive selection. *Journal of the Royal Statistical Society*, 97(4):558-625.

Okun, M.A. 1976. Adult age and cautiousness in decision: A review of the literature. *Human Development*, 19(1):220-233.

Olivares, J.A, Diaz, D. & Besser, M. 2008. Gender and portfolio choice: Are women more risk averse when selecting pension funds? *Draft Research Paper,* 1(1):1-13.

O'Neill. 1995. Education and income growth: Implication for cross-country inequality. *Journal of Political Economy*, 103(6):1289-1301.

Paccioli, L. 1494. Summa de arithmetica, geometria, proportioni et proportionalità. Venice: Italy.

Pallant, J. 2007. SPSS survival manual. 3rd ed. Berkshire: McGraw-Hill.

Palsson, A. 1996. Does the degree of relative risk aversion vary with household characteristics? *Journal of Economic Psychology*, 17(1):771-787.

Payne, J.W., Laughhunn, D.J. & Crum, R. 1984. Multiattribute risky choice behavior: The editing of complex prospects. *Management Science,* 11(1):1350-1361.

Pieson, J. 2012. Risk management in your personal financial plan. http://www.joycepaynepartners.com/client-insights/risk-management-in-your-personal-financial-plan Date of access: 10 Mar. 2016.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. & Podsakoff, N.P. 2003. Common method biases in behavioral research: A critical review of the literature and recommended Remedies. *Journal of Applied Psychology*, 88(5):879-903.

Potter, R. 1971. An emperical study of motivations of common stock investors. *Southern Journal of Business,* 6(1):41-44.

Powell, M. & Ansic, D. 1997. Gender differences in risk behaviour in financial decision-making: An experimental analysis. *Journal of Economic Psychology,* 18(1):605-628.

Pratt, J.W. 1964. Risk aversion in the small and in the large. *Econometrica,* 32(1):122-136.

Protopopescu, D. 2007. Improving the risk concept: A review of the Arrow-Pratt theory in the context of controlled dynamic stochastic environments. *The Economic Journal,* 1(1):1-51.

Ramudzuli, P.M. & Muzindutsi, P.F. 2015. Financial knowledge and subjective risk tolerance amongst students at a South African University. *Risk Governance and Control: Financial Markets and Institutions,* 5(3):180-185.

Reilly, F.K. & Brown, K.C. 2012. Analysis if investments and investment management of portfolios. 10th ed. South Western: Cengage.

Riley, N.F. & Russon, M.G. 1995. Individual asset allocation and indication of percieved client risk tolerance. *Journal of financial and strategic decisions,* 8(1):65-70.

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

Robbins, B. (2010). *Non Parametric Tests*. Retrieved June 25, 2016, from Scholars Series: https://www.google.co.za/url?sa=t&source=web&rct=j&url=http://biostat.mc.vanderbilt.edu/wiki/pub/Main/AnesShortCourse/NonParametrics.pdf&ved=0ahUKEwiM4ceh9rfQAhUFM8AKHX8IBZMQFggYMAA&usg=AFQjCNEEnFX9R2GF5IC2GQYvUG6f_5ekHw Date of access: 25 Jun. 2016.

Roscoe, J.T. 1969. Fundamental research statistics for the behavioural sciences. New York: Holt, Rinehart and Winston.

Rose-Ackerman, S. 1999. Corruption and government: Causes, cosequences and reform. New York: Cambridge University Press.

Roszkowski, M., Snelbecker, G., & Leimberg, S. 1993. Risk tolerance and risk aversion. *The tools and techniques of financial planning,* 4(1):213-225.

Roszkowski, M.J, Delaney, M. & Cordell, D. 2004. The comparability of husbands and wives on financial risk tolerance. *Journal of Personal Finance,* 3(3):129-144.

Roszkowski, M.J., Davey, G. & Grable, J.E. 2005. Questioning the questionnaire method: insights on measuring risk tolerance from Psychology and Psychometrics. *Journal of Financial Planning,* 18(4):68-77.

Ryack, K. 2011. The impact of family relationships on financial risk tolerance. *Financial Services Review,* 20(3):181.

Sahm, C.R. 2007. Risk tolerance and asset allocation. Michigan: University of Michigan. (Dissertation - PhD).

Samuelson, P.A. 1969. Lifetime portfolio selection by dynamic stochastic programming. *The Review of Economics and Statistics,* 51(1):239-246.

Schoemaker, P.J.H. 1980. Experiments on decisions under risk: The expected utility hypothesis. Boston: Martinus Nijhoff Publishing.

Schooley, D.K. & Worden, D.D. 1996. Risk aversion measures: Comparing attitudes and asset allocation. *Financial Services Review,* 5(1):87-99.

Shaw, K.L. 1996. An empirical analysis of risk aversion and income growth. *Journal of Labor Economics,* 14(1):626-653.

Shefrin, H. & Statman, M. 1985. The disposition to sell winners too early and ride, losers too long: Theory and evidence. *The Journal of Finance,* 40(1):777-792.

Siegel, F.W. & Hoban, J.P. 1982. Relative risk aversion revisited. *The Review of Economics and Statistics,* 64(1):481-487.

Slovic, P., Fischhoff, B. & Lichtenstein, S. 1978. Accident probabilities and seat belt usage: A psychological perspective. *Accident Analysis and Prevention,* 10(1):281-285.

Statman, M. 1995. A behavioral framework for dollar-cost averaging. *The Journal of Portfolio Management,* 1(1):70-78.

Strydom, B. & Metherell, C. 2012. Demographic factors affecting subjective financial risk tolerance: South African evidence. *Working Papers in Finance,* 1(2012):1-19.

Strydom, B., Christison, A. & Gokul, A. 2009. Financial risk tolerance: A South African perspective. *Working Papers in Finance,* 1(2009):1-22.

Subedar, Z., McCrae, M. & Gerace, D. 2006. The validity of financial risk advisors Heuristic risk tolerance categorisation: Evidence from a risk tolerance assessment tool. Australia: University of Wollongong.

Sulaiman, E.K. 2012. An empirical analysis of financial risk tolerance and demographic features of individual investors. *Procedia Economics and Finance,* 2(1):109-115.

Sung, J. & Hanna, S. 1996. Factors related to risk tolerance. *Association for Financial Counseling and Planning Education,* 7(1):11-19.

Tools for money. 2004. The five most commonly-used investment risk tolerance categories. http://toolsformoney.com/investment_risk_tolerance.html Date of access: 29 Feb. 2016.

Tversky, A. & Kahneman, D. 1981. The framing of decisions and the psychology of choice. *The Journal of Science,* 211(1):453-458.

Ujhelyi, A. 2009. Campaign finance regulation with competing interest groups. *Journal of Public Economics,* 3(93):373-391.

Wallach, M.A. & Kogan, N. 1959. Sex differences and judgment processes. *Journal of Personality,* 27(1):555-564.

Wallach, M.A. & Kogan, N. 1961. Aspects of judgment and decision making: Interrelationships and changes with age. *Behavioral Science*, 6(1):23-26.

Walliman, N. 2005. Your research project. 2nd ed. London: Sage publications.

Watson, J. & McNaughton, M. 2007. Gender differences in risk aversion and expected retirement benefits. *Financial Analysts Journal*, 63(4):52-62.

Weagley, R.O. & Gannon, C.F. 1991. Investor portfolio allocation. *Financial Counseling and Planning*, 2(1):131-154.

Weber, C.S. 2013. Cultural differences in risk tolerance. *IWE Working Papers*, 1(2013):1-26.

Weinraub, H. & Visscher, S. 1998. Industry practice relating to aggressive conservative working capital policies. *Journal of Financial and Strategic Decision*, 11(2):11-18.

Xiao, J.J. & Noring, F.E. 1994. Perceived saving motives and hierarchical financialneeds. *Financial Counseling and Planning*, 5(1):25-44.

Yang, Y. 2004. Characteristics of risk preferences: Revelations from Grable & Lytton's 13-Item Questionnaire. *Journal of Personal Finance*, 3(3):20-40.

Yao, R., Gutter, M.S. & Hanna, S.D. 2005. The financial risk tolerance of Blacks, Hispanics and Whites. *Financial Counseling and Planning Education*, 16(1):51-62.

Zhong, L.X. & Xiao, J.J. 1995. Determinants of family bond and stock holdings. *Financial Counseling and Planning*, 6(1):107-114.

APPENDIX A: QUESTIONNAIRE

CONSENT LETTER

NORTH WEST UNIVERSITY
School of Economic Sciences And
Information Technology

Research Project: Subjective financial risk tolerance among students at selected South African universities: A comparative analysis of different fields of studies University: A Comparative Analysis of Commerce and Humanity Students

Researchers: Mr Pfano Michael Ramudzuli (079 155 5150) E-mail: ramudzulipm@gmail.com
Supervisor: Mr Paul-Francois Muzindutsi (016 910 3381) E-mail: 24754293@nwu.ac.za

Dear Respondent,

You are invited to participate in a research project entitled: Subjective financial risk tolerance among students at selected South African universities: A comparative analysis of different fields of studies. The aim of this study is to analyse financial risk tolerance levels among students studying towards different qualifications.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequences. There will be no monetary gain from participating in this research project. Confidentiality and anonymity of records identifying you as a participant will be maintained by School of Economic Sciences and IT at North West University. If you have any questions or concerns about participating in this study, please contact Mr. Pfano Ramudzuli or Mr. Paul-Francois Muzindutsi at the numbers listed above. It should take you about 10 minutes to complete the questionnaire. We hope you will take the time to complete the questionnaire to the best of your abilities.

CONSENT

I ……understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Signature of Participant: _____ **Date:** _____

A. BACKGROUND INFORMATION						
1. What is your age?	18 Years or younger	18 Years or younger	18 Years or younger	18 Years or younger		
2. What is your gender?	Male	Female				
3. What is your race?	Black/ African	White	Indian/ Asian	Other(Specify):		
4. What is your academic year of study?	1st Year	2nd Year	3rd Year	4th Year	Postgraduate	
5. What is your living arrangement?	On-campus residence	Off-campus residence	Private accommodation	Staying at home		
6. Indicate your faculty	.....					
7. Which qualification are you studying towards?	Certificate	Diploma	Degree	B-Tech	Masters	
8. Indicate your qualification name: (e.g. Computer science)	.....					
9. Which is your desired employment industry?	Government	Banking	Health	Self-employment	Other(Specify):	

B. INCOME AND EXPENDITURE						
1. Indicate your monthly allowance in Rands	R500 or less	R501 to R1000	R1001 to R1500	R1501 to R2000	R2001 to R2500	More than R2500
2. Most/all my income comes from?	Parents/ Relatives	My part-time job	Bursary/ Scholarship	**Other(Specify): .....**		
3. In a month, I spend?	More than my monthly allowance	Exactly the same amount as my monthly allowance	Less than my monthly allowance			

C. PERSONAL (NON-FINANCIAL) RISK TAKING			
Please indicate the degree to which you agree or disagree with the statements below regarding you as a person			
	Agree	**Neutral**	**Disagree**
1. It's hard for me to win a bargain/argument.			
2. When travelling, I like to take new routes/roads.			
3. When driving a car, I would always obey traffic rules and avoid dangerous situations			
4. I like to try new foods, new places and totally new experiences.			
5. When making decisions, I am usually influenced by outcomes rather than risks associated with the decision			
6. I am satisfied with my life and the conditions in my life			
D. INCOME/ FINANCE RISK			

1. After saving for a "once-in-a-lifetime" vacation, you lose your only source of income. What would you do?			
Cancel the vacation and keep the many you were going to spend	*Go on a cheaper and more modest vacation*	*Go as scheduled hoping to use the break to search for another income source*	*Go as planned and even extend the vacation as this may be your only chance to do so*

2. When you hear "Risk", which of the following comes to mind first with regards to your money/income?				
Definite loss of money	*Possibility of losing money*	*Opportunity to make money*	*Adventure/Thrill*	

3. How often do you borrow money from friends/relatives or any other party?				
Never	*Sometimes*	*Most of the times*	*Always*	

4. How often do you lend money to friends/relatives or any other party?				
Never	*Sometimes*	*Most of the times*	*Always*	

5. Which of the following would make you the happiest?				
You inherit R 5000 from a relative	*You win R 5000 in a TV game show*	*You earn R 5000 by risking R 1000 of your own money*	*You earn R 5000 by risking R 2500 of your own money*	

E. SPECULATIVE RISK				
1. Suppose you are on a TV game show offering the following options, which would you choose?				
R1 000 in cash	*A 50% chance to win R5 000*	*A 25% chance to win R 10 000*	*A 25% chance to win R 100 000*	

2. Suppose a company you invested R3 000 in for 2 years is about to close down. They offer you the following options (each with two possible outcomes) and you can only choose one, which one would it be?			
Take your R3 000 and loose nothing	*Possibility of gaining R5 000 or losing R1 000 form your R3 000*	*Possibility of gaining R8 000 or losing R2 000 form your R3 000*	*Possibility of gaining R12 000 or losing all your R3 000*

3. You have just taken a job at a small fast growing company. After your first year the company is closing down and you are offered the following options, which one would you choose?			
A once off payment of R 300 000	*A monthly payment of R10 000 monthly for 3 years (i.e. It will be R360 000 in 3 years*	*Shares in another company to the value of R300 000 with the hope of selling them later at a larger profit*	

4. Suppose that you are about to retire, and have three choices for a pension, which one would you choose?		
Pension A: *Pension equal to your preretirement income (Amount you saved throughout working career)*	***Pension B:*** *A 50% chance your pension will be double your preretirement income, and a 50% chance that your pension will be 10% less than your preretirement income.*	***Pension C:*** *A 70% chance your pension will be double your preretirement income, and a 50% chance that your pension will be 50% less than your preretirement income.*

F. INVESTMENT RISK

1. How would you describe yourself as a financial risk taker? (e.g. Investing , saving or spending)				
Avoid loss at all costs	*Cautious*	*Willing to take calculated risks*	*Willing to take as much risk to get desired profit*	

2. Should you decide to invest, which of the following options regarding the management of investments would you choose?			
Manage them yourself	*Ask a knowledgeable friend*	*Hire a qualified investment manager*	

3. What drives your financial decisions such as spending, saving or investing?			
Loss associated with decision	*Both loss and return associated with the decision*	*Profit/return associated with the decision*	

4. Should you get employed today on a permanent basis with a stable salary, how much % of your monthly income (after paying for all expenses) would you be interested to invest/save?					
Nothing (0%)	*Less than 10%*	*10%-20%*	*25%-40%*	*More than 40%*	

5. As you probably know that investing comes with risks of losing your money. Suppose that you have R 50 000 invested, what % of loss in your investment would make you feel uncomfortable to an extent that you end up withdrawing your money?				
Less than 10%	*11% to 20%*	*21% to 30%*	*More than 30%*	

6. Provided you receive R 20 000 to invest, which of the following investments would you find appealing?		
60% low risk and low return, 30% medium risk with medium return and 10% high risk with high returns	*30% low risk and low return, 40% medium risk with medium return and 30% high risk with high returns*	*10% low risk and low return, 40% medium risk with medium return and 50% high risk with high returns*